# HARVEY TOOL™

Your Specials Are Our Standards™

## Precision at Your Fingertips

**Fully stocked miniature and specialty cutting tools engineered for the toughest cuts.**



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**Fall 2025 US Catalog**

# Think **Harvey Tool** First

## Unique Selection

We offer a comprehensive selection of more than 31,000 miniature and specialty cutting tools that are all fully stocked. The breadth and depth of our products help solve the industry's toughest machining challenges.




## Quality Products

We are committed to designing unique geometries that optimize cutting performance for a variety of materials and applications. We introduce hundreds of new tools into the market every 6 months, offering our customers the solutions they need most.

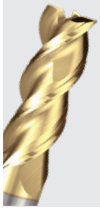
## Same-Day Shipping

Our fully stocked inventory is ready to ship day of purchase. We offer second day delivery at ground pricing, and any overnight orders ship until 7:00 p.m. EST. For additional shipping information and stock availability, please visit **HarveyTool.com.**

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# HARVEY PERFORMANCE COMPANY

Harvey Performance Company combines the leading Harvey Tool, Helical Solutions, Micro 100, Titan USA, CoreHog, Valor Holemaking, and ATA SGSPRO brands to provide world class tooling, unmatchred service, and innovative solutions that increase productivity for our customers.



**Helical**

**Let Helical Impress You**

Material-optimized high performance carbide end mills. Run faster, push harder, machine smarter.



**MICRO 100**

**Make More with Micro 100**

Exceptional quality turning tools designed for durability and performance in a range of difficult-to-machine materials.



**TITAN USA**

**Trust in Titan USA**

Broad assortment of quality, fully stocked cutting tools at exceptional value.



**COREHOG**

**Innovative Tools for Innovative Materials**

The industry's most innovative and advanced composite and honeycomb core cutting tools.



**VALOR HOLEMAKING**

**Victory Starts with Valor Holemaking**

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**ata sgspro**

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More than 1,200 precision-engineered carbide burs with options tailored to every grinding application.

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# What We Offer



## Miniature End Mills pg 9

Select from over **10,000** miniature end mills down to .001” cutter diameter, available in a variety of styles and profiles.



## Material Specific End Mills pg 111

Achieve the best results in high temp alloys, medium alloys, free machining steels, aluminum alloys, graphite, plastics, composites, wood, and more with over **6,700** high performance end mills.



## Undercutting End Mills pg 304

Over **1,100** options, with 3 different wrap angles: 300°, 270°, and 220°.



## Drill/End Mills pg 321

Over **600** options, with cutter diameters from 1/64" to 1".



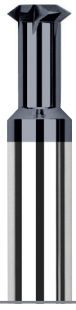
## Chamfer Cutters pg 333

Over **1,300** options, with diameters from 1/32” to 1” and 21 different angles per side.



## Engraving Cutters pg 363

Over **1,000** options, available with 17 included angles and a variety of styles.



## Double Angle Shank Cutters pg 386

Over **700** options in multiple styles and reach lengths and 14 included angles.

## Keyseat Cutters pg 397



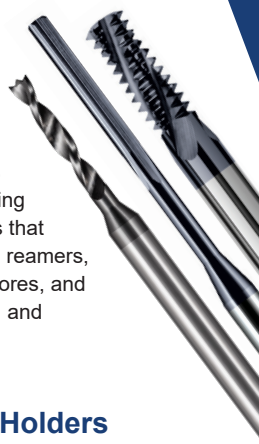
Over **2,200** options, with cutter diameters from 1/16” to 1-1/2”.

## Slitting Saws pg 428



Over **250** coated and uncoated options, with thicknesses from .0100” to .2500”.

## Holemaking & Threading pg 465



Solve a variety of holemaking challenges from spotting to threading with over **5,000** options that include miniature drills, reamers, countersinks, counterbores, and single-form, multi-form, and tri-form thread mills.



## Corner Rounding End Mills pg 434

Over **900** options, with over 100 radii from .003” to 5/8”.



## Dovetail Cutters pg 450

Over **600** options, with 17 included angles.



## Tool Holders pg 567

Pair our exceptional tooling with different styles and reaches of tool holders. Choices range from Extended Reach Tool Holders, Solid ER Integrated Tool Holders, Saw Arbors, ER Collets, and ER Performance Collets.

**30,000+ Tools**

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# Think **Harvey Tool** First

FEATURED SOLUTIONS

## Mold Tool & Die

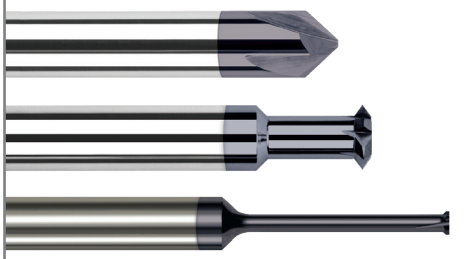
Building complex cavities requires **high performance tooling** that can mill **precise contours** while leaving **superior part finish.** Harvey Tool offers a selection of **tapered end mills** with unique geometries that are perfect for tackling the tough machining requirements of the **die and mold making** industries.




| | |
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## Corner Conditioning

Whether prepping a corner for functional or aesthetic reasons, Harvey Tool has a variety of unique and **hard-to-find profiles** for machining **corner requirements** and features. With multiple **angle options, reaches, and styles,** we are confident that our tools can solve any corner conditioning challenge.




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## Finishing

Achieving **optimal surface finish** is a critical goal for any machinist, but not all tools are designed with finish requirements in mind. Harvey Tool has a wide selection of finishing tools with **material-specific geometries** designed to ensure **tight part tolerances and reduce witness marks.**




| | |
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## Double Ended

While all tools experience normal wear over time, Harvey Tool's double-ended tooling offering allows you to experience **twice your tool's longevity.** Simply flip your tool over to its second cutting side and continue your machining.




| | |
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## Deburring

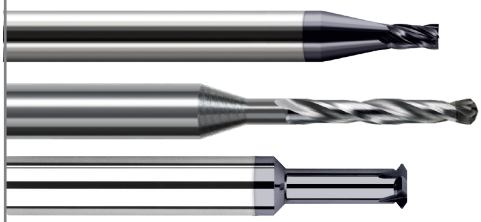
Deburring parts can be tiresome, expensive, and time-consuming, especially if done by hand. Harvey Tool's engineers have created a variety of **CNC-toleranced** deburring tools that allow you to deburr **in your CNC machine,** providing better finish, **reduced part and labor costs,** and increased capacity.




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## Metric Tooling

Our metric product offering includes high performance end mills and drills each with specialized geometry that will enhance tool results in a **variety of materials**. Featuring **tight tolerances** for ultra-precision micromachining and larger shank diameters for **increased rigidity,** these products will improve performance, decrease cycle times, and save you money.



See Metic featured solutions online today at harveytool.com/products/featured-solutions/metric-tooling

## Shop **Featured Solutions** Online Today

While ALL of our stocked products can be found in our full product catalog, our Featured Solutions series presents strategically grouped tools from across our catalog for easy reference.

# MACHINING ADVISOR PRO

**Machining Advisor Pro generates customized running parameters for your specific setup and material to take your Harvey Tool products further at the spindle.**

### Optimized for More Than 41,000 Products
Increase material removal rates and boost shop productivity with customized running parameters, specifically tailored for Harvey Tool, Helical Solutions and Valor Holemaking products.

### Customizable Speeds & Feeds
Generate specialized machining parameters by pairing your tool with your exact path, material, and machine setup.

### Free to Use
Access the app quickly on your desktop, tablet, or mobile phone with no fee or subscription required.

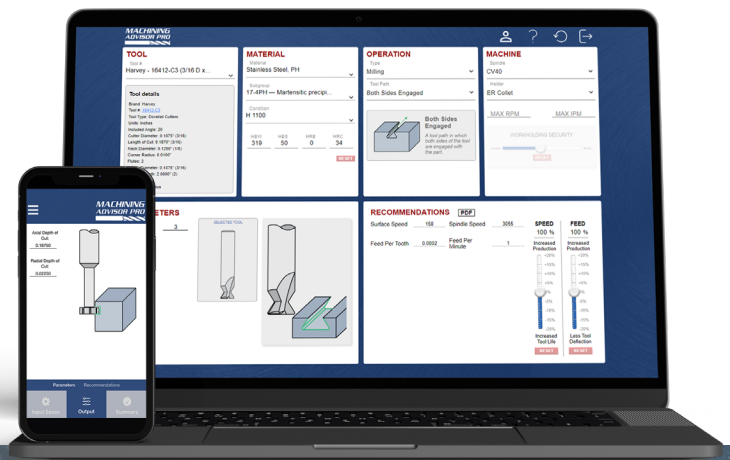
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## A Machinist Favorite

With Machining Advisor Pro I've become much more efficient at programming. The software takes the guess work and the headache out of feed, speed, step over, and step down to ensure it's going to work the first time.

Ryan S.
Shop Owner, Avella, PA

# MINIATURE END MILLS

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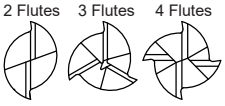
NEW SIZES!

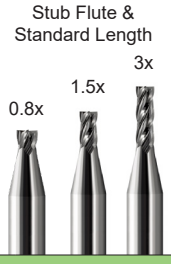
# MINIATURE END MILLS

## Square – Stub & Standard




- **Cutter diameter down to .001**
- Center cutting
- Solid carbide
- CNC ground in the USA




SQUARE

| CUTTER DIA. | LOC | | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | | AMORPHOUS DIAMOND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | $L_2$ +.010" −.000" | | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ |
| .001 | **.001** | (1.5x) | 1/8 | 1-1/2 | 13901 | | | 64.70 | | | | | | | | |
| .001 | **.003** | (3x) | 1/8 | 1-1/2 | 72001 | | | 64.70 | | | | | | | | |
| .002 | **.003** | (1.5x) | 1/8 | 1-1/2 | 13902 | | | 56.30 | | | | | | | | |
| .002 | **.006** | (3x) | 1/8 | 1-1/2 | 72002 | | | 56.30 | | | | | | | | |
| .003 | **.004** | (1.5x) | 1/8 | 1-1/2 | 13903 | | | 48.50 | | | | | | | | |
| .003 | **.009** | (3x) | 1/8 | 1-1/2 | 72003 | | | 48.50 | | | | | | | | |
| .004 (.1 mm) | **.006** | (1.5x) | 1/8 | 1-1/2 | 13904 | | | 41.60 | | | | | | | | |
| .004 (.1 mm) | **.012** | (3x) | 1/8 | 1-1/2 | 72004 | | | 41.60 | | | | | | | | |
| .005 | **.007** | (1.5x) | 1/8 | 1-1/2 | 13905 | 823005 | 14005* | 37.70 | 13905-C3 | 823005-C3 | 14005-C3* | 43.60 | | | | |
| .005 | **.015** | (3x) | 1/8 | 1-1/2 | 72005 | 836305 | 73005* | 37.70 | 72005-C3 | 836305-C3 | 73005-C3* | 43.60 | 72005-C4 | | 73005-C4* | 52.60 |
| .006 | **.009** | (1.5x) | 1/8 | 1-1/2 | 13906 | | 14006* | 38.50 | 13906-C3 | | 14006-C3* | 44.40 | | | | |
| .006 | **.018** | (3x) | 1/8 | 1-1/2 | 72006 | 836306 | 73006* | 38.50 | 72006-C3 | 836306-C3 | 73006-C3* | 44.40 | 72006-C4 | | 73006-C4* | 53.50 |
| .007 | **.010** | (1.5x) | 1/8 | 1-1/2 | 13907 | | 14007* | 37.80 | 13907-C3 | | 14007-C3* | 43.70 | | | | |
| .007 | **.021** | (3x) | 1/8 | 1-1/2 | 72007 | 836307 | 73007* | 38.50 | 72007-C3 | 836307-C3 | 73007-C3* | 44.40 | 72007-C4 | | 73007-C4* | 53.50 |
| .008 (.2 mm) | **.012** | (1.5x) | 1/8 | 1-1/2 | 13908 | | 14008* | 37.80 | 13908-C3 | | 14008-C3* | 43.70 | | | | |
| .008 (.2 mm) | **.024** | (3x) | 1/8 | 1-1/2 | 72008 | 836308 | 73008* | 38.50 | 72008-C3 | 836308-C3 | 73008-C3* | 44.40 | 72008-C4 | | 73008-C4* | 53.50 |
| .009 | **.013** | (1.5x) | 1/8 | 1-1/2 | 13909 | | 14009* | 37.80 | 13909-C3 | | 14009-C3* | 43.70 | | | 14009-C4* | 52.70 |
| .009 | **.027** | (3x) | 1/8 | 1-1/2 | 72009 | 836309 | 73009* | 37.80 | 72009-C3 | 836309-C3 | 73009-C3* | 43.70 | | | | |
| .010 | **.008** | (0.8x) | 1/8 | 1-1/2 | | | 771310 | 31.10 | | | 771310-C3 | 37.10 | | | | |
| .010 | **.015** | (1.5x) | 1/8 | 1-1/2 | 13910 | 823010 | 14010 | 29.80 | 13910-C3 | 823010-C3 | 14010-C3 | 35.70 | 13910-C4 | | 14010-C4 | 44.70 |
| .010 | **.030** | (3x) | 1/8 | 1-1/2 | 72010 | 836310 | 73010 | 29.80 | 72010-C3 | 836310-C3 | 73010-C3 | 35.70 | 72010-C4 | | 73010-C4 | 44.70 |
| .011 | **.016** | (1.5x) | 1/8 | 1-1/2 | 13911 | | 14011 | 30.30 | 13911-C3 | | 14011-C3 | 36.20 | | | | |
| .011 | **.033** | (3x) | 1/8 | 1-1/2 | 72011 | 836311 | 73011 | 31.00 | 72011-C3 | 836311-C3 | 73011-C3 | 37.00 | | | 73011-C4 | 46.00 |
| .012 (.3 mm) | **.018** | (1.5x) | 1/8 | 1-1/2 | 13912 | 823012 | 14012 | 30.30 | 13912-C3 | 823012-C3 | 14012-C3 | 36.20 | 13912-C4 | | 14012-C4 | 45.30 |
| .012 (.3 mm) | **.036** | (3x) | 1/8 | 1-1/2 | 72012 | 836312 | 73012 | 31.00 | 72012-C3 | 836312-C3 | 73012-C3 | 37.00 | 72012-C4 | | 73012-C4 | 46.00 |
| .013 | **.019** | (1.5x) | 1/8 | 1-1/2 | 13913 | | 14013 | 30.30 | 13913-C3 | | 14013-C3 | 36.20 | | | | |
| .013 | **.039** | (3x) | 1/8 | 1-1/2 | 72013 | 836313 | 73013 | 30.30 | 72013-C3 | 836313-C3 | 73013-C3 | 36.20 | | | 73013-C4 | 45.30 |
| .014 | **.021** | (1.5x) | 1/8 | 1-1/2 | 13914 | | 14014 | 30.30 | 13914-C3 | | 14014-C3 | 36.20 | | | | |
| .014 | **.042** | (3x) | 1/8 | 1-1/2 | 72014 | 836314 | 73014 | 30.30 | 72014-C3 | 836314-C3 | 73014-C3 | 36.20 | | | 73014-C4 | 45.30 |
| .015 (1/64) | **.012** | (0.8x) | 1/8 | 1-1/2 | | | 771315 | 26.50 | | | 771315-C3 | 32.40 | | | | |
| .015 (1/64) | **.022** | (1.5x) | 1/8 | 1-1/2 | 13915 | 823015 | 14015 | 24.80 | 13915-C3 | 823015-C3 | 14015-C3 | 30.70 | 13915-C4 | | 14015-C4 | 39.80 |
| .015 (1/64) | **.045** | (3x) | 1/8 | 1-1/2 | 72015 | 836315 | 73015 | 24.80 | 72015-C3 | 836315-C3 | 73015-C3 | 30.70 | 72015-C4 | 836315-C4 | 73015-C4 | 39.80 |
| .016 (.4 mm) | **.024** | (1.5x) | 1/8 | 1-1/2 | 13916 | 823016 | 14016 | 27.30 | 13916-C3 | 823016-C3 | 14016-C3 | 33.20 | 13916-C4 | | | 42.20 |
| .016 (.4 mm) | **.048** | (3x) | 1/8 | 1-1/2 | 72016 | 836316 | 73016 | 27.30 | 72016-C3 | 836316-C3 | 73016-C3 | 33.20 | | | 73016-C4 | 42.20 |
| .017 | **.026** | (1.5x) | 1/8 | 1-1/2 | 13917 | | 14017 | 27.30 | 13917-C3 | | 14017-C3 | 33.20 | | | | |
| .017 | **.051** | (3x) | 1/8 | 1-1/2 | 72017 | 836317 | 73017 | 27.30 | 72017-C3 | 836317-C3 | 73017-C3 | 33.20 | | | 73017-C4 | 42.20 |
| .018 | **.027** | (1.5x) | 1/8 | 1-1/2 | 13918 | | 14018 | 27.30 | 13918-C3 | | 14018-C3 | 33.20 | | | | |
| .018 | **.054** | (3x) | 1/8 | 1-1/2 | 72018 | 836318 | 73018 | 27.30 | 72018-C3 | 836318-C3 | 73018-C3 | 33.20 | 72018-C4 | | 73018-C4 | 42.20 |
| .019 | **.029** | (1.5x) | 1/8 | 1-1/2 | 13919 | | 14019 | 27.30 | 13919-C3 | | 14019-C3 | 33.20 | | | | |

Coated sizes down to .005"!

*End cutting (not center cutting)

continued on next page

# MINIATURE END MILLS

## Square – Stub & Standard (cont.)

continued from previous page

| CUTTER DIA. | LOC | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | | AMORPHOUS DIAMOND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ |
| .019 | **.057** (3x) | 1/8 | 1-1/2 | 72019 | 836319 | 73019 | 27.30 | 72019-C3 | 836319-C3 | 73019-C3 | 33.20 | | | 73019-C4 | 42.20 |
| .020 (.5 mm) | **.016** (0.8x) | 1/8 | 1-1/2 | 733420 | | 771320 | 25.30 | 733420-C3 | | 771320-C3 | 31.20 | | | | |
| .020 (.5 mm) | **.030** (1.5x) | 1/8 | 1-1/2 | 13920 | 823020 | 14020 | 23.80 | 13920-C3 | 823020-C3 | 14020-C3 | 29.70 | 13920-C4 | | 14020-C4 | 38.70 |
| NEW .020 (.5 mm) | **.060** (3x) | 1/8 | 1-1/2 | 72020 | 836320 | 73020 | 23.80 | 72020-C3 | 836320-C3 | 73020-C3 | 29.70 | 72020-C4 | 836320-C4 | 73020-C4 | 38.70 |
| .021 | **.031** (1.5x) | 1/8 | 1-1/2 | 13921 | | 14021 | 26.00 | 13921-C3 | | 14021-C3 | 31.90 | | | | |
| .021 | **.063** (3x) | 1/8 | 1-1/2 | 72021 | 836321 | 73021 | 26.00 | 72021-C3 | 836321-C3 | 73021-C3 | 31.90 | | | 73021-C4 | 40.90 |
| .022 | **.033** (1.5x) | 1/8 | 1-1/2 | 13922 | | 14022 | 26.00 | 13922-C3 | | 14022-C3 | 31.90 | | | | |
| .022 | **.066** (3x) | 1/8 | 1-1/2 | 72022 | 836322 | 73022 | 26.00 | 72022-C3 | 836322-C3 | 73022-C3 | 31.90 | | | 73022-C4 | 40.90 |
| .023 | **.035** (1.5x) | 1/8 | 1-1/2 | 13923 | 823023 | 14023 | 26.00 | 13923-C3 | 823023-C3 | 14023-C3 | 31.90 | 13923-C4 | | | 40.90 |
| .023 | **.069** (3x) | 1/8 | 1-1/2 | 72023 | 836323 | 73023 | 26.00 | 72023-C3 | 836323-C3 | 73023-C3 | 31.90 | | | 73023-C4 | 40.90 |
| .024 (.6 mm) | **.036** (1.5x) | 1/8 | 1-1/2 | 13924 | | 14024 | 26.00 | 13924-C3 | | 14024-C3 | 31.90 | | | | |
| .024 (.6 mm) | **.072** (3x) | 1/8 | 1-1/2 | 72024 | 836324 | 73024 | 26.00 | 72024-C3 | 836324-C3 | 73024-C3 | 31.90 | 72024-C4 | | 73024-C4 | 40.90 |
| .025 | **.020** (0.8x) | 1/8 | 1-1/2 | | | 771325 | 23.30 | | | 771325-C3 | 29.20 | | | | |
| .025 | **.037** (1.5x) | 1/8 | 1-1/2 | 13925 | 823025 | 14025 | 21.90 | 13925-C3 | 823025-C3 | 14025-C3 | 27.80 | 13925-C4 | | 14025-C4 | 36.80 |
| .025 | **.075** (3x) | 1/8 | 1-1/2 | 72025 | 836325 | 73025 | 21.90 | 72025-C3 | 836325-C3 | 73025-C3 | 27.80 | 72025-C4 | | 73025-C4 | 36.80 |
| .026 | **.039** (1.5x) | 1/8 | 1-1/2 | 13926 | | 14026 | 24.10 | 13926-C3 | | 14026-C3 | 30.00 | | | | |
| .026 | **.078** (3x) | 1/8 | 1-1/2 | 72026 | 836326 | 73026 | 24.10 | 72026-C3 | 836326-C3 | 73026-C3 | 30.00 | | | 73026-C4 | 39.00 |
| .027 | **.041** (1.5x) | 1/8 | 1-1/2 | 13927 | | 14027 | 24.10 | 13927-C3 | | 14027-C3 | 30.00 | | | | |
| .027 | **.081** (3x) | 1/8 | 1-1/2 | 72027 | 836327 | 73027 | 24.10 | 72027-C3 | 836327-C3 | 73027-C3 | 30.00 | | | 73027-C4 | 39.00 |
| .028 (.7 mm) | **.042** (1.5x) | 1/8 | 1-1/2 | 13928 | | 14028 | 24.10 | 13928-C3 | | 14028-C3 | 30.00 | | | | |
| .028 (.7 mm) | **.084** (3x) | 1/8 | 1-1/2 | 72028 | 836328 | 73028 | 24.10 | 72028-C3 | 836328-C3 | 73028-C3 | 30.00 | | | 73028-C4 | 39.00 |
| .029 | **.043** (1.5x) | 1/8 | 1-1/2 | 13929 | | 14029 | 24.10 | 13929-C3 | | 14029-C3 | 30.00 | | | | |
| .029 | **.087** (3x) | 1/8 | 1-1/2 | 72029 | 836329 | 73029 | 24.10 | 72029-C3 | 836329-C3 | 73029-C3 | 30.00 | | | 73029-C4 | 39.00 |
| .030 | **.045** (1.5x) | 1/8 | 1-1/2 | 13930 | 823030 | 14030 | 21.90 | 13930-C3 | 823030-C3 | 14030-C3 | 27.80 | 13930-C4 | | 14030-C4 | 36.80 |
| .030 | **.090** (3x) | 1/8 | 1-1/2 | 72030 | 836330 | 73030 | 21.90 | 72030-C3 | 836330-C3 | 73030-C3 | 27.80 | 72030-C4 | | 73030-C4 | 36.80 |
| .031 (1/32) | **.025** (0.8x) | 1/8 | 1-1/2 | 733431 | 736531 | 771331 | 23.50 | 733431-C3 | 736531-C3 | 771331-C3 | 29.40 | | | | |
| .031 (1/32) | **.046** (1.5x) | 1/8 | 1-1/2 | 13931 | 823031 | 14031 | 21.90 | 13931-C3 | 823031-C3 | 14031-C3 | 27.80 | 13931-C4 | | 14031-C4 | 36.80 |
| .031 (1/32) | **.093** (3x) | 1/8 | 1-1/2 | 72031 | 836331 | 73031 | 21.90 | 72031-C3 | 836331-C3 | 73031-C3 | 27.80 | 72031-C4 | 836331-C4 | 73031-C4 | 36.80 |
| .032 | **.048** (1.5x) | 1/8 | 1-1/2 | 13932 | | 14032 | 24.10 | 13932-C3 | | 14032-C3 | 30.00 | | | | |
| .032 | **.096** (3x) | 1/8 | 1-1/2 | 72032 | | 73032 | 24.10 | 72032-C3 | | 73032-C3 | 30.00 | | | | |
| .033 | **.049** (1.5x) | 1/8 | 1-1/2 | 13933 | | 14033 | 24.10 | 13933-C3 | | 14033-C3 | 30.00 | | | | |
| .033 | **.099** (3x) | 1/8 | 1-1/2 | 72033 | | 73033 | 24.10 | 72033-C3 | | 73033-C3 | 30.00 | | | | |
| .034 | **.051** (1.5x) | 1/8 | 1-1/2 | 13934 | | 14034 | 24.10 | 13934-C3 | | 14034-C3 | 30.00 | | | | |
| .034 | **.102** (3x) | 1/8 | 1-1/2 | 72034 | | 73034 | 24.10 | 72034-C3 | | 73034-C3 | 30.00 | | | | |
| .035 (.9 mm) | **.028** (0.8x) | 1/8 | 1-1/2 | | | 771335 | 20.40 | | | 771335-C3 | 26.40 | | | | |
| .035 (.9 mm) | **.052** (1.5x) | 1/8 | 1-1/2 | 13935 | 823035 | 14035 | 19.10 | 13935-C3 | 823035-C3 | 14035-C3 | 25.00 | | | 14035-C4 | 34.00 |
| .035 (.9 mm) | **.105** (3x) | 1/8 | 1-1/2 | 72035 | 836335 | 73035 | 19.10 | 72035-C3 | 836335-C3 | 73035-C3 | 25.00 | 72035-C4 | | 73035-C4 | 34.00 |
| .036 | **.054** (1.5x) | 1/8 | 1-1/2 | 13936 | | 14036 | 20.80 | 13936-C3 | | 14036-C3 | 26.70 | | | | |
| .036 | **.108** (3x) | 1/8 | 1-1/2 | 72036 | | 73036 | 20.80 | 72036-C3 | | 73036-C3 | 26.70 | | | | |
| .037 | **.055** (1.5x) | 1/8 | 1-1/2 | 13937 | | 14037 | 20.80 | 13937-C3 | | 14037-C3 | 26.70 | | | | |
| .037 | **.111** (3x) | 1/8 | 1-1/2 | 72037 | | 73037 | 20.80 | 72037-C3 | | 73037-C3 | 26.70 | | | | |
| .038 | **.057** (1.5x) | 1/8 | 1-1/2 | 13938 | | 14038 | 20.80 | 13938-C3 | | 14038-C3 | 26.70 | | | | |
| .038 | **.114** (3x) | 1/8 | 1-1/2 | 72038 | 836338 | 73038 | 20.80 | 72038-C3 | 836338-C3 | 73038-C3 | 26.70 | | | 73038-C4 | 35.70 |
| .039 (1 mm) | **.031** (0.8x) | 1/8 | 1-1/2 | | | 771339 | 21.90 | | | 771339-C3 | 27.80 | | | | |
| .039 (1 mm) | **.058** (1.5x) | 1/8 | 1-1/2 | 13939 | 823039 | 14039 | 20.60 | 13939-C3 | 823039-C3 | 14039-C3 | 26.50 | | | | |
| .039 (1 mm) | **.117** (3x) | 1/8 | 1-1/2 | 72039 | 836339 | 73039 | 20.60 | 72039-C3 | 836339-C3 | 73039-C3 | 26.50 | 72039-C4 | | 73039-C4 | 35.50 |
| .040 | **.032** (0.8x) | 1/8 | 1-1/2 | | | 771340 | 20.80 | | | 771340-C3 | 26.70 | | | | |

*End cutting (not center cutting)

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NEW SIZES!

# MINIATURE END MILLS

## Square – Stub & Standard (cont.)

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SQUARE

| CUTTER DIA. | LOC | | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | | AMORPHOUS DIAMOND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | $L_2$ +.010" −.000" | | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ |
| .040 | **.060** | (1.5x) | 1/8 | 1-1/2 | 13940 | 823040 | 14040 | 19.10 | 13940-C3 | 823040-C3 | 14040-C3 | 25.00 | 13940-C4 | | 14040-C4 | 34.00 |
| .040 | **.120** | (3x) | 1/8 | 1-1/2 | 72040 | 836340 | 73040 | 19.10 | 72040-C3 | 836340-C3 | 73040-C3 | 25.00 | 72040-C4 | | 73040-C4 | 34.00 |
| .041 | **.062** | (1.5x) | 1/8 | 1-1/2 | 13941 | | 14041 | 20.80 | 13941-C3 | | 14041-C3 | 26.70 | | | | |
| .041 | **.123** | (3x) | 1/8 | 1-1/2 | 72041 | | 73041 | 20.80 | 72041-C3 | | 73041-C3 | 26.70 | | | | |
| .042 | **.063** | (1.5x) | 1/8 | 1-1/2 | 13942 | | 14042 | 20.80 | 13942-C3 | | 14042-C3 | 26.70 | | | | |
| .042 | **.126** | (3x) | 1/8 | 1-1/2 | 72042 | | 73042 | 20.80 | 72042-C3 | | 73042-C3 | 26.70 | | | | |
| .043 (1.1 mm) | **.065** | (1.5x) | 1/8 | 1-1/2 | 13943 | | 14043 | 20.80 | 13943-C3 | | 14043-C3 | 26.70 | | | | |
| .043 (1.1 mm) | **.129** | (3x) | 1/8 | 1-1/2 | 72043 | 836343 | 73043 | 20.80 | 72043-C3 | 836343-C3 | 73043-C3 | 26.70 | | | | |
| .044 | **.066** | (1.5x) | 1/8 | 1-1/2 | 13944 | | 14044 | 20.80 | 13944-C3 | | 14044-C3 | 26.70 | | | | |
| .044 | **.132** | (3x) | 1/8 | 1-1/2 | 72044 | 836344 | 73044 | 20.80 | 72044-C3 | 836344-C3 | 73044-C3 | 26.70 | | | 73044-C4 | 35.70 |
| .045 | **.067** | (1.5x) | 1/8 | 1-1/2 | 13945 | 823045 | 14045 | 19.20 | 13945-C3 | 823045-C3 | 14045-C3 | 25.10 | | | 14045-C4 | 34.20 |
| .045 | **.135** | (3x) | 1/8 | 1-1/2 | 72045 | 836345 | 73045 | 19.10 | 72045-C3 | 836345-C3 | 73045-C3 | 25.00 | 72045-C4 | | 73045-C4 | 34.00 |
| .046 | **.069** | (1.5x) | 1/8 | 1-1/2 | | | 14046 | 20.80 | | | 14046-C3 | 26.70 | | | | |
| .046 | **.138** | (3x) | 1/8 | 1-1/2 | 72046 | 836346 | 73046 | 20.80 | 72046-C3 | 836346-C3 | 73046-C3 | 26.70 | | | | |
| .047 (3/64) | **.038** | (0.8x) | 1/8 | 1-1/2 | | | 771347 | 20.80 | | | 771347-C3 | 26.70 | | | | |
| .047 (3/64) | **.070** | (1.5x) | 1/8 | 1-1/2 | 13947 | 823047 | 14047 | 19.10 | 13947-C3 | 823047-C3 | 14047-C3 | 25.00 | 13947-C4 | | 14047-C4 | 34.00 |
| .047 (3/64) | **.141** | (3x) | 1/8 | 1-1/2 | 72047 | 836347 | 73047 | 19.10 | 72047-C3 | 836347-C3 | 73047-C3 | 25.00 | 72047-C4 | | 73047-C4 | 34.00 |
| .048 | **.144** | (3x) | 1/8 | 1-1/2 | 72048 | | 73048 | 20.80 | 72048-C3 | | 73048-C3 | 26.70 | | | | |
| .049 | **.147** | (3x) | 1/8 | 1-1/2 | 72049 | | 73049 | 20.80 | 72049-C3 | | 73049-C3 | 26.70 | | | | |
| .050 | **.040** | (0.8x) | 1/8 | 1-1/2 | | | 771350 | 20.80 | | | 771350-C3 | 26.70 | | | | |
| .050 | **.075** | (1.5x) | 1/8 | 1-1/2 | 13950 | 823050 | 14050 | 19.10 | 13950-C3 | 823050-C3 | 14050-C3 | 25.00 | 13950-C4 | | 14050-C4 | 34.00 |
| .050 | **.150** | (3x) | 1/8 | 1-1/2 | 72050 | 836350 | 73050 | 19.10 | 72050-C3 | 836350-C3 | 73050-C3 | 25.00 | 72050-C4 | | 73050-C4 | 34.00 |
| .051 (1.3 mm) | **.077** | (1.5x) | 1/8 | 1-1/2 | | | 14051 | 21.10 | | | 14051-C3 | 27.00 | | | | |
| .051 (1.3 mm) | **.153** | (3x) | 1/8 | 1-1/2 | 72051 | | 73051 | 20.80 | 72051-C3 | | 73051-C3 | 26.70 | | | | |
| .052 | **.078** | (1.5x) | 1/8 | 1-1/2 | 13952 | | 14052 | 20.80 | 13952-C3 | | 14052-C3 | 26.70 | | | | |
| .052 | **.156** | (3x) | 1/8 | 1-1/2 | 72052 | 836352 | 73052 | 20.80 | 72052-C3 | 836352-C3 | 73052-C3 | 26.70 | 72052-C4 | | | 35.70 |
| .053 | **.080** | (1.5x) | 1/8 | 1-1/2 | | | 14053 | 20.80 | | | 14053-C3 | 26.70 | | | | |
| .053 | **.159** | (3x) | 1/8 | 1-1/2 | 72053 | 836353 | 73053 | 20.80 | 72053-C3 | 836353-C3 | 73053-C3 | 26.70 | | | 73053-C4 | 35.70 |
| .054 | **.162** | (3x) | 1/8 | 1-1/2 | 72054 | | 73054 | 20.80 | 72054-C3 | | 73054-C3 | 26.70 | | | | |
| .055 (1.4 mm) | **.044** | (0.8x) | 1/8 | 1-1/2 | | | 771355 | 20.80 | | | 771355-C3 | 26.70 | | | | |
| .055 (1.4 mm) | **.082** | (1.5x) | 1/8 | 1-1/2 | 13955 | 823055 | 14055 | 19.10 | 13955-C3 | 823055-C3 | 14055-C3 | 25.00 | 13955-C4 | | 14055-C4 | 34.00 |
| .055 (1.4 mm) | **.165** | (3x) | 1/8 | 1-1/2 | 72055 | 836355 | 73055 | 19.10 | 72055-C3 | 836355-C3 | 73055-C3 | 25.00 | 72055-C4 | | 73055-C4 | 34.00 |
| .056 | **.168** | (3x) | 1/8 | 1-1/2 | 72056 | | 73056 | 20.80 | 72056-C3 | | 73056-C3 | 26.70 | | | | |
| .057 | **.086** | (1.5x) | 1/8 | 1-1/2 | | | 14057 | 20.80 | | | 14057-C3 | 26.70 | | | | |
| .057 | **.171** | (3x) | 1/8 | 1-1/2 | 72057 | 836357 | 73057 | 20.80 | 72057-C3 | 836357-C3 | 73057-C3 | 26.70 | 72057-C4 | | 73057-C4 | 35.70 |
| .058 | **.087** | (1.5x) | 1/8 | 1-1/2 | | | 14058 | 20.80 | | | 14058-C3 | 26.70 | | | | |
| .058 | **.174** | (3x) | 1/8 | 1-1/2 | 72058 | | 73058 | 20.80 | 72058-C3 | | 73058-C3 | 26.70 | | | 73058-C4 | 35.70 |
| .059 (1.5 mm) | **.089** | (1.5x) | 1/8 | 1-1/2 | 13959 | 823059 | 14059 | 20.80 | 13959-C3 | 823059-C3 | 14059-C3 | 26.70 | | | | |
| .059 (1.5 mm) | **.177** | (3x) | 1/8 | 1-1/2 | 72059 | 836359 | 73059 | 20.80 | 72059-C3 | 836359-C3 | 73059-C3 | 26.70 | | | 73059-C4 | 35.70 |
| .060 | **.048** | (0.8x) | 1/8 | 1-1/2 | | | 771360 | 20.80 | | | 771360-C3 | 26.70 | | | | |
| .060 | **.090** | (1.5x) | 1/8 | 1-1/2 | 13960 | 823060 | 14060 | 19.10 | 13960-C3 | 823060-C3 | 14060-C3 | 25.00 | | | 14060-C4 | 34.00 |
| .060 | **.180** | (3x) | 1/8 | 1-1/2 | 72060 | 836360 | 73060 | 19.10 | 72060-C3 | 836360-C3 | 73060-C3 | 25.00 | 72060-C4 | | 73060-C4 | 34.00 |
| .061 | **.183** | (3x) | 1/8 | 1-1/2 | | | 73061 | 20.90 | | | 73061-C3 | 26.80 | | | | |
| .062 (1/16) | **.050** | (0.8x) | 1/8 | 1-1/2 | 733462 | 736562 | 771362 | 21.50 | 733462-C3 | 736562-C3 | 771362-C3 | 27.40 | | | | |
| .062 (1/16) | **.093** | (1.5x) | 1/8 | 1-1/2 | 13962 | 823062 | 14062 | 17.10 | 13962-C3 | 823062-C3 | 14062-C3 | 23.00 | 13962-C4 | 823062-C4 | 14062-C4 | 32.10 |
| .062 (1/16) | **.186** | (3x) | 1/8 | 1-1/2 | 72062 | 836362 | 73062 | 17.10 | 72062-C3 | 836362-C3 | 73062-C3 | 23.00 | 72062-C4 | 836362-C4 | 73062-C4 | 32.10 |

*End cutting (not center cutting)

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# MINIATURE END MILLS

## Square – Stub & Standard (cont.)

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| CUTTER DIA. | LOC | | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | | AMORPHOUS DIAMOND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ |
| .063 (1.6 mm) | **.095** | (1.5x) | 1/8 | 1-1/2 | | | 14063 | 20.90 | | | 14063-C3 | 26.80 | | | | |
| .063 (1.6 mm) | **.189** | (3x) | 1/8 | 1-1/2 | | | 73063 | 20.90 | | | 73063-C3 | 26.80 | | | | |
| .064 | **.096** | (1.5x) | 1/8 | 1-1/2 | | | 14064 | 17.90 | | | 14064-C3 | 23.80 | | | | |
| .064 | **.192** | (3x) | 1/8 | 1-1/2 | 72064 | | 73064 | 20.90 | 72064-C3 | | 73064-C3 | 26.80 | | | | |
| .065 | **.097** | (1.5x) | 1/8 | 1-1/2 | 13965 | 823065 | 14065 | 17.40 | 13965-C3 | 823065-C3 | 14065-C3 | 23.40 | | | 14065-C4 | 32.40 |
| .065 | **.195** | (3x) | 1/8 | 1-1/2 | 72065 | 836365 | 73065 | 17.40 | 72065-C3 | 836365-C3 | 73065-C3 | 23.40 | 72065-C4 | | 73065-C4 | 32.40 |
| .066 | **.198** | (3x) | 1/8 | 1-1/2 | | | 73066 | 20.90 | | | 73066-C3 | 26.80 | | | | |
| .067 (1.7 mm) | **.201** | (3x) | 1/8 | 1-1/2 | | | 73067 | 20.90 | | | 73067-C3 | 26.80 | | | | |
| .068 | **.204** | (3x) | 1/8 | 1-1/2 | | | 73068 | 20.90 | | | 73068-C3 | 26.80 | | | | |
| .069 | **.207** | (3x) | 1/8 | 1-1/2 | | | 73069 | 20.90 | | | 73069-C3 | 26.80 | | | | |
| .070 | **.056** | (0.8x) | 1/8 | 1-1/2 | | | 771370 | 18.90 | | | 771370-C3 | 24.80 | | | | |
| .070 | **.105** | (1.5x) | 1/8 | 1-1/2 | 13970 | 823070 | 14070 | 17.40 | 13970-C3 | 823070-C3 | 14070-C3 | 23.40 | | | 14070-C4 | 32.40 |
| .070 | **.210** | (3x) | 1/8 | 1-1/2 | 72070 | 836370 | 73070 | 17.40 | 72070-C3 | 836370-C3 | 73070-C3 | 23.40 | 72070-C4 | | 73070-C4 | 32.40 |
| .071 (1.8 mm) | **.107** | (1.5x) | 1/8 | 1-1/2 | | | 14071 | 20.90 | | | 14071-C3 | 26.80 | | | | |
| .071 (1.8 mm) | **.213** | (3x) | 1/8 | 1-1/2 | 72071 | | 73071 | 20.90 | 72071-C3 | | 73071-C3 | 26.80 | | | | |
| .072 | **.108** | (1.5x) | 1/8 | 1-1/2 | | | 14072 | 20.90 | | | 14072-C3 | 26.80 | | | | |
| .072 | **.216** | (3x) | 1/8 | 1-1/2 | 72072 | | 73072 | 20.90 | 72072-C3 | | 73072-C3 | 26.80 | | | | |
| .073 | **.219** | (3x) | 1/8 | 1-1/2 | | | 73073 | 20.90 | | | 73073-C3 | 26.80 | | | | |
| .074 | **.222** | (3x) | 1/8 | 1-1/2 | | | 73074 | 20.90 | | | 73074-C3 | 26.80 | | | | |
| .075 (1.9 mm) | **.060** | (0.8x) | 1/8 | 1-1/2 | | | 771375 | 18.90 | | | 771375-C3 | 24.80 | | | | |
| .075 (1.9 mm) | **.112** | (1.5x) | 1/8 | 1-1/2 | 13975 | 823075 | 14075 | 17.40 | 13975-C3 | 823075-C3 | 14075-C3 | 23.40 | | | | |
| .075 (1.9 mm) | **.225** | (3x) | 1/8 | 1-1/2 | 72075 | 836375 | 73075 | 17.40 | 72075-C3 | 836375-C3 | 73075-C3 | 23.40 | | | 73075-C4 | 32.40 |
| .076 | **.228** | (3x) | 1/8 | 1-1/2 | | | 73076 | 20.90 | | | 73076-C3 | 26.80 | | | | |
| .077 | **.231** | (3x) | 1/8 | 1-1/2 | | | 73077 | 20.90 | | | 73077-C3 | 26.80 | | | | |
| .078 (5/64) | **.062** | (0.8x) | 1/8 | 1-1/2 | | | 771378 | 18.80 | | | 771378-C3 | 24.70 | | | | |
| .078 (5/64) | **.117** | (1.5x) | 1/8 | 1-1/2 | 13978 | 823078 | 14078 | 17.10 | 13978-C3 | 823078-C3 | 14078-C3 | 23.00 | 13978-C4 | | 14078-C4 | 32.10 |
| .078 (5/64) | **.234** | (3x) | 1/8 | 1-1/2 | 72078 | 836378 | 73078 | 17.10 | 72078-C3 | 836378-C3 | 73078-C3 | 23.00 | 72078-C4 | 836378-C4 | 73078-C4 | 32.10 |
| .079 | **.237** | (3x) | 1/8 | 1-1/2 | | | 73079 | 20.90 | | | 73079-C3 | 26.80 | | | | |
| .080 | **.120** | (1.5x) | 1/8 | 1-1/2 | 13980 | 823080 | 14080 | 17.40 | 13980-C3 | 823080-C3 | 14080-C3 | 23.40 | | | | |
| .080 | **.240** | (3x) | 1/8 | 1-1/2 | 72080 | 836380 | 73080 | 17.10 | 72080-C3 | 836380-C3 | 73080-C3 | 23.00 | 72080-C4 | | 73080-C4 | 32.10 |
| .081 | **.243** | (3x) | 1/8 | 1-1/2 | | | 73081 | 20.90 | | | 73081-C3 | 26.80 | | | | |
| .082 | **.246** | (3x) | 1/8 | 1-1/2 | | | 73082 | 20.90 | | | 73082-C3 | 26.80 | | | | |
| .083 (2.1 mm) | **.249** | (3x) | 1/8 | 1-1/2 | | | 73083 | 20.90 | | | 73083-C3 | 26.80 | | | | |
| .084 | **.252** | (3x) | 1/8 | 1-1/2 | | | 73084 | 20.90 | | | 73084-C3 | 26.80 | | | | |
| .085 | **.068** | (0.8x) | 1/8 | 1-1/2 | | | 771385 | 18.90 | | | 771385-C3 | 24.80 | | | | |
| .085 | **.127** | (1.5x) | 1/8 | 1-1/2 | 13985 | 823085 | 14085 | 17.40 | 13985-C3 | 823085-C3 | 14085-C3 | 23.40 | | | | |
| .085 | **.255** | (3x) | 1/8 | 1-1/2 | 72085 | 836385 | 73085 | 17.40 | 72085-C3 | 836385-C3 | 73085-C3 | 23.40 | | | 73085-C4 | 32.40 |
| .086 | **.258** | (3x) | 1/8 | 1-1/2 | | | 73086 | 20.90 | | | 73086-C3 | 26.80 | | | | |
| .087 (2.2 mm) | **.261** | (3x) | 1/8 | 1-1/2 | | | 73087 | 20.90 | | | 73087-C3 | 26.80 | | | | |
| .088 | **.132** | (1.5x) | 1/8 | 1-1/2 | | | 14088 | 17.90 | | | 14088-C3 | 23.80 | | | | |
| .088 | **.264** | (3x) | 1/8 | 1-1/2 | | | 73088 | 20.90 | | | 73088-C3 | 26.80 | | | | |
| .089 | **.267** | (3x) | 1/8 | 1-1/2 | | | 73089 | 20.90 | | | 73089-C3 | 26.80 | | | | |
| .090 | **.072** | (0.8x) | 1/8 | 1-1/2 | | | 771390 | 18.60 | | | 771390-C3 | 24.50 | | | | |
| .090 | **.135** | (1.5x) | 1/8 | 1-1/2 | 13990 | 823090 | 14090 | 17.10 | 13990-C3 | 823090-C3 | 14090-C3 | 23.00 | | | 14090-C4 | 32.10 |
| .090 | **.270** | (3x) | 1/8 | 1-1/2 | 72090 | 836390 | 73090 | 17.10 | 72090-C3 | 836390-C3 | 73090-C3 | 23.00 | 72090-C4 | | 73090-C4 | 32.10 |
| .091 (2.3 mm) | **.273** | (3x) | 1/8 | 1-1/2 | | | 73091 | 20.90 | | | 73091-C3 | 26.80 | | | | |
| .092 | **.276** | (3x) | 1/8 | 1-1/2 | | | 73092 | 20.90 | | | 73092-C3 | 26.80 | | | 73092-C4 | 35.80 |

*End cutting (not center cutting)

continued on next page

NEW SIZES!

# MINIATURE END MILLS

## Square – Stub & Standard (cont.)

continued from previous page

SQUARE

| CUTTER DIA. | LOC | | SHANK DIA. | OAL | UNCOATED | | | | ALTiN COATED | | | | AMORPHOUS DIAMOND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ |
| .093 (3/32) | **.074** | (0.8x) | 1/8 | 1-1/2 | 733493 | 736593 | 771393 | 18.90 | 733493-C3 | 736593-C3 | 771393-C3 | 24.80 | | | | |
| .093 (3/32) | **.139** | (1.5x) | 1/8 | 1-1/2 | 13993 | 823093 | 14093 | 17.10 | 13993-C3 | 823093-C3 | 14093-C3 | 23.00 | 13993-C4 | | 14093-C4 | 32.10 |
| .093 (3/32) | **.279** | (3x) | 1/8 | 1-1/2 | 72093 | 836393 | 73093 | 17.10 | 72093-C3 | 836393-C3 | 73093-C3 | 23.00 | 72093-C4 | 836393-C4 | 73093-C4 | 32.10 |
| .094 (2.4 mm) | **.141** | (1.5x) | 1/8 | 1-1/2 | | | 14094 | 21.20 | | | 14094-C3 | 27.10 | | | | |
| .094 (2.4 mm) | **.282** | (3x) | 1/8 | 1-1/2 | 72094 | | 73094 | 20.90 | 72094-C3 | | 73094-C3 | 26.80 | | | | |
| .095 | **.142** | (1.5x) | 1/8 | 1-1/2 | 13995 | 823095 | 14095 | 17.40 | 13995-C3 | 823095-C3 | 14095-C3 | 23.40 | | | | |
| .095 | **.285** | (3x) | 1/8 | 1-1/2 | 72095 | 836395 | 73095 | 17.40 | 72095-C3 | 836395-C3 | 73095-C3 | 23.40 | | | 73095-C4 | 32.40 |
| .096 | **.288** | (3x) | 1/8 | 1-1/2 | | | 73096 | 20.90 | | | 73096-C3 | 26.80 | | | | |
| .097 | **.291** | (3x) | 1/8 | 1-1/2 | | | 73097 | 20.90 | | | 73097-C3 | 26.80 | | | | |
| .098 (2.5 mm) | **.147** | (1.5x) | 1/8 | 1-1/2 | | | 14098 | 20.90 | | | 14098-C3 | 26.80 | | | | |
| .098 (2.5 mm) | **.294** | (3x) | 1/8 | 1-1/2 | 72098 | | 73098 | 20.90 | 72098-C3 | | 73098-C3 | 26.80 | | | | |
| .099 | **.297** | (3x) | 1/8 | 1-1/2 | | | 73099 | 20.90 | | | 73099-C3 | 26.80 | | | | |
| .100 | **.150** | (1.5x) | 1/8 | 1-1/2 | 13999 | 823100 | 14099 | 17.40 | 13999-C3 | 823100-C3 | 14099-C3 | 23.40 | 13999-C4 | | 14099-C4 | 32.40 |
| .100 | **.300** | (3x) | 1/8 | 1-1/2 | 72100 | 836400 | 73100 | 17.10 | 72100-C3 | 836400-C3 | 73100-C3 | 23.00 | 72100-C4 | | 73100-C4 | 32.10 |
| .101 | **.303** | (3x) | 1/8 | 1-1/2 | | | 73101 | 20.90 | | | 73101-C3 | 26.80 | | | | |
| .102 (2.6 mm) | **.153** | (1.5x) | 1/8 | 1-1/2 | | | 50306 | 20.90 | | | 50306-C3 | 26.80 | | | | NEW |
| .102 (2.6 mm) | **.306** | (3x) | 1/8 | 1-1/2 | | | 73102 | 20.90 | | | 73102-C3 | 26.80 | | | | |
| .103 | **.155** | (1.5x) | 1/8 | 1-1/2 | | | 14103 | 20.90 | | | 14103-C3 | 26.80 | | | | |
| .103 | **.309** | (3x) | 1/8 | 1-1/2 | | | 73103 | 20.90 | | | 73103-C3 | 26.80 | | | | |
| .104 | **.312** | (3x) | 1/8 | 1-1/2 | | | 73104 | 20.90 | | | 73104-C3 | 26.80 | | | | |
| .105 | **.158** | (1.5x) | 1/8 | 1-1/2 | 50200 | | 50300 | 17.40 | 50200-C3 | | 50300-C3 | 23.40 | | | | |
| .105 | **.315** | (3x) | 1/8 | 1-1/2 | 72105 | | 73105 | 17.10 | 72105-C3 | | 73105-C3 | 23.00 | | | 73105-C4 | 32.10 |
| .106 (2.7 mm) | **.318** | (3x) | 1/8 | 1-1/2 | | | 73106 | 20.90 | | | 73106-C3 | 26.80 | | | | |
| .107 | **.321** | (3x) | 1/8 | 1-1/2 | | | 73107 | 20.90 | | | 73107-C3 | 26.80 | | | | |
| .108 | **.324** | (3x) | 1/8 | 1-1/2 | | | 73108 | 20.90 | | | 73108-C3 | 26.80 | | | | |
| .109 (7/64) | **.087** | (0.8x) | 1/8 | 1-1/2 | | | 771402 | 18.60 | | | 771402-C3 | 24.50 | | | | |
| .109 (7/64) | **.164** | (1.5x) | 1/8 | 1-1/2 | 50201 | 823102 | 50301 | 17.10 | 50201-C3 | 823102-C3 | 50301-C3 | 23.00 | | | | |
| .109 (7/64) | **.327** | (3x) | 1/8 | 1-1/2 | 72109 | 836402 | 73109 | 17.10 | 72109-C3 | 836402-C3 | 73109-C3 | 23.00 | | | 73109-C4 | 32.10 |
| .110 | **.165** | (1.5x) | 1/8 | 1-1/2 | 50202 | | 50302 | 17.10 | 50202-C3 | | 50302-C3 | 23.00 | | | | |
| .110 | **.330** | (3x) | 1/8 | 1-1/2 | 72110 | | 73110 | 17.10 | 72110-C3 | | 73110-C3 | 23.00 | | | 73110-C4 | 32.10 |
| .111 (2.8 mm) | **.333** | (3x) | 1/8 | 1-1/2 | | | 73111 | 20.90 | | | 73111-C3 | 26.80 | | | | |
| .112 | **.336** | (3x) | 1/8 | 1-1/2 | | | 73112 | 20.90 | | | 73112-C3 | 26.80 | | | | |
| .113 | **.339** | (3x) | 1/8 | 1-1/2 | | | 73113 | 20.90 | | | 73113-C3 | 26.80 | | | | |
| .114 (2.9 mm) | **.341** | (3x) | 1/8 | 1-1/2 | | | 73114 | 20.90 | | | 73114-C3 | 26.80 | | | | |
| .115 | **.173** | (1.5x) | 1/8 | 1-1/2 | 50203 | | 50303 | 17.10 | 50203-C3 | | 50303-C3 | 23.00 | | | | |
| .115 | **.345** | (3x) | 1/8 | 1-1/2 | 72115 | | 73115 | 17.10 | 72115-C3 | | 73115-C3 | 23.00 | | | 73115-C4 | 32.10 |
| .116 | **.348** | (3x) | 1/8 | 1-1/2 | | | 73116 | 20.90 | | | 73116-C3 | 26.80 | | | | |
| .117 | **.351** | (3x) | 1/8 | 1-1/2 | | | 73117 | 20.90 | | | 73117-C3 | 26.80 | | | | |
| .118 (3 mm) | **.177** | (1.5x) | 1/8 | 1-1/2 | 50204 | 823105 | 50304 | 17.90 | 50204-C3 | 823105-C3 | 50304-C3 | 23.80 | | | 50304-C4 | 32.80 |
| .118 (3 mm) | **.354** | (3x) | 1/8 | 1-1/2 | 72118 | 836405 | 73118 | 17.50 | 72118-C3 | 836405-C3 | 73118-C3 | 23.50 | 72118-C4 | | 73118-C4 | 32.50 |
| .119 | **.357** | (3x) | 1/8 | 1-1/2 | | | 73119 | 20.90 | | | 73119-C3 | 26.80 | | | | |
| .120 | **.180** | (1.5x) | 1/8 | 1-1/2 | 50205 | | 50305 | 17.10 | 50205-C3 | | 50305-C3 | 23.00 | | | | |
| .120 | **.360** | (3x) | 1/8 | 1-1/2 | 72120 | 836406 | 73120 | 17.10 | 72120-C3 | 836406-C3 | 73120-C3 | 23.00 | | | 73120-C4 | 32.10 |
| .121 | **.363** | (3x) | 1/8 | 1-1/2 | | | 73121 | 20.90 | | | 73121-C3 | 26.80 | | | | |
| .122 | **.366** | (3x) | 1/8 | 1-1/2 | | | 73189 | 20.90 | | | 73189-C3 | 26.80 | | | | |
| .123 | **.369** | (3x) | 1/8 | 1-1/2 | | | 73123 | 20.90 | | | 73123-C3 | 26.80 | | | | |
| .124 | **.372** | (3x) | 1/8 | 1-1/2 | | | 73124 | 20.90 | | | 73124-C3 | 26.80 | | | | |

*End cutting (not center cutting)

continued on next page

# MINIATURE END MILLS

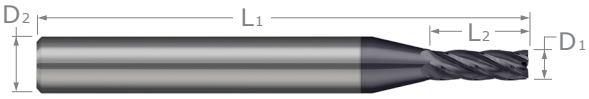
## Square – Stub & Standard (cont.)

continued from previous page

| | CUTTER DIA. | LOC | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | | AMORPHOUS DIAMOND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ |
| | .125 (1/8) | **.100** (0.8x) | 1/8 | 1-1/2 | 733508 | 736608 | 771408 | 18.30 | 733508-C3 | 736608-C3 | 771408-C3 | 24.20 | | | | |
| NEW | .125 (1/8) | **.187** (1.5x) | 1/8 | 1-1/2 | 50208 | 823108 | 50308 | 16.60 | 50208-C3 | 823108-C3 | 50308-C3 | 22.50 | 50208-C4 | 823108-C4 | 50308-C4 | 31.60 |
| | .125 (1/8) | **.375** (3x) | 1/8 | 1-1/2 | 72125 | 836408 | 73125 | 16.60 | 72125-C3 | 836408-C3 | 73125-C3 | 22.50 | 72125-C4 | 836408-C4 | 73125-C4 | 31.60 |
| | .140 (9/64) | **.112** (0.8x) | 3/16 | 2 | | | 771409 | 19.50 | | | 771409-C3 | 25.70 | | | | |
| | .140 (9/64) | **.220** (1.5x) | 3/16 | 2 | 50209 | 823109 | 50309 | 18.20 | 50209-C3 | 823109-C3 | 50309-C3 | 24.50 | | | | |
| | .140 (9/64) | **.562** (4x) | 3/16 | 2 | 72140 | 836409 | 73140 | 18.20 | 72140-C3 | 836409-C3 | 73140-C3 | 24.50 | | | 73140-C4 | 36.80 |
| | .156 (5/32) | **.125** (0.8x) | 3/16 | 2 | | | 771410 | 19.50 | | | 771410-C3 | 25.70 | | | | |
| NEW | .156 (5/32) | **.281** (1.5x) | 3/16 | 2 | 50210 | 823110 | 50310 | 18.20 | 50210-C3 | 823110-C3 | 50310-C3 | 24.50 | | 823110-C4 | 50310-C4 | 36.80 |
| | .156 (5/32) | **.562** (3x) | 3/16 | 2 | 72156 | 836410 | 73156 | 18.20 | 72156-C3 | 836410-C3 | 73156-C3 | 24.50 | 72156-C4 | 836410-C4 | 73156-C4 | 36.80 |
| | .172 (11/64) | **.312** (1.5x) | 3/16 | 2 | 50211 | | 50311 | 18.40 | 50211-C3 | | 50311-C3 | 24.60 | | | | |
| | .172 (11/64) | **.625** (3x) | 3/16 | 2 | 72172 | 836411 | 73172 | 18.20 | 72172-C3 | 836411-C3 | 73172-C3 | 24.50 | | | | |
| | .187 (3/16) | **.150** (0.8x) | 3/16 | 2 | | | 771412 | 19.60 | | | 771412-C3 | 26.20 | | | | |
| NEW | .187 (3/16) | **.312** (1.5x) | 3/16 | 2 | 50212 | 823112 | 50312 | 18.20 | 50212-C3 | 823112-C3 | 50312-C3 | 24.50 | 50212-C4 | 823112-C4 | 50312-C4 | 36.80 |
| | .187 (3/16) | **.625** (3x) | 3/16 | 2 | 72187 | 836412 | 73187 | 18.20 | 72187-C3 | 836412-C3 | 73187-C3 | 24.50 | 72187-C4 | 836412-C4 | 73187-C4 | 36.80 |
| | .203 (13/64) | **.312** (1.5x) | 1/4 | 2-1/2 | | | 50313 | 19.90 | | | 50313-C3 | 28.00 | | | | |
| | .203 (13/64) | **.625** (3x) | 1/4 | 2-1/2 | 72190 | 836413 | 73190 | 19.90 | 72190-C3 | 836413-C3 | 73190-C3 | 28.00 | | | | |
| | .218 (7/32) | **.330** (1.5x) | 1/4 | 2-1/2 | 50214 | 823114 | 50314 | 19.90 | 50214-C3 | 823114-C3 | 50314-C3 | 28.50 | | | | |
| | .218 (7/32) | **.625** (3x) | 1/4 | 2-1/2 | 72193 | 836414 | 73193 | 19.90 | 72193-C3 | 836414-C3 | 73193-C3 | 28.00 | | | | |
| | .234 (15/64) | **.750** (3x) | 1/4 | 2-1/2 | 72195 | | 73195 | 19.90 | 72195-C3 | | 73195-C3 | 28.00 | | | | |
| | .250 (1/4) | **.200** (0.8x) | 1/4 | 2-1/2 | | | 771416 | 21.50 | | | 771416-C3 | 30.30 | | | | |
| | .250 (1/4) | **.375** (1.5x) | 1/4 | 2-1/2 | 50216 | 823116 | 50316 | 19.90 | 50216-C3 | 823116-C3 | 50316-C3 | 28.50 | 50216-C4 | | 50316-C4 | 43.00 |
| NEW | .250 (1/4) | **.750** (3x) | 1/4 | 2-1/2 | 72199 | 836416 | 73199 | 19.90 | 72199-C3 | 836416-C3 | 73199-C3 | 28.00 | 72199-C4 | 836416-C4 | 73199-C4 | 41.30 |
| | .281 (9/32) | **.750** (3x) | 5/16 | 2-1/2 | | | 73122 | 27.10 | | | 73122-C3 | 37.20 | | | | |
| | .312 (5/16) | **.470** (1.5x) | 5/16 | 2-1/2 | 50220 | | 50320 | 27.40 | 50220-C3 | | 50320-C3 | 37.40 | | | | |
| | .312 (5/16) | **.812** (3x) | 5/16 | 2-1/2 | 15120 | | 15220 | 27.10 | 15120-C3 | | 15220-C3 | 37.20 | | | 15220-C4 | 52.60 |
| | .343 (11/32) | **1.000** (3x) | 3/8 | 2-1/2 | | | 15222 | 38.80 | | | 15222-C3 | 50.20 | | | | |
| | .375 (3/8) | **.300** (0.8x) | 3/8 | 2-1/2 | | | 771424 | 38.00 | | | 771424-C3 | 49.40 | | | | |
| | .375 (3/8) | **.570** (1.5x) | 3/8 | 2-1/2 | 50224 | 823124 | 50324 | 36.50 | 50224-C3 | 823124-C3 | 50324-C3 | 48.00 | 50224-C4 | | 50324-C4 | 65.80 |
| | .375 (3/8) | **1.000** (3x) | 3/8 | 2-1/2 | 15124 | 836424 | 15224 | 36.20 | 15124-C3 | 836424-C3 | 15224-C3 | 47.60 | | | 15224-C4 | 65.30 |
| | .437 (7/16) | **1.000** (2x) | 7/16 | 2-3/4 | | | 15228 | 57.80 | | | 15228-C3 | 71.30 | | | | |
| | .500 (1/2) | **.500** (1x) | 1/2 | 3 | | | 50332 | 59.60 | | | 50332-C3 | 76.60 | | | | |
| | .500 (1/2) | **1.000** (2x) | 1/2 | 3 | 15132 | 836432 | 15232 | 63.00 | 15132-C3 | 836432-C3 | 15232-C3 | 80.00 | 15132-C4 | | 15232-C4 | 98.70 |

# MINIATURE END MILLS

## Square – Stub & Standard – 5 Flute






- Cutter diameter down to .015"
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | ALTiN COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_4$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 5 FL | USD$ | 5 FL | USD$ |
| .015 (1/64) | .023 (1.5x) | 1/8 | 1-1/2 | 739415 | 27.40 | 739415-C3 | 33.30 |
| .015 (1/64) | .045 (3x) | 1/8 | 1-1/2 | 742015 | 29.20 | 742015-C3 | 35.10 |
| .020 (.5 mm) | .030 (1.5x) | 1/8 | 1-1/2 | 739420 | 27.40 | 739420-C3 | 33.30 |
| .020 (.5 mm) | .060 (3x) | 1/8 | 1-1/2 | 742020 | 29.20 | 742020-C3 | 35.10 |
| .025 | .038 (1.5x) | 1/8 | 1-1/2 | 739425 | 27.40 | 739425-C3 | 33.30 |
| .025 | .075 (3x) | 1/8 | 1-1/2 | 742025 | 29.20 | 742025-C3 | 35.10 |
| .031 (1/32) | .047 (1.5x) | 1/8 | 1-1/2 | 739431 | 25.50 | 739431-C3 | 31.50 |
| .031 (1/32) | .093 (3x) | 1/8 | 1-1/2 | 742031 | 27.80 | 742031-C3 | 33.70 |
| .040 | .060 (1.5x) | 1/8 | 1-1/2 | 739440 | 25.50 | 739440-C3 | 31.50 |
| .040 | .120 (3x) | 1/8 | 1-1/2 | 742040 | 26.90 | 742040-C3 | 32.80 |
| .045 | .068 (1.5x) | 1/8 | 1-1/2 | 739445 | 25.50 | 739445-C3 | 31.50 |
| .045 | .135 (3x) | 1/8 | 1-1/2 | 742045 | 26.90 | 742045-C3 | 32.80 |
| .047 (3/64) | .071 (1.5x) | 1/8 | 1-1/2 | 739447 | 25.50 | 739447-C3 | 31.50 |
| .047 (3/64) | .141 (3x) | 1/8 | 1-1/2 | 742047 | 26.90 | 742047-C3 | 32.80 |
| .050 | .075 (1.5x) | 1/8 | 1-1/2 | 739450 | 25.50 | 739450-C3 | 31.50 |
| .050 | .150 (3x) | 1/8 | 1-1/2 | 742050 | 26.90 | 742050-C3 | 32.80 |
| .055 | .083 (1.5x) | 1/8 | 1-1/2 | 739455 | 25.50 | 739455-C3 | 31.50 |
| .055 | .165 (3x) | 1/8 | 1-1/2 | 742055 | 26.90 | 742055-C3 | 32.80 |
| .060 | .090 (1.5x) | 1/8 | 1-1/2 | 739460 | 25.50 | 739460-C3 | 31.50 |
| .060 | .180 (3x) | 1/8 | 1-1/2 | 742060 | 26.90 | 742060-C3 | 32.80 |
| .062 (1/16) | .093 (1.5x) | 1/8 | 1-1/2 | 739462 | 25.50 | 739462-C3 | 31.50 |
| .062 (1/16) | .186 (3x) | 1/8 | 1-1/2 | 742062 | 26.90 | 742062-C3 | 32.80 |
| .070 | .105 (1.5x) | 1/8 | 1-1/2 | 739470 | 25.50 | 739470-C3 | 31.50 |
| .070 | .210 (3x) | 1/8 | 1-1/2 | 742070 | 26.90 | 742070-C3 | 32.80 |
| .075 | .113 (1.5x) | 1/8 | 1-1/2 | 739475 | 25.50 | 739475-C3 | 31.50 |
| .075 | .225 (3x) | 1/8 | 1-1/2 | 742075 | 26.90 | 742075-C3 | 32.80 |
| .078 (5/64) | .117 (1.5x) | 1/8 | 1-1/2 | 739478 | 25.50 | 739478-C3 | 31.50 |
| .078 (5/64) | .234 (3x) | 1/8 | 1-1/2 | 742078 | 26.90 | 742078-C3 | 32.80 |
| .080 | .120 (1.5x) | 1/8 | 1-1/2 | 739480 | 25.50 | 739480-C3 | 31.50 |
| .080 | .240 (3x) | 1/8 | 1-1/2 | 742080 | 26.90 | 742080-C3 | 32.80 |
| .085 | .128 (1.5x) | 1/8 | 1-1/2 | 739485 | 25.50 | 739485-C3 | 31.50 |
| .085 | .255 (3x) | 1/8 | 1-1/2 | 742085 | 26.90 | 742085-C3 | 32.80 |
| .090 | .135 (1.5x) | 1/8 | 1-1/2 | 739490 | 25.50 | 739490-C3 | 31.50 |
| .090 | .270 (3x) | 1/8 | 1-1/2 | 742090 | 26.90 | 742090-C3 | 32.80 |
| .093 (3/32) | .140 (1.5x) | 1/8 | 1-1/2 | 739493 | 25.50 | 739493-C3 | 31.50 |
| .093 (3/32) | .279 (3x) | 1/8 | 1-1/2 | 742093 | 26.90 | 742093-C3 | 32.80 |
| .109 (7/64) | .164 (1.5x) | 1/8 | 1-1/2 | 739502 | 25.50 | 739502-C3 | 31.50 |
| .109 (7/64) | .327 (3x) | 1/8 | 1-1/2 | 742102 | 26.90 | 742102-C3 | 32.80 |
| .118 (3 mm) | .177 (1.5x) | 1/8 | 1-1/2 | 739505 | 25.50 | 739505-C3 | 31.50 |
| .118 (3 mm) | .354 (3x) | 1/8 | 1-1/2 | 742105 | 26.90 | 742105-C3 | 32.80 |

continued on next page

# MINIATURE END MILLS

## Square – Stub & Standard – 5 Flute (cont.)

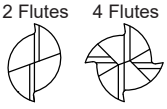
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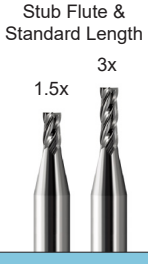
| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_4$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 5 FL | USD$ | 5 FL | USD$ |
| .125 (1/8) | .187 (1.5x) | 1/8 | 1-1/2 | 739508 | 23.80 | 739508-C3 | 29.70 |
| .125 (1/8) | .375 (3x) | 1/8 | 1-1/2 | 742108 | 25.10 | 742108-C3 | 31.00 |
| .140 (9/64) | .220 (1.5x) | 3/16 | 2 | 739509 | 27.50 | 739509-C3 | 33.70 |
| .140 (9/64) | .562 (3x) | 3/16 | 2 | 742109 | 29.00 | 742109-C3 | 35.20 |
| .156 (5/32) | .281 (1.5x) | 3/16 | 2 | 739510 | 27.50 | 739510-C3 | 33.70 |
| .156 (5/32) | .562 (3x) | 3/16 | 2 | 742110 | 29.00 | 742110-C3 | 35.20 |
| .187 (3/16) | .312 (1.5x) | 3/16 | 2 | 739512 | 27.50 | 739512-C3 | 34.00 |
| .187 (3/16) | .625 (3x) | 3/16 | 2 | 742112 | 29.00 | 742112-C3 | 35.40 |
| .250 (1/4) | .375 (1.5x) | 1/4 | 2-1/2 | 739516 | 32.60 | 739516-C3 | 41.40 |
| .250 (1/4) | .750 (3x) | 1/4 | 2-1/2 | 742116 | 34.30 | 742116-C3 | 43.00 |
| .375 (3/8) | .570 (1.5x) | 3/8 | 2-1/2 | 739524 | 48.80 | 739524-C3 | 60.20 |
| .375 (3/8) | 1.000 (3x) | 3/8 | 2-1/2 | 742124 | 52.00 | 742124-C3 | 63.40 |
| .500 (1/2) | .750 (1.5x) | 1/2 | 3 | 739532 | 73.50 | 739532-C3 | 89.10 |
| .500 (1/2) | 1.000 (2x) | 1/2 | 3 | 742132 | 80.00 | 742132-C3 | 95.60 |

# MINIATURE END MILLS

## Square – Stub & Standard – Metric




SQUARE

- All dimensions and tolerances in metric values
- Cutter diameter down to 0.5mm
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | | ALTiN COATED | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.00mm −.02mm | $L_2$ +.25mm −.00mm | $D_2$ | $L_1$ | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| .500 mm | .75 (1.5x) | 3 mm | 38 mm | 740811 | 740711 | 25.00 | 740811-C3 | 740711-C3 | 30.90 |
| .500 mm | 1.50 (3x) | 3 mm | 38 mm | 741411 | 743411 | 25.00 | 741411-C3 | 743411-C3 | 30.90 |
| 1.00 mm | 1.50 (1.5x) | 3 mm | 38 mm | 740822 | 740722 | 21.00 | 740822-C3 | 740722-C3 | 26.90 |
| 1.00 mm | 3.00 (3x) | 3 mm | 38 mm | 741422 | 743422 | 21.00 | 741422-C3 | 743422-C3 | 26.90 |
| 1.20 mm | 3.50 (3x) | 3 mm | 38 mm | 741427 | 743427 | 21.20 | 741427-C3 | 743427-C3 | 27.10 |
| 1.40 mm | 4.00 (3x) | 3 mm | 38 mm | 741431 | 743431 | 21.20 | 741431-C3 | 743431-C3 | 27.10 |
| 1.50 mm | 2.20 (1.5x) | 3 mm | 38 mm | 740833 | 740733 | 21.20 | 740833-C3 | 740733-C3 | 27.10 |
| 1.50 mm | 4.50 (3x) | 3 mm | 38 mm | 741433 | 743433 | 21.20 | 741433-C3 | 743433-C3 | 27.10 |
| 1.60 mm | 5.00 (3x) | 3 mm | 38 mm | 741436 | 743436 | 21.20 | 741436-C3 | 743436-C3 | 27.10 |
| 1.80 mm | 5.50 (3x) | 3 mm | 38 mm | 741440 | 743440 | 21.20 | 741440-C3 | 743440-C3 | 27.10 |
| 2.00 mm | 3.00 (1.5x) | 3 mm | 38 mm | 740845 | 740745 | 21.00 | 740845-C3 | 740745-C3 | 26.90 |
| 2.00 mm | 6.00 (3x) | 3 mm | 38 mm | 741445 | 743445 | 21.00 | 741445-C3 | 743445-C3 | 26.90 |
| 2.50 mm | 7.50 (3x) | 3 mm | 38 mm | 741451 | 743451 | 21.20 | 741451-C3 | 743451-C3 | 27.10 |
| 3.00 mm | 4.50 (1.5x) | 3 mm | 38 mm | 740857 | 740757 | 19.70 | 740857-C3 | 740757-C3 | 25.60 |
| 3.00 mm | 9.00 (3x) | 3 mm | 38 mm | 741457 | 743457 | 19.70 | 741457-C3 | 743457-C3 | 25.60 |

| $D_1$ +.00mm −.04mm | $L_2$ +.75mm −.00mm | $D_2$ | $L_1$ | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|
| 3.50 mm | 5.00 (1.5x) | 4 mm | 50 mm | 740859 | 740759 | 21.90 | 740859-C3 | 740759-C3 | 28.10 |
| 3.50 mm | 10.00 (3x) | 4 mm | 50 mm | 741459 | 743459 | 21.90 | 741459-C3 | 743459-C3 | 28.10 |
| 4.00 mm | 6.00 (1.5x) | 4 mm | 50 mm | 740861 | 740761 | 21.90 | 740861-C3 | 740761-C3 | 28.10 |
| 4.00 mm | 12.00 (3x) | 4 mm | 50 mm | 741461 | 743461 | 21.90 | 741461-C3 | 743461-C3 | 28.10 |
| 4.50 mm | 13.00 (3x) | 5 mm | 50 mm | 741462 | 743462 | 26.90 | 741462-C3 | 743462-C3 | 34.40 |
| 5.00 mm | 7.50 (1.5x) | 5 mm | 50 mm | 740864 | 740764 | 26.90 | 740864-C3 | 740764-C3 | 34.40 |
| 5.00 mm | 15.00 (3x) | 5 mm | 50 mm | 741464 | 743464 | 26.90 | 741464-C3 | 743464-C3 | 34.40 |
| 6.00 mm | 9.00 (1.5x) | 6 mm | 50 mm | 740866 | 740766 | 28.10 | 740866-C3 | 740766-C3 | 35.60 |
| 6.00 mm | 18.00 (3x) | 6 mm | 50 mm | 741466 | 743466 | 28.10 | 741466-C3 | 743466-C3 | 35.60 |
| 7.00 mm | 10.00 (1.5x) | 8 mm | 63 mm | 740868 | 740768 | 34.50 | 740868-C3 | 740768-C3 | 45.90 |
| 7.00 mm | 21.00 (3x) | 8 mm | 63 mm | 741468 | 743468 | 34.50 | 741468-C3 | 743468-C3 | 45.90 |
| 8.00 mm | 12.00 (1.5x) | 8 mm | 63 mm | 740870 | 740770 | 34.50 | 740870-C3 | 740770-C3 | 45.90 |
| 8.00 mm | 24.00 (3x) | 8 mm | 63 mm | 741470 | 743470 | 34.50 | 741470-C3 | 743470-C3 | 45.90 |
| 9.00 mm | 13.00 (1.5x) | 10 mm | 75 mm | 740871 | 740771 | 56.80 | 740871-C3 | 740771-C3 | 70.10 |
| 9.00 mm | 27.00 (3x) | 10 mm | 75 mm | 741471 | 743471 | 56.80 | 741471-C3 | 743471-C3 | 70.10 |
| 10.00 mm | 15.00 (1.5x) | 10 mm | 75 mm | 740873 | 740773 | 59.00 | 740873-C3 | 740773-C3 | 72.20 |
| 10.00 mm | 30.00 (3x) | 10 mm | 75 mm | 741473 | 743473 | 59.00 | 741473-C3 | 743473-C3 | 72.20 |
| 11.00 mm | 16.00 (1.5x) | 12 mm | 75 mm | 740874 | 740774 | 65.30 | 740874-C3 | 740774-C3 | 80.90 |
| 11.00 mm | 32.00 (3x) | 12 mm | 75 mm | 741474 | 743474 | 65.30 | 741474-C3 | 743474-C3 | 80.90 |
| 12.00 mm | 18.00 (1.5x) | 12 mm | 75 mm | 740876 | 740776 | 67.40 | 740876-C3 | 740776-C3 | 82.90 |
| 12.00 mm | 36.00 (3x) | 12 mm | 75 mm | 741476 | 743476 | 67.40 | 741476-C3 | 743476-C3 | 82.90 |

# MINIATURE END MILLS

## Square – Long Flute




**Stocked in 9 Lengths of Cut!**

- **Long flute and long shank design for deep cavities**
- Mills deep pockets • Center cutting • Solid carbide • CNC ground in the USA

| | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | ALTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| | .004 | **.020** (5x) | 3 | 1/8 | 2-1/2 | 31804 | 54.70 | | | | |
| | .005 | **.025** (5x) | 3 | 1/8 | 2-1/2 | 31805 | 53.80 | | | | |
| | .005 | **.040** (8x) | 3 | 1/8 | 2-1/2 | 33605 | 57.10 | | | | |
| | .006 | **.030** (5x) | 3 | 1/8 | 2-1/2 | 31806 | 53.80 | | | | |
| | .006 | **.048** (8x) | 3 | 1/8 | 2-1/2 | 33606 | 57.10 | | | | |
| | .008 | **.040** (5x) | 3 | 1/8 | 2-1/2 | 31808 | 53.80 | | | | |
| | .008 | **.064** (8x) | 3 | 1/8 | 2-1/2 | 33608 | 57.10 | | | | |
| | .010 | **.040** (4x) | 3 | 1/8 | 2-1/2 | 888410 | 45.50 | 888410-C3 | 51.40 | | |
| | .010 | **.050** (5x) | 3 | 1/8 | 2-1/2 | 12710 | 45.70 | 12710-C3 | 51.60 | 12710-C4 | 60.70 |
| | .010 | **.050** (5x) | 4 | 1/8 | 2-1/2 | 834110 | 47.70 | 834110-C3 | 53.70 | | |
| | .010 | **.060** (6x) | 3 | 1/8 | 2-1/2 | 894210 | 54.80 | 894210-C3 | 60.70 | | |
| | .010 | **.070** (7x) | 3 | 1/8 | 2-1/2 | 897910 | 63.90 | 897910-C3 | 69.90 | | |
| | .010 | **.080** (8x) | 3 | 1/8 | 2-1/2 | 33610 | 81.60 | 33610-C3 | 87.50 | | |
| | .010 | **.100** (10x) | 3 | 1/8 | 2-1/2 | 951310 | 86.20 | 951310-C3 | 92.10 | | |
| | .012 | **.060** (5x) | 3 | 1/8 | 2-1/2 | 31812 | 46.40 | 31812-C3 | 52.30 | | |
| | .012 | **.096** (8x) | 3 | 1/8 | 2-1/2 | 33612 | 81.60 | 33612-C3 | 87.50 | | |
| | .015 (1/64) | **.062** (4x) | 3 | 1/8 | 2-1/2 | 888415 | 41.90 | 888415-C3 | 47.90 | | |
| | .015 (1/64) | **.062** (4x) | 4 | 1/8 | 2-1/2 | 836915 | 43.80 | 836915-C3 | 49.70 | | |
| | .015 (1/64) | **.078** (5x) | 3 | 1/8 | 2-1/2 | 31815 | 41.90 | 31815-C3 | 47.90 | 31815-C4 | 57.00 |
| | .015 (1/64) | **.078** (5x) | 4 | 1/8 | 2-1/2 | 834115 | 43.80 | 834115-C3 | 49.70 | | |
| | .015 (1/64) | **.093** (6x) | 3 | 1/8 | 2-1/2 | 894215 | 50.10 | 894215-C3 | 56.10 | | |
| | .015 (1/64) | **.109** (7x) | 3 | 1/8 | 2-1/2 | 897915 | 58.40 | 897915-C3 | 64.40 | | |
| | .015 (1/64) | **.125** (8x) | 3 | 1/8 | 2-1/2 | 33615 | 73.50 | 33615-C3 | 79.40 | 33615-C4 | 88.60 |
| | .015 (1/64) | **.125** (8x) | 4 | 1/8 | 2-1/2 | 826815 | 75.20 | 826815-C3 | 81.10 | | |
| | .015 (1/64) | **.156** (10x) | 3 | 1/8 | 2-1/2 | 951315 | 82.10 | 951315-C3 | 88.00 | | |
| | .015 (1/64) | **.187** (12x) | 3 | 1/8 | 2-1/2 | 34915 | 90.60 | 34915-C3 | 96.50 | | |
| | .017 | **.085** (5x) | 3 | 1/8 | 2-1/2 | 31817 | 46.40 | 31817-C3 | 52.30 | | |
| | .017 | **.136** (8x) | 3 | 1/8 | 2-1/2 | 33617 | 80.80 | 33617-C3 | 86.70 | | |
| | .020 (.5 mm) | **.080** (4x) | 3 | 1/8 | 2-1/2 | 888420 | 35.80 | 888420-C3 | 41.70 | | |
| | .020 (.5 mm) | **.080** (4x) | 4 | 1/8 | 2-1/2 | 836920 | 38.20 | 836920-C3 | 44.10 | | |
| | .020 (.5 mm) | **.100** (5x) | 3 | 1/8 | 2-1/2 | 12720 | 35.80 | 12720-C3 | 41.70 | 12720-C4 | 51.40 |
| | .020 (.5 mm) | **.100** (5x) | 4 | 1/8 | 2-1/2 | 834120 | 38.20 | 834120-C3 | 44.10 | | |
| | .020 (.5 mm) | **.120** (6x) | 3 | 1/8 | 2-1/2 | 894220 | 43.10 | 894220-C3 | 49.00 | | |
| | .020 (.5 mm) | **.120** (6x) | 4 | 1/8 | 2-1/2 | 758020 | 46.40 | 758020-C3 | 52.30 | | |
| | .020 (.5 mm) | **.140** (7x) | 3 | 1/8 | 2-1/2 | 897920 | 50.10 | 897920-C3 | 56.10 | | |
| | .020 (.5 mm) | **.160** (8x) | 3 | 1/8 | 2-1/2 | 33620 | 70.30 | 33620-C3 | 76.20 | 33620-C4 | 85.30 |
| | .020 (.5 mm) | **.160** (8x) | 4 | 1/8 | 2-1/2 | 826820 | 74.20 | 826820-C3 | 80.10 | | |
| | .020 (.5 mm) | **.200** (10x) | 3 | 1/8 | 2-1/2 | 951320 | 78.80 | 951320-C3 | 84.70 | | |
| NEW | .020 (.5 mm) | **.250** (12x) | 3 | 1/8 | 2-1/2 | 34920 | 87.20 | 34920-C3 | 93.10 | 34920-C4 | 103.00 |
| | .020 (.5 mm) | **.300** (15x) | 3 | 1/8 | 2-1/2 | 35820 | 106.00 | 35820-C3 | 111.90 | | |
| | .024 | **.120** (5x) | 3 | 1/8 | 2-1/2 | 31824 | 34.20 | 31824-C3 | 40.10 | | |
| | .024 | **.192** (8x) | 3 | 1/8 | 2-1/2 | 33624 | 69.60 | 33624-C3 | 75.60 | | |

continued on next page

NEW SIZES!

# MINIATURE END MILLS

## Square – Long Flute (cont.)

continued from previous page

SQUARE

| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | $L_2$ +.010" −.000" | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| .025 | **.100** (4x) | 3 | 1/8 | 2-1/2 | 888425 | 34.20 | 888425-C3 | 40.10 | | | |
| .025 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 12725 | 34.20 | 12725-C3 | 40.10 | 12725-C4 | 49.70 | |
| .025 | **.125** (5x) | 4 | 1/8 | 2-1/2 | 834125 | 36.10 | 834125-C3 | 42.00 | | | |
| .025 | **.150** (6x) | 3 | 1/8 | 2-1/2 | 894225 | 41.20 | 894225-C3 | 47.10 | | | |
| .025 | **.175** (7x) | 3 | 1/8 | 2-1/2 | 897925 | 48.00 | 897925-C3 | 53.90 | | | |
| .025 | **.203** (8x) | 3 | 1/8 | 2-1/2 | 33625 | 68.50 | 33625-C3 | 74.40 | 33625-C4 | 83.40 | |
| .025 | **.203** (8x) | 4 | 1/8 | 2-1/2 | 826825 | 70.40 | 826825-C3 | 76.30 | | | |
| .025 | **.250** (10x) | 3 | 1/8 | 2-1/2 | 951325 | 72.80 | 951325-C3 | 78.70 | | | |
| .025 | **.312** (12x) | 3 | 1/8 | 2-1/2 | 34925 | 77.30 | 34925-C3 | 83.20 | | | |
| .028 | **.140** (5x) | 4 | 1/8 | 2-1/2 | 834128 | 36.10 | 834128-C3 | 42.00 | | | NEW |
| .028 | **.224** (8x) | 4 | 1/8 | 2-1/2 | 826828 | 70.40 | 826828-C3 | 76.30 | | | NEW |
| .030 | **.125** (4x) | 3 | 1/8 | 2-1/2 | 888430 | 33.00 | 888430-C3 | 38.90 | | | |
| .030 | **.150** (5x) | 3 | 1/8 | 2-1/2 | 12730 | 33.00 | 12730-C3 | 38.90 | 12730-C4 | 48.50 | |
| .030 | **.156** (5x) | 4 | 1/8 | 2-1/2 | 834130 | 34.90 | 834130-C3 | 40.80 | | | |
| .030 | **.187** (6x) | 3 | 1/8 | 2-1/2 | 894230 | 39.40 | 894230-C3 | 45.40 | | | |
| .030 | **.218** (7x) | 3 | 1/8 | 2-1/2 | 897930 | 46.10 | 897930-C3 | 52.00 | | | |
| .030 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 33630 | 65.00 | 33630-C3 | 70.90 | 33630-C4 | 80.80 | |
| .030 | **.312** (10x) | 3 | 1/8 | 2-1/2 | 951330 | 69.50 | 951330-C3 | 75.50 | | | |
| .030 | **.375** (12x) | 3 | 1/8 | 2-1/2 | 34930 | 73.10 | 34930-C3 | 79.00 | | | |
| .031 (1/32) | **.125** (4x) | 3 | 1/8 | 2-1/2 | 888431 | 33.00 | 888431-C3 | 38.90 | 888431-C4 | 48.50 | |
| .031 (1/32) | **.125** (4x) | 4 | 1/8 | 2-1/2 | 836931 | 34.90 | 836931-C3 | 40.80 | | | |
| .031 (1/32) | **.156** (5x) | 3 | 1/8 | 2-1/2 | 31831 | 33.00 | 31831-C3 | 38.90 | 31831-C4 | 48.50 | |
| .031 (1/32) | **.156** (5x) | 4 | 1/8 | 2-1/2 | 834131 | 34.60 | 834131-C3 | 40.50 | 834131-C4 | 50.30 | |
| .031 (1/32) | **.187** (6x) | 3 | 1/8 | 2-1/2 | 894231 | 39.40 | 894231-C3 | 45.40 | 894231-C4 | 55.10 | |
| .031 (1/32) | **.187** (6x) | 4 | 1/8 | 2-1/2 | 12531 | 41.40 | 12531-C3 | 47.30 | | | |
| .031 (1/32) | **.218** (7x) | 3 | 1/8 | 2-1/2 | 897931 | 46.10 | 897931-C3 | 52.00 | | | |
| .031 (1/32) | **.218** (7x) | 4 | 1/8 | 2-1/2 | 810331 | 48.00 | 810331-C3 | 53.90 | | | |
| .031 (1/32) | **.250** (8x) | 3 | 1/8 | 2-1/2 | 33631 | 65.00 | 33631-C3 | 70.90 | 33631-C4 | 80.00 | |
| .031 (1/32) | **.250** (8x) | 4 | 1/8 | 2-1/2 | 826831 | 66.80 | 826831-C3 | 72.80 | | | |
| .031 (1/32) | **.281** (9x) | 3 | 1/8 | 2-1/2 | 837831 | 68.20 | 837831-C3 | 74.10 | | | |
| .031 (1/32) | **.312** (10x) | 3 | 1/8 | 2-1/2 | 951331 | 68.90 | 951331-C3 | 74.80 | 951331-C4 | 83.90 | |
| .031 (1/32) | **.312** (10x) | 4 | 1/8 | 2-1/2 | 802631 | 72.10 | 802631-C3 | 78.10 | | | |
| .031 (1/32) | **.375** (12x) | 3 | 1/8 | 2-1/2 | 34931 | 73.10 | 34931-C3 | 79.00 | 34931-C4 | 88.20 | |
| .031 (1/32) | **.375** (12x) | 4 | 1/8 | 2-1/2 | 818031 | 75.50 | 818031-C3 | 81.40 | | | |
| .031 (1/32) | **.470** (15x) | 3 | 1/8 | 2-1/2 | 35831 | 99.00 | 35831-C3 | 104.90 | | | |
| .035 (.9 mm) | **.140** (4x) | 3 | 1/8 | 2-1/2 | 888435 | 33.00 | 888435-C3 | 38.90 | | | |
| .035 (.9 mm) | **.175** (5x) | 3 | 1/8 | 2-1/2 | 12735 | 33.00 | 12735-C3 | 38.90 | 12735-C4 | 48.50 | |
| .035 (.9 mm) | **.187** (5x) | 4 | 1/8 | 2-1/2 | 834135 | 35.40 | 834135-C3 | 41.30 | | | |
| .035 (.9 mm) | **.218** (6x) | 3 | 1/8 | 2-1/2 | 894235 | 39.40 | 894235-C3 | 45.40 | | | |
| .035 (.9 mm) | **.250** (7x) | 3 | 1/8 | 2-1/2 | 897935 | 46.10 | 897935-C3 | 52.00 | | | |
| .035 (.9 mm) | **.280** (8x) | 3 | 1/8 | 2-1/2 | 33635 | 65.00 | 33635-C3 | 70.90 | 33635-C4 | 80.00 | |
| .035 (.9 mm) | **.350** (10x) | 3 | 1/8 | 2-1/2 | 951335 | 68.90 | 951335-C3 | 74.80 | | | |
| .035 (.9 mm) | **.425** (12x) | 3 | 1/8 | 2-1/2 | 34935 | 74.30 | 34935-C3 | 80.20 | | | |
| .039 (1 mm) | **.156** (4x) | 3 | 1/8 | 2-1/2 | 888439 | 33.40 | 888439-C3 | 39.30 | | | |
| .039 (1 mm) | **.156** (4x) | 4 | 1/8 | 2-1/2 | 836939 | 35.80 | 836939-C3 | 41.70 | | | |
| .039 (1 mm) | **.203** (5x) | 3 | 1/8 | 2-1/2 | 31839 | 33.40 | 31839-C3 | 39.30 | 31839-C4 | 49.00 | |
| .039 (1 mm) | **.203** (5x) | 4 | 1/8 | 2-1/2 | 834139 | 35.80 | 834139-C3 | 41.70 | | | |

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# MINIATURE END MILLS

## Square – Long Flute (cont.)

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| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .039 (1 mm) | **.240** (6x) | 3 | 1/8 | 2-1/2 | 894239 | 52.70 | 894239-C3 | 58.60 | | |
| .039 (1 mm) | **.281** (7x) | 3 | 1/8 | 2-1/2 | 897939 | 59.50 | 897939-C3 | 65.40 | | |
| .039 (1 mm) | **.325** (8x) | 3 | 1/8 | 2-1/2 | 33639 | 65.50 | 33639-C3 | 71.40 | | |
| .039 (1 mm) | **.325** (8x) | 4 | 1/8 | 2-1/2 | 826839 | 67.10 | 826839-C3 | 73.00 | | |
| .039 (1 mm) | **.400** (10x) | 3 | 1/8 | 2-1/2 | 951339 | 69.50 | 951339-C3 | 75.50 | | |
| .039 (1 mm) | **.480** (12x) | 3 | 1/8 | 2-1/2 | 34939 | 74.60 | 34939-C3 | 80.50 | | |
| .040 | **.160** (4x) | 3 | 1/8 | 2-1/2 | 888440 | 33.00 | 888440-C3 | 38.90 | | |
| .040 | **.160** (4x) | 4 | 1/8 | 2-1/2 | 836940 | 36.00 | 836940-C3 | 41.90 | | |
| .040 | **.200** (5x) | 3 | 1/8 | 2-1/2 | 12740 | 33.00 | 12740-C3 | 38.90 | 12740-C4 | 48.50 |
| .040 | **.203** (5x) | 4 | 1/8 | 2-1/2 | 834140 | 34.90 | 834140-C3 | 40.80 | | |
| .040 | **.240** (6x) | 3 | 1/8 | 2-1/2 | 894240 | 39.40 | 894240-C3 | 45.40 | | |
| .040 | **.281** (7x) | 3 | 1/8 | 2-1/2 | 897940 | 46.10 | 897940-C3 | 52.00 | | |
| .040 | **.281** (7x) | 4 | 1/8 | 2-1/2 | 810340 | 47.90 | 810340-C3 | 53.80 | | |
| .040 | **.325** (8x) | 3 | 1/8 | 2-1/2 | 33640 | 65.00 | 33640-C3 | 70.90 | 33640-C4 | 80.00 |
| .040 | **.325** (8x) | 4 | 1/8 | 2-1/2 | 826840 | 66.80 | 826840-C3 | 72.80 | | |
| .040 | **.400** (10x) | 3 | 1/8 | 2-1/2 | 951340 | 68.90 | 951340-C3 | 74.80 | | |
| .040 | **.480** (12x) | 3 | 1/8 | 2-1/2 | 34940 | 74.30 | 34940-C3 | 80.20 | | |
| .045 | **.187** (4x) | 3 | 1/8 | 2-1/2 | 888445 | 33.00 | 888445-C3 | 38.90 | | |
| .045 | **.225** (5x) | 3 | 1/8 | 2-1/2 | 12745 | 33.00 | 12745-C3 | 38.90 | 12745-C4 | 48.50 |
| .045 | **.225** (5x) | 4 | 1/8 | 2-1/2 | 834145 | 34.90 | 834145-C3 | 40.80 | | |
| .045 | **.281** (6x) | 3 | 1/8 | 2-1/2 | 894245 | 39.40 | 894245-C3 | 45.40 | | |
| .045 | **.325** (7x) | 3 | 1/8 | 2-1/2 | 897945 | 46.10 | 897945-C3 | 52.00 | | |
| .045 | **.375** (8x) | 3 | 1/8 | 2-1/2 | 33645 | 65.00 | 33645-C3 | 70.90 | | |
| .045 | **.450** (10x) | 3 | 1/8 | 2-1/2 | 951345 | 68.90 | 951345-C3 | 74.80 | | |
| .045 | **.550** (12x) | 3 | 1/8 | 2-1/2 | 34945 | 74.30 | 34945-C3 | 80.20 | | |
| .047 (3/64) | **.187** (4x) | 3 | 1/8 | 2-1/2 | 888447 | 33.00 | 888447-C3 | 38.90 | 888447-C4 | 48.50 |
| .047 (3/64) | **.187** (4x) | 4 | 1/8 | 2-1/2 | 836947 | 34.90 | 836947-C3 | 40.80 | | |
| .047 (3/64) | **.250** (5x) | 3 | 1/8 | 2-1/2 | 31847 | 33.00 | 31847-C3 | 38.90 | 31847-C4 | 48.50 |
| .047 (3/64) | **.250** (5x) | 4 | 1/8 | 2-1/2 | 834147 | 34.60 | 834147-C3 | 40.50 | 834147-C4 | 50.10 |
| .047 (3/64) | **.281** (6x) | 3 | 1/8 | 2-1/2 | 894247 | 39.40 | 894247-C3 | 45.40 | | |
| NEW .047 (3/64) | **.281** (6x) | 4 | 1/8 | 2-1/2 | 12547 | 41.30 | 12547-C3 | 47.20 | | |
| .047 (3/64) | **.328** (7x) | 3 | 1/8 | 2-1/2 | 897947 | 46.10 | 897947-C3 | 52.00 | | |
| .047 (3/64) | **.375** (8x) | 3 | 1/8 | 2-1/2 | 33647 | 63.60 | 33647-C3 | 69.50 | 33647-C4 | 78.70 |
| .047 (3/64) | **.375** (8x) | 4 | 1/8 | 2-1/2 | 826847 | 65.50 | 826847-C3 | 71.40 | | |
| .047 (3/64) | **.480** (10x) | 3 | 1/8 | 2-1/2 | 951347 | 68.90 | 951347-C3 | 74.80 | | |
| .047 (3/64) | **.570** (12x) | 3 | 1/8 | 2-1/2 | 34947 | 73.10 | 34947-C3 | 79.00 | 34947-C4 | 88.90 |
| .047 (3/64) | **.710** (15x) | 3 | 1/8 | 2-1/2 | 35847 | 93.20 | 35847-C3 | 99.10 | | |
| .050 | **.203** (4x) | 3 | 1/8 | 2-1/2 | 888450 | 33.00 | 888450-C3 | 38.90 | | |
| .050 | **.203** (4x) | 4 | 1/8 | 2-1/2 | 836950 | 35.40 | 836950-C3 | 41.30 | | |
| .050 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 31850 | 33.00 | 31850-C3 | 38.90 | | |
| .050 | **.250** (5x) | 4 | 1/8 | 2-1/2 | 834150 | 34.90 | 834150-C3 | 40.80 | | |
| .050 | **.300** (6x) | 3 | 1/8 | 2-1/2 | 12750 | 33.00 | 12750-C3 | 38.90 | 12750-C4 | 48.50 |
| .050 | **.300** (6x) | 4 | 1/8 | 2-1/2 | 12550 | 34.90 | 12550-C3 | 40.80 | | |
| .050 | **.350** (7x) | 3 | 1/8 | 2-1/2 | 897950 | 46.10 | 897950-C3 | 52.00 | | |
| .050 | **.400** (8x) | 3 | 1/8 | 2-1/2 | 33650 | 65.00 | 33650-C3 | 70.90 | 33650-C4 | 80.00 |
| .050 | **.500** (10x) | 3 | 1/8 | 2-1/2 | 951350 | 69.50 | 951350-C3 | 75.50 | | |
| .050 | **.600** (12x) | 3 | 1/8 | 2-1/2 | 34950 | 73.10 | 34950-C3 | 79.00 | | |

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# MINIATURE END MILLS

## Square – Long Flute (cont.)

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SQUARE

| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .055 (1.4 mm) | **.220** (4x) | 3 | 1/8 | 2-1/2 | 888455 | 29.40 | 888455-C3 | 35.30 | | |
| .055 (1.4 mm) | **.275** (5x) | 3 | 1/8 | 2-1/2 | 31855 | 29.40 | 31855-C3 | 35.30 | 31855-C4 | 45.20 |
| .055 (1.4 mm) | **.275** (5x) | 4 | 1/8 | 2-1/2 | 834155 | 31.70 | 834155-C3 | 37.60 | | |
| .055 (1.4 mm) | **.330** (6x) | 3 | 1/8 | 2-1/2 | 894255 | 32.00 | 894255-C3 | 37.90 | | |
| .055 (1.4 mm) | **.385** (7x) | 3 | 1/8 | 2-1/2 | 12755 | 33.00 | 12755-C3 | 38.90 | 12755-C4 | 48.50 |
| .055 (1.4 mm) | **.385** (7x) | 4 | 1/8 | 2-1/2 | 810355 | 34.90 | 810355-C3 | 40.80 | | |
| .055 (1.4 mm) | **.450** (8x) | 3 | 1/8 | 2-1/2 | 33655 | 46.70 | 33655-C3 | 52.60 | | |
| .055 (1.4 mm) | **.560** (10x) | 3 | 1/8 | 2-1/2 | 951355 | 51.30 | 951355-C3 | 57.20 | | |
| .055 (1.4 mm) | **.660** (12x) | 3 | 1/8 | 2-1/2 | 34955 | 74.30 | 34955-C3 | 80.20 | | |
| .059 (1.5 mm) | **.295** (5x) | 3 | 1/8 | 2-1/2 | 31859 | 30.70 | 31859-C3 | 36.60 | | |
| .059 (1.5 mm) | **.472** (8x) | 3 | 1/8 | 2-1/2 | 12759 | 30.70 | 12759-C3 | 36.60 | | |
| .060 | **.250** (4x) | 3 | 1/8 | 2-1/2 | 888460 | 29.40 | 888460-C3 | 35.30 | | |
| .060 | **.250** (4x) | 4 | 1/8 | 2-1/2 | 836960 | 32.30 | 836960-C3 | 38.20 | | |
| .060 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 31860 | 29.40 | 31860-C3 | 35.30 | | |
| .060 | **.312** (5x) | 4 | 1/8 | 2-1/2 | 834160 | 31.10 | 834160-C3 | 37.10 | | |
| .060 | **.375** (6x) | 3 | 1/8 | 2-1/2 | 894260 | 30.50 | 894260-C3 | 36.40 | | |
| .060 | **.375** (6x) | 4 | 1/8 | 2-1/2 | 12560 | 31.50 | 12560-C3 | 37.40 | | |
| .060 | **.437** (7x) | 3 | 1/8 | 2-1/2 | 897960 | 32.00 | 897960-C3 | 37.90 | | |
| .060 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 12760 | 33.40 | 12760-C3 | 39.30 | 12760-C4 | 49.00 |
| .060 | **.500** (8x) | 4 | 1/8 | 2-1/2 | 826860 | 35.80 | 826860-C3 | 41.70 | | |
| .060 | **.625** (10x) | 3 | 1/8 | 2-1/2 | 951360 | 58.10 | 951360-C3 | 64.00 | | |
| .060 | **.720** (12x) | 3 | 1/8 | 2-1/2 | 34960 | 74.30 | 34960-C3 | 80.20 | | |
| .062 (1/16) | **.250** (4x) | 3 | 1/8 | 2-1/2 | 888462 | 29.40 | 888462-C3 | 35.30 | 888462-C4 | 44.90 |
| .062 (1/16) | **.250** (4x) | 4 | 1/8 | 2-1/2 | 836962 | 31.70 | 836962-C3 | 37.60 | 836962-C4 | 47.20 |
| .062 (1/16) | **.312** (5x) | 3 | 1/8 | 2-1/2 | 31862 | 29.40 | 31862-C3 | 35.30 | 31862-C4 | 44.90 |
| .062 (1/16) | **.312** (5x) | 4 | 1/8 | 2-1/2 | 834162 | 31.70 | 834162-C3 | 37.60 | 834162-C4 | 47.20 |
| .062 (1/16) | **.375** (6x) | 3 | 1/8 | 2-1/2 | 894262 | 30.50 | 894262-C3 | 36.40 | 894262-C4 | 46.10 |
| .062 (1/16) | **.375** (6x) | 4 | 1/8 | 2-1/2 | 12562 | 31.50 | 12562-C3 | 37.40 | 12562-C4 | 46.90 |
| .062 (1/16) | **.437** (7x) | 3 | 1/8 | 2-1/2 | 897962 | 32.00 | 897962-C3 | 37.90 | 897962-C4 | 47.50 |
| .062 (1/16) | **.437** (7x) | 4 | 1/8 | 2-1/2 | 810362 | 33.10 | 810362-C3 | 39.00 | | |
| .062 (1/16) | **.500** (8x) | 3 | 1/8 | 2-1/2 | 33662 | 33.40 | 33662-C3 | 39.30 | 33662-C4 | 49.00 |
| .062 (1/16) | **.500** (8x) | 4 | 1/8 | 2-1/2 | 826862 | 35.30 | 826862-C3 | 41.20 | 826862-C4 | 50.90 |
| .062 (1/16) | **.562** (9x) | 3 | 1/8 | 2-1/2 | 837862 | 38.70 | 837862-C3 | 44.60 | | |
| .062 (1/16) | **.562** (9x) | 4 | 1/8 | 2-1/2 | 770862 | 40.50 | 770862-C3 | 46.40 | | |
| .062 (1/16) | **.625** (10x) | 3 | 1/8 | 2-1/2 | 951362 | 42.10 | 951362-C3 | 48.10 | 951362-C4 | 57.20 |
| .062 (1/16) | **.625** (10x) | 4 | 1/8 | 2-1/2 | 802662 | 45.40 | 802662-C3 | 51.30 | | |
| .062 (1/16) | **.750** (12x) | 3 | 1/8 | 2-1/2 | 34962 | 57.20 | 34962-C3 | 63.10 | 34962-C4 | 72.30 |
| .062 (1/16) | **.750** (12x) | 4 | 1/8 | 2-1/2 | 818062 | 59.60 | 818062-C3 | 65.50 | | |
| .062 (1/16) | **.950** (15x) | 3 | 1/8 | 2-1/2 | 35862 | 82.10 | 35862-C3 | 88.00 | 35862-C4 | 97.20 |
| .062 (1/16) | **.950** (15x) | 4 | 1/8 | 2-1/2 | 740362 | 84.50 | 740362-C3 | 90.40 | | |
| .065 | **.325** (5x) | 3 | 1/8 | 2-1/2 | 31865 | 29.40 | 31865-C3 | 35.30 | | |
| .065 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 12765 | 33.00 | 12765-C3 | 38.90 | 12765-C4 | 48.80 |
| .065 | **.650** (10x) | 3 | 1/8 | 2-1/2 | 951365 | 51.30 | 951365-C3 | 57.20 | | |
| .070 | **.281** (4x) | 3 | 1/8 | 2-1/2 | 888470 | 31.70 | 888470-C3 | 37.60 | | |
| .070 | **.375** (5x) | 3 | 1/8 | 2-1/2 | 31870 | 29.40 | 31870-C3 | 35.30 | 31870-C4 | 45.20 |
| .070 | **.375** (5x) | 4 | 1/8 | 2-1/2 | 834170 | 32.30 | 834170-C3 | 38.20 | | |

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# MINIATURE END MILLS

## Square – Long Flute (cont.)

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| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .070 | **.500** (7x) | 3 | 1/8 | 2-1/2 | 12770 | 33.00 | 12770-C3 | 38.90 | 12770-C4 | 48.50 |
| .070 | **.700** (10x) | 3 | 1/8 | 2-1/2 | 951370 | 51.30 | 951370-C3 | 57.20 | | |
| .070 | **.850** (12x) | 3 | 1/8 | 2-1/2 | 34970 | 57.90 | 34970-C3 | 63.80 | | |
| .075 | **.300** (4x) | 3 | 1/8 | 2-1/2 | 888475 | 32.30 | 888475-C3 | 38.20 | | |
| .075 | **.375** (5x) | 3 | 1/8 | 2-1/2 | 31875 | 29.40 | 31875-C3 | 35.30 | | |
| .075 | **.450** (6x) | 3 | 1/8 | 2-1/2 | 894275 | 32.00 | 894275-C3 | 37.90 | | |
| .075 | **.500** (7x) | 3 | 1/8 | 2-1/2 | 12775 | 33.00 | 12775-C3 | 38.90 | 12775-C4 | 48.50 |
| .075 | **.531** (7x) | 4 | 1/8 | 2-1/2 | 810375 | 35.00 | 810375-C3 | 40.90 | | |
| .075 | **.750** (10x) | 3 | 1/8 | 2-1/2 | 951375 | 51.30 | 951375-C3 | 57.20 | | |
| .075 | **.900** (12x) | 3 | 1/8 | 2-1/2 | 34975 | 57.90 | 34975-C3 | 63.80 | | |
| .078 (5/64) | **.312** (4x) | 3 | 1/8 | 2-1/2 | 888478 | 29.40 | 888478-C3 | 35.30 | 888478-C4 | 45.20 |
| .078 (5/64) | **.312** (4x) | 4 | 1/8 | 2-1/2 | 836978 | 31.70 | 836978-C3 | 37.60 | | |
| .078 (5/64) | **.406** (5x) | 3 | 1/8 | 2-1/2 | 31878 | 29.40 | 31878-C3 | 35.30 | 31878-C4 | 44.90 |
| .078 (5/64) | **.406** (5x) | 4 | 1/8 | 2-1/2 | 834178 | 31.70 | 834178-C3 | 37.60 | 834178-C4 | 47.20 |
| .078 (5/64) | **.475** (6x) | 3 | 1/8 | 2-1/2 | 894278 | 30.50 | 894278-C3 | 36.40 | | |
| .078 (5/64) | **.475** (6x) | 4 | 1/8 | 2-1/2 | 12578 | 33.00 | 12578-C3 | 38.90 | | |
| .078 (5/64) | **.550** (7x) | 3 | 1/8 | 2-1/2 | 897978 | 32.00 | 897978-C3 | 37.90 | 897978-C4 | 47.70 |
| .078 (5/64) | **.550** (7x) | 4 | 1/8 | 2-1/2 | 810378 | 33.90 | 810378-C3 | 39.90 | | |
| .078 (5/64) | **.625** (8x) | 3 | 1/8 | 2-1/2 | 33678 | 33.40 | 33678-C3 | 39.30 | 33678-C4 | 49.00 |
| .078 (5/64) | **.625** (8x) | 4 | 1/8 | 2-1/2 | 826878 | 36.40 | 826878-C3 | 42.40 | | |
| .078 (5/64) | **.800** (10x) | 3 | 1/8 | 2-1/2 | 951378 | 41.40 | 951378-C3 | 47.30 | | |
| .078 (5/64) | **.940** (12x) | 3 | 1/8 | 2-1/2 | 34978 | 57.20 | 34978-C3 | 63.10 | 34978-C4 | 72.30 |
| .078 (5/64) | **1.187** (15x) | 3 | 1/8 | 2-1/2 | 35878 | 82.10 | 35878-C3 | 88.00 | 35878-C4 | 97.90 |
| .080 | **.320** (4x) | 3 | 1/8 | 2-1/2 | 888480 | 29.90 | 888480-C3 | 35.80 | | |
| .080 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 31880 | 29.40 | 31880-C3 | 35.30 | | |
| .080 | **.406** (5x) | 4 | 1/8 | 2-1/2 | 834180 | 32.30 | 834180-C3 | 38.20 | | |
| .080 | **.750** (9x) | 3 | 1/8 | 2-1/2 | 12780 | 33.50 | 12780-C3 | 39.40 | 12780-C4 | 49.30 |
| .080 | **.960** (12x) | 3 | 1/8 | 2-1/2 | 34980 | 57.90 | 34980-C3 | 63.80 | | |
| .085 | **.425** (5x) | 3 | 1/8 | 2-1/2 | 31885 | 29.40 | 31885-C3 | 35.30 | | |
| .085 | **.750** (9x) | 3 | 1/8 | 2-1/2 | 12785 | 33.50 | 12785-C3 | 39.40 | 12785-C4 | 49.30 |
| .090 | **.450** (5x) | 3 | 1/8 | 2-1/2 | 31890 | 29.40 | 31890-C3 | 35.30 | | |
| .090 | **.450** (5x) | 4 | 1/8 | 2-1/2 | 834190 | 32.30 | 834190-C3 | 38.20 | | |
| .090 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 12790 | 33.40 | 12790-C3 | 39.30 | 12790-C4 | 49.20 |
| .090 | **.900** (10x) | 3 | 1/8 | 2-1/2 | 951390 | 51.30 | 951390-C3 | 57.20 | | |
| .090 | **1.080** (12x) | 3 | 1/8 | 2-1/2 | 34990 | 59.10 | 34990-C3 | 65.00 | | |
| .093 (3/32) | **.375** (4x) | 3 | 1/8 | 2-1/2 | 888493 | 29.40 | 888493-C3 | 35.30 | 888493-C4 | 44.90 |
| .093 (3/32) | **.375** (4x) | 4 | 1/8 | 2-1/2 | 836993 | 31.70 | 836993-C3 | 37.60 | | |
| .093 (3/32) | **.500** (5x) | 3 | 1/8 | 2-1/2 | 31893 | 29.40 | 31893-C3 | 35.30 | 31893-C4 | 44.90 |
| .093 (3/32) | **.500** (5x) | 4 | 1/8 | 2-1/2 | 834193 | 31.70 | 834193-C3 | 37.60 | 834193-C4 | 47.20 |
| .093 (3/32) | **.585** (6x) | 3 | 1/8 | 2-1/2 | 894293 | 30.50 | 894293-C3 | 36.40 | 894293-C4 | 46.30 |
| .093 (3/32) | **.585** (6x) | 4 | 1/8 | 2-1/2 | 12593 | 31.20 | 12593-C3 | 37.20 | | |
| .093 (3/32) | **.670** (7x) | 3 | 1/8 | 2-1/2 | 897993 | 32.00 | 897993-C3 | 37.90 | 897993-C4 | 47.50 |
| .093 (3/32) | **.670** (7x) | 4 | 1/8 | 2-1/2 | 810393 | 33.60 | 810393-C3 | 39.50 | | |
| .093 (3/32) | **.750** (8x) | 3 | 1/8 | 2-1/2 | 33693 | 33.40 | 33693-C3 | 39.30 | 33693-C4 | 49.00 |
| .093 (3/32) | **.750** (8x) | 4 | 1/8 | 2-1/2 | 826893 | 36.40 | 826893-C3 | 42.40 | | |
| .093 (3/32) | **.850** (9x) | 3 | 1/8 | 2-1/2 | 837893 | 39.10 | 837893-C3 | 45.00 | | |
| .093 (3/32) | **.950** (10x) | 3 | 1/8 | 2-1/2 | 951393 | 41.40 | 951393-C3 | 47.30 | | |
| .093 (3/32) | **1.125** (12x) | 3 | 1/8 | 2-1/2 | 34993 | 57.20 | 34993-C3 | 63.10 | 34993-C4 | 72.30 |
| .093 (3/32) | **1.400** (15x) | 3 | 1/8 | 3 | 35893 | 85.30 | 35893-C3 | 91.20 | 35893-C4 | 100.40 |

continued on next page

# MINIATURE END MILLS

## Square – Long Flute (cont.)

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SQUARE

| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| .095 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 31895 | 29.40 | 31895-C3 | 35.30 | | | |
| .095 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 12795 | 33.00 | 12795-C3 | 38.90 | 12795-C4 | 48.80 | |
| .095 | **.950** (10x) | 3 | 1/8 | 2-1/2 | 951395 | 51.30 | 951395-C3 | 57.20 | | | |
| .100 | **.400** (4x) | 3 | 1/8 | 2-1/2 | 888500 | 29.40 | 888500-C3 | 35.30 | | | |
| .100 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 31899 | 29.40 | 31899-C3 | 35.30 | 31899-C4 | 45.20 | |
| .100 | **.500** (5x) | 4 | 1/8 | 2-1/2 | 834200 | 31.70 | 834200-C3 | 37.60 | | | |
| .100 | **.600** (6x) | 3 | 1/8 | 2-1/2 | 894300 | 30.50 | 894300-C3 | 36.40 | | | |
| .100 | **.700** (7x) | 4 | 1/8 | 2-1/2 | 810400 | 33.30 | 810400-C3 | 39.20 | | | |
| .100 | **.750** (7.5x) | 3 | 1/8 | 2-1/2 | 12799 | 33.00 | 12799-C3 | 38.90 | 12799-C4 | 48.50 | |
| .100 | **.800** (8x) | 4 | 1/8 | 2-1/2 | 826900 | 36.10 | 826900-C3 | 42.00 | | | |
| .100 | **1.000** (10x) | 3 | 1/8 | 2-1/2 | 951600 | 51.30 | 951600-C3 | 57.20 | | | |
| .100 | **1.200** (12x) | 3 | 1/8 | 2-1/2 | 34999 | 57.90 | 34999-C3 | 63.80 | | | |
| .102 | **.510** (5x) | 4 | 1/8 | 2-1/2 | 834299 | 31.70 | 834299-C3 | 37.60 | | | NEW |
| .102 | **.816** (8x) | 4 | 1/8 | 2-1/2 | 826999 | 36.10 | 826999-C3 | 42.00 | | | NEW |
| .105 | **.530** (5x) | 3 | 1/8 | 2-1/2 | 31901 | 30.30 | 31901-C3 | 36.20 | | | |
| .109 (7/64) | **.437** (4x) | 3 | 1/8 | 2-1/2 | 888502 | 29.40 | 888502-C3 | 35.30 | | | |
| .109 (7/64) | **.570** (5x) | 3 | 1/8 | 2-1/2 | 31902 | 29.40 | 31902-C3 | 35.30 | 31902-C4 | 45.20 | |
| .109 (7/64) | **.570** (5x) | 4 | 1/8 | 2-1/2 | 834202 | 31.70 | 834202-C3 | 37.60 | | | |
| .109 (7/64) | **.680** (6x) | 3 | 1/8 | 2-1/2 | 894302 | 30.50 | 894302-C3 | 36.40 | | | |
| .109 (7/64) | **.790** (7x) | 3 | 1/8 | 2-1/2 | 898002 | 33.30 | 898002-C3 | 39.20 | | | |
| .109 (7/64) | **.900** (8x) | 3 | 1/8 | 2-1/2 | 33702 | 33.30 | 33702-C3 | 39.20 | | | |
| .109 (7/64) | **.900** (8x) | 4 | 1/8 | 2-1/2 | 826902 | 36.30 | 826902-C3 | 42.20 | | | |
| .109 (7/64) | **1.125** (10x) | 3 | 1/8 | 2-1/2 | 951602 | 58.10 | 951602-C3 | 64.00 | | | |
| .110 | **.570** (5x) | 3 | 1/8 | 2-1/2 | 31903 | 30.30 | 31903-C3 | 36.20 | | | |
| .115 | **.600** (5x) | 3 | 1/8 | 2-1/2 | 31904 | 30.30 | 31904-C3 | 36.20 | | | |
| .118 (3 mm) | **.475** (4x) | 3 | 1/8 | 2-1/2 | 888505 | 29.80 | 888505-C3 | 35.70 | | | |
| .118 (3 mm) | **.625** (5x) | 3 | 1/8 | 2-1/2 | 31905 | 29.80 | 31905-C3 | 35.70 | 31905-C4 | 45.30 | |
| .118 (3 mm) | **.625** (5x) | 4 | 1/8 | 2-1/2 | 834205 | 31.60 | 834205-C3 | 37.50 | | | |
| .118 (3 mm) | **.735** (6x) | 3 | 1/8 | 2-1/2 | 894305 | 30.50 | 894305-C3 | 36.40 | | | |
| .118 (3 mm) | **.840** (7x) | 3 | 1/8 | 2-1/2 | 898005 | 33.30 | 898005-C3 | 39.20 | | | |
| .118 (3 mm) | **.950** (8x) | 3 | 1/8 | 2-1/2 | 33705 | 33.60 | 33705-C3 | 39.50 | | | |
| .118 (3 mm) | **.950** (8x) | 4 | 1/8 | 2-1/2 | 826905 | 35.60 | 826905-C3 | 41.50 | | | |
| .118 (3 mm) | **1.187** (10x) | 3 | 1/8 | 2-1/2 | 951605 | 58.50 | 951605-C3 | 64.50 | | | |
| .120 | **.625** (5x) | 3 | 1/8 | 2-1/2 | 31906 | 30.70 | 31906-C3 | 36.60 | | | |

| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | **.500** (4x) | 3 | 1/8 | 2-1/2 | 888508 | 28.90 | 888508-C3 | 34.80 | 888508-C4 | 44.30 | |
| .125 (1/8) | **.500** (4x) | 3 | 1/8 | 2-1/2 | 888508 | 28.90 | 888508-C3 | 34.80 | 888508-C4 | 44.30 | |
| .125 (1/8) | **.500** (4x) | 4 | 1/8 | 2-1/2 | 837008 | 31.80 | 837008-C3 | 37.70 | | | |
| .125 (1/8) | **.625** (5x) | 3 | 1/8 | 2-1/2 | 31908 | 28.90 | 31908-C3 | 34.80 | 31908-C4 | 44.30 | |
| .125 (1/8) | **.625** (5x) | 4 | 1/8 | 2-1/2 | 834208 | 31.80 | 834208-C3 | 37.70 | 834208-C4 | 47.30 | |
| .125 (1/8) | **.750** (6x) | 3 | 1/8 | 2-1/2 | 894308 | 29.90 | 894308-C3 | 35.80 | 894308-C4 | 45.50 | |
| .125 (1/8) | **.750** (6x) | 4 | 1/8 | 2-1/2 | 12508 | 31.80 | 12508-C3 | 37.70 | | | |
| .125 (1/8) | **.875** (7x) | 3 | 1/8 | 2-1/2 | 898008 | 30.40 | 898008-C3 | 36.30 | 898008-C4 | 46.20 | NEW |
| .125 (1/8) | **.875** (7x) | 4 | 1/8 | 2-1/2 | 810408 | 33.60 | 810408-C3 | 39.50 | | | |
| .125 (1/8) | **1.000** (8x) | 3 | 1/8 | 2-1/2 | 33708 | 31.10 | 33708-C3 | 37.10 | 33708-C4 | 46.60 | |
| .125 (1/8) | **1.000** (8x) | 4 | 1/8 | 2-1/2 | 826908 | 34.30 | 826908-C3 | 40.20 | | | |

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# MINIATURE END MILLS

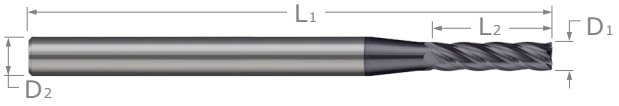
## Square – Long Flute (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .125 (1/8) | **1.125** (9x) | 3 | 1/8 | 2-1/2 | 837908 | 43.80 | 837908-C3 | 49.70 | | |
| .125 (1/8) | **1.250** (10x) | 3 | 1/8 | 2-1/2 | 951608 | 53.10 | 951608-C3 | 59.10 | 951608-C4 | 68.90 |
| .125 (1/8) | **1.250** (10x) | 4 | 1/8 | 2-1/2 | 802708 | 55.40 | 802708-C3 | 61.30 | | |
| .125 (1/8) | **1.500** (12x) | 3 | 1/8 | 3 | 35008 | 60.80 | 35008-C3 | 66.70 | 35008-C4 | 75.90 |
| .125 (1/8) | **1.500** (12x) | 4 | 1/8 | 3 | 818108 | 63.20 | 818108-C3 | 69.10 | | |
| .125 (1/8) | **1.875** (15x) | 3 | 1/8 | 3 | 35908 | 85.30 | 35908-C3 | 91.20 | 35908-C4 | 101.10 |
| .140 (9/64) | **.562** (4x) | 4 | 3/16 | 3 | 837009 | 31.80 | 837009-C3 | 38.30 | | |
| .140 (9/64) | **.750** (5x) | 4 | 3/16 | 3 | 31909 | 31.80 | 31909-C3 | 38.30 | | |
| .140 (9/64) | **.875** (6x) | 4 | 3/16 | 3 | 12509 | 34.30 | 12509-C3 | 40.90 | | |
| .140 (9/64) | **1.125** (8x) | 4 | 3/16 | 3 | 33709 | 56.40 | 33709-C3 | 62.70 | | |
| .140 (9/64) | **1.450** (10x) | 4 | 3/16 | 3 | 951609 | 66.60 | 951609-C3 | 73.30 | | |
| .156 (5/32) | **.625** (4x) | 4 | 3/16 | 3 | 888510 | 29.60 | 888510-C3 | 36.10 | | |
| .156 (5/32) | **.750** (5x) | 4 | 3/16 | 3 | 834210 | 29.60 | 834210-C3 | 36.10 | 834210-C4 | 47.40 |
| .156 (5/32) | **.937** (6x) | 3 | 3/16 | 3 | 894310 | 30.30 | 894310-C3 | 37.00 | | |
| .156 (5/32) | **1.000** (6x) | 4 | 3/16 | 3 | 12510 | 32.10 | 12510-C3 | 38.70 | 12510-C4 | 49.90 |
| .156 (5/32) | **1.093** (7x) | 4 | 3/16 | 3 | 898010 | 38.00 | 898010-C3 | 44.50 | | |
| .156 (5/32) | **1.250** (8x) | 4 | 3/16 | 3 | 33710 | 56.40 | 33710-C3 | 62.70 | | |
| .156 (5/32) | **1.570** (10x) | 4 | 3/16 | 3 | 951610 | 66.60 | 951610-C3 | 73.30 | | |
| .156 (5/32) | **1.875** (12x) | 4 | 3/16 | 4 | 35010 | 79.10 | 35010-C3 | 88.00 | 35010-C4 | 98.20 |
| .172 (11/64) | **.875** (5x) | 4 | 3/16 | 3 | 834211 | 32.40 | 834211-C3 | 39.00 | | |
| .172 (11/64) | **1.375** (8x) | 4 | 3/16 | 3 | 33711 | 60.20 | 33711-C3 | 66.80 | | |
| .187 (3/16) | **.750** (4x) | 4 | 3/16 | 3 | 888512 | 29.60 | 888512-C3 | 36.10 | 888512-C4 | 47.70 |
| .187 (3/16) | **1.000** (5x) | 4 | 3/16 | 3 | 834212 | 29.60 | 834212-C3 | 36.10 | 834212-C4 | 47.40 |
| .187 (3/16) | **1.156** (6x) | 3 | 3/16 | 3 | 894312 | 30.30 | 894312-C3 | 37.00 | | |
| .187 (3/16) | **1.125** (6x) | 4 | 3/16 | 3 | 12512 | 32.10 | 12512-C3 | 38.70 | 77012 | 49.90 |
| .187 (3/16) | **1.312** (7x) | 4 | 3/16 | 3 | 898012 | 38.00 | 898012-C3 | 44.50 | | |
| .187 (3/16) | **1.500** (8x) | 3 | 3/16 | 3 | 733612 | 54.00 | 733612-C3 | 60.60 | | |
| .187 (3/16) | **1.500** (8x) | 4 | 3/16 | 3 | 33712 | 56.40 | 33712-C3 | 62.70 | 33712-C4 | 74.20 |
| .187 (3/16) | **1.875** (10x) | 4 | 3/16 | 4 | 951612 | 66.80 | 951612-C3 | 75.70 | | |
| .187 (3/16) | **2.250** (12x) | 4 | 3/16 | 4 | 35012 | 79.10 | 35012-C3 | 88.00 | | |
| .218 (7/32) | **.875** (4x) | 4 | 1/4 | 4 | 888514 | 34.50 | 888514-C3 | 43.10 | | |
| .218 (7/32) | **1.125** (5x) | 4 | 1/4 | 4 | 834214 | 34.50 | 834214-C3 | 44.80 | | |
| .218 (7/32) | **1.750** (8x) | 4 | 1/4 | 4 | 33714 | 43.40 | 33714-C3 | 52.00 | | |
| .218 (7/32) | **2.187** (10x) | 4 | 1/4 | 4 | 951614 | 45.00 | 951614-C3 | 53.70 | | |
| .250 (1/4) | **1.000** (4x) | 4 | 1/4 | 4 | 888516 | 33.80 | 888516-C3 | 42.50 | | |
| .250 (1/4) | **1.250** (5x) | 4 | 1/4 | 4 | 834216 | 33.80 | 834216-C3 | 42.50 | 834216-C4 | 57.30 |
| .250 (1/4) | **1.500** (6x) | 3 | 1/4 | 4 | 894316 | 34.70 | 894316-C3 | 45.00 | | |
| .250 (1/4) | **1.500** (6x) | 4 | 1/4 | 4 | 12516 | 36.30 | 12516-C3 | 46.70 | 77016 | 59.80 |
| .250 (1/4) | **1.750** (7x) | 4 | 1/4 | 4 | 898016 | 43.40 | 898016-C3 | 52.00 | | |
| .250 (1/4) | **2.000** (8x) | 4 | 1/4 | 4 | 33716 | 60.30 | 33716-C3 | 70.50 | 33716-C4 | 83.80 |
| .250 (1/4) | **2.500** (10x) | 4 | 1/4 | 4 | 951616 | 72.50 | 951616-C3 | 82.70 | | |
| .250 (1/4) | **3.000** (12x) | 4 | 1/4 | 6 | 35016 | 86.90 | 35016-C3 | 98.50 | | |
| .312 (5/16) | **1.625** (5x) | 4 | 5/16 | 4 | 12520 | 52.40 | 12520-C3 | 62.80 | | |
| .375 (3/8) | **1.750** (5x) | 4 | 3/8 | 4 | 12524 | 55.70 | 12524-C3 | 71.50 | 12524-C4 | 85.00 |
| .375 (3/8) | **3.000** (8x) | 4 | 3/8 | 6 | 33724 | 111.40 | 33724-C3 | 125.70 | | |
| .500 (1/2) | **2.000** (4x) | 4 | 1/2 | 4 | 12532 | 78.50 | 12532-C3 | 95.70 | 12532-C4 | 113.60 |
| .500 (1/2) | **3.000** (6x) | 4 | 1/2 | 6 | 888532 | 152.20 | 888532-C3 | 171.60 | | |

# MINIATURE END MILLS

## Square – Long Flute – 5 Flute



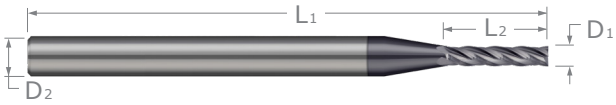



- **Long flute and long length design for deep cavities**
- Mills deep pockets • Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 5 FL | USD$ | 5 FL | USD$ |
| .020 (.5 mm) | **.100** (5x) | 1/8 | 2-1/2 | 707120 | 44.00 | 707120-C3 | 49.90 |
| .020 (.5 mm) | **.160** (8x) | 1/8 | 2-1/2 | 706920 | 45.30 | 706920-C3 | 51.20 |
| .031 (1/32) | **.156** (5x) | 1/8 | 2-1/2 | 707131 | 41.00 | 707131-C3 | 46.90 |
| .031 (1/32) | **.250** (8x) | 1/8 | 2-1/2 | 706931 | 42.10 | 706931-C3 | 48.10 |
| .062 (1/16) | **.312** (5x) | 1/8 | 2-1/2 | 707162 | 38.50 | 707162-C3 | 44.40 |
| .062 (1/16) | **.500** (8x) | 1/8 | 2-1/2 | 706962 | 39.00 | 706962-C3 | 44.90 |
| .078 (5/64) | **.406** (5x) | 1/8 | 2-1/2 | 707178 | 27.20 | 707178-C3 | 33.10 |
| .078 (5/64) | **.625** (8x) | 1/8 | 2-1/2 | 706978 | 39.00 | 706978-C3 | 44.90 |
| .093 (3/32) | **.500** (5x) | 1/8 | 2-1/2 | 707193 | 38.50 | 707193-C3 | 44.40 |
| .093 (3/32) | **.750** (8x) | 1/8 | 2-1/2 | 706993 | 39.00 | 706993-C3 | 44.90 |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 5 FL | USD$ | 5 FL | USD$ |
| .125 (1/8) | **.625** (5x) | 1/8 | 2-1/2 | 707208 | 38.50 | 707208-C3 | 44.40 |
| .125 (1/8) | **1.000** (8x) | 1/8 | 2-1/2 | 707008 | 38.50 | 707008-C3 | 44.40 |
| .187 (3/16) | **1.000** (5x) | 3/16 | 3 | 707212 | 40.60 | 707212-C3 | 47.20 |
| .187 (3/16) | **1.500** (8x) | 3/16 | 3 | 707012 | 41.20 | 707012-C3 | 47.90 |
| .250 (1/4) | **1.250** (5x) | 1/4 | 4 | 707216 | 49.50 | 707216-C3 | 58.10 |
| .250 (1/4) | **2.000** (8x) | 1/4 | 4 | 707016 | 50.40 | 707016-C3 | 59.10 |

# MINIATURE END MILLS

## Square – Long Flute – Metric






- **Long flute and long length design for deep cavities**
- All dimensions and tolerances in metric values
- Cutter diameter down to 0.5mm • Mills deep pockets • Center cutting
- Solid carbide • CNC ground in the USA

| | CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.00mm −.02mm | $L_2$ +.25mm −.00mm | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| NEW | .50 mm | 2.50 mm (5x) | 3 mm | 50 mm | 731711 | 32.10 | 731711-C3 | 38.00 |
| NEW | .50 mm | 4.00 mm (8x) | 3 mm | 50 mm | 744211 | 35.70 | 744211-C3 | 41.60 |
| NEW | 1.00 mm | 5.00 mm (5x) | 3 mm | 50 mm | 731722 | 30.40 | 731722-C3 | 36.30 |
| NEW | 1.00 mm | 8.00 mm (8x) | 3 mm | 50 mm | 744222 | 34.00 | 744222-C3 | 39.90 |
| NEW | 1.50 mm | 7.50 mm (5x) | 3 mm | 50 mm | 731733 | 29.30 | 731733-C3 | 35.20 |
| NEW | 1.50 mm | 12.00 mm (8x) | 3 mm | 50 mm | 744233 | 32.90 | 744233-C3 | 38.80 |
| NEW | 2.00 mm | 10.00 mm (5x) | 3 mm | 50 mm | 731745 | 29.30 | 731745-C3 | 35.20 |
| NEW | 2.00 mm | 16.00 mm (8x) | 3 mm | 50 mm | 744245 | 32.90 | 744245-C3 | 38.80 |
| NEW | 3.00 mm | 15.00 mm (5x) | 3 mm | 50 mm | 731757 | 29.30 | 731757-C3 | 35.20 |
| NEW | 3.00 mm | 24.00 mm (8x) | 3 mm | 50 mm | 744257* | 32.90 | 744257-C3* | 38.80 |
| | $D_1$ +.00mm −.04mm | $L_2$ +.75mm −.00mm | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| NEW | 4.00 mm | 20.00 mm (5x) | 4 mm | 63 mm | 731761 | 26.50 | 731761-C3 | 32.40 |
| NEW | 4.00 mm | 32.00 mm (8x) | 4 mm | 63 mm | 744261 | 30.10 | 744261-C3 | 36.00 |
| NEW | 5.00 mm | 25.00 mm (5x) | 5 mm | 63 mm | 731764 | 28.00 | 731764-C3 | 33.90 |
| NEW | 5.00 mm | 40.00 mm (8x) | 5 mm | 75 mm | 744264 | 31.70 | 744264-C3 | 37.60 |
| NEW | 6.00 mm | 30.00 mm (5x) | 6 mm | 63 mm | 731766 | 35.70 | 731766-C3 | 41.70 |
| NEW | 6.00 mm | 48.00 mm (8x) | 6 mm | 100 mm | 744266 | 39.30 | 744266-C3 | 45.30 |
| NEW | 8.00 mm | 40.00 mm (5x) | 8 mm | 75 mm | 731770 | 45.00 | 731770-C3 | 51.00 |
| NEW | 8.00 mm | 64.00 mm (8x) | 8 mm | 100 mm | 744270 | 48.70 | 744270-C3 | 54.70 |
| NEW | 10.00 mm | 50.00 mm (5x) | 10 mm | 100 mm | 731773 | 73.30 | 731773-C3 | 79.30 |
| NEW | 10.00 mm | 80.00 mm (8x) | 10 mm | 125 mm | 744273 | 76.90 | 744273-C3 | 82.90 |
| NEW | 12.00 mm | 60.00 mm (5x) | 12 mm | 100 mm | 731776 | 104.80 | 731776-C3 | 110.80 |
| NEW | 12.00 mm | 96.00 mm (8x) | 12 mm | 150 mm | 744276 | 108.50 | 744276-C3 | 114.50 |

*D1 +.000 mm / -.040 mm

# MINIATURE END MILLS

## Square – Deburring End Mill




**End Mill Tolerances with Bur-Style Geometry!**

SQUARE

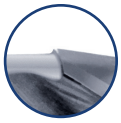
- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Bur geometry is optimized for removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | RIGHT HAND TEETH | LEFT HAND TEETH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.020''}_{-.000''}$ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .015 (1/64) | **.045** (3x) | 6 | 3 | 1/8 | 2-1/2 | 60715 | 40.20 | 60715-C3 | 46.10 |
| .031 (1/32) | **.093** (3x) | 6 | 3 | 1/8 | 2-1/2 | 60731 | 30.70 | 60731-C3 | 36.60 |
| .047 (3/64) | **.141** (3x) | 8 | 4 | 1/8 | 2-1/2 | 60747 | 29.70 | 60747-C3 | 35.60 |
| .062 (1/16) | **.186** (3x) | 8 | 4 | 1/8 | 2-1/2 | 60762 | 29.70 | 60762-C3 | 35.60 |
| .078 (5/64) | **.234** (3x) | 10 | 5 | 1/8 | 2-1/2 | 60778 | 30.20 | 60778-C3 | 36.10 |
| .093 (3/32) | **.279** (3x) | 12 | 6 | 1/8 | 2-1/2 | 60793 | 30.20 | 60793-C3 | 36.10 |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .125 (1/8) | **.375** (3x) | 14 | 7 | 1/8 | 2-1/2 | 60808 | 28.00 | 60808-C3 | 33.90 |
| .187 (3/16) | **.562** (3x) | 16 | 8 | 3/16 | 2-1/2 | 60812 | 51.10 | 60812-C3 | 57.70 |
| .250 (1/4) | **.750** (3x) | 18 | 9 | 1/4 | 2-1/2 | 60816 | 59.60 | 60816-C3 | 67.70 |

# MINIATURE END MILLS

## Square – Long Reach, Standard Flute



Reduced Neck Diameter to Avoid Heeling

• Length of cut = 3x diameter • Center cutting • Solid carbide • CNC ground in the USA



| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIA. | OAL | | UNCOATED | | | AlTiN COATED | | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | $L_2$ +.010" −.000" | $L_3$ +.010" −.000" | $D_2$ | $L_1$ | | 2 FL | 4FL | USD$ | 2FL | 4FL | USD$ | 4 FL | USD$ |
| .005 | .015 | **.025** (5x) | 1/8 | 1-1/2 | | 944505 | 956805 | 59.00 | | | | | |
| .005 | .015 | **.040** (8x) | 1/8 | 1-1/2 | | 76205 | 76405 | 59.00 | | | | | |
| .008 | .024 | **.040** (5x) | 1/8 | 1-1/2 | | 944508 | 956808 | 59.00 | | | | | |
| .008 | .024 | **.065** (8x) | 1/8 | 1-1/2 | | 76208 | 76408 | 59.00 | | | | | |
| .010 | .030 | **.050** (5x) | 1/8 | 1-1/2 | | 944510 | 956810 | 56.40 | 944510-C3 | 956810-C3 | 62.30 | | |
| .010 | .030 | **.080** (8x) | 1/8 | 1-1/2 | | 76210 | 76410 | 56.40 | 76210-C3 | 76410-C3 | 62.30 | | |
| .010 | .030 | **.100** (10x) | 1/8 | 1-1/2 | | | 846110 | 59.60 | | 846110-C3 | 65.50 | | |
| .010 | .030 | **.125** (12x) | 1/8 | 1-1/2 | | 952010 | 992510 | 59.60 | 952010-C3 | 992510-C3 | 65.50 | | |
| .015 (1/64) | .045 | **.078** (5x) | 1/8 | 1-1/2 | | 944515 | 956815 | 45.50 | 944515-C3 | 956815-C3 | 51.40 | | |
| .015 (1/64) | .045 | **.093** (6x) | 1/8 | 1-1/2 | | | 802415 | 45.50 | | 802415-C3 | 51.40 | | |
| .015 (1/64) | .045 | **.109** (7x) | 1/8 | 1-1/2 | | | 896815 | 45.50 | | 896815-C3 | 51.40 | | |
| .015 (1/64) | .045 | **.128** (8x) | 1/8 | 1-1/2 | | 76215 | 76415 | 45.50 | 76215-C3 | 76415-C3 | 51.40 | | |
| .015 (1/64) | .045 | **.156** (10x) | 1/8 | 1-1/2 | | 849615 | 846115 | 47.40 | | 846115-C3 | 53.40 | | |
| .015 (1/64) | .045 | **.187** (12x) | 1/8 | 1-1/2 | | 952015 | 992515 | 47.40 | 952015-C3 | 992515-C3 | 53.40 | | |
| .020 (.5 mm) | .060 | **.100** (5x) | 1/8 | 1-1/2 | | 944520 | 956820 | 43.50 | 944520-C3 | 956820-C3 | 49.40 | 956820-C4 | 58.40 |
| .020 (.5 mm) | .060 | **.100** (5x) | 1/8 | 2-1/2 | **LONG!** | | 736120 | 48.50 | | 736120-C3 | 54.40 | | |
| .020 (.5 mm) | .060 | **.120** (6x) | 1/8 | 1-1/2 | | | 802420 | 43.50 | | 802420-C3 | 49.40 | | |
| .020 (.5 mm) | .060 | **.140** (7x) | 1/8 | 1-1/2 | | | 896820 | 43.50 | | 896820-C3 | 49.40 | | |
| .020 (.5 mm) | .060 | **.170** (8x) | 1/8 | 1-1/2 | | 76220 | 76420 | 43.50 | 76220-C3 | 76420-C3 | 49.40 | 76420-C4 | 58.40 |
| .020 (.5 mm) | .060 | **.160** (8x) | 1/8 | 2-1/2 | **LONG!** | | 735520 | 48.50 | | 735520-C3 | 54.40 | | |
| .020 (.5 mm) | .060 | **.200** (10x) | 1/8 | 1-1/2 | | 849620 | 846120 | 45.70 | | 846120-C3 | 51.60 | | |
| .020 (.5 mm) | .060 | **.250** (12x) | 1/8 | 1-1/2 | | 952020 | 992520 | 45.70 | 952020-C3 | 992520-C3 | 51.60 | | |
| .025 | .075 | **.125** (5x) | 1/8 | 1-1/2 | | 944525 | 956825 | 41.90 | 944525-C3 | 956825-C3 | 47.90 | | |
| .025 | .075 | **.150** (6x) | 1/8 | 1-1/2 | | | 802425 | 41.90 | | 802425-C3 | 47.90 | | |
| .025 | .075 | **.213** (8x) | 1/8 | 1-1/2 | | 76225 | 76425 | 41.90 | 76225-C3 | 76425-C3 | 47.90 | | |
| .025 | .075 | **.312** (12x) | 1/8 | 1-1/2 | | 952025 | 992525 | 43.40 | 952025-C3 | 992525-C3 | 49.30 | | |
| .030 | .090 | **.156** (5x) | 1/8 | 1-1/2 | | 944530 | 956830 | 41.90 | 944530-C3 | 956830-C3 | 47.90 | | |
| .030 | .090 | **.270** (9x) | 1/8 | 1-1/2 | | 76230 | 76430 | 41.90 | 76230-C3 | 76430-C3 | 47.90 | | |
| .030 | .090 | **.375** (12x) | 1/8 | 1-1/2 | | 952030 | 992530 | 43.40 | 952030-C3 | 992530-C3 | 49.30 | | |
| .031 (1/32) | .093 | **.156** (5x) | 1/8 | 1-1/2 | | 944531 | 956831 | 41.90 | 944531-C3 | 956831-C3 | 47.90 | 956831-C4 | 56.90 |
| .031 (1/32) | .093 | **.156** (5x) | 1/8 | 2-1/2 | **LONG!** | | 736131 | 47.00 | | 736131-C3 | 52.90 | | |
| .031 (1/32) | .093 | **.187** (6x) | 1/8 | 1-1/2 | | 757931 | 802431 | 41.90 | | 802431-C3 | 47.90 | | |
| .031 (1/32) | .093 | **.218** (7x) | 1/8 | 1-1/2 | | | 896831 | 41.90 | | 896831-C3 | 47.90 | | |
| .031 (1/32) | .093 | **.250** (8x) | 1/8 | 1-1/2 | | 960831 | 972231 | 41.90 | | 972231-C3 | 47.90 | | |
| .031 (1/32) | .093 | **.279** (9x) | 1/8 | 1-1/2 | | 76231 | 76431 | 41.90 | 76231-C3 | 76431-C3 | 47.90 | 76431-C4 | 56.90 |
| .031 (1/32) | .093 | **.281** (9x) | 1/8 | 2-1/2 | **LONG!** | | 735331 | 47.00 | | 735331-C3 | 52.90 | | |
| .031 (1/32) | .093 | **.312** (10x) | 1/8 | 1-1/2 | | | 846131 | 43.40 | | 846131-C3 | 49.30 | | |
| .031 (1/32) | .093 | **.375** (12x) | 1/8 | 1-1/2 | | 952031 | 992531 | 43.40 | 952031-C3 | 992531-C3 | 49.30 | | |
| .031 (1/32) | .093 | **.470** (15x) | 1/8 | 1-1/2 | | 829131 | 838631 | 45.80 | 829131-C3 | 838631-C3 | 51.70 | | |
| .035 (.9 mm) | .105 | **.187** (5x) | 1/8 | 1-1/2 | | 944535 | 956835 | 41.90 | 944535-C3 | 956835-C3 | 47.90 | | |
| .035 (.9 mm) | .105 | **.218** (6x) | 1/8 | 1-1/2 | | | 802435 | 41.90 | | 802435-C3 | 47.90 | | |
| .035 (.9 mm) | .105 | **.315** (9x) | 1/8 | 1-1/2 | | 76235 | 76435 | 41.90 | 76235-C3 | 76435-C3 | 47.90 | 76435-C4 | 56.90 |
| .035 (.9 mm) | .105 | **.425** (12x) | 1/8 | 1-1/2 | | 952035 | 992535 | 43.40 | 952035-C3 | 992535-C3 | 49.30 | | |

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# MINIATURE END MILLS

## Square – Long Reach, Standard Flute (cont.)

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SQUARE

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIA. | OAL | | UNCOATED | | | AlTiN COATED | | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | | 2 FL | 4FL | USD$ | 2FL | 4FL | USD$ | 4 FL | USD$ |
| .039 (1 mm) | .117 | **.203** (5x) | 1/8 | 1-1/2 | | 944539 | 956839 | 41.90 | 944539-C3 | 956839-C3 | 47.90 | | |
| .039 (1 mm) | .117 | **.240** (6x) | 1/8 | 1-1/2 | | | 802439 | 41.90 | | 802439-C3 | 47.90 | | |
| .039 (1 mm) | .117 | **.325** (8x) | 1/8 | 1-1/2 | | 960839 | 972239 | 41.90 | 960839-C3 | 972239-C3 | 47.90 | | |
| .039 (1 mm) | .117 | **.400** (10x) | 1/8 | 1-1/2 | | | 846139 | 43.40 | | 846139-C3 | 49.30 | | |
| .039 (1 mm) | .117 | **.480** (12x) | 1/8 | 1-1/2 | | 952039 | 992539 | 43.40 | | 992539-C3 | 49.30 | | |
| .040 | .120 | **.203** (5x) | 1/8 | 1-1/2 | | 944540 | 956840 | 41.90 | 944540-C3 | 956840-C3 | 47.90 | | |
| .040 | .120 | **.281** (7x) | 1/8 | 1-1/2 | | | 896840 | 41.90 | | 896840-C3 | 47.90 | | |
| .040 | .120 | **.360** (9x) | 1/8 | 1-1/2 | | 76240 | 76440 | 41.90 | 76240-C3 | 76440-C3 | 47.90 | 76440-C4 | 56.90 |
| .040 | .120 | **.400** (10x) | 1/8 | 1-1/2 | | | 846140 | 43.40 | | 846140-C3 | 49.30 | | |
| .040 | .120 | **.480** (12x) | 1/8 | 1-1/2 | | 952040 | 992540 | 43.40 | 952040-C3 | 992540-C3 | 49.30 | | |
| .045 | .135 | **.225** (5x) | 1/8 | 1-1/2 | | 944545 | 956845 | 41.20 | 944545-C3 | 956845-C3 | 47.10 | | |
| .045 | .135 | **.405** (9x) | 1/8 | 1-1/2 | | 76245 | 76445 | 41.20 | 76245-C3 | 76445-C3 | 47.10 | | |
| .047 (3/64) | .141 | **.250** (5x) | 1/8 | 1-1/2 | | 944547 | 956847 | 41.20 | 944547-C3 | 956847-C3 | 47.10 | | |
| .047 (3/64) | .141 | **.281** (6x) | 1/8 | 1-1/2 | | | 802447 | 41.90 | | 802447-C3 | 47.90 | | |
| .047 (3/64) | .141 | **.328** (7x) | 1/8 | 1-1/2 | | 898747 | 896847 | 41.20 | | 896847-C3 | 47.10 | | |
| .047 (3/64) | .141 | **.375** (8x) | 1/8 | 1-1/2 | | | 972247 | 41.20 | | 972247-C3 | 47.10 | | |
| .047 (3/64) | .141 | **.423** (9x) | 1/8 | 1-1/2 | | 76247 | 76447 | 41.20 | 76247-C3 | 76447-C3 | 47.10 | | |
| .047 (3/64) | .141 | **.480** (10x) | 1/8 | 1-1/2 | | | 846147 | 42.40 | | 846147-C3 | 48.30 | | |
| .047 (3/64) | .141 | **.570** (12x) | 1/8 | 1-1/2 | | 952047 | 992547 | 42.40 | 952047-C3 | 992547-C3 | 48.30 | | |
| .047 (3/64) | .141 | **.710** (15x) | 1/8 | 2-1/2 | | | 838647 | 46.10 | | 838647-C3 | 52.00 | | |
| .050 | .150 | **.250** (5x) | 1/8 | 1-1/2 | | 944550 | 956850 | 41.20 | 944550-C3 | 956850-C3 | 47.10 | | |
| .050 | .150 | **.400** (8x) | 1/8 | 1-1/2 | | 960850 | 972250 | 41.20 | 960850-C3 | 972250-C3 | 47.10 | | |
| .050 | .150 | **.500** (10x) | 1/8 | 1-1/2 | | 76250 | 76450 | 42.40 | 76250-C3 | 76450-C3 | 48.30 | 76450-C4 | 57.30 |
| .050 | .150 | **.600** (12x) | 1/8 | 2 | | 952050 | 992550 | 45.00 | 952050-C3 | 992550-C3 | 51.00 | | |
| .055 (1.4 mm) | .165 | **.275** (5x) | 1/8 | 1-1/2 | | 944555 | 956855 | 42.10 | 944555-C3 | 956855-C3 | 48.10 | | |
| .055 (1.4 mm) | .165 | **.500** (9x) | 1/8 | 1-1/2 | | 76255 | 76455 | 42.10 | 76255-C3 | 76455-C3 | 48.10 | | |
| .055 (1.4 mm) | .165 | **.660** (12x) | 1/8 | 2 | | 952055 | 992555 | 44.80 | | 992555-C3 | 50.80 | | |
| .060 | .180 | **.312** (5x) | 1/8 | 1-1/2 | | 944560 | 956860 | 41.20 | 944560-C3 | 956860-C3 | 47.10 | | |
| .060 | .180 | **.375** (6x) | 1/8 | 1-1/2 | | | 802460 | 41.20 | | 802460-C3 | 47.10 | | |
| .060 | .180 | **.500** (8x) | 1/8 | 1-1/2 | | 76260 | 76460 | 41.20 | 76260-C3 | 76460-C3 | 47.10 | | |
| .060 | .180 | **.625** (10x) | 1/8 | 2 | | | 846160 | 42.40 | | 846160-C3 | 48.30 | | |
| .060 | .180 | **.720** (12x) | 1/8 | 2 | | 952060 | 992560 | 42.40 | 952060-C3 | 992560-C3 | 48.30 | | |
| .062 (1/16) | .186 | **.312** (5x) | 1/8 | 1-1/2 | | 944562 | 956862 | 41.20 | 944562-C3 | 956862-C3 | 47.10 | 956862-C4 | 56.20 |
| .062 (1/16) | .186 | **.312** (5x) | 1/8 | 2-1/2 | **LONG!** | | 736162 | 46.30 | | 736162-C3 | 52.20 | | |
| .062 (1/16) | .186 | **.375** (6x) | 1/8 | 1-1/2 | | 736662 | 802462 | 41.20 | | 802462-C3 | 47.10 | | |
| .062 (1/16) | .186 | **.437** (7x) | 1/8 | 1-1/2 | | | 896862 | 41.20 | | 896862-C3 | 47.10 | | |
| .062 (1/16) | .186 | **.500** (8x) | 1/8 | 1-1/2 | | 76262 | 76462 | 41.20 | 76262-C3 | 76462-C3 | 47.10 | 76462-C4 | 56.20 |
| .062 (1/16) | .186 | **.500** (8x) | 1/8 | 2-1/2 | **LONG!** | | 735562 | 46.30 | | 735562-C3 | 52.20 | | |
| .062 (1/16) | .186 | **.562** (9x) | 1/8 | 2 | | | 758162 | 42.40 | | 758162-C3 | 48.30 | | |
| .062 (1/16) | .186 | **.625** (10x) | 1/8 | 2 | | 849662 | 846162 | 42.40 | 849662-C3 | 846162-C3 | 48.30 | | |
| .062 (1/16) | .186 | **.750** (12x) | 1/8 | 2 | | 952062 | 992562 | 42.40 | 952062-C3 | 992562-C3 | 48.30 | | |
| .062 (1/16) | .186 | **.950** (15x) | 1/8 | 2 | | 829162 | 838662 | 45.00 | 829162-C3 | 838662-C3 | 51.00 | | |
| .065 | .195 | **.500** (8x) | 1/8 | 1-1/2 | | 76265 | 76465 | 41.20 | 76265-C3 | 76465-C3 | 47.10 | | |
| .070 | .210 | **.375** (5x) | 1/8 | 1-1/2 | | | 956770 | 41.20 | | 956770-C3 | 47.10 | | |
| .070 | .210 | **.500** (7x) | 1/8 | 1-1/2 | | 76270 | 76470 | 41.20 | 76270-C3 | 76470-C3 | 47.10 | | |
| .070 | .210 | **.850** (12x) | 1/8 | 2 | | 952070 | 992570 | 42.40 | 952070-C3 | 992570-C3 | 48.30 | | |

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# MINIATURE END MILLS

## Square – Long Reach, Standard Flute (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIA. | OAL | | UNCOATED | | | AlTiN COATED | | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | $D_2$ | $L_1$ | | 2 FL | 4FL | USD$ | 2FL | 4FL | USD$ | 4 FL | USD$ |
| .075 | .225 | **.500** (7x) | 1/8 | 1-1/2 | | 76275 | 76475 | 41.20 | 76275-C3 | 76475-C3 | 47.10 | | |
| .075 | .225 | **.750** (10x) | 1/8 | 2 | | | 846175 | 43.30 | | 846175-C3 | 49.20 | | |
| .078 (5/64) | .234 | **.406** (5x) | 1/8 | 1-1/2 | | | 956878 | 41.20 | | 956878-C3 | 47.10 | | |
| .078 (5/64) | .234 | **.475** (6x) | 1/8 | 2-1/2 | **LONG!** | | 735978 | 46.30 | | 735978-C3 | 52.20 | | |
| .078 (5/64) | .234 | **.500** (6x) | 1/8 | 1-1/2 | | 76278 | 76478 | 41.20 | 76278-C3 | 76478-C3 | 47.10 | 76478-C4 | 56.20 |
| .078 (5/64) | .234 | **.550** (7x) | 1/8 | 1-1/2 | | | 896878 | 41.20 | | 896878-C3 | 47.10 | | |
| .078 (5/64) | .234 | **.625** (8x) | 1/8 | 2 | | 960878 | 972278 | 41.30 | | 972278-C3 | 47.20 | | |
| .078 (5/64) | .234 | **.800** (10x) | 1/8 | 2 | | 849678 | 846178 | 42.40 | | 846178-C3 | 48.30 | | |
| .078 (5/64) | .234 | **.940** (12x) | 1/8 | 2 | | 952078 | 992578 | 42.40 | 952078-C3 | 992578-C3 | 48.30 | | |
| .078 (5/64) | .234 | **1.187** (15x) | 1/8 | 2-1/2 | | | 838678 | 46.10 | | 838678-C3 | 52.00 | | |
| .080 | .240 | **.500** (6x) | 1/8 | 1-1/2 | | 76280 | 76480 | 41.20 | 76280-C3 | 76480-C3 | 47.10 | | |
| .080 | .240 | **.960** (12x) | 1/8 | 2 | | 952080 | 992580 | 42.40 | 952080-C3 | 992580-C3 | 48.30 | | |
| .085 | .255 | **.500** (6x) | 1/8 | 1-1/2 | | 76285 | 76485 | 41.20 | 76285-C3 | 76485-C3 | 47.10 | | |
| .085 | .255 | **.875** (10x) | 1/8 | 2 | | | 846185 | 42.40 | | 846185-C3 | 48.30 | | |
| .090 | .270 | **.625** (7x) | 1/8 | 1-1/2 | | 76290 | 76490 | 41.20 | 76290-C3 | 76490-C3 | 47.10 | | |
| .090 | .270 | **1.080** (12x) | 1/8 | 2 | | 952090 | 992590 | 42.40 | 952090-C3 | 992590-C3 | 48.30 | | |
| .093 (3/32) | .279 | **.500** (5x) | 1/8 | 1-1/2 | | 944593 | 956893 | 41.20 | 944593-C3 | 956893-C3 | 47.10 | 956893-C4 | 56.20 |
| .093 (3/32) | .279 | **.500** (5x) | 1/8 | 2-1/2 | **LONG!** | | 736193 | 46.30 | | 736193-C3 | 52.20 | | |
| .093 (3/32) | .279 | **.585** (6x) | 1/8 | 1-1/2 | | 757993 | 802493 | 41.20 | | 802493-C3 | 47.10 | | |
| .093 (3/32) | .279 | **.625** (7x) | 1/8 | 1-1/2 | | 76293 | 76493 | 41.20 | 76293-C3 | 76493-C3 | 47.10 | 76493-C4 | 56.20 |
| .093 (3/32) | .279 | **.670** (7x) | 1/8 | 3 | **LONG!** | | 735793 | 46.30 | | 735793-C3 | 52.20 | | |
| .093 (3/32) | .279 | **.750** (8x) | 1/8 | 2 | | 972293 | 960893 | 42.40 | | 960893-C3 | 48.30 | | |
| .093 (3/32) | .279 | **.950** (10x) | 1/8 | 2 | | 849693 | 846193 | 42.40 | 849693-C3 | 846193-C3 | 48.30 | | |
| .093 (3/32) | .279 | **1.125** (12x) | 1/8 | 2 | | 952093 | 992593 | 42.40 | 952093-C3 | 992593-C3 | 48.30 | | |
| .093 (3/32) | .279 | **1.400** (15x) | 1/8 | 2-1/2 | | 829193 | 838693 | 45.00 | 829193-C3 | 838693-C3 | 51.00 | | |
| .095 | .285 | **.625** (6x) | 1/8 | 1-1/2 | | 76295 | 76495 | 41.20 | 76295-C3 | 76495-C3 | 47.10 | | |
| .100 | .300 | **.625** (6x) | 1/8 | 1-1/2 | | 76300 | 76500 | 41.20 | 76300-C3 | 76500-C3 | 47.10 | | |
| .100 | .300 | **.800** (8x) | 1/8 | 2 | | | 972300 | 42.40 | | 972300-C3 | 48.30 | | |
| .100 | .300 | **1.200** (12x) | 1/8 | 2-1/2 | | 952100 | 992600 | 42.40 | 952100-C3 | 992600-C3 | 48.30 | | |
| .109 (7/64) | .327 | **.570** (5x) | 1/8 | 1-1/2 | | 944602 | 956902 | 41.20 | | 956902-C3 | 47.10 | | |
| .109 (7/64) | .327 | **.900** (8x) | 1/8 | 2 | | 960902 | 972302 | 41.20 | | 972302-C3 | 47.10 | | |
| .109 (7/64) | .327 | **1.125** (10x) | 1/8 | 2 | | | 846202 | 42.40 | | 846202-C3 | 48.30 | | |
| .118 (3 mm) | .354 | **.625** (5x) | 1/8 | 1-1/2 | | 944605 | 956905 | 41.20 | 944605-C3 | 956905-C3 | 47.10 | | |
| .118 (3 mm) | .354 | **.735** (6x) | 1/8 | 2 | | | 802505 | 41.20 | | 802505-C3 | 47.10 | | |
| .118 (3 mm) | .354 | **.950** (8x) | 1/8 | 2 | | 960905 | 972305 | 41.20 | 960905-C3 | 972305-C3 | 47.10 | | |
| .118 (3 mm) | .354 | **1.187** (10x) | 1/8 | 2-1/2 | | | 846205 | 43.30 | | 846205-C3 | 49.20 | | |

| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | $D_2$ | $L_1$ | 2 FL | 4FL | USD$ | 2FL | 4FL | USD$ | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .375 | **.625** (5x) | 1/8 | 1-1/2 | 944608 | 956908 | 41.20 | 944608-C3 | 956908-C3 | 47.10 | 956908-C4 | 56.20 |
| .125 (1/8) | .375 | **.750** (6x) | 1/8 | 2 | 76308 | 802508 | 41.20 | | 802508-C3 | 47.10 | | |
| .125 (1/8) | .375 | **.875** (7x) | 1/8 | 2-1/2 | | 802308 | 44.60 | | 802308-C3 | 50.60 | | |
| .125 (1/8) | .375 | **1.000** (8x) | 1/8 | 2 | 960908 | 972308 | 41.20 | 960908-C3 | 972308-C3 | 47.10 | 972308-C4 | 59.80 |
| .125 (1/8) | .375 | **1.250** (10x) | 1/8 | 2-1/2 | 849708 | 846208 | 44.60 | 849708-C3 | 846208-C3 | 50.60 | | |
| .125 (1/8) | .375 | **1.500** (12x) | 1/8 | 2-1/2 | 952108 | 992608 | 44.60 | 952108-C3 | 992608-C3 | 50.60 | | |
| .125 (1/8) | .375 | **1.875** (15x) | 1/8 | 3 | 829208 | 838708 | 47.60 | 829208-C3 | 838708-C3 | 53.60 | | |
| .140 (9/64) | .422 | **.750** (5x) | 3/16 | 2 | 944609 | 956909 | 48.60 | | 956909-C3 | 55.20 | | |
| .140 (9/64) | .425 | **.875** (6x) | 3/16 | 2 | | 802509 | 48.60 | | 802509-C3 | 54.80 | | |

continued on next page

# MINIATURE END MILLS

## Square – Long Reach, Standard Flute (cont.)

continued from previous page



| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIA. | OAL | UNCOATED | | | AlTiN COATED | | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | 4FL | USD$ | 2FL | 4FL | USD$ | 4 FL | USD$ |
| .140 (9/64) | .425 | **1.000** (7x) | 3/16 | 2-1/2 | | 802309 | 48.60 | | 802309-C3 | 55.20 | | |
| .140 (9/64) | .422 | **1.125** (8x) | 3/16 | 2-1/2 | 960909 | 972309 | 48.60 | | 972309-C3 | 55.20 | | |
| .140 (9/64) | .425 | **1.450** (10x) | 3/16 | 3 | | 846209 | 50.90 | | 846209-C3 | 57.50 | | |
| .156 (5/32) | .469 | **.750** (5x) | 3/16 | 2 | 944610 | 956910 | 48.60 | | 956910-C3 | 55.20 | | |
| .156 (5/32) | .470 | **.937** (6x) | 3/16 | 2 | | 802510 | 48.60 | | 802510-C3 | 54.80 | | |
| .156 (5/32) | .470 | **1.093** (7x) | 3/16 | 2-1/2 | | 802310 | 48.60 | | 802310-C3 | 55.20 | | |
| .156 (5/32) | .469 | **1.250** (8x) | 3/16 | 2-1/2 | 960910 | 972310 | 48.60 | | 972310-C3 | 55.20 | | |
| .156 (5/32) | .470 | **1.570** (10x) | 3/16 | 3 | | 846210 | 50.90 | | 846210-C3 | 57.50 | | |
| .187 (3/16) | .562 | **1.000** (5x) | 3/16 | 2 | 944612 | 956912 | 48.60 | 944612-C3 | 956912-C3 | 55.20 | | |
| .187 (3/16) | .562 | **1.500** (8x) | 3/16 | 2-1/2 | 960912 | 972312 | 48.60 | 960912-C3 | 972312-C3 | 55.20 | | |
| .187 (3/16) | .562 | **1.875** (10x) | 3/16 | 3 | 849712 | 846212 | 50.90 | 849712-C3 | 846212-C3 | 57.50 | | |
| .250 (1/4) | .750 | **1.250** (5x) | 1/4 | 2-1/2 | 944616 | 956916 | 54.40 | 944616-C3 | 956916-C3 | 63.30 | | |
| .250 (1/4) | .750 | **2.000** (8x) | 1/4 | 4 | 960916 | 972316 | 54.40 | 960916-C3 | 972316-C3 | 64.60 | | |
| .250 (1/4) | .750 | **3.000** (12x) | 1/4 | 6 | 952116 | 992616 | 63.00 | | 992616-C3 | 74.60 | | |
| .375 (3/8) | 1.125 | **2.000** (5x) | 3/8 | 4 | | 956924 | 57.00 | | 956924-C3 | 69.20 | | |
| .375 (3/8) | 1.125 | **3.000** (8x) | 3/8 | 4 | | 972324 | 57.00 | | 972324-C3 | 72.80 | | |

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# MINIATURE END MILLS

## Square – Long Reach, Standard Flute – 5 Flute




• Length of cut = 3x diameter • Center cutting • Solid carbide • CNC ground in the USA



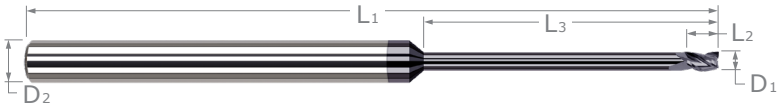
| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 5 FL | USD$ | 5 FL | USD$ |
| .020 (.5 mm) | .060 | **.100** (5x) | 1/8 | 1-1/2 | 702420 | 57.40 | 702420-C3 | 63.30 |
| .020 (.5 mm) | .060 | **.160** (8x) | 1/8 | 1-1/2 | 702220 | 62.10 | 702220-C3 | 68.00 |
| .031 (1/32) | .093 | **.156** (5x) | 1/8 | 1-1/2 | 702431 | 57.40 | 702431-C3 | 63.30 |
| .031 (1/32) | .093 | **.250** (8x) | 1/8 | 1-1/2 | 702231 | 62.10 | 702231-C3 | 68.00 |
| .062 (1/16) | .186 | **.312** (5x) | 1/8 | 1-1/2 | 702462 | 57.40 | 702462-C3 | 63.30 |
| .062 (1/16) | .186 | **.500** (8x) | 1/8 | 2 | 702262 | 62.10 | 702262-C3 | 68.00 |
| .078 (5/64) | .234 | **.406** (5x) | 1/8 | 2 | 702478 | 57.40 | 702478-C3 | 63.30 |
| .078 (5/64) | .234 | **.625** (8x) | 1/8 | 2 | 702278 | 62.60 | 702278-C3 | 68.50 |
| .093 (3/32) | .279 | **.500** (5x) | 1/8 | 2 | 702493 | 60.50 | 702493-C3 | 66.40 |
| .093 (3/32) | .279 | **.750** (8x) | 1/8 | 2 | 702293 | 65.20 | 702293-C3 | 71.10 |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 5 FL | USD$ | 5 FL | USD$ |
| .125 (1/8) | .375 | **.625** (5x) | 1/8 | 2 | 702508 | 61.10 | 702508-C3 | 67.10 |
| .125 (1/8) | .375 | **1.000** (8x) | 1/8 | 2-1/2 | 702308 | 65.80 | 702308-C3 | 71.70 |
| .187 (3/16) | .570 | **1.000** (5x) | 3/16 | 2-1/2 | 702512 | 64.60 | 702512-C3 | 71.20 |
| .187 (3/16) | .570 | **1.500** (8x) | 3/16 | 3 | 702312 | 68.90 | 702312-C3 | 75.60 |
| .250 (1/4) | .750 | **1.250** (5x) | 1/4 | 4 | 702516 | 67.60 | 702516-C3 | 76.20 |
| .250 (1/4) | .750 | **2.000** (8x) | 1/4 | 4 | 702316 | 72.20 | 702316-C3 | 80.90 |

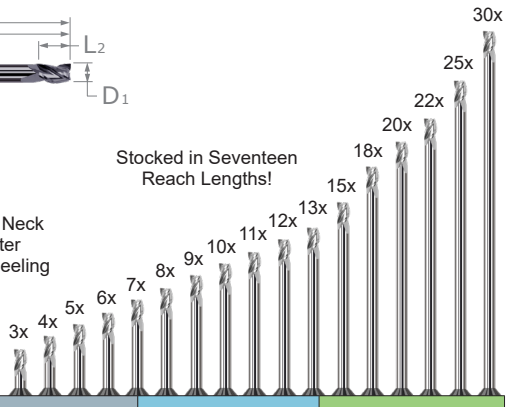
NEW SIZES!

# MINIATURE END MILLS

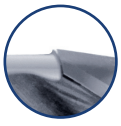
## Square – Long Reach, Stub Flute






- **Long length design for deep cavities**
- Stub flutes for maximum rigidity
- Length of cut = 1½x diameter
- Center cutting
- Solid carbide • CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .005 | .007 | **.025** (5x) | 3 | 1/8 | 2-1/2 | 33205 | 57.30 | | | | |
| .005 | .007 | **.040** (8x) | 3 | 1/8 | 2-1/2 | 34605 | 57.30 | | | | |
| .008 | .012 | **.040** (5x) | 3 | 1/8 | 2-1/2 | 33208 | 57.30 | | | | |
| .008 | .012 | **.065** (8x) | 3 | 1/8 | 2-1/2 | 34608 | 57.30 | | | | |
| .010 | .015 | **.030** (3x) | 3 | 1/8 | 2-1/2 | 47810 | 55.00 | 47810-C3 | 60.90 | | |
| .010 | .015 | **.050** (5x) | 3 | 1/8 | 2-1/2 | 33210 | 55.00 | 33210-C3 | 60.90 | 33210-C4 | 70.10 |
| .010 | .015 | **.050** (5x) | 4 | 1/8 | 2-1/2 | 861610 | 55.00 | 861610-C3 | 60.90 | | |
| .010 | .015 | **.060** (6x) | 3 | 1/8 | 2-1/2 | 937010 | 56.30 | 937010-C3 | 62.20 | | |
| .010 | .015 | **.070** (7x) | 3 | 1/8 | 2-1/2 | 934810 | 56.30 | 934810-C3 | 62.20 | | |
| .010 | .015 | **.080** (8x) | 3 | 1/8 | 2-1/2 | 34610 | 58.10 | 34610-C3 | 64.00 | 34610-C4 | 73.30 |
| .010 | .015 | **.080** (8x) | 4 | 1/8 | 2-1/2 | 874110 | 58.10 | 874110-C3 | 64.00 | | |
| .010 | .015 | **.100** (10x) | 3 | 1/8 | 2-1/2 | 982110 | 61.10 | 982110-C3 | 67.10 | | |
| .010 | .015 | **.125** (12x) | 3 | 1/8 | 2-1/2 | 35410 | 61.80 | 35410-C3 | 67.70 | 35410-C4 | 76.80 |
| .010 | .015 | **.150** (15x) | 3 | 1/8 | 2-1/2 | 48910 | 71.10 | 48910-C3 | 77.00 | | |
| .010 | .015 | **.180** (18x) | 3 | 1/8 | 2-1/2 | 977310 | 79.10 | 977310-C3 | 85.00 | | |
| .011 | .016 | **.055** (5x) | 3 | 1/8 | 2-1/2 | 33211 | 55.00 | 33211-C3 | 60.90 | | |
| .011 | .016 | **.088** (8x) | 3 | 1/8 | 2-1/2 | 34611 | 58.10 | 34611-C3 | 64.00 | | |
| .012 (.3 mm) | .018 | **.060** (5x) | 3 | 1/8 | 2-1/2 | 33212 | 55.00 | 33212-C3 | 60.90 | | |
| .012 (.3 mm) | .018 | **.096** (8x) | 3 | 1/8 | 2-1/2 | 34612 | 58.10 | 34612-C3 | 64.00 | | |
| .013 | .019 | **.065** (5x) | 3 | 1/8 | 2-1/2 | 33213 | 55.00 | 33213-C3 | 60.90 | 33213-C4 | 70.80 |
| .013 | .019 | **.104** (8x) | 3 | 1/8 | 2-1/2 | 34613 | 58.10 | 34613-C3 | 64.00 | | |
| .014 | .021 | **.070** (5x) | 3 | 1/8 | 2-1/2 | 33214 | 55.00 | 33214-C3 | 60.90 | | |
| .014 | .021 | **.112** (8x) | 3 | 1/8 | 2-1/2 | 34614 | 58.10 | 34614-C3 | 64.00 | | |
| .015 (1/64) | .022 | **.045** (3x) | 3 | 1/8 | 2-1/2 | 47815 | 45.50 | 47815-C3 | 51.40 | 47815-C4 | 61.20 |
| .015 (1/64) | .022 | **.062** (4x) | 3 | 1/8 | 2-1/2 | 945515 | 45.50 | 945515-C3 | 51.40 | | |
| .015 (1/64) | .022 | **.078** (5x) | 3 | 1/8 | 2-1/2 | 33215 | 45.50 | 33215-C3 | 51.40 | 33215-C4 | 60.50 |
| .015 (1/64) | .022 | **.078** (5x) | 4 | 1/8 | 2-1/2 | 861615 | 45.50 | 861615-C3 | 51.40 | | |
| .015 (1/64) | .022 | **.093** (6x) | 3 | 1/8 | 2-1/2 | 937015 | 45.70 | 937015-C3 | 51.60 | | |
| .015 (1/64) | .022 | **.109** (7x) | 3 | 1/8 | 2-1/2 | 934815 | 45.70 | 934815-C3 | 51.60 | | |
| .015 (1/64) | .022 | **.125** (8x) | 3 | 1/8 | 2-1/2 | 34615 | 45.70 | 34615-C3 | 51.60 | 34615-C4 | 60.70 |
| .015 (1/64) | .022 | **.125** (8x) | 4 | 1/8 | 2-1/2 | 874115 | 45.70 | 874115-C3 | 51.60 | | |
| .015 (1/64) | .022 | **.156** (10x) | 3 | 1/8 | 2-1/2 | 982115 | 47.40 | 982115-C3 | 53.40 | 982115-C4 | 62.30 |
| .015 (1/64) | .022 | **.187** (12x) | 3 | 1/8 | 2-1/2 | 35415 | 47.40 | 35415-C3 | 53.40 | 35415-C4 | 62.30 |
| .015 (1/64) | .022 | **.225** (15x) | 3 | 1/8 | 2-1/2 | 48915 | 53.70 | 48915-C3 | 59.60 | 48915-C4 | 68.60 |
| .015 (1/64) | .022 | **.270** (18x) | 3 | 1/8 | 2-1/2 | 977315 | 63.80 | 977315-C3 | 69.80 | | |
| .015 (1/64) | .022 | **.300** (20x) | 3 | 1/8 | 2-1/2 | 58315 | 67.90 | 58315-C3 | 73.80 | | |
| .015 (1/64) | .022 | **.375** (25x) | 3 | 1/8 | 2-1/2 | 38015 | 86.80 | 38015-C3 | 92.70 | 38015-C4 | 102.60 |

continued on next page

# MINIATURE END MILLS

## Square – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .016 (.4 mm) | .024 | **.080** (5x) | 3 | 1/8 | 2-1/2 | 33216 | 46.80 | 33216-C3 | 52.70 | | |
| .016 (.4 mm) | .024 | **.128** (8x) | 3 | 1/8 | 2-1/2 | 34616 | 47.10 | 34616-C3 | 53.00 | | |
| .017 | .026 | **.085** (5x) | 3 | 1/8 | 2-1/2 | 33217 | 46.80 | 33217-C3 | 52.70 | | |
| .017 | .026 | **.136** (8x) | 3 | 1/8 | 2-1/2 | 34617 | 47.10 | 34617-C3 | 53.00 | | |
| .018 | .027 | **.090** (5x) | 3 | 1/8 | 2-1/2 | 33218 | 46.80 | 33218-C3 | 52.70 | | |
| .018 | .027 | **.144** (8x) | 3 | 1/8 | 2-1/2 | 34618 | 47.10 | 34618-C3 | 53.00 | | |
| .019 | .029 | **.095** (5x) | 3 | 1/8 | 2-1/2 | 33219 | 46.80 | 33219-C3 | 52.70 | | |
| .019 | .029 | **.152** (8x) | 3 | 1/8 | 2-1/2 | 34619 | 47.10 | 34619-C3 | 53.00 | | |
| .020 (.5 mm) | .030 | **.060** (3x) | 3 | 1/8 | 2-1/2 | 47820 | 43.50 | 47820-C3 | 49.40 | | |
| .020 (.5 mm) | .030 | **.080** (4x) | 3 | 1/8 | 2-1/2 | 945520 | 43.50 | 945520-C3 | 49.40 | 945520-C4 | 59.30 |
| .020 (.5 mm) | .030 | **.080** (4x) | 4 | 1/8 | 2-1/2 | 752020 | 43.50 | 752020-C3 | 49.90 | | |
| .020 (.5 mm) | .030 | **.100** (5x) | 3 | 1/8 | 2-1/2 | 33220 | 43.50 | 33220-C3 | 49.40 | 33220-C4 | 58.40 |
| .020 (.5 mm) | .030 | **.100** (5x) | 4 | 1/8 | 2-1/2 | 861620 | 45.80 | 861620-C3 | 51.70 | | |
| .020 (.5 mm) | .030 | **.120** (6x) | 3 | 1/8 | 2-1/2 | 937020 | 43.50 | 937020-C3 | 49.40 | 937020-C4 | 59.30 |
| .020 (.5 mm) | .030 | **.140** (7x) | 3 | 1/8 | 2-1/2 | 934820 | 43.70 | 934820-C3 | 49.60 | | |
| .020 (.5 mm) | .030 | **.160** (8x) | 3 | 1/8 | 2-1/2 | 34620 | 43.70 | 34620-C3 | 49.60 | 34620-C4 | 58.60 |
| .020 (.5 mm) | .030 | **.160** (8x) | 4 | 1/8 | 2-1/2 | 874120 | 44.50 | 874120-C3 | 50.40 | | |
| .020 (.5 mm) | .030 | **.180** (9x) | 3 | 1/8 | 2-1/2 | 846820 | 45.70 | 846820-C3 | 51.60 | | |
| .020 (.5 mm) | .030 | **.200** (10x) | 3 | 1/8 | 2-1/2 | 982120 | 45.70 | 982120-C3 | 51.60 | 982120-C4 | 61.40 |
| .020 (.5 mm) | .030 | **.200** (10x) | 4 | 1/8 | 2-1/2 | 789120 | 45.70 | 789120-C3 | 51.60 | | |
| .020 (.5 mm) | .030 | **.250** (12x) | 3 | 1/8 | 2-1/2 | 35420 | 45.70 | 35420-C3 | 51.60 | 35420-C4 | 60.70 |
| .020 (.5 mm) | .030 | **.250** (12x) | 4 | 1/8 | 2-1/2 | 801720 | 45.70 | 801720-C3 | 51.60 | | |
| .020 (.5 mm) | .030 | **.300** (15x) | 3 | 1/8 | 2-1/2 | 48920 | 51.60 | 48920-C3 | 57.50 | 48920-C4 | 66.60 |
| .020 (.5 mm) | .030 | **.360** (18x) | 3 | 1/8 | 2-1/2 | 977320 | 59.70 | 977320-C3 | 65.60 | | |
| .020 (.5 mm) | .030 | **.400** (20x) | 3 | 1/8 | 2-1/2 | 58320 | 64.90 | 58320-C3 | 70.80 | 58320-C4 | 80.70 |
| .020 (.5 mm) | .030 | **.440** (22x) | 3 | 1/8 | 2-1/2 | 969620 | 71.70 | 969620-C3 | 77.60 | | |
| .020 (.5 mm) | .030 | **.500** (25x) | 3 | 1/8 | 2-1/2 | 38020 | 83.80 | 38020-C3 | 89.70 | **25x Diameter!** | |
| .020 (.5 mm) | .030 | **.600** (30x) | 3 | 1/8 | 2-1/2 | 972020 | 89.60 | 972020-C3 | 95.50 | **30x Diameter!** | |
| .021 | .031 | **.105** (5x) | 3 | 1/8 | 2-1/2 | 33221 | 46.40 | 33221-C3 | 52.30 | | |
| .021 | .031 | **.168** (8x) | 3 | 1/8 | 2-1/2 | 34621 | 46.60 | 34621-C3 | 52.50 | | |
| .022 | .033 | **.110** (5x) | 3 | 1/8 | 2-1/2 | 33222 | 45.50 | 33222-C3 | 51.40 | | |
| .022 | .033 | **.176** (8x) | 3 | 1/8 | 2-1/2 | 34622 | 45.70 | 34622-C3 | 51.60 | | |
| .023 | .035 | **.115** (5x) | 3 | 1/8 | 2-1/2 | 33223 | 45.50 | 33223-C3 | 51.40 | | |
| .023 | .035 | **.187** (8x) | 3 | 1/8 | 2-1/2 | 34623 | 45.70 | 34623-C3 | 51.60 | | |
| .024 (.6 mm) | .036 | **.120** (5x) | 3 | 1/8 | 2-1/2 | 33224 | 45.50 | 33224-C3 | 51.40 | | |
| .024 (.6 mm) | .036 | **.192** (8x) | 3 | 1/8 | 2-1/2 | 34624 | 45.70 | 34624-C3 | 51.60 | | |
| .025 | .037 | **.075** (3x) | 3 | 1/8 | 2-1/2 | 47825 | 41.90 | 47825-C3 | 47.90 | | |
| .025 | .037 | **.100** (4x) | 3 | 1/8 | 2-1/2 | 945525 | 41.90 | 945525-C3 | 47.90 | | |
| .025 | .037 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 33225 | 41.90 | 33225-C3 | 47.90 | 33225-C4 | 57.00 |
| .025 | .037 | **.125** (5x) | 4 | 1/8 | 2-1/2 | 861625 | 41.90 | 861625-C3 | 47.90 | | |
| .025 | .037 | **.150** (6x) | 3 | 1/8 | 2-1/2 | 937025 | 41.90 | 937025-C3 | 47.90 | | |
| .025 | .037 | **.175** (7x) | 3 | 1/8 | 2-1/2 | 934825 | 41.90 | 934825-C3 | 47.90 | | |
| .025 | .037 | **.203** (8x) | 3 | 1/8 | 2-1/2 | 34625 | 42.10 | 34625-C3 | 48.10 | 34625-C4 | 57.20 |
| .025 | .037 | **.203** (8x) | 4 | 1/8 | 2-1/2 | 874125 | 42.10 | 874125-C3 | 48.10 | | |
| .025 | .037 | **.250** (10x) | 3 | 1/8 | 2-1/2 | 982125 | 43.40 | 982125-C3 | 49.30 | | |
| .025 | .037 | **.312** (12x) | 3 | 1/8 | 2-1/2 | 35425 | 43.40 | 35425-C3 | 49.30 | 35425-C4 | 59.20 |
| .025 | .037 | **.375** (15x) | 3 | 1/8 | 2-1/2 | 48925 | 50.70 | 48925-C3 | 56.60 | 48925-C4 | 65.70 |
| .025 | .037 | **.450** (18x) | 3 | 1/8 | 2-1/2 | 977325 | 59.50 | 977325-C3 | 65.40 | | |
| .025 | .037 | **.500** (20x) | 3 | 1/8 | 2-1/2 | 58325 | 63.80 | 58325-C3 | 69.80 | | |
| .025 | .037 | **.625** (25x) | 3 | 1/8 | 2-1/2 | 38025 | 82.90 | 38025-C3 | 88.90 | **25x Diameter!** | |

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NEW SIZES!

# MINIATURE END MILLS

## Square – Long Reach, Stub Flute (cont.)

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SQUARE

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| .026 | .039 | **.130** (5x) | 3 | 1/8 | 2-1/2 | 33226 | 42.80 | 33226-C3 | 48.70 | | | |
| .026 | .039 | **.208** (8x) | 3 | 1/8 | 2-1/2 | 34626 | 43.10 | 34626-C3 | 49.00 | | | |
| .027 | .041 | **.135** (5x) | 3 | 1/8 | 2-1/2 | 33227 | 42.80 | 33227-C3 | 48.70 | | | |
| .027 | .041 | **.216** (8x) | 3 | 1/8 | 2-1/2 | 34627 | 43.10 | 34627-C3 | 49.00 | | | |
| .028 (.7 mm) | .042 | **.140** (5x) | 3 | 1/8 | 2-1/2 | 33228 | 42.80 | 33228-C3 | 48.70 | | | |
| .028 (.7 mm) | .042 | **.224** (8x) | 3 | 1/8 | 2-1/2 | 34628 | 43.10 | 34628-C3 | 49.00 | | | |
| .029 | .043 | **.145** (5x) | 3 | 1/8 | 2-1/2 | 33229 | 42.80 | 33229-C3 | 48.70 | | | |
| .029 | .043 | **.232** (8x) | 3 | 1/8 | 2-1/2 | 34629 | 43.10 | 34629-C3 | 49.00 | | | |
| .030 | .045 | **.090** (3x) | 3 | 1/8 | 2-1/2 | 47830 | 41.90 | 47830-C3 | 47.90 | | | |
| .030 | .045 | **.125** (4x) | 3 | 1/8 | 2-1/2 | 945530 | 41.90 | 945530-C3 | 47.90 | | | |
| .030 | .045 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 33230 | 41.90 | 33230-C3 | 47.90 | 33230-C4 | 57.70 | |
| .030 | .045 | **.156** (5x) | 4 | 1/8 | 2-1/2 | 861630 | 44.40 | 861630-C3 | 50.30 | | | |
| .030 | .045 | **.187** (6x) | 3 | 1/8 | 2-1/2 | 937030 | 42.10 | 937030-C3 | 48.10 | | | |
| .030 | .045 | **.218** (7x) | 3 | 1/8 | 2-1/2 | 934830 | 42.10 | 934830-C3 | 48.10 | | | |
| .030 | .045 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 34630 | 42.10 | 34630-C3 | 48.10 | 34630-C4 | 57.20 | |
| .030 | .045 | **.250** (8x) | 4 | 1/8 | 2-1/2 | 874130 | 42.10 | 874130-C3 | 48.10 | | | |
| .030 | .045 | **.270** (9x) | 3 | 1/8 | 2-1/2 | 846830 | 43.40 | 846830-C3 | 49.30 | | | |
| .030 | .045 | **.312** (10x) | 3 | 1/8 | 2-1/2 | 982130 | 43.40 | 982130-C3 | 49.30 | | | |
| .030 | .045 | **.375** (12x) | 3 | 1/8 | 2-1/2 | 35430 | 43.40 | 35430-C3 | 49.30 | 35430-C4 | 58.30 | |
| .030 | .045 | **.450** (15x) | 3 | 1/8 | 2-1/2 | 48930 | 50.70 | 48930-C3 | 56.60 | | | |
| .030 | .045 | **.540** (18x) | 3 | 1/8 | 2-1/2 | 977330 | 59.00 | 977330-C3 | 64.90 | | | |
| .030 | .045 | **.600** (20x) | 3 | 1/8 | 2-1/2 | 58330 | 63.80 | 58330-C3 | 69.80 | | | |
| .031 (1/32) | .046 | **.093** (3x) | 3 | 1/8 | 2-1/2 | 47831 | 41.90 | 47831-C3 | 47.90 | 47831-C4 | 57.70 | |
| .031 (1/32) | .046 | **.093** (3x) | 4 | 1/8 | 2-1/2 | 739931 | 41.90 | 739931-C3 | 47.90 | | | |
| .031 (1/32) | .046 | **.125** (4x) | 3 | 1/8 | 2-1/2 | 945531 | 41.90 | 945531-C3 | 47.90 | 945531-C4 | 57.70 | |
| .031 (1/32) | .046 | **.125** (4x) | 4 | 1/8 | 2-1/2 | 752031 | 41.90 | 752031-C3 | 47.90 | | | |
| .031 (1/32) | .046 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 33231 | 41.90 | 33231-C3 | 47.90 | 33231-C4 | 57.00 | |
| .031 (1/32) | .046 | **.156** (5x) | 4 | 1/8 | 2-1/2 | 861631 | 44.40 | 861631-C3 | 50.30 | | | |
| .031 (1/32) | .046 | **.187** (6x) | 3 | 1/8 | 2-1/2 | 937031 | 41.90 | 937031-C3 | 47.90 | 937031-C4 | 57.00 | |
| .031 (1/32) | .046 | **.187** (6x) | 4 | 1/8 | 2-1/2 | 753631 | 44.40 | 753631-C3 | 50.30 | | | NEW |
| .031 (1/32) | .046 | **.218** (7x) | 3 | 1/8 | 2-1/2 | 934831 | 42.10 | 934831-C3 | 48.10 | | | |
| .031 (1/32) | .046 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 34631 | 42.10 | 34631-C3 | 48.10 | 34631-C4 | 57.20 | |
| .031 (1/32) | .046 | **.250** (8x) | 4 | 1/8 | 2-1/2 | 874131 | 44.50 | 874131-C3 | 50.40 | | | |
| .031 (1/32) | .046 | **.281** (9x) | 3 | 1/8 | 2-1/2 | 846831 | 43.40 | 846831-C3 | 49.30 | | | |
| .031 (1/32) | .046 | **.312** (10x) | 3 | 1/8 | 2-1/2 | 982131 | 43.40 | 982131-C3 | 49.30 | 982131-C4 | 58.30 | |
| .031 (1/32) | .046 | **.312** (10x) | 4 | 1/8 | 2-1/2 | 789131 | 43.40 | 789131-C3 | 49.30 | | | |
| .031 (1/32) | .046 | **.343** (11x) | 3 | 1/8 | 2-1/2 | 850231 | 44.20 | 850231-C3 | 50.10 | | | |
| .031 (1/32) | .046 | **.375** (12x) | 3 | 1/8 | 2-1/2 | 35431 | 43.40 | 35431-C3 | 49.30 | 35431-C4 | 58.30 | |
| .031 (1/32) | .046 | **.375** (12x) | 4 | 1/8 | 2-1/2 | 801731 | 43.40 | 801731-C3 | 49.30 | | | |
| .031 (1/32) | .046 | **.470** (15x) | 3 | 1/8 | 2-1/2 | 48931 | 50.70 | 48931-C3 | 56.60 | 48931-C4 | 65.70 | |
| .031 (1/32) | .046 | **.565** (18x) | 3 | 1/8 | 2-1/2 | 977331 | 63.80 | 977331-C3 | 69.80 | 977331-C4 | 79.60 | |
| .031 (1/32) | .046 | **.625** (20x) | 3 | 1/8 | 2-1/2 | 58331 | 63.80 | 58331-C3 | 69.80 | | | |
| .031 (1/32) | .046 | **.687** (22x) | 3 | 1/8 | 2-1/2 | 969631 | 70.70 | 969631-C3 | 76.60 | | | |
| .031 (1/32) | .046 | **.775** (25x) | 3 | 1/8 | 2-1/2 | 38031 | 82.90 | 38031-C3 | 88.90 | **25x Diameter!** | | |
| .031 (1/32) | .046 | **.937** (30x) | 3 | 1/8 | 2-1/2 | 972031 | 98.80 | 972031-C3 | 104.70 | **30x Diameter!** | | |

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# MINIATURE END MILLS

## Square – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | $L_2$ +.010" −.000" | $L_3$ +.010" −.000" | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .035 (.9 mm) | .052 | **.105** (3x) | 3 | 1/8 | 2-1/2 | 47835 | 41.90 | 47835-C3 | 47.90 | | |
| .035 (.9 mm) | .052 | **.187** (5x) | 3 | 1/8 | 2-1/2 | 33235 | 41.90 | 33235-C3 | 47.90 | 33235-C4 | 57.00 |
| .035 (.9 mm) | .052 | **.187** (5x) | 4 | 1/8 | 2-1/2 | 861635 | 42.70 | 861635-C3 | 48.60 | | |
| .035 (.9 mm) | .052 | **.218** (6x) | 3 | 1/8 | 2-1/2 | 937035 | 42.10 | 937035-C3 | 48.10 | | |
| .035 (.9 mm) | .052 | **.250** (7x) | 3 | 1/8 | 2-1/2 | 934835 | 42.10 | 934835-C3 | 48.10 | | |
| .035 (.9 mm) | .052 | **.281** (8x) | 3 | 1/8 | 2-1/2 | 34635 | 42.10 | 34635-C3 | 48.10 | 34635-C4 | 57.20 |
| .035 (.9 mm) | .052 | **.350** (10x) | 3 | 1/8 | 2-1/2 | 982135 | 43.40 | 982135-C3 | 49.30 | | |
| .035 (.9 mm) | .052 | **.425** (12x) | 3 | 1/8 | 2-1/2 | 35435 | 43.40 | 35435-C3 | 49.30 | 35435-C4 | 58.30 |
| .035 (.9 mm) | .052 | **.525** (15x) | 3 | 1/8 | 2-1/2 | 48935 | 50.70 | 48935-C3 | 56.60 | | |
| .035 (.9 mm) | .052 | **.700** (20x) | 3 | 1/8 | 2-1/2 | 58335 | 63.80 | 58335-C3 | 69.80 | | |
| .039 (1 mm) | .059 | **.117** (3x) | 3 | 1/8 | 2-1/2 | 47839 | 41.90 | 47839-C3 | 47.90 | | |
| .039 (1 mm) | .059 | **.203** (5x) | 3 | 1/8 | 2-1/2 | 33239 | 41.90 | 33239-C3 | 47.90 | 33239-C4 | 57.70 |
| .039 (1 mm) | .059 | **.203** (5x) | 4 | 1/8 | 2-1/2 | 861639 | 41.90 | 861639-C3 | 47.90 | | |
| .039 (1 mm) | .059 | **.240** (6x) | 3 | 1/8 | 2-1/2 | 937039 | 42.10 | 937039-C3 | 48.10 | | |
| .039 (1 mm) | .059 | **.281** (7x) | 3 | 1/8 | 2-1/2 | 934839 | 42.10 | 934839-C3 | 48.10 | | |
| .039 (1 mm) | .059 | **.325** (8x) | 3 | 1/8 | 2-1/2 | 34639 | 42.10 | 34639-C3 | 48.10 | 34639-C4 | 57.90 |
| .039 (1 mm) | .059 | **.325** (8x) | 4 | 1/8 | 2-1/2 | 874139 | 42.10 | 874139-C3 | 48.10 | | |
| .039 (1 mm) | .059 | **.400** (10x) | 3 | 1/8 | 2-1/2 | 982139 | 43.40 | 982139-C3 | 49.30 | | |
| .039 (1 mm) | .059 | **.480** (12x) | 3 | 1/8 | 2-1/2 | 35439 | 43.40 | 35439-C3 | 49.30 | | |
| .039 (1 mm) | .059 | **.600** (15x) | 3 | 1/8 | 2-1/2 | 48939 | 50.70 | 48939-C3 | 56.60 | | |
| .039 (1 mm) | .059 | **.700** (18x) | 3 | 1/8 | 2-1/2 | 977339 | 55.10 | 977339-C3 | 61.00 | | |
| .040 | .060 | **.120** (3x) | 3 | 1/8 | 2-1/2 | 47840 | 41.90 | 47840-C3 | 47.90 | | |
| .040 | .060 | **.160** (4x) | 3 | 1/8 | 2-1/2 | 945540 | 41.90 | 945540-C3 | 47.90 | 945540-C4 | 57.70 |
| .040 | .060 | **.203** (5x) | 3 | 1/8 | 2-1/2 | 33240 | 41.90 | 33240-C3 | 47.90 | 33240-C4 | 57.00 |
| .040 | .060 | **.203** (5x) | 4 | 1/8 | 2-1/2 | 861640 | 44.40 | 861640-C3 | 50.30 | | |
| .040 | .060 | **.240** (6x) | 3 | 1/8 | 2-1/2 | 937040 | 42.10 | 937040-C3 | 48.10 | | |
| .040 | .060 | **.281** (7x) | 3 | 1/8 | 2-1/2 | 934840 | 42.10 | 934840-C3 | 48.10 | | |
| .040 | .060 | **.325** (8x) | 3 | 1/8 | 2-1/2 | 34640 | 42.10 | 34640-C3 | 48.10 | 34640-C4 | 57.20 |
| .040 | .060 | **.325** (8x) | 4 | 1/8 | 2-1/2 | 874140 | 42.10 | 874140-C3 | 48.10 | | |
| .040 | .060 | **.400** (10x) | 3 | 1/8 | 2-1/2 | 982140 | 43.40 | 982140-C3 | 49.30 | 982140-C4 | 59.20 |
| .040 | .060 | **.400** (10x) | 4 | 1/8 | 2-1/2 | 789140 | 44.20 | 789140-C3 | 50.10 | | |
| .040 | .060 | **.480** (12x) | 3 | 1/8 | 2-1/2 | 35440 | 43.40 | 35440-C3 | 49.30 | 35440-C4 | 58.30 |
| .040 | .060 | **.600** (15x) | 3 | 1/8 | 2-1/2 | 48940 | 50.70 | 48940-C3 | 56.60 | 48940-C4 | 65.70 |
| .040 | .060 | **.720** (18x) | 3 | 1/8 | 2-1/2 | 977340 | 63.80 | 977340-C3 | 69.80 | | |
| .040 | .060 | **.800** (20x) | 3 | 1/8 | 2-1/2 | 58340 | 63.80 | 58340-C3 | 69.80 | | |
| .040 | .060 | **1.000** (25x) | 3 | 1/8 | 2-1/2 | 38040 | 82.90 | 38040-C3 | 88.90 | **25x Diameter!** | |
| .045 | .067 | **.135** (3x) | 3 | 1/8 | 2-1/2 | 47845 | 41.20 | 47845-C3 | 47.10 | | |
| .045 | .067 | **.225** (5x) | 3 | 1/8 | 2-1/2 | 33245 | 41.20 | 33245-C3 | 47.10 | 33245-C4 | 57.00 |
| .045 | .067 | **.375** (8x) | 3 | 1/8 | 2-1/2 | 34645 | 41.30 | 34645-C3 | 47.20 | 34645-C4 | 56.90 |
| .045 | .067 | **.450** (10x) | 3 | 1/8 | 2-1/2 | 982145 | 42.70 | 982145-C3 | 48.60 | | |
| .045 | .067 | **.550** (12x) | 3 | 1/8 | 2-1/2 | 35445 | 42.70 | 35445-C3 | 48.60 | 35445-C4 | 57.80 |
| .045 | .067 | **.680** (15x) | 3 | 1/8 | 2-1/2 | 48945 | 48.20 | 48945-C3 | 54.10 | | |
| .045 | .067 | **.900** (20x) | 3 | 1/8 | 2-1/2 | 58345 | 60.20 | 58345-C3 | 66.10 | | |

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NEW SIZES!

# MINIATURE END MILLS

## Square – Long Reach, Stub Flute (cont.)

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SQUARE

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .047 (3/64) | .070 | **.141** (3x) | 3 | 1/8 | 2-1/2 | 47847 | 41.20 | 47847-C3 | 47.10 | | |
| .047 (3/64) | .070 | **.187** (4x) | 3 | 1/8 | 2-1/2 | 945547 | 41.20 | 945547-C3 | 47.10 | | |
| .047 (3/64) | .070 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 33247 | 41.20 | 33247-C3 | 47.10 | 33247-C4 | 56.70 |
| .047 (3/64) | .070 | **.250** (5x) | 4 | 1/8 | 2-1/2 | 861647 | 43.70 | 861647-C3 | 49.60 | | |
| .047 (3/64) | .070 | **.281** (6x) | 3 | 1/8 | 2-1/2 | 937047 | 41.20 | 937047-C3 | 47.10 | | |
| .047 (3/64) | .070 | **.328** (7x) | 3 | 1/8 | 2-1/2 | 934847 | 41.30 | 934847-C3 | 47.20 | | |
| .047 (3/64) | .070 | **.375** (8x) | 3 | 1/8 | 2-1/2 | 34647 | 41.30 | 34647-C3 | 47.20 | 34647-C4 | 56.90 |
| .047 (3/64) | .070 | **.375** (8x) | 4 | 1/8 | 2-1/2 | 874147 | 43.80 | 874147-C3 | 49.70 | | |
| .047 (3/64) | .070 | **.425** (9x) | 3 | 1/8 | 2-1/2 | 846847 | 42.70 | 846847-C3 | 48.60 | | |
| .047 (3/64) | .070 | **.480** (10x) | 3 | 1/8 | 2-1/2 | 982147 | 42.70 | 982147-C3 | 48.60 | 982147-C4 | 57.80 |
| .047 (3/64) | .070 | **.570** (12x) | 3 | 1/8 | 2-1/2 | 35447 | 42.70 | 35447-C3 | 48.60 | 35447-C4 | 57.80 |
| .047 (3/64) | .070 | **.570** (12x) | 4 | 1/8 | 2-1/2 | 801747 | 45.40 | 801747-C3 | 51.30 | | |
| .047 (3/64) | .070 | **.710** (15x) | 3 | 1/8 | 2-1/2 | 48947 | 48.20 | 48947-C3 | 54.10 | 48947-C4 | 63.30 |
| .047 (3/64) | .070 | **.850** (18x) | 3 | 1/8 | 2-1/2 | 977347 | 60.20 | 977347-C3 | 66.10 | | |
| .047 (3/64) | .070 | **.950** (20x) | 3 | 1/8 | 2-1/2 | 58347 | 60.20 | 58347-C3 | 66.10 | | |
| .047 (3/64) | .070 | **1.187** (25x) | 3 | 1/8 | 2-1/2 | 38047 | 73.10 | 38047-C3 | 79.00 | **25x Diameter!** | |
| .047 (3/64) | .070 | **1.406** (30x) | 3 | 1/8 | 2-1/2 | 972047 | 96.80 | 972047-C3 | 102.80 | **30x Diameter!** | |
| .050 | .075 | **.150** (3x) | 3 | 1/8 | 2-1/2 | 47850 | 41.20 | 47850-C3 | 47.10 | | |
| .050 | .075 | **.203** (4x) | 3 | 1/8 | 2-1/2 | 945550 | 41.20 | 945550-C3 | 47.10 | | |
| .050 | .075 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 33250 | 41.20 | 33250-C3 | 47.10 | 33250-C4 | 56.70 |
| .050 | .075 | **.250** (5x) | 4 | 1/8 | 2-1/2 | 861650 | 43.80 | 861650-C3 | 49.70 | | |
| .050 | .075 | **.300** (6x) | 3 | 1/8 | 2-1/2 | 937050 | 41.30 | 937050-C3 | 47.20 | | |
| .050 | .075 | **.350** (7x) | 3 | 1/8 | 2-1/2 | 934850 | 41.30 | 934850-C3 | 47.20 | | |
| .050 | .075 | **.400** (8x) | 3 | 1/8 | 2-1/2 | 34650 | 41.30 | 34650-C3 | 47.20 | 34650-C4 | 56.90 |
| .050 | .075 | **.450** (9x) | 3 | 1/8 | 2-1/2 | 846850 | 42.70 | 846850-C3 | 48.60 | | |
| .050 | .075 | **.500** (10x) | 3 | 1/8 | 2-1/2 | 982150 | 42.70 | 982150-C3 | 48.60 | | |
| .050 | .075 | **.600** (12x) | 3 | 1/8 | 2-1/2 | 35450 | 42.70 | 35450-C3 | 48.60 | 35450-C4 | 57.80 |
| .050 | .075 | **.750** (15x) | 3 | 1/8 | 2-1/2 | 48950 | 48.20 | 48950-C3 | 54.10 | | |
| .050 | .075 | **.900** (18x) | 3 | 1/8 | 2-1/2 | 977350 | 60.20 | 977350-C3 | 66.10 | | |
| .055 (1.4 mm) | .082 | **.165** (3x) | 3 | 1/8 | 2-1/2 | 47855 | 41.20 | 47855-C3 | 47.10 | | |
| .055 (1.4 mm) | .082 | **.275** (5x) | 3 | 1/8 | 2-1/2 | 33255 | 41.20 | 33255-C3 | 47.10 | 33255-C4 | 57.00 |
| .055 (1.4 mm) | .082 | **.275** (5x) | 4 | 1/8 | 2-1/2 | 861655 | 41.90 | 861655-C3 | 47.90 | | |
| .055 (1.4 mm) | .082 | **.330** (6x) | 3 | 1/8 | 2-1/2 | 937055 | 41.30 | 937055-C3 | 47.20 | | |
| .055 (1.4 mm) | .082 | **.385** (7x) | 3 | 1/8 | 2-1/2 | 934855 | 41.30 | 934855-C3 | 47.20 | | |
| .055 (1.4 mm) | .082 | **.450** (8x) | 3 | 1/8 | 2-1/2 | 34655 | 41.30 | 34655-C3 | 47.20 | 34655-C4 | 57.10 |
| .055 (1.4 mm) | .082 | **.560** (10x) | 3 | 1/8 | 2-1/2 | 982155 | 42.70 | 982155-C3 | 48.60 | | |
| .055 (1.4 mm) | .082 | **.660** (12x) | 3 | 1/8 | 2-1/2 | 35455 | 43.60 | 35455-C3 | 49.50 | 35455-C4 | 58.50 |
| .055 (1.4 mm) | .082 | **.825** (15x) | 3 | 1/8 | 2-1/2 | 48955 | 48.20 | 48955-C3 | 54.10 | | |
| .055 (1.4 mm) | .082 | **1.000** (18x) | 3 | 1/8 | 2-1/2 | 977355 | 60.20 | 977355-C3 | 66.10 | | |
| .060 | .090 | **.180** (3x) | 3 | 1/8 | 2-1/2 | 47860 | 41.20 | 47860-C3 | 47.10 | | |
| .060 | .090 | **.250** (4x) | 3 | 1/8 | 2-1/2 | 945560 | 41.20 | 945560-C3 | 47.10 | | |
| .060 | .090 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 33260 | 41.20 | 33260-C3 | 47.10 | 33260-C4 | 57.00 |
| .060 | .090 | **.312** (5x) | 4 | 1/8 | 2-1/2 | 861660 | 43.60 | 861660-C3 | 49.50 | | |
| .060 | .090 | **.375** (6x) | 3 | 1/8 | 2-1/2 | 937060 | 41.30 | 937060-C3 | 47.20 | | |
| .060 | .090 | **.437** (7x) | 3 | 1/8 | 2-1/2 | 934860 | 41.30 | 934860-C3 | 47.20 | | |
| .060 | .090 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 34660 | 41.30 | 34660-C3 | 47.20 | 34660-C4 | 57.10 |
| .060 | .090 | **.500** (8x) | 4 | 1/8 | 2-1/2 | 874160 | 42.00 | 874160-C3 | 48.00 | | |
| .060 | .090 | **.562** (9x) | 3 | 1/8 | 2-1/2 | 846860 | 42.70 | 846860-C3 | 48.60 | | |

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# MINIATURE END MILLS

## Square – Long Reach, Stub Flute (cont.)

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| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .060 | .090 | **.625** (10x) | 3 | 1/8 | 2-1/2 | 982160 | 42.70 | 982160-C3 | 48.60 | | |
| .060 | .090 | **.720** (12x) | 3 | 1/8 | 2-1/2 | 35460 | 42.70 | 35460-C3 | 48.60 | 35460-C4 | 57.80 |
| .060 | .090 | **.900** (15x) | 3 | 1/8 | 2-1/2 | 48960 | 48.20 | 48960-C3 | 54.10 | | |
| .060 | .090 | **1.062** (18x) | 3 | 1/8 | 2-1/2 | 977360 | 60.20 | 977360-C3 | 66.10 | | |
| .060 | .090 | **1.200** (20x) | 3 | 1/8 | 2-1/2 | 58360 | 60.20 | 58360-C3 | 66.10 | | |
| .062 (1/16) | .093 | **.186** (3x) | 3 | 1/8 | 2-1/2 | 47862 | 41.20 | 47862-C3 | 47.10 | 47862-C4 | 57.00 |
| .062 (1/16) | .093 | **.186** (3x) | 4 | 1/8 | 2-1/2 | 739962 | 41.20 | 739962-C3 | 47.10 | | |
| .062 (1/16) | .093 | **.250** (4x) | 3 | 1/8 | 2-1/2 | 945562 | 41.20 | 945562-C3 | 47.10 | 945562-C4 | 56.70 |
| .062 (1/16) | .093 | **.250** (4x) | 4 | 1/8 | 2-1/2 | 752062 | 41.20 | 752062-C3 | 47.10 | | |
| .062 (1/16) | .093 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 33262 | 41.20 | 33262-C3 | 47.10 | 33262-C4 | 56.70 |
| .062 (1/16) | .093 | **.312** (5x) | 4 | 1/8 | 2-1/2 | 861662 | 43.70 | 861662-C3 | 49.60 | | |
| .062 (1/16) | .093 | **.375** (6x) | 3 | 1/8 | 2-1/2 | 937062 | 41.20 | 937062-C3 | 47.10 | 937062-C4 | 56.70 |
| .062 (1/16) | .093 | **.375** (6x) | 4 | 1/8 | 2-1/2 | 753662 | 41.20 | 753662-C3 | 47.10 | | |
| .062 (1/16) | .093 | **.437** (7x) | 3 | 1/8 | 2-1/2 | 934862 | 41.30 | 934862-C3 | 47.20 | 934862-C4 | 56.90 |
| .062 (1/16) | .093 | **.437** (7x) | 4 | 1/8 | 2-1/2 | 753262 | 41.30 | 753262-C3 | 47.20 | | |
| .062 (1/16) | .093 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 34662 | 41.30 | 34662-C3 | 47.20 | 34662-C4 | 56.90 |
| .062 (1/16) | .093 | **.500** (8x) | 4 | 1/8 | 2-1/2 | 874162 | 44.60 | 874162-C3 | 50.60 | 874162-C4 | 59.60 |
| .062 (1/16) | .093 | **.562** (9x) | 3 | 1/8 | 2-1/2 | 846862 | 42.70 | 846862-C3 | 48.60 | | |
| .062 (1/16) | .093 | **.625** (10x) | 3 | 1/8 | 2-1/2 | 982162 | 42.70 | 982162-C3 | 48.60 | 982162-C4 | 57.80 |
| .062 (1/16) | .093 | **.625** (10x) | 4 | 1/8 | 2-1/2 | 789162 | 43.60 | 789162-C3 | 49.50 | | |
| .062 (1/16) | .093 | **.687** (11x) | 3 | 1/8 | 2-1/2 | 850262 | 42.70 | 850262-C3 | 48.60 | | |
| .062 (1/16) | .093 | **.750** (12x) | 3 | 1/8 | 2-1/2 | 35462 | 42.70 | 35462-C3 | 48.60 | 35462-C4 | 57.80 |
| .062 (1/16) | .093 | **.750** (12x) | 4 | 1/8 | 2-1/2 | 801762 | 45.30 | 801762-C3 | 51.20 | | |
| .062 (1/16) | .093 | **.800** (13x) | 3 | 1/8 | 2-1/2 | 839362 | 45.50 | 839362-C3 | 51.40 | | |
| .062 (1/16) | .093 | **.950** (15x) | 3 | 1/8 | 2-1/2 | 48962 | 48.20 | 48962-C3 | 54.10 | 48962-C4 | 63.30 |
| .062 (1/16) | .093 | **.950** (15x) | 4 | 1/8 | 2-1/2 | 735162 | 48.20 | 735162-C3 | 54.10 | | |
| .062 (1/16) | .093 | **1.125** (18x) | 3 | 1/8 | 2-1/2 | 977362 | 60.20 | 977362-C3 | 66.10 | 977362-C4 | 76.00 |
| .062 (1/16) | .093 | **1.250** (20x) | 3 | 1/8 | 2-1/2 | 58362 | 60.20 | 58362-C3 | 66.10 | 58362-C4 | 76.00 |
| .062 (1/16) | .093 | **1.375** (22x) | 3 | 1/8 | 3 | 969662 | 67.90 | 969662-C3 | 73.80 | | |
| .062 (1/16) | .093 | **1.550** (25x) | 3 | 1/8 | 3 | 38062 | 73.10 | 38062-C3 | 79.00 | **25x Diameter!** | |
| .062 (1/16) | .093 | **1.875** (30x) | 3 | 1/8 | 3 | 972062 | 96.80 | 972062-C3 | 102.80 | **30x Diameter!** | |
| .065 | .097 | **.195** (3x) | 3 | 1/8 | 2-1/2 | 47865 | 41.20 | 47865-C3 | 47.10 | | |
| .065 | .097 | **.325** (5x) | 3 | 1/8 | 2-1/2 | 33265 | 41.20 | 33265-C3 | 47.10 | | |
| .065 | .097 | **.530** (8x) | 3 | 1/8 | 2-1/2 | 34665 | 41.30 | 34665-C3 | 47.20 | 34665-C4 | 57.10 |
| .065 | .097 | **.650** (10x) | 3 | 1/8 | 2-1/2 | 982165 | 42.70 | 982165-C3 | 48.60 | | |
| .065 | .097 | **.800** (12x) | 3 | 1/8 | 2-1/2 | 35465 | 42.70 | 35465-C3 | 48.60 | | |
| .070 | .105 | **.210** (3x) | 3 | 1/8 | 2-1/2 | 47870 | 41.20 | 47870-C3 | 47.10 | | |
| .070 | .105 | **.375** (5x) | 3 | 1/8 | 2-1/2 | 33270 | 41.20 | 33270-C3 | 47.10 | 33270-C4 | 57.00 |
| .070 | .105 | **.375** (5x) | 4 | 1/8 | 2-1/2 | 861670 | 43.60 | 861670-C3 | 49.50 | | |
| .070 | .105 | **.570** (8x) | 3 | 1/8 | 2-1/2 | 34670 | 41.30 | 34670-C3 | 47.20 | 34670-C4 | 57.10 |
| .070 | .105 | **.700** (10x) | 3 | 1/8 | 2-1/2 | 982170 | 42.70 | 982170-C3 | 48.60 | | |
| .070 | .105 | **.850** (12x) | 3 | 1/8 | 2-1/2 | 35470 | 42.70 | 35470-C3 | 48.60 | | |
| .070 | .105 | **1.062** (15x) | 3 | 1/8 | 2-1/2 | 48970 | 48.20 | 48970-C3 | 54.10 | | |
| .075 | .112 | **.225** (3x) | 3 | 1/8 | 2-1/2 | 47875 | 41.20 | 47875-C3 | 47.10 | | |
| .075 | .112 | **.375** (5x) | 3 | 1/8 | 2-1/2 | 33275 | 41.20 | 33275-C3 | 47.10 | | |
| .075 | .112 | **.625** (8x) | 3 | 1/8 | 2-1/2 | 34675 | 41.30 | 34675-C3 | 47.20 | 34675-C4 | 56.90 |
| .075 | .112 | **.750** (10x) | 3 | 1/8 | 2-1/2 | 982175 | 42.70 | 982175-C3 | 48.60 | | |
| .075 | .112 | **.900** (12x) | 3 | 1/8 | 2-1/2 | 35475 | 42.70 | 35475-C3 | 48.60 | | |

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NEW SIZES!

# MINIATURE END MILLS

## Square – Long Reach, Stub Flute (cont.)

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SQUARE

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| .078 (5/64) | .117 | **.234** (3x) | 3 | 1/8 | 2-1/2 | 47878 | 41.20 | 47878-C3 | 47.10 | | | |
| .078 (5/64) | .117 | **.312** (4x) | 3 | 1/8 | 2-1/2 | 945578 | 41.20 | 945578-C3 | 47.10 | | | |
| .078 (5/64) | .117 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 33278 | 41.20 | 33278-C3 | 47.10 | 33278-C4 | 56.70 | |
| .078 (5/64) | .117 | **.406** (5x) | 4 | 1/8 | 2-1/2 | 861678 | 43.70 | 861678-C3 | 49.60 | | | |
| .078 (5/64) | .117 | **.475** (6x) | 3 | 1/8 | 2-1/2 | 937078 | 41.20 | 937078-C3 | 47.10 | | | |
| .078 (5/64) | .117 | **.550** (7x) | 3 | 1/8 | 2-1/2 | 934878 | 41.30 | 934878-C3 | 47.20 | | | |
| .078 (5/64) | .117 | **.625** (8x) | 3 | 1/8 | 2-1/2 | 34678 | 41.30 | 34678-C3 | 47.20 | 34678-C4 | 56.90 | |
| .078 (5/64) | .117 | **.625** (8x) | 4 | 1/8 | 2-1/2 | 874178 | 43.80 | 874178-C3 | 49.70 | | | |
| .078 (5/64) | .117 | **.700** (9x) | 3 | 1/8 | 2-1/2 | 846878 | 42.70 | 846878-C3 | 48.60 | | | |
| .078 (5/64) | .117 | **.800** (10x) | 3 | 1/8 | 2-1/2 | 982178 | 42.70 | 982178-C3 | 48.60 | | | |
| .078 (5/64) | .117 | **.800** w(10x) | 4 | 1/8 | 2-1/2 | 789178 | 45.20 | 789178-C3 | 51.10 | | | NEW |
| .078 (5/64) | .117 | **.940** (12x) | 3 | 1/8 | 2-1/2 | 35478 | 42.70 | 35478-C3 | 48.60 | 35478-C4 | 57.80 | |
| .078 (5/64) | .117 | **1.187** (15x) | 3 | 1/8 | 2-1/2 | 48978 | 48.20 | 48978-C3 | 54.10 | | | |
| .078 (5/64) | .117 | **1.400** (18x) | 3 | 1/8 | 3 | 977378 | 60.20 | 977378-C3 | 66.10 | | | |
| .078 (5/64) | .117 | **1.562** (20x) | 3 | 1/8 | 3 | 58378 | 60.20 | 58378-C3 | 66.10 | | | |
| .078 (5/64) | .117 | **1.950** (25x) | 3 | 1/8 | 3 | 38078 | 73.10 | 38078-C3 | 79.00 | **25x Diameter!** | | |
| .078 (5/64) | .117 | **2.343** (30x) | 3 | 1/8 | 4 | 972078 | 96.80 | 972078-C3 | 103.20 | **30x Diameter!** | | |
| .080 | .120 | **.240** (3x) | 3 | 1/8 | 2-1/2 | 47880 | 41.20 | 47880-C3 | 47.10 | | | |
| .080 | .120 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 33280 | 41.20 | 33280-C3 | 47.10 | | | |
| .080 | .120 | **.650** (8x) | 3 | 1/8 | 2-1/2 | 34680 | 41.30 | 34680-C3 | 47.20 | 34680-C4 | 57.10 | |
| .080 | .120 | **.960** (12x) | 3 | 1/8 | 2-1/2 | 35480 | 42.70 | 35480-C3 | 48.60 | | | |
| .085 | .127 | **.425** (5x) | 3 | 1/8 | 2-1/2 | 33285 | 41.20 | 33285-C3 | 47.10 | | | |
| .085 | .127 | **.700** (8x) | 3 | 1/8 | 2-1/2 | 34685 | 41.30 | 34685-C3 | 47.20 | 34685-C4 | 57.10 | |
| .085 | .127 | **1.020** (12x) | 3 | 1/8 | 2-1/2 | 35485 | 42.70 | 35485-C3 | 48.60 | | | |
| .090 | .135 | **.270** (3x) | 3 | 1/8 | 2-1/2 | 47890 | 41.20 | 47890-C3 | 47.10 | | | |
| .090 | .135 | **.450** (5x) | 3 | 1/8 | 2-1/2 | 33290 | 41.20 | 33290-C3 | 47.10 | | | |
| .090 | .135 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 34690 | 41.30 | 34690-C3 | 47.20 | 34690-C4 | 56.90 | |
| .090 | .135 | **1.080** (12x) | 3 | 1/8 | 2-1/2 | 35490 | 42.70 | 35490-C3 | 48.60 | | | |
| .093 (3/32) | .139 | **.279** (3x) | 3 | 1/8 | 2-1/2 | 47893 | 41.20 | 47893-C3 | 47.10 | 47893-C4 | 57.00 | |
| .093 (3/32) | .139 | **.279** (3x) | 4 | 1/8 | 2-1/2 | 739993 | 43.70 | 739993-C3 | 49.60 | | | |
| .093 (3/32) | .139 | **.375** (4x) | 3 | 1/8 | 2-1/2 | 945593 | 41.20 | 945593-C3 | 47.10 | 945593-C4 | 57.00 | |
| .093 (3/32) | .139 | **.375** (4x) | 4 | 1/8 | 2-1/2 | 752093 | 41.20 | 752093-C3 | 47.10 | | | |
| .093 (3/32) | .139 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 33293 | 41.20 | 33293-C3 | 47.10 | 33293-C4 | 56.70 | |
| .093 (3/32) | .139 | **.500** (5x) | 4 | 1/8 | 2-1/2 | 861693 | 43.70 | 861693-C3 | 49.60 | | | |
| .093 (3/32) | .139 | **.585** (6x) | 3 | 1/8 | 2-1/2 | 937093 | 41.20 | 937093-C3 | 47.10 | 937093-C4 | 57.00 | |
| .093 (3/32) | .139 | **.585** (6x) | 4 | 1/8 | 2-1/2 | 753693 | 41.20 | 753693-C3 | 47.10 | | | |
| .093 (3/32) | .139 | **.670** (7x) | 3 | 1/8 | 2-1/2 | 934893 | 41.30 | 934893-C3 | 47.20 | 934893-C4 | 57.10 | |
| .093 (3/32) | .139 | **.670** (7x) | 4 | 1/8 | 2-1/2 | 753293 | 41.30 | 753293-C3 | 47.20 | | | |
| .093 (3/32) | .139 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 34693 | 41.30 | 34693-C3 | 47.20 | 34693-C4 | 56.90 | |
| .093 (3/32) | .139 | **.750** (8x) | 4 | 1/8 | 2-1/2 | 874193 | 43.80 | 874193-C3 | 49.70 | | | |
| .093 (3/32) | .139 | **.850** (9x) | 3 | 1/8 | 2-1/2 | 846893 | 42.70 | 846893-C3 | 48.60 | | | |
| .093 (3/32) | .139 | **.950** (10x) | 3 | 1/8 | 2-1/2 | 982193 | 42.70 | 982193-C3 | 48.60 | 982193-C4 | 58.40 | |
| .093 (3/32) | .139 | **.950** (10x) | 4 | 1/8 | 2-1/2 | 789193 | 42.70 | 789193-C3 | 48.60 | | | |
| .093 (3/32) | .139 | **1.030** (11x) | 3 | 1/8 | 2-1/2 | 850293 | 42.70 | 850293-C3 | 48.60 | | | |
| .093 (3/32) | .139 | **1.125** (12x) | 3 | 1/8 | 2-1/2 | 35493 | 42.70 | 35493-C3 | 48.60 | 35493-C4 | 57.80 | |
| .093 (3/32) | .139 | **1.125** (12x) | 4 | 1/8 | 2-1/2 | 801793 | 42.70 | 801793-C3 | 48.60 | | | |
| .093 (3/32) | .139 | **1.250** (13x) | 3 | 1/8 | 2-1/2 | 839393 | 45.90 | 839393-C3 | 51.80 | | | |

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# MINIATURE END MILLS

## Square – Long Reach, Stub Flute (cont.)

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| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .093 (3/32) | .139 | **1.400** (15x) | 3 | 1/8 | 3 | 48993 | 50.10 | 48993-C3 | 56.10 | 48993-C4 | 65.10 |
| .093 (3/32) | .139 | **1.675** (18x) | 3 | 1/8 | 3 | 977393 | 60.90 | 977393-C3 | 66.40 | | |
| .093 (3/32) | .139 | **1.875** (20x) | 3 | 1/8 | 4 | 58393 | 66.40 | 58393-C3 | 72.80 | | |
| .093 (3/32) | .139 | **2.062** (22x) | 3 | 1/8 | 4 | 969693 | 69.80 | 969693-C3 | 76.10 | | |
| .093 (3/32) | .139 | **2.312** (25x) | 3 | 1/8 | 4 | 38093 | 76.10 | 38093-C3 | 82.40 | **25x Diameter!** | |
| .093 (3/32) | .139 | **2.812** (30x) | 3 | 1/8 | 4 | 972093 | 107.40 | 972093-C3 | 113.80 | **30x Diameter!** | |
| .095 | .142 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 33295 | 41.20 | 33295-C3 | 47.10 | | |
| .095 | .142 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 34695 | 41.30 | 34695-C3 | 47.20 | 34695-C4 | 57.10 |
| .095 | .142 | **1.150** (12x) | 3 | 1/8 | 2-1/2 | 35495 | 42.70 | 35495-C3 | 48.60 | | |
| .100 | .150 | **.300** (3x) | 3 | 1/8 | 2-1/2 | 978400 | 41.20 | 978400-C3 | 47.10 | | |
| .100 | .150 | **.400** (4x) | 3 | 1/8 | 2-1/2 | 945600 | 41.20 | 945600-C3 | 47.10 | | |
| .100 | .150 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 33300 | 41.20 | 33300-C3 | 47.10 | | |
| .100 | .150 | **.600** (6x) | 3 | 1/8 | 2-1/2 | 937100 | 41.20 | 937100-C3 | 47.10 | | |
| .100 | .150 | **.700** (7x) | 3 | 1/8 | 2-1/2 | 934900 | 41.20 | 934900-C3 | 47.10 | | |
| .100 | .150 | **.800** (8x) | 3 | 1/8 | 2-1/2 | 34700 | 41.30 | 34700-C3 | 47.20 | 34700-C4 | 56.90 |
| .100 | .150 | **1.000** (10x) | 3 | 1/8 | 2-1/2 | 982200 | 42.70 | 982200-C3 | 48.60 | | |
| .100 | .150 | **1.200** (12x) | 3 | 1/8 | 2-1/2 | 35499 | 42.70 | 35499-C3 | 48.60 | | |
| .100 | .150 | **1.500** (15x) | 3 | 1/8 | 3 | 49000 | 51.00 | 49000-C3 | 56.90 | | |
| .100 | .150 | **1.812** (18x) | 3 | 1/8 | 4 | 977400 | 63.80 | 977400-C3 | 70.20 | | |
| .105 | .158 | **.530** (5x) | 3 | 1/8 | 2-1/2 | 33301 | 41.20 | 33301-C3 | 47.10 | | |
| .105 | .158 | **.850** (8x) | 3 | 1/8 | 2-1/2 | 34701 | 41.30 | 34701-C3 | 47.20 | | |
| .109 (7/64) | .163 | **.570** (5x) | 3 | 1/8 | 2-1/2 | 33302 | 41.20 | 33302-C3 | 47.10 | 33302-C4 | 57.00 |
| .109 (7/64) | .163 | **.570** (5x) | 4 | 1/8 | 2-1/2 | 861702 | 41.90 | 861702-C3 | 47.90 | | |
| .109 (7/64) | .163 | **.680** (6x) | 3 | 1/8 | 2-1/2 | 937102 | 41.30 | 937102-C3 | 47.20 | | |
| .109 (7/64) | .163 | **.790** (7x) | 3 | 1/8 | 2-1/2 | 934902 | 41.30 | 934902-C3 | 47.20 | | |
| .109 (7/64) | .163 | **.900** (8x) | 3 | 1/8 | 2-1/2 | 34702 | 41.30 | 34702-C3 | 47.20 | | |
| .109 (7/64) | .163 | **1.125** (10x) | 3 | 1/8 | 2-1/2 | 982202 | 42.70 | 982202-C3 | 48.60 | | |
| .109 (7/64) | .163 | **1.312** (12x) | 3 | 1/8 | 3 | 35502 | 43.40 | 35502-C3 | 49.30 | | |
| .110 | .165 | **.570** (5x) | 3 | 1/8 | 2-1/2 | 33303 | 41.20 | 33303-C3 | 47.10 | | |
| .110 | .165 | **.900** (8x) | 3 | 1/8 | 2-1/2 | 34703 | 42.00 | 34703-C3 | 48.00 | | |
| .115 | .173 | **.600** (5x) | 3 | 1/8 | 2-1/2 | 33304 | 41.20 | 33304-C3 | 47.10 | | |
| .115 | .173 | **.950** (8x) | 3 | 1/8 | 2-1/2 | 34704 | 41.30 | 34704-C3 | 47.20 | | |
| .118 (3 mm) | .177 | **.475** (4x) | 3 | 1/8 | 2-1/2 | 945605 | 41.20 | 945605-C3 | 47.10 | | |
| .118 (3 mm) | .177 | **.625** (5x) | 3 | 1/8 | 2-1/2 | 33305 | 41.20 | 33305-C3 | 47.10 | | |
| .118 (3 mm) | .177 | **.625** (5x) | 4 | 1/8 | 2-1/2 | 861705 | 41.20 | 861705-C3 | 47.10 | | |
| .118 (3 mm) | .177 | **.735** (6x) | 3 | 1/8 | 2-1/2 | 937105 | 41.30 | 937105-C3 | 47.20 | | |
| .118 (3 mm) | .177 | **.840** (7x) | 3 | 1/8 | 2-1/2 | 934905 | 41.30 | 934905-C3 | 47.20 | | |
| .118 (3 mm) | .177 | **.950** (8x) | 3 | 1/8 | 2-1/2 | 34705 | 41.30 | 34705-C3 | 47.20 | | |
| .118 (3 mm) | .177 | **.950** (8x) | 4 | 1/8 | 2-1/2 | 874205 | 42.00 | 874205-C3 | 48.00 | | |
| .118 (3 mm) | .177 | **1.187** (10x) | 3 | 1/8 | 2-1/2 | 982205 | 42.70 | 982205-C3 | 48.60 | | |
| .118 (3 mm) | .177 | **1.420** (12x) | 3 | 1/8 | 3 | 35505 | 43.40 | 35505-C3 | 49.30 | | |
| .118 (3 mm) | .177 | **1.770** (15x) | 3 | 1/8 | 3 | 49005 | 52.00 | 49005-C3 | 57.90 | | |
| .118 (3 mm) | .177 | **2.125** (18x) | 3 | 1/8 | 4 | 977405 | 64.80 | 977405-C3 | 71.10 | | |
| .120 | .180 | **.625** (5x) | 3 | 1/8 | 2-1/2 | 33306 | 41.20 | 33306-C3 | 47.10 | | |
| .120 | .180 | **1.000** (8x) | 3 | 1/8 | 2-1/2 | 34706 | 41.30 | 34706-C3 | 47.20 | | |

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NEW SIZES!

# MINIATURE END MILLS

## Square – Long Reach, Stub Flute (cont.)

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SQUARE

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .125 (1/8) | .187 | .375 (3x) | 3 | 1/8 | 2-1/2 | 978408 | 41.20 | 978408-C3 | 47.10 | | |
| .125 (1/8) | .187 | .500 (4x) | 3 | 1/8 | 2-1/2 | 945608 | 41.20 | 945608-C3 | 47.10 | 945608-C4 | 56.70 |
| .125 (1/8) | .187 | .625 (5x) | 3 | 1/8 | 2-1/2 | 33308 | 41.20 | 33308-C3 | 47.10 | 33308-C4 | 56.70 |
| .125 (1/8) | .187 | .625 (5x) | 4 | 1/8 | 2-1/2 | 861708 | 43.70 | 861708-C3 | 49.60 | | |
| .125 (1/8) | .187 | .750 (6x) | 3 | 1/8 | 2-1/2 | 937108 | 41.20 | 937108-C3 | 47.10 | 937108-C4 | 56.70 |
| .125 (1/8) | .187 | .750 (6x) | 4 | 1/8 | 2-1/2 | 753708 | 41.90 | 753708-C3 | 47.90 | | |
| .125 (1/8) | .187 | .875 (7x) | 3 | 1/8 | 2-1/2 | 934908 | 41.20 | 934908-C3 | 47.10 | 934908-C4 | 57.00 |
| .125 (1/8) | .187 | .875 (7x) | 4 | 1/8 | 2-1/2 | 753308 | 41.90 | 753308-C3 | 47.90 | | |
| .125 (1/8) | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 34708 | 41.20 | 34708-C3 | 47.10 | 34708-C4 | 56.70 |
| .125 (1/8) | .187 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 874208 | 43.70 | 874208-C3 | 49.60 | | |
| .125 (1/8) | .187 | 1.125 (9x) | 3 | 1/8 | 2-1/2 | 846908 | 44.50 | 846908-C3 | 50.40 | | |
| .125 (1/8) | .187 | 1.250 (10x) | 3 | 1/8 | 2-1/2 | 982208 | 44.50 | 982208-C3 | 50.40 | 982208-C4 | 59.50 |
| .125 (1/8) | .187 | 1.250 (10x) | 4 | 1/8 | 2-1/2 | 789208 | 44.50 | 789208-C3 | 50.40 | | |
| .125 (1/8) | .187 | 1.375 (11x) | 3 | 1/8 | 2-1/2 | 850308 | 44.60 | 850308-C3 | 50.60 | | |
| .125 (1/8) | .187 | 1.500 (12x) | 3 | 1/8 | 3 | 35508 | 44.60 | 35508-C3 | 50.60 | 35508-C4 | 59.60 |
| .125 (1/8) | .187 | 1.500 (12x) | 4 | 1/8 | 3 | 801808 | 44.60 | 801808-C3 | 50.60 | | |
| .125 (1/8) | .187 | 1.625 (13x) | 3 | 1/8 | 3 | 839408 | 47.90 | 839408-C3 | 53.80 | | |
| .125 (1/8) | .187 | 1.875 (15x) | 3 | 1/8 | 3 | 49008 | 51.00 | 49008-C3 | 56.90 | 49008-C4 | 66.00 |
| .125 (1/8) | .187 | 2.250 (18x) | 3 | 1/8 | 4 | 977408 | 61.10 | 977408-C3 | 67.50 | | |
| .125 (1/8) | .187 | 2.500 (20x) | 3 | 1/8 | 4 | 58408 | 63.30 | 58408-C3 | 69.60 | | |
| .125 (1/8) | .187 | 2.750 (22x) | 3 | 1/8 | 4 | 969708 | 66.80 | 969708-C3 | 73.20 | | |
| .125 (1/8) | .187 | 3.125 (25x) | 3 | 1/8 | 4 | 38108 | 73.50 | 38108-C3 | 79.80 | **25x Diameter!** | |
| .125 (1/8) | .187 | 3.750 (30x) | 3 | 1/8 | 6 | 973608 | 89.50 | 973608-C3 | 97.50 | **30x Diameter!** | |
| .140 (9/64) | .220 | .425 (3x) | 3 | 3/16 | 3 | 978409 | 48.60 | 978409-C3 | 55.20 | | |
| .140 (9/64) | .220 | .750 (5x) | 3 | 3/16 | 3 | 33309 | 48.60 | 33309-C3 | 55.20 | 33309-C4 | 66.40 |
| .140 (9/64) | .220 | .750 (5x) | 4 | 3/16 | 3 | 861709 | 48.60 | 861709-C3 | 55.20 | | |
| .140 (9/64) | .220 | 1.125 (8x) | 3 | 3/16 | 3 | 34709 | 48.60 | 34709-C3 | 55.20 | | |
| .140 (9/64) | .220 | 1.450 (10x) | 3 | 3/16 | 3 | 982209 | 52.20 | 982209-C3 | 58.60 | | |
| .140 (9/64) | .220 | 1.680 (12x) | 3 | 3/16 | 4 | 35509 | 56.10 | 35509-C3 | 63.20 | | |
| .156 (5/32) | .234 | .470 (3x) | 3 | 3/16 | 3 | 978410 | 48.60 | 978410-C3 | 55.20 | | |
| .156 (5/32) | .234 | .625 (4x) | 3 | 3/16 | 3 | 945610 | 48.60 | 945610-C3 | 55.20 | | |
| .156 (5/32) | .234 | .750 (5x) | 3 | 3/16 | 3 | 33310 | 48.60 | 33310-C3 | 55.20 | 33310-C4 | 66.40 |
| .156 (5/32) | .234 | .750 (5x) | 4 | 3/16 | 3 | 861710 | 48.60 | 861710-C3 | 55.20 | | |
| .156 (5/32) | .234 | .937 (6x) | 3 | 3/16 | 3 | 937110 | 48.60 | 937110-C3 | 55.20 | | |
| .156 (5/32) | .234 | 1.093 (7x) | 3 | 3/16 | 3 | 934910 | 48.60 | 934910-C3 | 55.20 | | |
| .156 (5/32) | .234 | 1.250 (8x) | 3 | 3/16 | 3 | 34710 | 48.60 | 34710-C3 | 55.20 | 34710-C4 | 69.40 |
| .156 (5/32) | .234 | 1.250 (8x) | 4 | 3/16 | 3 | 874210 | 48.60 | 874210-C3 | 55.20 | | |
| .156 (5/32) | .234 | 1.375 (9x) | 3 | 3/16 | 3 | 846910 | 52.20 | 846910-C3 | 58.60 | | |
| .156 (5/32) | .234 | 1.570 (10x) | 3 | 3/16 | 3 | 982210 | 52.20 | 982210-C3 | 58.60 | | |
| .156 (5/32) | .234 | 1.875 (12x) | 3 | 3/16 | 4 | 35510 | 52.40 | 35510-C3 | 61.20 | | |
| .156 (5/32) | .234 | 2.375 (15x) | 3 | 3/16 | 4 | 49010 | 56.10 | 49010-C3 | 64.70 | | |
| .156 (5/32) | .234 | 2.812 (18x) | 3 | 3/16 | 6 | 977410 | 77.30 | 977410-C3 | 88.90 | | |
| .172 (11/64) | .258 | .875 (5x) | 3 | 3/16 | 3 | 33311 | 48.60 | 33311-C3 | 55.20 | | |
| .172 (11/64) | .258 | 1.375 (8x) | 3 | 3/16 | 3 | 34711 | 48.60 | 34711-C3 | 55.20 | | |

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# MINIATURE END MILLS

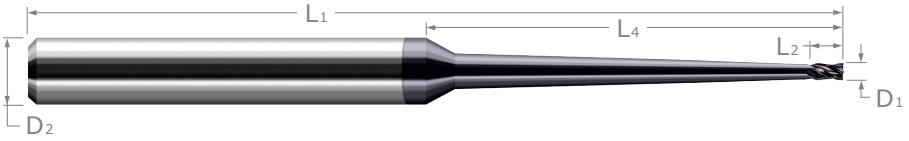
## Square – Long Reach, Stub Flute (cont.)

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| | CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.030″}_{-.000″}$ | $L_3$ $^{+.030″}_{-.000″}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| | .187 (3/16) | .281 | .570 (3x) | 3 | 3/16 | 3 | 978412 | 48.60 | 978412-C3 | 55.20 | | |
| | .187 (3/16) | .281 | .750 (4x) | 3 | 3/16 | 3 | 945612 | 48.60 | 945612-C3 | 55.20 | | |
| | .187 (3/16) | .281 | 1.000 (5x) | 3 | 3/16 | 3 | 33312 | 48.60 | 33312-C3 | 55.20 | 33312-C4 | 69.40 |
| | .187 (3/16) | .281 | 1.000 (5x) | 4 | 3/16 | 3 | 861712 | 48.60 | 861712-C3 | 55.20 | | |
| | .187 (3/16) | .281 | 1.156 (6x) | 3 | 3/16 | 3 | 937112 | 48.60 | 937112-C3 | 55.20 | | |
| | .187 (3/16) | .281 | 1.312 (7x) | 3 | 3/16 | 3 | 934912 | 48.60 | 934912-C3 | 55.20 | | |
| | .187 (3/16) | .281 | 1.500 (8x) | 3 | 3/16 | 3 | 34712 | 48.60 | 34712-C3 | 55.20 | 34712-C4 | 69.40 |
| | .187 (3/16) | .281 | 1.500 (8x) | 4 | 3/16 | 3 | 874212 | 50.90 | 874212-C3 | 57.50 | | |
| | .187 (3/16) | .281 | 1.680 (9x) | 3 | 3/16 | 3 | 846912 | 52.20 | 846912-C3 | 58.60 | | |
| | .187 (3/16) | .281 | 1.875 (10x) | 3 | 3/16 | 4 | 982212 | 52.20 | 982212-C3 | 61.00 | | |
| NEW | .187 (3/16) | .281 | 1.875 (10x) | 4 | 3/16 | 4 | 789212 | 54.50 | 789212-C3 | 61.70 | | |
| | .187 (3/16) | .281 | 2.250 (12x) | 3 | 3/16 | 4 | 35512 | 52.40 | 35512-C3 | 61.20 | 35512-C4 | 74.40 |
| | .187 (3/16) | .281 | 2.812 (15x) | 3 | 3/16 | 4 | 49012 | 56.10 | 49012-C3 | 64.70 | | |
| | .187 (3/16) | .281 | 3.375 (18x) | 3 | 3/16 | 6 | 977412 | 79.80 | 977412-C3 | 88.20 | | |
| | .187 (3/16) | .281 | 3.750 (20x) | 3 | 3/16 | 6 | 58412 | 79.80 | 58412-C3 | 88.20 | | |
| | .187 (3/16) | .281 | 4.125 (22x) | 3 | 3/16 | 6 | 969712 | 78.80 | 969712-C3 | 90.40 | | |
| | .203 (13/64) | .312 | 1.015 (5x) | 3 | 1/4 | 4 | 33313 | 61.10 | 33313-C3 | 69.80 | | |
| | .203 (13/64) | .312 | 1.625 (8x) | 3 | 1/4 | 4 | 34713 | 61.10 | 34713-C3 | 71.50 | | |
| | .218 (7/32) | .330 | 1.125 (5x) | 3 | 1/4 | 4 | 33314 | 60.80 | 33314-C3 | 71.10 | | |
| | .218 (7/32) | .330 | 1.750 (8x) | 3 | 1/4 | 4 | 34714 | 60.80 | 34714-C3 | 71.10 | | |
| | .218 (7/32) | .330 | 2.187 (10x) | 3 | 1/4 | 4 | 982214 | 62.70 | 982214-C3 | 72.90 | | |
| | .250 (1/4) | .375 | .750 (3x) | 3 | 1/4 | 4 | 978416 | 54.40 | 978416-C3 | 64.60 | | |
| | .250 (1/4) | .375 | 1.000 (4x) | 3 | 1/4 | 4 | 945616 | 54.40 | 945616-C3 | 64.60 | | |
| | .250 (1/4) | .375 | 1.250 (5x) | 3 | 1/4 | 4 | 33316 | 54.40 | 33316-C3 | 64.60 | 33316-C4 | 77.90 |
| | .250 (1/4) | .375 | 1.250 (5x) | 4 | 1/4 | 4 | 861716 | 54.40 | 861716-C3 | 64.60 | | |
| | .250 (1/4) | .375 | 1.500 (6x) | 3 | 1/4 | 4 | 937116 | 54.40 | 937116-C3 | 64.60 | | |
| | .250 (1/4) | .375 | 1.750 (7x) | 3 | 1/4 | 4 | 934916 | 54.40 | 934916-C3 | 64.60 | | |
| | .250 (1/4) | .375 | 2.000 (8x) | 3 | 1/4 | 4 | 34716 | 54.40 | 34716-C3 | 64.60 | 34716-C4 | 77.90 |
| | .250 (1/4) | .375 | 2.000 (8x) | 4 | 1/4 | 4 | 874216 | 56.80 | 874216-C3 | 67.10 | | |
| | .250 (1/4) | .375 | 2.250 (9x) | 3 | 1/4 | 4 | 846916 | 61.40 | 846916-C3 | 71.70 | | |
| | .250 (1/4) | .375 | 2.500 (10x) | 3 | 1/4 | 4 | 982216 | 61.40 | 982216-C3 | 71.70 | | |
| | .250 (1/4) | .375 | 3.000 (12x) | 3 | 1/4 | 6 | 35516 | 67.30 | 35516-C3 | 78.90 | 35516-C4 | 96.00 |
| | .250 (1/4) | .375 | 3.750 (15x) | 3 | 1/4 | 6 | 49016 | 68.60 | 49016-C3 | 80.20 | | |
| | .250 (1/4) | .375 | 5.000 (20x) | 3 | 1/4 | 8 | 58416 | 142.90 | 58416-C3 | 160.20 | | |
| | .312 (5/16) | .470 | 1.625 (5x) | 3 | 5/16 | 4 | 33320 | 90.60 | 33320-C3 | 102.80 | | |
| | .312 (5/16) | .470 | 2.500 (8x) | 3 | 5/16 | 4 | 34720 | 90.60 | 34720-C3 | 102.80 | | |
| | .375 (3/8) | .570 | 2.000 (5x) | 3 | 3/8 | 4 | 33324 | 90.60 | 33324-C3 | 102.90 | | |
| | .375 (3/8) | .570 | 3.000 (8x) | 3 | 3/8 | 6 | 34724 | 124.70 | 34724-C3 | 142.50 | | |
| | .375 (3/8) | .570 | 3.750 (10x) | 3 | 3/8 | 6 | 982224 | 124.70 | 982224-C3 | 139.00 | | |
| | .500 (1/2) | .750 | 2.625 (5x) | 3 | 1/2 | 4 | 33332 | 107.10 | 33332-C3 | 123.70 | | |

# MINIATURE END MILLS

## Square – Tapered Reach (Clearance Cutters)




**Maximum Reach & Maximum Rigidity!**

SQUARE

- Designed for deep cavity profiling
- 2° tapered neck design minimizes deflection and maximizes wall clearance
- Length of cut = 1½x diameter
- Neck behind length of cut is reduced for 1x diameter
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

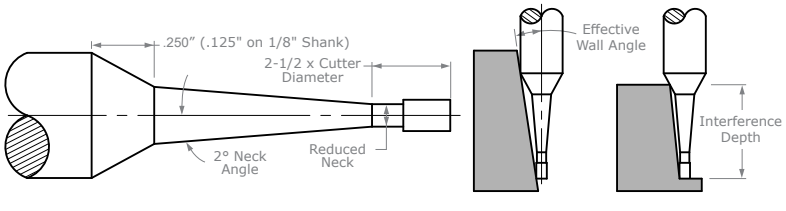
| CUTTER DIA. | LOC | OVERALL REACH | EFF. WALL ANGLE | SHANK DIA. | OAL | INTERFERENCE DEPTH AT WALL ANGLE* | | | | | | UNCOATED | | | AlTiN NANO COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000" −.001" | $L_2$ +.020" −.000" | $L_4$ +.020" −.000" | | $D_2$ (h6) | $L_1$ | 0° | .5° | 1° | 2° | 3° | 4° | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| .015 | .023 | **1/2** | 6.4° | 1/8 | 2-1/2 | .060 | .080 | .125 | .375 | .395 | .420 | | 990215 | 87.50 | | 990215-C6 | 94.80 |
| .031 | .047 | **1/2** | 5.4° | 1/8 | 2-1/2 | .115 | .155 | .235 | .385 | .410 | .440 | | 990231 | 67.40 | | 990231-C6 | 74.60 |
| .031 | .047 | **1** | 6.3° | 1/4 | 4 | .115 | .155 | .235 | .755 | .800 | .850 | 26631 | 30831 | 81.20 | 26631-C6 | 30831-C6 | 91.70 |
| .031 | .047 | **1-1/2** | 4.2° | 1/4 | 4 | .115 | .155 | .235 | 1.260 | 1.355 | 1.470 | 28331 | 31231 | 87.70 | 28331-C6 | 31231-C6 | 98.20 |
| .031 | .047 | **2** | 3.1° | 1/4 | 4 | .115 | .155 | .235 | 1.765 | 1.965 | - | 17431 | 913131 | 94.00 | 17431-C6 | 913131-C6 | 104.50 |
| .047 | .071 | **1/2** | 4.5° | 1/8 | 2-1/2 | .180 | .245 | .370 | .395 | .430 | .470 | | 990247 | 68.00 | | 990247-C6 | 75.30 |
| .047 | .071 | **1** | 5.9° | 1/4 | 4 | .180 | .245 | .370 | .765 | .815 | .870 | 26647 | 30847 | 81.20 | 26647-C6 | 30847-C6 | 91.70 |
| .047 | .071 | **1-1/2** | 3.9° | 1/4 | 4 | .180 | .245 | .370 | 1.275 | 1.380 | - | 28347 | 31247 | 87.70 | 28347-C6 | 31247-C6 | 98.20 |
| .062 | .093 | **1/2** | 3.7° | 1/8 | 2-1/2 | .220 | .295 | .375 | .410 | .460 | - | | 990262 | 65.50 | | 990262-C6 | 72.80 |
| .062 | .093 | **1** | 5.4° | 1/4 | 4 | .220 | .295 | .445 | .775 | .825 | .890 | 26662 | 30862 | 78.90 | 26662-C6 | 30862-C6 | 89.40 |
| .062 | .093 | **1-1/2** | 3.7° | 1/4 | 4 | .220 | .295 | .445 | 1.285 | 1.410 | - | 28362 | 31262 | 85.30 | 28362-C6 | 31262-C6 | 95.80 |
| .062 | .093 | **2** | 2.6° | 1/4 | 4 | .220 | .295 | .445 | 1.805 | - | - | 17462 | 913162 | 91.80 | 17462-C6 | 913162-C6 | 102.20 |
| .078 | .118 | **1** | 5.0° | 1/4 | 4 | .305 | .405 | .610 | .785 | .845 | .915 | 26678 | 30878 | 78.90 | 26678-C6 | 30878-C6 | 89.40 |
| .078 | .118 | **1-1/2** | 3.4° | 1/4 | 4 | .305 | .405 | .610 | 1.305 | 1.445 | - | 28378 | 31278 | 85.30 | 28378-C6 | 31278-C6 | 95.80 |
| .093 | .140 | **1** | 4.6° | 1/4 | 4 | .340 | .455 | .685 | .795 | .865 | .945 | 26693 | 30893 | 79.90 | 26693-C6 | 30893-C6 | 90.40 |
| .093 | .140 | **1-1/2** | 3.1° | 1/4 | 4 | .340 | .455 | .685 | 1.320 | - | - | 28393 | 31293 | 84.60 | 28393-C6 | 31293-C6 | 95.10 |
| .093 | .140 | **2** | 2.2° | 1/4 | 4 | .340 | .455 | .685 | 1.890 | - | - | 17493 | 913193 | 89.50 | 17493-C6 | 913193-C6 | 100.00 |
| .125 | .188 | **1** | 3.7° | 1/4 | 4 | .450 | .600 | .760 | .835 | .930 | - | 26708 | 30908 | 79.90 | 26708-C6 | 30908-C6 | 90.40 |
| .125 | .188 | **1-1/2** | 2.5° | 1/4 | 4 | .450 | .600 | .905 | 1.395 | - | - | 28408 | 31308 | 84.60 | 28408-C6 | 31308-C6 | 95.10 |
| .125 | .188 | **2** | 1.7° | 1/4 | 4 | .450 | .600 | .905 | - | - | - | 17508 | 913208 | 89.50 | 17508-C6 | 913208-C6 | 100.00 |
| .156 | .234 | **1** | 2.8° | 1/4 | 4 | .525 | .705 | .780 | .895 | - | - | 26710 | 30910 | 79.90 | 26710-C6 | 30910-C6 | 90.40 |
| .156 | .234 | **1-1/2** | 1.9° | 1/4 | 4 | .525 | .705 | 1.060 | - | - | - | 28410 | 31310 | 84.60 | 28410-C6 | 31310-C6 | 95.10 |
| .187 | .281 | **1-1/2** | 1.3° | 1/4 | 4 | .605 | .805 | 1.215 | - | - | - | 28412 | 31312 | 84.60 | 28412-C6 | 31312-C6 | 95.10 |
| .250 | .375 | **1-1/2** | 2.5° | 3/8 | 4 | .760 | 1.015 | 1.275 | 1.425 | - | - | 28416 | 31316 | 109.20 | 28416-C6 | 31316-C6 | 124.20 |

*Values are approximate and may vary due to tolerancing.

For detailed interference charts with more angles, scan the QR code or visit **harveytool.com/resources**

**Effective Wall Angle:**
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

**Interference Depth:**
At a given angle, the depth at which the cutter interferes with the workpiece.

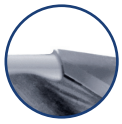


# MINIATURE END MILLS

## Square – Long Reach, Long Flute




- **Long length design for deep cavities**
- Long flutes for deep pocket milling
- Length of cut is > 5x diameter
- 3 and 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling



| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .010 | .050 | .080 (8x) | 3 | 1/8 | 2-1/2 | 876610 | 58.30 | 876610-C3 | 64.30 | | |
| .010 | .050 | .100 (10x) | 3 | 1/8 | 2-1/2 | 13610 | 59.90 | 13610-C3 | 65.80 | 10010 | 74.90 |
| .010 | .050 | .150 (15x) | 3 | 1/8 | 2-1/2 | 948210 | 76.00 | 948210-C3 | 81.90 | | |
| .012 | .060 | .120 (10x) | 3 | 1/8 | 2-1/2 | 13612 | 59.90 | 13612-C3 | 65.80 | | |
| .015 (1/64) | .075 | .125 (8x) | 3 | 1/8 | 2-1/2 | 876615 | 46.30 | 876615-C3 | 52.20 | | |
| .015 (1/64) | .075 | .150 (10x) | 3 | 1/8 | 2-1/2 | 13615 | 47.60 | 13615-C3 | 53.60 | 10015 | 62.50 |
| .015 (1/64) | .075 | .225 (15x) | 3 | 1/8 | 2-1/2 | 948215 | 65.30 | 948215-C3 | 71.20 | | |
| .020 (.5 mm) | .100 | .160 (8x) | 3 | 1/8 | 2-1/2 | 876620 | 44.30 | 876620-C3 | 50.20 | | |
| .020 (.5 mm) | .100 | .200 (10x) | 3 | 1/8 | 2-1/2 | 13620 | 45.70 | 13620-C3 | 51.60 | 10020 | 60.70 |
| .020 (.5 mm) | .100 | .300 (15x) | 3 | 1/8 | 2-1/2 | 948220 | 63.00 | 948220-C3 | 68.90 | | |
| .025 | .125 | .250 (10x) | 3 | 1/8 | 2-1/2 | 13625 | 43.90 | 13625-C3 | 49.80 | 10025 | 58.90 |
| .025 | .125 | .312 (12x) | 3 | 1/8 | 2-1/2 | 867025 | 57.50 | 867025-C3 | 63.40 | | |
| .030 | .150 | .300 (10x) | 3 | 1/8 | 2-1/2 | 13630 | 43.90 | 13630-C3 | 49.80 | 10030 | 58.90 |
| .030 | .150 | .450 (15x) | 3 | 1/8 | 2-1/2 | 948230 | 60.90 | 948230-C3 | 66.80 | | |
| .031 (1/32) | .155 | .250 (8x) | 3 | 1/8 | 2-1/2 | 876631 | 42.60 | 876631-C3 | 48.50 | | |
| .031 (1/32) | .155 | .310 (10x) | 3 | 1/8 | 2-1/2 | 13631 | 43.90 | 13631-C3 | 49.80 | 10031 | 58.90 |
| .031 (1/32) | .155 | .312 (10x) | 4 | 1/8 | 2-1/2 | 776031 | 43.90 | 776031-C3 | 49.80 | | |
| .031 (1/32) | .155 | .375 (12x) | 3 | 1/8 | 2-1/2 | 867031 | 57.00 | 867031-C3 | 62.90 | | |
| .031 (1/32) | .155 | .470 (15x) | 3 | 1/8 | 2-1/2 | 948231 | 60.90 | 948231-C3 | 66.80 | | |
| .035 (.9 mm) | .175 | .350 (10x) | 3 | 1/8 | 2-1/2 | 13635 | 43.90 | 13635-C3 | 49.80 | 10035 | 59.70 |
| .040 | .200 | .325 (8x) | 3 | 1/8 | 2-1/2 | 876640 | 42.50 | 876640-C3 | 48.40 | | |
| .040 | .200 | .400 (10x) | 3 | 1/8 | 2-1/2 | 13640 | 43.90 | 13640-C3 | 49.80 | 10040 | 58.90 |
| .040 | .200 | .600 (15x) | 3 | 1/8 | 2-1/2 | 948240 | 60.90 | 948240-C3 | 66.80 | | |
| .045 | .225 | .450 (10x) | 3 | 1/8 | 2-1/2 | 13645 | 43.10 | 13645-C3 | 49.00 | 10045 | 58.90 |
| .047 (3/64) | .250 | .375 (8x) | 3 | 1/8 | 2-1/2 | 876647 | 41.70 | 876647-C3 | 47.60 | | |
| .047 (3/64) | .250 | .500 (10x) | 3 | 1/8 | 2-1/2 | 13647 | 43.10 | 13647-C3 | 49.00 | 10047 | 58.10 |
| .047 (3/64) | .250 | .500 (10x) | 4 | 1/8 | 2-1/2 | 776047 | 43.10 | 776047-C3 | 49.00 | | |
| .047 (3/64) | .250 | .570 (12x) | 3 | 1/8 | 2-1/2 | 867047 | 53.90 | 867047-C3 | 59.80 | | |
| .047 (3/64) | .250 | .710 (15x) | 3 | 1/8 | 2-1/2 | 948247 | 57.80 | 948247-C3 | 63.70 | | |
| .050 | .300 | .500 (10x) | 3 | 1/8 | 2-1/2 | 956350 | 43.10 | 956350-C3 | 49.00 | | |
| .050 | .300 | .600 (12x) | 3 | 1/8 | 2-1/2 | 13650 | 43.10 | 13650-C3 | 49.00 | 10050 | 58.90 |
| .050 | .300 | .750 (15x) | 3 | 1/8 | 2-1/2 | 948250 | 57.80 | 948250-C3 | 63.70 | | |
| .055 (1.4 mm) | .385 | .770 (14x) | 3 | 1/8 | 2-1/2 | 13655 | 45.70 | 13655-C3 | 51.60 | 10055 | 61.40 |
| .060 | .312 | .625 (10x) | 3 | 1/8 | 2-1/2 | 956360 | 43.10 | 956360-C3 | 49.00 | | |
| .060 | .312 | .720 (12x) | 3 | 1/8 | 2-1/2 | 867060 | 43.10 | 867060-C3 | 49.00 | | |
| .060 | .500 | 1.000 (16x) | 3 | 1/8 | 2-1/2 | 13660 | 45.90 | 13660-C3 | 51.80 | 10060 | 61.20 |

continued on next page

# MINIATURE END MILLS

## Square – Long Reach, Long Flute (cont.)

continued from previous page

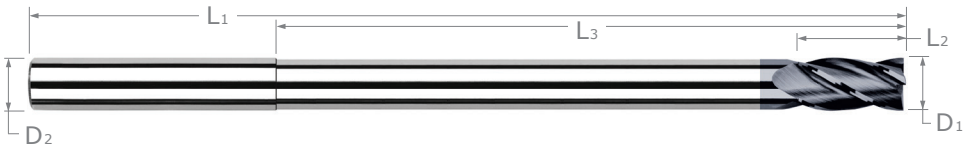
SQUARE

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .062 (1/16) | .312 | .500 (8x) | 3 | 1/8 | 2-1/2 | 876662 | 41.60 | 876662-C3 | 47.50 | | |
| .062 (1/16) | .312 | .625 (10x) | 3 | 1/8 | 2-1/2 | 956362 | 43.10 | 956362-C3 | 49.00 | | |
| .062 (1/16) | .312 | .750 (12x) | 3 | 1/8 | 2-1/2 | 867062 | 42.20 | 867062-C3 | 48.20 | | |
| .062 (1/16) | .500 | 1.000 (16x) | 3 | 1/8 | 2-1/2 | 13662 | 45.90 | 13662-C3 | 51.80 | 10062 | 61.20 |
| .062 (1/16) | .312 | 1.000 (16x) | 4 | 1/8 | 2-1/2 | 776062 | 45.90 | 776062-C3 | 51.80 | | |
| .062 (1/16) | .312 | 1.125 (18x) | 3 | 1/8 | 2-1/2 | 720762 | 46.60 | 720762-C3 | 52.50 | | |
| .065 | .500 | 1.000 (15x) | 3 | 1/8 | 2-1/2 | 13665 | 45.70 | 13665-C3 | 51.60 | 10065 | 61.00 |
| .070 | .375 | .700 (10x) | 3 | 1/8 | 2-1/2 | 956370 | 43.10 | 956370-C3 | 49.00 | | |
| .070 | .500 | 1.000 (14x) | 3 | 1/8 | 2-1/2 | 13670 | 45.70 | 13670-C3 | 51.60 | 10070 | 61.40 |
| .075 | .500 | 1.000 (13x) | 3 | 1/8 | 2-1/2 | 13675 | 43.10 | 13675-C3 | 49.00 | 10075 | 58.90 |
| .078 (5/64) | .406 | .800 (10x) | 3 | 1/8 | 2-1/2 | 956378 | 43.10 | 956378-C3 | 49.00 | | |
| .078 (5/64) | .500 | 1.000 (12x) | 3 | 1/8 | 2-1/2 | 13678 | 43.10 | 13678-C3 | 49.00 | 10078 | 58.10 |
| .078 (5/64) | .406 | 1.000 (12x) | 4 | 1/8 | 2-1/2 | 776078 | 43.10 | 776078-C3 | 49.00 | | |
| .078 (5/64) | .406 | 1.187 (15x) | 3 | 1/8 | 2-1/2 | 948278 | 57.80 | 948278-C3 | 63.70 | | |
| .080 | .750 | 1.250 (15x) | 3 | 1/8 | 2-1/2 | 13680 | 45.90 | 13680-C3 | 51.80 | 10080 | 61.20 |
| .085 | .750 | 1.250 (14x) | 3 | 1/8 | 2-1/2 | 13685 | 45.90 | 13685-C3 | 51.80 | 10085 | 61.70 |
| .090 | .750 | 1.250 (13x) | 3 | 1/8 | 2-1/2 | 13690 | 43.40 | 13690-C3 | 49.30 | 10090 | 59.20 |
| .093 (3/32) | .500 | .750 (8x) | 3 | 1/8 | 2-1/2 | 876693 | 41.60 | 876693-C3 | 47.50 | | |
| .093 (3/32) | .500 | .950 (10x) | 3 | 1/8 | 2-1/2 | 956393 | 43.10 | 956393-C3 | 49.00 | | |
| .093 (3/32) | .750 | .950 (10x) | 3 | 1/8 | 2-1/2 | 755693 | 44.20 | 755693-C3 | 50.10 | | |
| .093 (3/32) | .750 | 1.250 (13x) | 3 | 1/8 | 2-1/2 | 13693 | 43.40 | 13693-C3 | 49.30 | 10093 | 58.30 |
| .093 (3/32) | .500 | 1.250 (13x) | 4 | 1/8 | 2-1/2 | 776093 | 43.40 | 776093-C3 | 49.30 | | |
| .093 (3/32) | .500 | 1.400 (15x) | 3 | 1/8 | 3 | 948293 | 57.80 | 948293-C3 | 63.70 | | |
| .093 (3/32) | .750 | 1.400 (15x) | 3 | 1/8 | 3 | 720593 | 59.10 | 720593-C3 | 65.00 | | |
| .093 (3/32) | .500 | 1.675 (18x) | 3 | 1/8 | 3 | 720793 | 59.70 | 720793-C3 | 65.60 | | |
| .095 | .750 | 1.250 (13x) | 3 | 1/8 | 2-1/2 | 13695 | 43.10 | 13695-C3 | 49.00 | 10095 | 58.10 |
| .100 | .750 | 1.250 (12x) | 3 | 1/8 | 2-1/2 | 13700 | 43.10 | 13700-C3 | 49.00 | 10100 | 58.90 |

| $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | $L_3$ +.020″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .625 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 876708 | 41.60 | 876708-C3 | 47.50 | | |
| .125 (1/8) | .625 | 1.250 (10x) | 3 | 1/8 | 2-1/2 | 956408 | 44.40 | 956408-C3 | 50.30 | | |
| .125 (1/8) | 1.000 | 1.250 (10x) | 3 | 1/8 | 2-1/2 | 755708 | 45.00 | 755708-C3 | 51.00 | | |
| .125 (1/8) | 1.000 | 1.500 (12x) | 3 | 1/8 | 2-1/2 | 13708 | 44.60 | 13708-C3 | 50.60 | 10108 | 59.80 |
| .125 (1/8) | .625 | 1.500 (12x) | 4 | 1/8 | 2-1/2 | 776108 | 44.60 | 776108-C3 | 50.60 | | |
| .125 (1/8) | .625 | 1.875 (15x) | 3 | 1/8 | 3 | 948308 | 61.40 | 948308-C3 | 67.40 | | |
| .125 (1/8) | 1.000 | 1.875 (15x) | 3 | 1/8 | 3 | 720608 | 62.60 | 720608-C3 | 68.50 | | |
| .140 (9/64) | .750 | 1.125 (8x) | 3 | 3/16 | 3 | 876709 | 54.10 | 876709-C3 | 60.70 | | |
| .140 (9/64) | .750 | 1.450 (10x) | 3 | 3/16 | 3 | 956409 | 56.70 | 956409-C3 | 63.30 | | |
| .156 (5/32) | .750 | 1.250 (8x) | 3 | 3/16 | 3 | 876710 | 54.10 | 876710-C3 | 60.70 | | |
| .156 (5/32) | .750 | 1.570 (10x) | 3 | 3/16 | 3 | 956410 | 56.70 | 956410-C3 | 63.30 | | |
| .187 (3/16) | 1.125 | 1.625 (8x) | 3 | 3/16 | 3 | 13712 | 51.00 | 13712-C3 | 57.60 | 10112 | 71.70 |
| .187 (3/16) | 1.000 | 1.875 (10x) | 3 | 3/16 | 4 | 956412 | 54.00 | 956412-C3 | 61.10 | | |
| .250 (1/4) | 1.500 | 2.000 (8x) | 3 | 1/4 | 4 | 13716 | 56.90 | 13716-C3 | 64.00 | 10116 | 80.40 |
| .250 (1/4) | 1.250 | 2.500 (10x) | 3 | 1/4 | 4 | 956416 | 62.20 | 956416-C3 | 72.50 | | |
| .375 (3/8) | 2.000 | 3.000 (8x) | 3 | 3/8 | 6 | 876724 | 149.30 | 876724-C3 | 163.60 | | |

# MINIATURE END MILLS

## Square – Extra Long Length



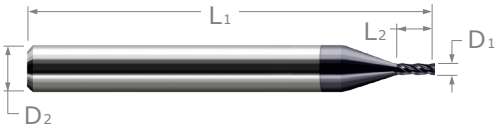



- **Up to 10" overall length**
- Longest overall length carbide end mill available in stock
- Extended reach • 4 flutes • Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000" −.002" | $L_2$ +.030" −.000" | $L_3$ +.030" −.000" | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .250 (1/4) | .375 | 4.375 (17.5x) | 1/4 | 6 | 991916 | 102.50 | 991916-C3 | 114.00 |
| .250 (1/4) | .375 | 4.375 (17.5x) | 1/4 | 8 | 960516 | 141.60 | 960516-C3 | 159.00 |
| .312 (5/16) | .470 | 4.343 (14x) | 5/16 | 6 | 991920 | 122.30 | 991920-C3 | 139.60 |
| .375 (3/8) | .562 | 4.312 (11.5x) | 3/8 | 6 | 991924 | 137.80 | 991924-C3 | 155.90 |
| .375 (3/8) | .562 | 4.312 (11.5x) | 3/8 | 8 | 960524 | 169.70 | 960524-C3 | 193.80 |
| .437 (7/16) | .656 | 5.875 (13.5x) | 7/16 | 8 | 991928 | 240.40 | 991928-C3 | 261.40 |
| .500 (1/2) | .750 | 5.750 (11.5x) | 1/2 | 8 | 991932 | 252.50 | 991932-C3 | 288.10 |
| .500 (1/2) | .750 | 5.750 (11.5x) | 1/2 | 10 | 960532 | 367.00 | 960532-C3 | 402.60 |
| .625 (5/8) | .937 | 5.687 (9x) | 5/8 | 8 | 991940 | 424.90 | 991940-C3 | 451.30 |
| .750 (3/4) | 1.125 | 5.625 (7.5x) | 3/4 | 8 | 991948 | 527.80 | 991948-C3 | 559.50 |

# MINIATURE END MILLS

## Square – Router Style



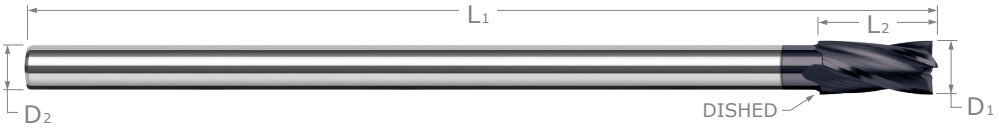

- Router style shank and tight overall length for quick and consistent tool changes
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | | AlTiN COATED | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | $L_2$ +.010" −.000" | $D_2$ | $L_1$ +.010" −.000" | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| .015 (1/64) | **.045** (3x) | 1/4 | 2 | 760615 | 761715 | 39.90 | 760615-C3 | 761715-C3 | 47.50 |
| .031 (1/32) | **.093** (3x) | 1/4 | 2 | 760631 | 761731 | 39.90 | 760631-C3 | 761731-C3 | 47.50 |
| .047 (3/64) | **.141** (3x) | 1/4 | 2 | 760647 | 761747 | 39.90 | 760647-C3 | 761747-C3 | 47.50 |
| .062 (1/16) | **.186** (3x) | 1/4 | 2 | 760662 | 761762 | 39.90 | 760662-C3 | 761762-C3 | 47.50 |
| .078 (5/64) | **.234** (3x) | 1/4 | 2 | 760678 | 761778 | 39.90 | 760678-C3 | 761778-C3 | 47.50 |
| .093 (3/32) | **.279** (3x) | 1/4 | 2 | 760693 | 761793 | 39.90 | 760693-C3 | 761793-C3 | 47.50 |

| | $D_1$ +.0005" −.0005" | $L_2$ +.030" −.000" | $D_2$ | $L_1$ +.010" −.000" | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|
| NEW | .125 (1/8) | **.187** (1.5x) | 1/4 | 2 | | 698108 | 38.60 | | 698108-C3 | 46.10 |
| | .125 (1/8) | **.375** (3x) | 1/4 | 2 | 760708 | 761808 | 39.90 | 760708-C3 | 761808-C3 | 47.50 |
| NEW | .187 (3/16) | **.312** (1.5x) | 1/4 | 2 | | 698112 | 38.50 | | 698112-C3 | 46.00 |
| | .187 (3/16) | **.625** (3x) | 1/4 | 2 | 760712 | 761812 | 39.90 | 760712-C3 | 761812-C3 | 47.50 |

# END MILLS

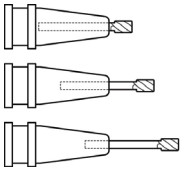
## Square – Reduced Shank




SQUARE

- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Center cutting
- Solid carbide
- CNC ground in the USA

**Chuck at Any Depth!**

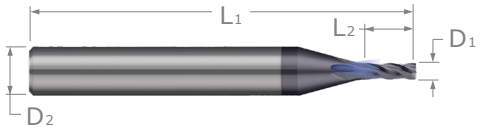


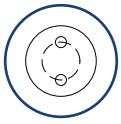
| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| **1/8** | 3/16 (1.5x) | 2 | **3 mm** | 2-1/2 | 907808 | 101.70 | 907808-C3 | 107.60 | 907808-C4 | 116.70 |
| **1/8** | 3/16 (1.5x) | 4 | **3 mm** | 2-1/2 | 943208 | 104.60 | 943208-C3 | 110.50 | 943208-C4 | 120.40 |
| **1/8** | 3/8 (3x) | 4 | **3 mm** | 2-1/2 | 789308 | 107.20 | 789308-C3 | 113.10 | | |
| **5/32** | 15/64 (1.5x) | 2 | **1/8** | 2-1/2 | 907810 | 101.70 | 907810-C3 | 108.40 | | |
| **5/32** | 15/64 (1.5x) | 4 | **1/8** | 2-1/2 | 943210 | 104.60 | 943210-C3 | 111.30 | | |
| **5/32** | 15/64 (1.5x) | 4 | **1/8** | 4 | 920610 | 114.50 | 920610-C3 | 123.30 | | |
| **3/16** | 9/32 (1.5x) | 2 | **1/8** | 2-1/2 | 907812 | 101.70 | 907812-C3 | 108.40 | | |
| **3/16** | 9/32 (1.5x) | 4 | **1/8** | 2-1/2 | 943212 | 104.60 | 943212-C3 | 111.30 | | |
| **3/16** | 9/32 (1.5x) | 4 | **5/32** | 4 | 920613 | 114.50 | 920613-C3 | 123.30 | 920613-C4 | 136.50 |
| **3/16** | .570 (3x) | 4 | **1/8** | 2-1/2 | 789312 | 107.20 | 789312-C3 | 113.90 | | |
| **1/4** | 3/8 (1.5x) | 2 | **3/16** | 3 | 907816 | 112.40 | 907816-C3 | 120.50 | | |
| **1/4** | 3/8 (1.5x) | 4 | **3/16** | 3 | 943216 | 113.30 | 943216-C3 | 122.10 | 943216-C4 | 134.70 |
| **1/4** | 3/8 (1.5x) | 4 | **3/16** | 4 | 920616 | 153.90 | 920616-C3 | 164.10 | | |
| **1/4** | 3/4 (3x) | 4 | **3/16** | 3 | 789316 | 118.50 | 789316-C3 | 127.30 | | |
| **5/16** | 15/32 (1.5x) | 4 | **1/4** | 4 | 943220 | 139.20 | 943220-C3 | 151.40 | | |
| **5/16** | 15/32 (1.5x) | 4 | **1/4** | 6 | 920620 | 184.00 | 920620-C3 | 196.00 | | |
| **3/8** | 9/16 (1.5x) | 4 | **5/16** | 4 | 943224 | 164.30 | 943224-C3 | 180.10 | 943224-C4 | 197.00 |
| **3/8** | 9/16 (1.5x) | 4 | **5/16** | 6 | 920624 | 200.40 | 920624-C3 | 218.30 | | |
| **7/16** | 21/32 (1.5x) | 4 | **3/8** | 6 | 943228 | 227.70 | 943228-C3 | 244.20 | | |
| **1/2** | 3/4 (1.5x) | 4 | **7/16** | 6 | 943232 | 257.60 | 943232-C3 | 274.90 | | |
| **5/8** | 15/16 (1.5x) | 4 | **1/2** | 6 | 943240 | 334.80 | 943240-C3 | 360.30 | | |
| **3/4** | 1-1/8 (1.5x) | 4 | **5/8** | 6 | 943248 | 413.10 | 943248-C3 | 439.90 | | |

**For Ball Reduced Shank, please see page 76.**
**For Corner Radius Reduced Shank, please see page 102.**

# MINIATURE END MILLS

## Square – Coolant Through



Cross sectional view of dual coolant channels



- Coolant-through design for improved chip removal and heat reduction
- Dual coolant channels through shank transition
- AlTiN coating for improved lubricity and heat resistance
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | | AlTiN COATED | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| .031 | **.093** (3x) | 1/4 | 2 | 741531 | 742931 | 47.10 | 741531-C3 | 742931-C3 | 54.60 |
| .047 | **.141** (3x) | 1/4 | 2 | 741547 | 742947 | 47.70 | 741547-C3 | 742947-C3 | 55.20 |
| .062 | **.186** (3x) | 1/4 | 2 | 741562 | 742962 | 48.20 | 741562-C3 | 742962-C3 | 55.60 |
| .078 | **.234** (3x) | 1/4 | 2 | 741578 | 742978 | 49.30 | 741578-C3 | 742978-C3 | 56.80 |
| .093 | **.279** (3x) | 3/8 | 2 | 741593 | 742993 | 71.70 | 741593-C3 | 742993-C3 | 82.50 |
| .125 | **.375** (3x) | 3/8 | 2 | 741608 | 743008 | 72.20 | 741608-C3 | 743008-C3 | 83.00 |

In The Loupe TV

**Check Out Our New CNC Show!**

Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

youtube.com/intheloupetv

NEW SIZES!

# MINIATURE END MILLS

## Ball – Stub & Standard




- **Cutter diameter down to .002"**
- Center cutting • Solid carbide
- CNC ground in the USA







BALL

| CUTTER DIA. | LOC | | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | | AMORPHOUS DIAMOND | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | $L_2$ +.010" −.000" | | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | |
| .002 | .003 | (1.5x) | 1/8 | 1-1/2 | 24502 | | | 78.90 | | | | | | | | | |
| .002 | .006 | (3x) | 1/8 | 1-1/2 | 74002 | | | 78.90 | | | | | | | | | |
| .003 | .004 | (1.5x) | 1/8 | 1-1/2 | 24503 | | | 69.80 | | | | | | | | | |
| .003 | .009 | (3x) | 1/8 | 1-1/2 | 74003 | | | 70.50 | | | | | | | | | |
| .004 (.1 mm) | .006 | (1.5x) | 1/8 | 1-1/2 | 24504 | | | 62.80 | | | | | | | | | |
| .004 (.1 mm) | .012 | (3x) | 1/8 | 1-1/2 | 74004 | | | 62.80 | | | | | | | | | |
| .005 | .007 | (1.5x) | 1/8 | 1-1/2 | 24505 | | 24605 | 56.60 | 24505-C3 | | 24605-C3 | 62.50 | | | 24605-C4 | 71.50 | |
| .005 | .015 | (3x) | 1/8 | 1-1/2 | 74005 | | 74305 | 56.60 | 74005-C3 | | 74305-C3 | 62.50 | 74005-C4 | | 74305-C4 | 71.50 | |
| .006 | .009 | (1.5x) | 1/8 | 1-1/2 | 24506 | | 24606 | 58.10 | | | 24606-C3 | 64.00 | | | | | |
| .006 | .018 | (3x) | 1/8 | 1-1/2 | 74006 | | 74306 | 58.10 | 74006-C3 | | 74306-C3 | 64.00 | | | | | |
| .007 | .010 | (1.5x) | 1/8 | 1-1/2 | 24507 | | 24607 | 58.10 | | | 24607-C3 | 64.00 | | | | | |
| .007 | .021 | (3x) | 1/8 | 1-1/2 | 74007 | | 74307 | 58.10 | 74007-C3 | | 74307-C3 | 64.00 | | | | | |
| .008 (.2 mm) | .012 | (1.5x) | 1/8 | 1-1/2 | 24508 | | 24608 | 58.10 | 24508-C3 | | 24608-C3 | 64.00 | | | | | |
| .008 (.2 mm) | .024 | (3x) | 1/8 | 1-1/2 | 74008 | 835908 | 74308 | 58.10 | 74008-C3 | 835908-C3 | 74308-C3 | 64.00 | 74008-C4 | | | 73.10 | |
| .009 | .013 | (1.5x) | 1/8 | 1-1/2 | 24509 | | 24609 | 58.10 | | | 24609-C3 | 64.00 | | | | | |
| .009 | .027 | (3x) | 1/8 | 1-1/2 | 74009 | | 74309 | 58.10 | | | 74309-C3 | 64.00 | | | | | |
| .010 | .008 | (0.8x) | 1/8 | 1-1/2 | | | 758210 | 46.50 | | | 758210-C3 | 52.40 | | | | | |
| .010 | .015 | (1.5x) | 1/8 | 1-1/2 | 24510 | 823410 | 24610 | 45.00 | 24510-C3 | 823410-C3 | 24610-C3 | 51.00 | | | 24610-C4 | 60.00 | |
| .010 | .030 | (3x) | 1/8 | 1-1/2 | 74010 | 835910 | 74310 | 45.00 | 74010-C3 | 835910-C3 | 74310-C3 | 51.00 | 74010-C4 | | 74310-C4 | 60.00 | |
| .011 | .016 | (1.5x) | 1/8 | 1-1/2 | 24511 | | 24611 | 47.10 | | | 24611-C3 | 53.00 | | | | | |
| .011 | .033 | (3x) | 1/8 | 1-1/2 | 74011 | | 74311 | 47.10 | | | 74311-C3 | 53.00 | | | | | |
| .012 (.3 mm) | .018 | (1.5x) | 1/8 | 1-1/2 | 24512 | | 24612 | 47.10 | 24512-C3 | | 24612-C3 | 53.00 | | | | | |
| .012 (.3 mm) | .036 | (3x) | 1/8 | 1-1/2 | 74012 | 835912 | 74312 | 47.10 | 74012-C3 | 835912-C3 | 74312-C3 | 53.00 | 74012-C4 | | | 62.10 | |
| .013 | .019 | (1.5x) | 1/8 | 1-1/2 | 24513 | | 24613 | 47.10 | | | 24613-C3 | 53.00 | | | | | |
| .013 | .039 | (3x) | 1/8 | 1-1/2 | 74013 | | 74313 | 47.10 | | | 74313-C3 | 53.00 | | | | | |
| .014 | .021 | (1.5x) | 1/8 | 1-1/2 | 24514 | | 24614 | 47.10 | | | 24614-C3 | 53.00 | | | | | |
| .014 | .042 | (3x) | 1/8 | 1-1/2 | 74014 | | 74314 | 47.10 | | | 74314-C3 | 53.00 | | | | | |
| .015 (1/64) | .012 | (0.8x) | 1/8 | 1-1/2 | | | 758215 | 36.30 | | | 758215-C3 | 42.20 | | | | | NEW |
| .015 (1/64) | .022 | (1.5x) | 1/8 | 1-1/2 | 24515 | 823415 | 24615 | 34.90 | 24515-C3 | 823415-C3 | 24615-C3 | 40.80 | 24515-C4 | | 24615-C4 | 49.80 | |
| .015 (1/64) | .045 | (3x) | 1/8 | 1-1/2 | 74015 | 835915 | 74315 | 34.90 | 74015-C3 | 835915-C3 | 74315-C3 | 40.80 | 74015-C4 | | 74315-C4 | 49.80 | |
| .016 (.4 mm) | .024 | (1.5x) | 1/8 | 1-1/2 | 24516 | | 24616 | 36.50 | | | 24616-C3 | 42.50 | | | | | |
| .016 (.4 mm) | .048 | (3x) | 1/8 | 1-1/2 | 74016 | | 74316 | 36.50 | | | 74316-C3 | 42.50 | | | | | |
| .017 | .026 | (1.5x) | 1/8 | 1-1/2 | 24517 | | 24617 | 36.50 | | | 24617-C3 | 42.50 | | | | | |
| .017 | .051 | (3x) | 1/8 | 1-1/2 | 74017 | | 74317 | 36.50 | | | 74317-C3 | 42.50 | | | | | |
| .018 | .027 | (1.5x) | 1/8 | 1-1/2 | 24518 | | 24618 | 36.50 | | | 24618-C3 | 42.50 | | | | | |
| .018 | .054 | (3x) | 1/8 | 1-1/2 | 74018 | | 74318 | 36.50 | 74018-C3 | | 74318-C3 | 42.50 | | | | | |
| .019 | .029 | (1.5x) | 1/8 | 1-1/2 | 24519 | | 24619 | 36.50 | | | 24619-C3 | 42.50 | | | | | |
| .019 | .057 | (3x) | 1/8 | 1-1/2 | 74019 | | 74319 | 36.50 | | | 74319-C3 | 42.50 | 74019-C4 | | | 51.50 | |

Down to .002"!

continued on next page

NEW SIZES!

# MINIATURE END MILLS

## Ball – Stub & Standard (cont.)

continued from previous page

| | CUTTER DIA. | LOC | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | | AMORPHOUS DIAMOND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ |
| | .020 (.5 mm) | .016 (0.8x) | 1/8 | 1-1/2 | | | 758220 | 35.10 | | | 758220-C3 | 41.00 | | | | |
| | .020 (.5 mm) | .030 (1.5x) | 1/8 | 1-1/2 | 24520 | 823420 | 24620 | 33.60 | 24520-C3 | 823420-C3 | 24620-C3 | 39.50 | 24520-C4 | | 24620-C4 | 48.60 |
| | .020 (.5 mm) | .060 (3x) | 1/8 | 1-1/2 | 74020 | 835920 | 74320 | 33.60 | 74020-C3 | 835920-C3 | 74320-C3 | 39.50 | 74020-C4 | | 74320-C4 | 48.60 |
| | .021 | .031 (1.5x) | 1/8 | 1-1/2 | 24521 | | 24621 | 35.30 | | | 24621-C3 | 41.20 | | | | |
| | .021 | .063 (3x) | 1/8 | 1-1/2 | 74021 | | 74321 | 35.30 | 74021-C3 | | 74321-C3 | 41.20 | | | | |
| | .022 | .033 (1.5x) | 1/8 | 1-1/2 | 24522 | | 24622 | 35.30 | | | 24622-C3 | 41.20 | | | | |
| | .022 | .066 (3x) | 1/8 | 1-1/2 | 74022 | | 74322 | 35.30 | | | 74322-C3 | 41.20 | | | | |
| | .023 | .035 (1.5x) | 1/8 | 1-1/2 | 24523 | | 24623 | 35.30 | | | 24623-C3 | 41.20 | | | | |
| | .023 | .069 (3x) | 1/8 | 1-1/2 | 74023 | | 74323 | 35.30 | 74023-C3 | | 74323-C3 | 41.20 | | | | |
| | .024 (.6 mm) | .036 (1.5x) | 1/8 | 1-1/2 | 24524 | | 24624 | 35.30 | | | 24624-C3 | 41.20 | | | | |
| | .024 (.6 mm) | .072 (3x) | 1/8 | 1-1/2 | 74024 | | 74324 | 35.30 | | | 74324-C3 | 41.20 | | | | |
| NEW | .025 | .020 (0.8x) | 1/8 | 1-1/2 | | | 758225 | 31.80 | | | 758225-C3 | 37.70 | | | | |
| | .025 | .037 (1.5x) | 1/8 | 1-1/2 | 24525 | 823425 | 24625 | 30.30 | 24525-C3 | 823425-C3 | 24625-C3 | 36.20 | | | 24625-C4 | 45.30 |
| | .025 | .075 (3x) | 1/8 | 1-1/2 | 74025 | 835925 | 74325 | 30.30 | 74025-C3 | 835925-C3 | 74325-C3 | 36.20 | 74025-C4 | | 74325-C4 | 45.30 |
| | .026 | .039 (1.5x) | 1/8 | 1-1/2 | 24526 | | 24626 | 31.70 | | | 24626-C3 | 37.60 | | | | |
| | .026 | .078 (3x) | 1/8 | 1-1/2 | 74026 | | 74326 | 31.70 | | | 74326-C3 | 37.60 | | | | |
| | .027 | .041 (1.5x) | 1/8 | 1-1/2 | 24527 | | 24627 | 31.70 | | | 24627-C3 | 37.60 | | | | |
| | .027 | .081 (3x) | 1/8 | 1-1/2 | 74027 | | 74327 | 31.70 | | | 74327-C3 | 37.60 | | | | |
| | .028 (.7 mm) | .042 (1.5x) | 1/8 | 1-1/2 | 24528 | | 24628 | 31.70 | | | 24628-C3 | 37.60 | | | | |
| | .028 (.7 mm) | .084 (3x) | 1/8 | 1-1/2 | 74028 | | 74328 | 31.70 | | | 74328-C3 | 37.60 | | | | |
| | .029 | .043 (1.5x) | 1/8 | 1-1/2 | 24529 | | 24629 | 31.70 | | | 24629-C3 | 37.60 | | | | |
| | .029 | .087 (3x) | 1/8 | 1-1/2 | 74029 | | 74329 | 31.70 | | | 74329-C3 | 37.60 | | | | |
| | .030 | .024 (0.8x) | 1/8 | 1-1/2 | | | 758230 | 29.10 | | | 758230-C3 | 35.00 | | | | |
| | .030 | .045 (1.5x) | 1/8 | 1-1/2 | 24530 | 823430 | 24630 | 27.70 | 24530-C3 | 823430-C3 | 24630-C3 | 33.60 | | | 24630-C4 | 42.70 |
| | .030 | .090 (3x) | 1/8 | 1-1/2 | 74030 | 835930 | 74330 | 27.70 | 74030-C3 | 835930-C3 | 74330-C3 | 33.60 | 74030-C4 | | 74330-C4 | 42.70 |
| | .031 (1/32) | .025 (0.8x) | 1/8 | 1-1/2 | | | 758231 | 27.70 | | | 758231-C3 | 33.60 | | | | |
| | .031 (1/32) | .046 (1.5x) | 1/8 | 1-1/2 | 24531 | 823431 | 24631 | 27.70 | 24531-C3 | 823431-C3 | 24631-C3 | 33.60 | 24531-C4 | | 24631-C4 | 42.70 |
| | .031 (1/32) | .093 (3x) | 1/8 | 1-1/2 | 74031 | 835931 | 74331 | 27.70 | 74031-C3 | 835931-C3 | 74331-C3 | 33.60 | 74031-C4 | 835931-C4 | 74331-C4 | 42.70 |
| NEW | .032 | .026 (0.8x) | 1/8 | 1-1/2 | | | 758232 | 30.50 | | | 758232-C3 | 36.40 | | | | |
| NEW | .032 | .048 (1.5x) | 1/8 | 1-1/2 | 24532 | | 24632 | 29.10 | | | 24632-C3 | 35.00 | 24532-C4 | | | 44.00 |
| | .032 | .096 (3x) | 1/8 | 1-1/2 | 74032 | | 74332 | 29.10 | 74032-C3 | | 74332-C3 | 35.00 | | | | |
| | .033 | .049 (1.5x) | 1/8 | 1-1/2 | 24533 | | 24633 | 29.10 | | | 24633-C3 | 35.00 | | | | |
| | .033 | .099 (3x) | 1/8 | 1-1/2 | 74033 | | 74333 | 29.10 | 74033-C3 | | 74333-C3 | 35.00 | | | | |
| | .034 | .051 (1.5x) | 1/8 | 1-1/2 | 24534 | | 24634 | 29.10 | | | 24634-C3 | 35.00 | | | | |
| | .034 | .102 (3x) | 1/8 | 1-1/2 | 74034 | | 74334 | 29.10 | | | 74334-C3 | 35.00 | | | | |
| | .035 (.9 mm) | .052 (1.5x) | 1/8 | 1-1/2 | 24535 | 823435 | 24635 | 26.20 | 24535-C3 | 823435-C3 | 24635-C3 | 32.10 | | | 24635-C4 | 41.10 |
| | .035 (.9 mm) | .105 (3x) | 1/8 | 1-1/2 | 74035 | 835935 | 74335 | 26.20 | 74035-C3 | 835935-C3 | 74335-C3 | 32.10 | 74035-C4 | | 74335-C4 | 41.10 |
| | .036 | .054 (1.5x) | 1/8 | 1-1/2 | 24536 | | 24636 | 27.40 | | | 24636-C3 | 33.30 | | | | |
| | .036 | .108 (3x) | 1/8 | 1-1/2 | 74036 | | 74336 | 27.40 | | | 74336-C3 | 33.30 | | | | |
| | .037 | .055 (1.5x) | 1/8 | 1-1/2 | 24537 | | 24637 | 27.40 | | | 24637-C3 | 33.30 | | | | |
| | .037 | .111 (3x) | 1/8 | 1-1/2 | 74037 | | 74337 | 27.40 | | | 74337-C3 | 33.30 | | | | |
| | .038 | .057 (1.5x) | 1/8 | 1-1/2 | 24538 | | 24638 | 27.40 | | | 24638-C3 | 33.30 | | | | |
| | .038 | .114 (3x) | 1/8 | 1-1/2 | 74038 | | 74338 | 27.40 | | | 74338-C3 | 33.30 | | | | |
| NEW | .039 (1 mm) | .031 (0.8x) | 1/8 | 1-1/2 | | | 758239 | 28.30 | | | 758239-C3 | 34.30 | | | | |
| | .039 (1 mm) | .058 (1.5x) | 1/8 | 1-1/2 | 24539 | 823439 | 24639 | 26.90 | 24539-C3 | 823439-C3 | 24639-C3 | 32.80 | | | | |
| | .039 (1 mm) | .117 (3x) | 1/8 | 1-1/2 | 74039 | 835939 | 74339 | 26.90 | 74039-C3 | 835939-C3 | 74339-C3 | 32.80 | 74039-C4 | | 74339-C4 | 41.80 |

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NEW SIZES!

# MINIATURE END MILLS

## Ball – Stub & Standard (cont.)

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BALL

| CUTTER DIA. | LOC | | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | | AMORPHOUS DIAMOND | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | |
| .040 | .032 | (0.8x) | 1/8 | 1-1/2 | | | 758240 | 27.50 | | | 758240-C3 | 33.40 | | | | | |
| .040 | .060 | (1.5x) | 1/8 | 1-1/2 | 24540 | 823440 | 24640 | 26.20 | 24540-C3 | 823440-C3 | 24640-C3 | 32.10 | 24540-C4 | | 24640-C4 | 41.10 | |
| .040 | .120 | (3x) | 1/8 | 1-1/2 | 74040 | 835940 | 74340 | 26.20 | 74040-C3 | 835940-C3 | 74340-C3 | 32.10 | 74040-C4 | | 74340-C4 | 41.10 | |
| .041 | .123 | (3x) | 1/8 | 1-1/2 | 74041 | | 74341 | 27.40 | | | 74341-C3 | 33.30 | | | | | |
| .042 | .126 | (3x) | 1/8 | 1-1/2 | 74042 | | 74342 | 27.40 | | | 74342-C3 | 33.30 | | | | | |
| .043 (1.1 mm) | .129 | (3x) | 1/8 | 1-1/2 | 74043 | | 74343 | 27.40 | | | 74343-C3 | 33.30 | | | | | |
| .044 | .132 | (3x) | 1/8 | 1-1/2 | 74044 | | 74344 | 27.40 | | | 74344-C3 | 33.30 | | | | | |
| .045 | .067 | (1.5x) | 1/8 | 1-1/2 | 24545 | 823445 | 24645 | 26.20 | | 823445-C3 | 24645-C3 | 32.10 | | | 24645-C4 | 41.10 | |
| .045 | .135 | (3x) | 1/8 | 1-1/2 | 74045 | 835945 | 74345 | 26.20 | 74045-C3 | 835945-C3 | 74345-C3 | 32.10 | 74045-C4 | | 74345-C4 | 41.10 | |
| .046 | .138 | (3x) | 1/8 | 1-1/2 | 74046 | | 74346 | 27.40 | | | 74346-C3 | 33.30 | | | | | |
| .047 (3/64) | .038 | (0.8x) | 1/8 | 1-1/2 | | | 758247 | 27.50 | | | 758247-C3 | 33.40 | | | | | |
| .047 (3/64) | .070 | (1.5x) | 1/8 | 1-1/2 | 24547 | 823447 | 24647 | 26.20 | 24547-C3 | 823447-C3 | 24647-C3 | 32.10 | 24547-C4 | | 24647-C4 | 41.10 | |
| .047 (3/64) | .141 | (3x) | 1/8 | 1-1/2 | 74047 | 835947 | 74347 | 26.20 | 74047-C3 | 835947-C3 | 74347-C3 | 32.10 | 74047-C4 | | 74347-C4 | 41.10 | |
| .048 | .144 | (3x) | 1/8 | 1-1/2 | 74048 | | 74348 | 27.40 | | | 74348-C3 | 33.30 | | | | | |
| .049 | .147 | (3x) | 1/8 | 1-1/2 | 74049 | | 74349 | 27.40 | | | 74349-C3 | 33.30 | | | | | |
| .050 | .040 | (0.8x) | 1/8 | 1-1/2 | | | 758250 | 27.50 | | | 758250-C3 | 33.40 | | | | | |
| .050 | .075 | (1.5x) | 1/8 | 1-1/2 | 24550 | 823450 | 24650 | 26.20 | 24550-C3 | 823450-C3 | 24650-C3 | 32.10 | | | 24650-C4 | 41.10 | |
| .050 | .150 | (3x) | 1/8 | 1-1/2 | 74050 | 835950 | 74350 | 26.20 | 74050-C3 | 835950-C3 | 74350-C3 | 32.10 | 74050-C4 | | 74350-C4 | 41.10 | |
| .051 (1.3 mm) | .153 | (3x) | 1/8 | 1-1/2 | 74051 | | 74351 | 27.40 | | | 74351-C3 | 33.30 | | | | | |
| .052 | .156 | (3x) | 1/8 | 1-1/2 | 74052 | | 74352 | 27.40 | | | 74352-C3 | 33.30 | | | | | |
| .053 | .159 | (3x) | 1/8 | 1-1/2 | 74053 | | 74353 | 27.40 | | | 74353-C3 | 33.30 | | | | | |
| .054 | .162 | (3x) | 1/8 | 1-1/2 | 74054 | | 74354 | 27.40 | | | 74354-C3 | 33.30 | | | | | |
| .055 (1.4 mm) | .044 | (0.8x) | 1/8 | 1-1/2 | | | 758255 | 27.60 | | | 758255-C3 | 33.50 | | | | | NEW |
| .055 (1.4 mm) | .082 | (1.5x) | 1/8 | 1-1/2 | 24555 | 823455 | 24655 | 26.20 | 24555-C3 | 823455-C3 | 24655-C3 | 32.10 | | | 24655-C4 | 41.10 | |
| .055 (1.4 mm) | .165 | (3x) | 1/8 | 1-1/2 | 74055 | 835955 | 74355 | 26.20 | 74055-C3 | 835955-C3 | 74355-C3 | 32.10 | 74055-C4 | | 74355-C4 | 41.10 | |
| .056 | .168 | (3x) | 1/8 | 1-1/2 | 74056 | | 74356 | 27.40 | | | 74356-C3 | 33.30 | | | | | |
| .057 | .171 | (3x) | 1/8 | 1-1/2 | 74057 | | 74357 | 27.40 | | | 74357-C3 | 33.30 | | | | | |
| .058 | .174 | (3x) | 1/8 | 1-1/2 | 74058 | | 74358 | 27.40 | | | 74358-C3 | 33.30 | | | | | |
| .059 (1.5 mm) | .089 | (1.5x) | 1/8 | 1-1/2 | 24559 | | 24659 | 27.40 | | | 24659-C3 | 33.30 | | | | | |
| .059 (1.5 mm) | .177 | (3x) | 1/8 | 1-1/2 | 74059 | | 74359 | 27.40 | | | 74359-C3 | 33.30 | | | | | |
| .060 | .049 | (0.8x) | 1/8 | 1-1/2 | | | 758260 | 27.50 | | | 758260-C3 | 33.40 | | | | | |
| .060 | .090 | (1.5x) | 1/8 | 1-1/2 | 24560 | 823460 | 24660 | 26.20 | 24560-C3 | 823460-C3 | 24660-C3 | 32.10 | | | 24660-C4 | 41.10 | |
| .060 | .180 | (3x) | 1/8 | 1-1/2 | 74060 | 835960 | 74360 | 26.20 | 74060-C3 | 835960-C3 | 74360-C3 | 32.10 | 74060-C4 | | 74360-C4 | 41.10 | |
| .061 | .183 | (3x) | 1/8 | 1-1/2 | | | 74361 | 26.20 | | | 74361-C3 | 32.10 | | | | | |
| .062 (1/16) | .050 | (0.8x) | 1/8 | 1-1/2 | | | 758262 | 25.70 | | | 758262-C3 | 31.70 | | | | | |
| .062 (1/16) | .093 | (1.5x) | 1/8 | 1-1/2 | 24562 | 823462 | 24662 | 25.70 | 24562-C3 | 823462-C3 | 24662-C3 | 31.70 | 24562-C4 | | 24662-C4 | 40.70 | |
| .062 (1/16) | .186 | (3x) | 1/8 | 1-1/2 | 74062 | 835962 | 74362 | 25.70 | 74062-C3 | 835962-C3 | 74362-C3 | 31.70 | 74062-C4 | 835962-C4 | 74362-C4 | 40.70 | |
| .063 | .189 | (3x) | 1/8 | 1-1/2 | | | 74363 | 26.20 | | | 74363-C3 | 32.10 | | | | | |
| .064 | .192 | (3x) | 1/8 | 1-1/2 | | | 74364 | 26.20 | | | 74364-C3 | 32.10 | | | | | |
| .065 | .097 | (1.5x) | 1/8 | 1-1/2 | 24565 | 823465 | 24665 | 25.70 | | 823465-C3 | 24665-C3 | 31.70 | | | | | |
| .065 | .195 | (3x) | 1/8 | 1-1/2 | 74065 | 835965 | 74365 | 25.70 | 74065-C3 | 835965-C3 | 74365-C3 | 31.70 | 74065-C4 | | 74365-C4 | 40.70 | |
| .066 | .198 | (3x) | 1/8 | 1-1/2 | | | 74366 | 26.20 | | | 74366-C3 | 32.10 | | | | | |
| .067 | .201 | (3x) | 1/8 | 1-1/2 | | | 74367 | 26.20 | | | 74367-C3 | 32.10 | | | | | |
| .068 | .204 | (3x) | 1/8 | 1-1/2 | | | 74368 | 26.20 | | | 74368-C3 | 32.10 | | | | | |
| .069 | .207 | (3x) | 1/8 | 1-1/2 | | | 74369 | 26.20 | | | 74369-C3 | 32.10 | | | | | |

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NEW SIZES!

# MINIATURE END MILLS

## Ball – Stub & Standard (cont.)

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| | CUTTER DIA. | LOC | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | | AMORPHOUS DIAMOND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ |
| NEW | .070 | .056 (0.8x) | 1/8 | 1-1/2 | | | 758270 | 27.20 | | | 758270-C3 | 33.10 | | | | |
| | .070 | .105 (1.5x) | 1/8 | 1-1/2 | 24570 | 823470 | 24670 | 25.70 | 24570-C3 | 823470-C3 | 24670-C3 | 31.70 | | | | |
| | .070 | .210 (3x) | 1/8 | 1-1/2 | 74070 | 835970 | 74370 | 25.70 | 74070-C3 | 835970-C3 | 74370-C3 | 31.70 | 74070-C4 | | 74370-C4 | 40.70 |
| | .071 | .213 (3x) | 1/8 | 1-1/2 | | | 74371 | 25.70 | | | 74371-C3 | 31.70 | | | | |
| | .075 | .112 (1.5x) | 1/8 | 1-1/2 | 24575 | | 24675 | 25.70 | | | 24675-C3 | 31.70 | | | | |
| | .075 | .225 (3x) | 1/8 | 1-1/2 | 74075 | 835975 | 74375 | 25.70 | 74075-C3 | 835975-C3 | 74375-C3 | 31.70 | 74075-C4 | | | 40.70 |
| | .078 (5/64) | .062 (0.8x) | 1/8 | 1-1/2 | | | 758278 | 27.10 | | | 758278-C3 | 33.00 | | | | |
| | .078 (5/64) | .117 (1.5x) | 1/8 | 1-1/2 | 24578 | 823478 | 24678 | 25.70 | 24578-C3 | 823478-C3 | 24678-C3 | 31.70 | | | 24678-C4 | 40.70 |
| | .078 (5/64) | .234 (3x) | 1/8 | 1-1/2 | 74078 | 835978 | 74378 | 25.70 | 74078-C3 | 835978-C3 | 74378-C3 | 31.70 | 74078-C4 | | 74378-C4 | 40.70 |
| | .080 | .120 (1.5x) | 1/8 | 1-1/2 | 24580 | 823480 | 24680 | 25.70 | | 823480-C3 | 24680-C3 | 31.70 | | | | |
| | .080 | .240 (3x) | 1/8 | 1-1/2 | 74080 | 835980 | 74380 | 25.70 | 74080-C3 | 835980-C3 | 74380-C3 | 31.70 | 74080-C4 | | 74380-C4 | 40.70 |
| NEW | .085 | .068 (0.8x) | 1/8 | 1-1/2 | | | 758285 | 27.20 | | | 758285-C3 | 33.10 | | | | |
| | .085 | .127 (1.5x) | 1/8 | 1-1/2 | 24585 | | 24685 | 25.70 | | | 24685-C3 | 31.70 | | | | |
| | .085 | .255 (3x) | 1/8 | 1-1/2 | 74085 | | 74385 | 25.70 | | | 74385-C3 | 31.70 | | | | |
| | .090 | .135 (1.5x) | 1/8 | 1-1/2 | 24590 | 823490 | 24690 | 25.70 | | 823490-C3 | 24690-C3 | 31.70 | | | | |
| | .090 | .270 (3x) | 1/8 | 1-1/2 | 74090 | 835990 | 74390 | 25.70 | 74090-C3 | 835990-C3 | 74390-C3 | 31.70 | 74090-C4 | | 74390-C4 | 40.70 |
| | .093 (3/32) | .074 (0.8x) | 1/8 | 1-1/2 | | | 758293 | 25.70 | | | 758293-C3 | 31.70 | | | | |
| | .093 (3/32) | .139 (1.5x) | 1/8 | 1-1/2 | 24593 | 823493 | 24693 | 25.70 | 24593-C3 | 823493-C3 | 24693-C3 | 31.70 | 24593-C4 | | 24693-C4 | 40.70 |
| | .093 (3/32) | .279 (3x) | 1/8 | 1-1/2 | 74093 | 835993 | 74393 | 25.70 | 74093-C3 | 835993-C3 | 74393-C3 | 31.70 | 74093-C4 | | 74393-C4 | 40.70 |
| | .095 | .142 (1.5x) | 1/8 | 1-1/2 | 24595 | | 24695 | 25.70 | | | 24695-C3 | 31.70 | | | | |
| | .095 | .285 (3x) | 1/8 | 1-1/2 | 74095 | | 74395 | 25.70 | | | 74395-C3 | 31.70 | | | | |
| | .098 | .294 (3x) | 1/8 | 1-1/2 | | | 74398 | 28.90 | | | 74398-C3 | 34.80 | | | | |
| | .100 | .150 (1.5x) | 1/8 | 1-1/2 | 24599 | 823500 | 24699 | 25.70 | 24599-C3 | 823500-C3 | 24699-C3 | 31.70 | | | | |
| | .100 | .300 (3x) | 1/8 | 1-1/2 | 74100 | 836000 | 74400 | 25.70 | 74100-C3 | 836000-C3 | 74400-C3 | 31.70 | 74100-C4 | | 74400-C4 | 40.70 |
| | .103 | .309 (3x) | 1/8 | 1-1/2 | | | 74403 | 25.70 | | | 74403-C3 | 31.70 | | | | |
| | .105 | .158 (1.5x) | 1/8 | 1-1/2 | 50900 | | 51000 | 25.70 | | | 51000-C3 | 31.70 | | | | |
| | .105 | .315 (3x) | 1/8 | 1-1/2 | 74105 | | 74405 | 25.70 | | | 74405-C3 | 31.70 | | | | |
| NEW | .109 (7/64) | .087 (0.8x) | 1/8 | 1-1/2 | | | 758302 | 27.20 | | | 758302-C3 | 33.10 | | | | |
| | .109 (7/64) | .164 (1.5x) | 1/8 | 1-1/2 | 50901 | 823502 | 51001 | 25.70 | 50901-C3 | 823502-C3 | 51001-C3 | 31.70 | | | | |
| | .109 (7/64) | .375 (3x) | 1/8 | 1-1/2 | 74109 | 836002 | 74409 | 25.70 | 74109-C3 | 836002-C3 | 74409-C3 | 31.70 | | | | |
| | .110 | .165 (1.5x) | 1/8 | 1-1/2 | 50902 | | 51002 | 25.70 | | | 51002-C3 | 31.70 | | | | |
| | .110 | .330 (3x) | 1/8 | 1-1/2 | 74110 | | 74410 | 25.70 | | | 74410-C3 | 31.70 | | | | |
| | .115 | .173 (1.5x) | 1/8 | 1-1/2 | 50903 | | 51003 | 25.70 | | | 51003-C3 | 31.70 | | | | |
| | .115 | .345 (3x) | 1/8 | 1-1/2 | 74115 | | 74415 | 25.70 | | | 74415-C3 | 31.70 | | | | |
| NEW | .118 (3 mm) | .094 (0.8x) | 1/8 | 1-1/2 | | | 758305 | 27.80 | | | 758305-C3 | 33.70 | | | | |
| | .118 (3 mm) | .177 (1.5x) | 1/8 | 1-1/2 | 50904 | 823505 | 51004 | 26.40 | | 823505-C3 | 51004-C3 | 32.30 | | | | |
| | .118 (3 mm) | .354 (3x) | 1/8 | 1-1/2 | 74118 | 836005 | 74418 | 26.40 | 74118-C3 | 836005-C3 | 74418-C3 | 32.30 | | | | |
| | .120 | .180 (1.5x) | 1/8 | 1-1/2 | 50905 | | 51005 | 25.70 | | | 51005-C3 | 31.70 | | | | |
| | .120 | .360 (3x) | 1/8 | 1-1/2 | 74120 | | 74420 | 25.70 | | | 74420-C3 | 31.70 | | | | |

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NEW SIZES!

# MINIATURE END MILLS

## Ball – Stub & Standard (cont.)

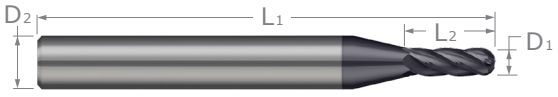
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| CUTTER DIA. | LOC | | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | | AMORPHOUS DIAMOND | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000" −.002" | $L_2$ +.030" −.000" | | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | 2 FL | 3 FL | 4 FL | USD$ | |
| .125 (1/8) | .100 | (0.8x) | 1/8 | 1-1/2 | | | 758308 | 23.80 | | | 758308-C3 | 29.70 | | | | | |
| .125 (1/8) | .187 | (1.5x) | 1/8 | 1-1/2 | 50908 | 823508 | 51008 | 23.80 | 50908-C3 | 823508-C3 | 51008-C3 | 29.70 | 50908-C4 | | 51008-C4 | 38.70 | |
| .125 (1/8) | .375 | (3x) | 1/8 | 1-1/2 | 74125 | 836008 | 74425 | 23.80 | 74125-C3 | 836008-C3 | 74425-C3 | 29.70 | 74125-C4 | 836008-C4 | 74425-C4 | 38.70 | |
| .140 (9/64) | .112 | (0.8x) | 3/16 | 2 | | | 758309 | 24.90 | | | 758309-C3 | 31.10 | | | | | NEW |
| .140 (9/64) | .220 | (1.5x) | 3/16 | 2 | 50909 | | 51009 | 24.30 | 50909-C3 | | 51009-C3 | 30.80 | | | | | |
| .140 (9/64) | .562 | (3x) | 3/16 | 2 | 74140 | 836009 | 74440 | 24.30 | 74140-C3 | 836009-C3 | 74440-C3 | 30.50 | | | | | |
| .156 (5/32) | .125 | (0.8x) | 3/16 | 2 | | | 758310 | 26.80 | | | 758310-C3 | 33.00 | | | | | NEW |
| .156 (5/32) | .281 | (1.5x) | 3/16 | 2 | 50910 | 823510 | 51010 | 25.30 | | 823510-C3 | 51010-C3 | 31.70 | | | 51010-C4 | 43.60 | |
| .156 (5/32) | .562 | (3x) | 3/16 | 2 | 74156 | 836010 | 74456 | 25.30 | 74156-C3 | 836010-C3 | 74456-C3 | 31.60 | | | 74456-C4 | 42.00 | |
| .172 (11/64) | .312 | (1.5x) | 3/16 | 2 | | | 51011 | 28.20 | | | 51011-C3 | 34.70 | | | | | |
| .172 (11/64) | .625 | (3x) | 3/16 | 2 | | | 74472 | 28.20 | | | 74472-C3 | 34.70 | | | | | |
| .187 (3/16) | .150 | (0.8x) | 3/16 | 2 | | | 758312 | 26.80 | | | 758312-C3 | 33.00 | | | | | |
| .187 (3/16) | .312 | (1.5x) | 3/16 | 2 | 50912 | 823512 | 51012 | 25.30 | 50912-C3 | 823512-C3 | 51012-C3 | 31.70 | | | 51012-C4 | 43.60 | |
| .187 (3/16) | .625 | (3x) | 3/16 | 2 | 74187 | 836012 | 74487 | 25.30 | 74187-C3 | 836012-C3 | 74487-C3 | 31.70 | 74187-C4 | | 74487-C4 | 43.60 | |
| .203 (13/64) | .312 | (1.5x) | 1/4 | 2-1/2 | | | 51013 | 31.00 | | | 51013-C3 | 39.70 | | | | | |
| .203 (13/64) | .625 | (3x) | 1/4 | 2-1/2 | | | 74490 | 31.00 | | | 74490-C3 | 39.70 | | | | | |
| .218 (7/32) | .330 | (1.5x) | 1/4 | 2-1/2 | 50914 | 823514 | 51014 | 27.90 | | 823514-C3 | 51014-C3 | 36.60 | | | | | |
| .218 (7/32) | .625 | (3x) | 1/4 | 2-1/2 | 74193 | 836014 | 74493 | 27.90 | 74193-C3 | 836014-C3 | 74493-C3 | 36.00 | | | | | |
| .234 (15/64) | .750 | (3x) | 1/4 | 2-1/2 | | | 74495 | 31.00 | | | 74495-C3 | 39.10 | | | | | |
| .250 (1/4) | .200 | (0.8x) | 1/4 | 2-1/2 | | | 758316 | 29.50 | | | 758316-C3 | 37.60 | | | | | |
| .250 (1/4) | .375 | (1.5x) | 1/4 | 2-1/2 | 50916 | 823516 | 51016 | 27.90 | 50916-C3 | 823516-C3 | 51016-C3 | 36.60 | 50916-C4 | | 51016-C4 | 51.10 | |
| .250 (1/4) | .750 | (3x) | 1/4 | 2-1/2 | 74199 | 836016 | 74499 | 27.90 | 74199-C3 | 836016-C3 | 74499-C3 | 36.00 | 74199-C4 | | 74499-C4 | 49.30 | |
| .312 (5/16) | .470 | (1.5x) | 5/16 | 2-1/2 | | | 51020 | 36.20 | | | 51020-C3 | 46.30 | | | | | |
| .312 (5/16) | .812 | (3x) | 5/16 | 2-1/2 | | | 74620 | 36.20 | | | 74620-C3 | 46.30 | | | | | |
| .375 (3/8) | .570 | (1.5x) | 3/8 | 2-1/2 | | | 51024 | 45.20 | | | 51024-C3 | 56.60 | | | | | |
| .375 (3/8) | 1.000 | (3x) | 3/8 | 2-1/2 | 74124 | | 74624 | 45.20 | | | 74624-C3 | 56.60 | | | 74624-C4 | 74.60 | |
| .500 (1/2) | 1.000 | (2x) | 1/2 | 3 | 74132 | | 74632 | 71.60 | | | 74632-C3 | 88.70 | | | 74632-C4 | 107.90 | |

# MINIATURE END MILLS

## Ball – Stub & Standard – 5 Flute




- **Cutter diameter down to .020"**
- Center cutting • Solid carbide
- CNC ground in the USA

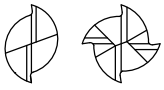


| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 5 FL | USD$ | 5 FL | USD$ |
| .020 (.5 mm) | **.030** (1.5x) | 1/8 | 1-1/2 | 714820 | 37.30 | 714820-C3 | 43.20 |
| .020 (.5 mm) | **.060** (3x) | 1/8 | 1-1/2 | 715020 | 38.90 | 715020-C3 | 44.80 |
| .031 (1/32) | **.047** (1.5x) | 1/8 | 1-1/2 | 714831 | 31.20 | 714831-C3 | 37.20 |
| .031 (1/32) | **.093** (3x) | 1/8 | 1-1/2 | 715031 | 33.40 | 715031-C3 | 39.30 |
| .047 (3/64) | **.071** (1.5x) | 1/8 | 1-1/2 | 714847 | 32.50 | 714847-C3 | 38.40 |
| .047 (3/64) | **.141** (3x) | 1/8 | 1-1/2 | 715047 | 33.90 | 715047-C3 | 39.90 |
| .062 (1/16) | **.093** (1.5x) | 1/8 | 1-1/2 | 714862 | 34.00 | 714862-C3 | 40.00 |
| .062 (1/16) | **.186** (3x) | 1/8 | 1-1/2 | 715062 | 35.40 | 715062-C3 | 41.30 |
| .078 (5/64) | **.117** (1.5x) | 1/8 | 1-1/2 | 714878 | 34.00 | 714878-C3 | 40.00 |
| .078 (5/64) | **.234** (3x) | 1/8 | 1-1/2 | 715078 | 35.40 | 715078-C3 | 41.30 |
| .093 (3/32) | **.140** (1.5x) | 1/8 | 1-1/2 | 714893 | 34.00 | 714893-C3 | 40.00 |
| .093 (3/32) | **.279** (3x) | 1/8 | 1-1/2 | 715093 | 35.40 | 715093-C3 | 41.30 |
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $D_2$ | $L_1$ | 5 FL | USD$ | 5 FL | USD$ |
| .125 (1/8) | **.187** (1.5x) | 1/8 | 1-1/2 | 714908 | 31.00 | 714908-C3 | 37.00 |
| .125 (1/8) | **.375** (3x) | 1/8 | 1-1/2 | 715108 | 32.30 | 715108-C3 | 38.20 |
| .187 (3/16) | **.312** (1.5x) | 3/16 | 2 | 714912 | 34.80 | 714912-C3 | 41.00 |
| .187 (3/16) | **.625** (3x) | 3/16 | 2 | 715112 | 36.10 | 715112-C3 | 42.40 |
| .250 (1/4) | **.375** (1.5x) | 1/4 | 2-1/2 | 714916 | 40.70 | 714916-C3 | 48.80 |
| .250 (1/4) | **.750** (3x) | 1/4 | 2-1/2 | 715116 | 42.20 | 715116-C3 | 50.30 |

# MINIATURE END MILLS

## Ball – Stub & Standard – Metric







- All dimensions and tolerances in metric values
- Cutter diameter down to 0.5mm
- Center cutting
- Solid carbide
- CNC ground in the USA

BALL

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | | ALTiN COATED | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.00mm −.02mm | $L_2$ +.25mm −.00mm | $D_2$ | $L_1$ | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| .500 mm | .75 (1.5x) | 3 mm | 38 mm | 741311 | 741211 | 28.60 | 741311-C3 | 741211-C3 | 34.60 |
| .500 mm | 1.50 (3x) | 3 mm | 38 mm | 739611 | 741011 | 28.60 | 739611-C3 | 741011-C3 | 34.60 |
| 1.00 mm | 1.50 (1.5x) | 3 mm | 38 mm | 741322 | 741222 | 24.00 | 741322-C3 | 741222-C3 | 29.90 |
| 1.00 mm | 3.00 (3x) | 3 mm | 38 mm | 739622 | 741022 | 24.00 | 739622-C3 | 741022-C3 | 29.90 |
| 1.20 mm | 3.50 (3x) | 3 mm | 38 mm | 739627 | 741027 | 24.30 | 739627-C3 | 741027-C3 | 30.20 |
| 1.40 mm | 4.00 (3x) | 3 mm | 38 mm | 739631 | 741031 | 24.30 | 739631-C3 | 741031-C3 | 30.20 |
| 1.50 mm | 2.20 (1.5x) | 3 mm | 38 mm | 741333 | 741233 | 24.30 | 741333-C3 | 741233-C3 | 30.20 |
| 1.50 mm | 4.50 (3x) | 3 mm | 38 mm | 739633 | 741033 | 24.30 | 739633-C3 | 741033-C3 | 30.20 |
| 1.60 mm | 5.00 (3x) | 3 mm | 38 mm | 739636 | 741036 | 24.30 | 739636-C3 | 741036-C3 | 30.20 |
| 1.80 mm | 5.50 (3x) | 3 mm | 38 mm | 739640 | 741040 | 24.30 | 739640-C3 | 741040-C3 | 30.20 |
| 2.00 mm | 3.00 (1.5x) | 3 mm | 38 mm | 741345 | 741245 | 24.00 | 741345-C3 | 741245-C3 | 29.90 |
| 2.00 mm | 6.00 (3x) | 3 mm | 38 mm | 739645 | 741045 | 24.00 | 739645-C3 | 741045-C3 | 29.90 |
| 2.50 mm | 3.70 (1.5x) | 3 mm | 38 mm | 741351 | 741251 | 24.30 | 741351-C3 | 741251-C3 | 30.20 |
| 2.50 mm | 7.50 (3x) | 3 mm | 38 mm | 739651 | 741051 | 24.30 | 739651-C3 | 741051-C3 | 30.20 |
| 3.00 mm | 4.50 (1.5x) | 3 mm | 38 mm | 741357 | 741257 | 22.70 | 741357-C3 | 741257-C3 | 28.60 |
| 3.00 mm | 9.00 (3x) | 3 mm | 38 mm | 739657 | 741057 | 22.70 | 739657-C3 | 741057-C3 | 28.60 |

| $D_1$ +.00mm −.04mm | $L_2$ +.75mm −.00mm | $D_2$ | $L_1$ | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|
| 4.00 mm | 6.00 (1.5x) | 4 mm | 50 mm | 741361 | 741261 | 26.80 | 741361-C3 | 741261-C3 | 33.00 |
| 4.00 mm | 12.00 (3x) | 4 mm | 50 mm | 739661 | 741061 | 26.80 | 739661-C3 | 741061-C3 | 33.00 |
| 5.00 mm | 7.50 (1.5x) | 5 mm | 50 mm | 741364 | 741264 | 32.70 | 741364-C3 | 741264-C3 | 40.00 |
| 5.00 mm | 15.00 (3x) | 5 mm | 50 mm | 739664 | 741064 | 32.70 | 739664-C3 | 741064-C3 | 40.20 |
| 6.00 mm | 9.00 (1.5x) | 6 mm | 50 mm | 741366 | 741266 | 39.40 | 741366-C3 | 741266-C3 | 46.90 |
| 6.00 mm | 18.00 (3x) | 6 mm | 50 mm | 739666 | 741066 | 39.40 | 739666-C3 | 741066-C3 | 46.90 |
| 7.00 mm | 10.00 (1.5x) | 8 mm | 63 mm | 741368 | 741268 | 43.90 | 741368-C3 | 741268-C3 | 55.30 |
| 7.00 mm | 21.00 (3x) | 8 mm | 63 mm | 739668 | 741068 | 43.90 | 739668-C3 | 741068-C3 | 55.30 |
| 8.00 mm | 12.00 (1.5x) | 8 mm | 63 mm | 741370 | 741270 | 48.40 | 741370-C3 | 741270-C3 | 59.80 |
| 8.00 mm | 24.00 (3x) | 8 mm | 63 mm | 739670 | 741070 | 50.10 | 739670-C3 | 741070-C3 | 61.60 |
| 9.00 mm | 13.00 (1.5x) | 10 mm | 75 mm | 741371 | 741271 | 66.30 | 741371-C3 | 741271-C3 | 79.60 |
| 9.00 mm | 27.00 (3x) | 10 mm | 75 mm | 739671 | 741071 | 66.30 | 739671-C3 | 741071-C3 | 79.60 |
| 10.00 mm | 15.00 (1.5x) | 10 mm | 75 mm | 741373 | 741273 | 82.50 | 741373-C3 | 741273-C3 | 95.80 |
| 10.00 mm | 30.00 (3x) | 10 mm | 75 mm | 739673 | 741073 | 82.50 | 739673-C3 | 741073-C3 | 95.80 |
| 11.00 mm | 16.00 (1.5x) | 12 mm | 75 mm | 741374 | 741274 | 95.00 | 741374-C3 | 741274-C3 | 110.50 |
| 11.00 mm | 32.00 (3x) | 12 mm | 75 mm | 739674 | 741074 | 95.00 | 739674-C3 | 741074-C3 | 110.50 |
| 12.00 mm | 18.00 (1.5x) | 12 mm | 75 mm | 741376 | 741276 | 101.40 | 741376-C3 | 741276-C3 | 117.00 |
| 12.00 mm | 36.00 (3x) | 12 mm | 75 mm | 739676 | 741076 | 101.40 | 739676-C3 | 741076-C3 | 117.00 |

# MINIATURE END MILLS

## Ball – Long Flute




**Stocked in 10 Lengths of Cut!**

- **Long flute and long shank design for deep cavities**
- Mills deep pockets • Center cutting • Solid carbide • CNC ground in the USA



| | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| | .005 | **.025** (5x) | 3 | 1/8 | 2-1/2 | 32205 | 57.20 | | | | |
| | .008 | **.040** (5x) | 3 | 1/8 | 2-1/2 | 32208 | 55.90 | | | | |
| | .010 | **.050** (5x) | 3 | 1/8 | 2-1/2 | 12810 | 52.70 | 12810-C3 | 58.60 | 12810-C4 | 67.70 |
| | .010 | **.050** (5x) | 4 | 1/8 | 2-1/2 | 841010 | 54.80 | 841010-C3 | 60.70 | | |
| | .010 | **.080** (8x) | 3 | 1/8 | 2-1/2 | 34010 | 88.70 | 34010-C3 | 94.70 | | |
| NEW | .012 (.3 mm) | **.060** (5x) | 4 | 1/8 | 2-1/2 | 841012 | 54.80 | 841012-C3 | 60.70 | | |
| NEW | .012 (.3 mm) | **.096** (8x) | 4 | 1/8 | 2-1/2 | 845512 | 88.70 | 845512-C3 | 94.70 | | |
| | .015 (1/64) | **.062** (4x) | 3 | 1/8 | 2-1/2 | 895715 | 48.60 | 895715-C3 | 54.50 | | |
| | .015 (1/64) | **.078** (5x) | 3 | 1/8 | 2-1/2 | 32215 | 48.60 | 32215-C3 | 54.50 | 32215-C4 | 63.70 |
| | .015 (1/64) | **.078** (5x) | 4 | 1/8 | 2-1/2 | 841015 | 50.80 | 841015-C3 | 56.70 | | |
| | .015 (1/64) | **.093** (6x) | 3 | 1/8 | 2-1/2 | 877115 | 56.40 | 877115-C3 | 62.30 | | |
| | .015 (1/64) | **.109** (7x) | 3 | 1/8 | 2-1/2 | 861415 | 65.00 | 861415-C3 | 70.90 | | |
| | .015 (1/64) | **.125** (8x) | 3 | 1/8 | 2-1/2 | 34015 | 85.00 | 34015-C3 | 90.90 | 34015-C4 | 100.10 |
| | .015 (1/64) | **.125** (8x) | 4 | 1/8 | 2-1/2 | 845515 | 87.20 | 845515-C3 | 93.10 | | |
| | .015 (1/64) | **.187** (12x) | 3 | 1/8 | 2-1/2 | 35115 | 109.20 | 35115-C3 | 115.10 | | |
| | .020 (.5 mm) | **.080** (4x) | 3 | 1/8 | 2-1/2 | 895720 | 41.90 | 895720-C3 | 47.90 | | |
| | .020 (.5 mm) | **.100** (5x) | 3 | 1/8 | 2-1/2 | 12820 | 41.90 | 12820-C3 | 47.90 | 12820-C4 | 57.00 |
| | .020 (.5 mm) | **.100** (5x) | 4 | 1/8 | 2-1/2 | 841020 | 46.50 | 841020-C3 | 52.40 | | |
| | .020 (.5 mm) | **.120** (6x) | 3 | 1/8 | 2-1/2 | 877120 | 48.70 | 877120-C3 | 54.60 | | |
| | .020 (.5 mm) | **.160** (8x) | 3 | 1/8 | 2-1/2 | 34020 | 79.00 | 34020-C3 | 84.90 | 34020-C4 | 94.80 |
| | .020 (.5 mm) | **.200** (10x) | 3 | 1/8 | 2-1/2 | 957220 | 94.90 | 957220-C3 | 100.80 | | |
| | .020 (.5 mm) | **.250** (12x) | 3 | 1/8 | 2-1/2 | 35120 | 103.00 | 35120-C3 | 108.90 | | |
| | .025 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 12825 | 39.50 | 12825-C3 | 45.50 | 12825-C4 | 55.20 |
| | .025 | **.203** (8x) | 3 | 1/8 | 2-1/2 | 34025 | 77.30 | 34025-C3 | 83.20 | | |
| | .030 | **.125** (4x) | 3 | 1/8 | 2-1/2 | 895730 | 38.50 | 895730-C3 | 44.40 | | |
| | .030 | **.150** (5x) | 3 | 1/8 | 2-1/2 | 12830 | 38.50 | 12830-C3 | 44.40 | 12830-C4 | 53.50 |
| | .030 | **.156** (5x) | 4 | 1/8 | 2-1/2 | 841030 | 42.60 | 841030-C3 | 48.50 | | |
| | .030 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 34030 | 75.00 | 34030-C3 | 81.00 | | |
| | .031 (1/32) | **.125** (4x) | 3 | 1/8 | 2-1/2 | 895731 | 38.50 | 895731-C3 | 44.40 | 895731-C4 | 54.30 |
| | .031 (1/32) | **.125** (4x) | 4 | 1/8 | 2-1/2 | 801531 | 42.60 | 801531-C3 | 48.50 | | |
| | .031 (1/32) | **.156** (5x) | 3 | 1/8 | 2-1/2 | 32231 | 38.50 | 32231-C3 | 44.40 | 32231-C4 | 53.50 |
| | .031 (1/32) | **.156** (5x) | 4 | 1/8 | 2-1/2 | 841031 | 42.40 | 841031-C3 | 48.30 | | |
| | .031 (1/32) | **.187** (6x) | 3 | 1/8 | 2-1/2 | 877131 | 43.40 | 877131-C3 | 49.30 | 877131-C4 | 58.30 |
| | .031 (1/32) | **.187** (6x) | 4 | 1/8 | 2-1/2 | 754131 | 45.40 | 754131-C3 | 51.30 | | |
| | .031 (1/32) | **.218** (7x) | 3 | 1/8 | 2-1/2 | 861431 | 48.60 | 861431-C3 | 54.50 | | |
| | .031 (1/32) | **.250** (8x) | 3 | 1/8 | 2-1/2 | 34031 | 75.00 | 34031-C3 | 81.00 | 34031-C4 | 90.00 |
| | .031 (1/32) | **.250** (8x) | 4 | 1/8 | 2-1/2 | 845531 | 77.10 | 845531-C3 | 83.00 | | |
| | .031 (1/32) | **.312** (10x) | 3 | 1/8 | 2-1/2 | 957231 | 80.20 | 957231-C3 | 86.20 | | |
| | .031 (1/32) | **.375** (12x) | 3 | 1/8 | 2-1/2 | 35131 | 87.70 | 35131-C3 | 93.60 | 35131-C4 | 102.70 |
| | .031 (1/32) | **.470** (15x) | 3 | 1/8 | 2-1/2 | 36031 | 109.50 | 36031-C3 | 115.40 | | |

continued on next page

NEW SIZES!

# MINIATURE END MILLS

## Ball – Long Flute (cont.)

continued from previous page



| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| .035 (.9 mm) | **.175** (5x) | 3 | 1/8 | 2-1/2 | 12835 | 38.50 | 12835-C3 | 44.40 | 12835-C4 | 53.50 | |
| .035 (.9 mm) | **.281** (8x) | 3 | 1/8 | 2-1/2 | 34035 | 75.00 | 34035-C3 | 81.00 | | | |
| .039 (1 mm) | **.156** (4x) | 3 | 1/8 | 2-1/2 | 895739 | 38.50 | 895739-C3 | 44.40 | | | |
| .039 (1 mm) | **.203** (5x) | 3 | 1/8 | 2-1/2 | 32239 | 38.50 | 32239-C3 | 44.40 | | | |
| .039 (1 mm) | **.203** (5x) | 4 | 1/8 | 2-1/2 | 841039 | 40.60 | 841039-C3 | 46.50 | | | |
| .039 (1 mm) | **.325** (8x) | 3 | 1/8 | 2-1/2 | 34039 | 75.00 | 34039-C3 | 81.00 | 34039-C4 | 90.80 | NEW |
| .039 (1 mm) | **.480** (12x) | 3 | 1/8 | 2-1/2 | 35139 | 88.50 | 35139-C3 | 94.50 | | | |
| .040 | **.160** (4x) | 3 | 1/8 | 2-1/2 | 895740 | 38.50 | 895740-C3 | 44.40 | | | |
| .040 | **.200** (5x) | 3 | 1/8 | 2-1/2 | 12840 | 38.50 | 12840-C3 | 44.40 | 12840-C4 | 53.50 | |
| .040 | **.200** (5x) | 4 | 1/8 | 2-1/2 | 841040 | 42.60 | 841040-C3 | 48.50 | | | |
| .040 | **.240** (6x) | 3 | 1/8 | 2-1/2 | 877140 | 43.40 | 877140-C3 | 49.30 | | | |
| .040 | **.281** (7x) | 3 | 1/8 | 2-1/2 | 861440 | 48.60 | 861440-C3 | 54.50 | | | |
| .040 | **.325** (8x) | 3 | 1/8 | 2-1/2 | 34040 | 75.00 | 34040-C3 | 81.00 | 34040-C4 | 90.00 | |
| .040 | **.325** (8x) | 4 | 1/8 | 2-1/2 | 845540 | 77.20 | 845540-C3 | 83.10 | | | |
| .040 | **.480** (12x) | 3 | 1/8 | 2-1/2 | 35140 | 87.70 | 35140-C3 | 93.60 | | | |
| .045 | **.225** (5x) | 3 | 1/8 | 2-1/2 | 12845 | 38.50 | 12845-C3 | 44.40 | 12845-C4 | 54.30 | |
| .045 | **.375** (8x) | 3 | 1/8 | 2-1/2 | 34045 | 75.00 | 34045-C3 | 81.00 | | | |
| .047 (3/64) | **.187** (4x) | 3 | 1/8 | 2-1/2 | 895747 | 38.50 | 895747-C3 | 44.40 | | | |
| .047 (3/64) | **.250** (5x) | 3 | 1/8 | 2-1/2 | 32247 | 38.50 | 32247-C3 | 44.40 | 32247-C4 | 53.50 | |
| .047 (3/64) | **.250** (5x) | 4 | 1/8 | 2-1/2 | 841047 | 42.40 | 841047-C3 | 48.30 | | | |
| .047 (3/64) | **.375** (8x) | 3 | 1/8 | 2-1/2 | 34047 | 70.90 | 34047-C3 | 76.80 | 34047-C4 | 85.90 | |
| .047 (3/64) | **.375** (8x) | 4 | 1/8 | 2-1/2 | 845547 | 74.40 | 845547-C3 | 80.30 | | | |
| .047 (3/64) | **.570** (12x) | 3 | 1/8 | 2-1/2 | 35147 | 87.70 | 35147-C3 | 93.60 | 35147-C4 | 102.70 | |
| .050 | **.203** (4x) | 3 | 1/8 | 2-1/2 | 895750 | 38.50 | 895750-C3 | 44.40 | | | |
| .050 | **.300** (6x) | 3 | 1/8 | 2-1/2 | 12850 | 38.50 | 12850-C3 | 44.40 | 12850-C4 | 53.50 | |
| .050 | **.400** (8x) | 3 | 1/8 | 2-1/2 | 34050 | 75.00 | 34050-C3 | 81.00 | | | |
| .055 (1.4 mm) | **.275** (5x) | 3 | 1/8 | 2-1/2 | 32255 | 34.20 | 32255-C3 | 40.10 | | | |
| .055 (1.4 mm) | **.385** (7x) | 3 | 1/8 | 2-1/2 | 12855 | 38.50 | 12855-C3 | 44.40 | 12855-C4 | 54.30 | |
| .060 | **.250** (4x) | 3 | 1/8 | 2-1/2 | 895760 | 34.20 | 895760-C3 | 40.10 | | | |
| .060 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 32260 | 34.20 | 32260-C3 | 40.10 | 32260-C4 | 49.90 | |
| .060 | **.312** (5x) | 4 | 1/8 | 2-1/2 | 841060 | 37.70 | 841060-C3 | 43.60 | | | |
| .060 | **.375** (6x) | 3 | 1/8 | 2-1/2 | 877160 | 35.60 | 877160-C3 | 41.50 | | | |
| .060 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 12860 | 39.10 | 12860-C3 | 45.00 | 12860-C4 | 54.90 | |
| .060 | **.720** (12x) | 3 | 1/8 | 2-1/2 | 35160 | 68.30 | 35160-C3 | 74.20 | | | |
| .062 (1/16) | **.250** (4x) | 3 | 1/8 | 2-1/2 | 895762 | 34.20 | 895762-C3 | 40.10 | 895762-C4 | 49.90 | |
| .062 (1/16) | **.250** (4x) | 4 | 1/8 | 2-1/2 | 801562 | 36.40 | 801562-C3 | 42.40 | | | |
| .062 (1/16) | **.312** (5x) | 3 | 1/8 | 2-1/2 | 32262 | 34.20 | 32262-C3 | 40.10 | 32262-C4 | 49.70 | |
| .062 (1/16) | **.312** (5x) | 4 | 1/8 | 2-1/2 | 841062 | 37.70 | 841062-C3 | 43.60 | 841062-C4 | 53.20 | |
| .062 (1/16) | **.375** (6x) | 3 | 1/8 | 2-1/2 | 877162 | 35.60 | 877162-C3 | 41.50 | 877162-C4 | 51.20 | |
| .062 (1/16) | **.375** (6x) | 4 | 1/8 | 2-1/2 | 754162 | 39.10 | 754162-C3 | 45.00 | | | |
| .062 (1/16) | **.437** (7x) | 3 | 1/8 | 2-1/2 | 861462 | 37.20 | 861462-C3 | 43.10 | | | |
| .062 (1/16) | **.500** (8x) | 3 | 1/8 | 2-1/2 | 34062 | 38.50 | 34062-C3 | 44.40 | 34062-C4 | 53.50 | |
| .062 (1/16) | **.500** (8x) | 4 | 1/8 | 2-1/2 | 845562 | 41.90 | 845562-C3 | 47.90 | 845562-C4 | 57.00 | |
| .062 (1/16) | **.558** (9x) | 3 | 1/8 | 2-1/2 | 757662 | 47.20 | 757662-C3 | 53.10 | | | |
| .062 (1/16) | **.625** (10x) | 3 | 1/8 | 2-1/2 | 957262 | 52.60 | 957262-C3 | 58.50 | 957262-C4 | 68.40 | |
| .062 (1/16) | **.625** (10x) | 4 | 1/8 | 2-1/2 | 751262 | 57.20 | 751262-C3 | 63.10 | | | |
| .062 (1/16) | **.750** (12x) | 3 | 1/8 | 2-1/2 | 35162 | 68.80 | 35162-C3 | 74.70 | 35162-C4 | 83.80 | |
| .062 (1/16) | **.950** (15x) | 3 | 1/8 | 2-1/2 | 36062 | 93.80 | 36062-C3 | 99.80 | 36062-C4 | 109.60 | |

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# MINIATURE END MILLS

## Ball – Long Flute (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .065 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 12865 | 38.40 | 12865-C3 | 44.30 | 12865-C4 | 54.20 |
| .070 | **.375** (5x) | 4 | 1/8 | 2-1/2 | 841070 | 37.90 | 841070-C3 | 43.80 | | |
| .070 | **.500** (7x) | 3 | 1/8 | 2-1/2 | 12870 | 38.40 | 12870-C3 | 44.30 | 12870-C4 | 54.20 |
| .075 | **.375** (5x) | 4 | 1/8 | 2-1/2 | 841075 | 37.90 | 841075-C3 | 43.80 | | |
| .075 | **.500** (7x) | 3 | 1/8 | 2-1/2 | 12875 | 38.40 | 12875-C3 | 44.30 | 12875-C4 | 54.20 |
| .078 (5/64) | **.312** (4x) | 3 | 1/8 | 2-1/2 | 895778 | 34.20 | 895778-C3 | 40.10 | | |
| NEW .078 (5/64) | **.312** (4x) | 4 | 1/8 | 2-1/2 | 801578 | 37.70 | 801578-C3 | 43.60 | | |
| .078 (5/64) | **.406** (5x) | 3 | 1/8 | 2-1/2 | 32278 | 34.20 | 32278-C3 | 40.10 | 32278-C4 | 49.70 |
| .078 (5/64) | **.406** (5x) | 4 | 1/8 | 2-1/2 | 841078 | 37.70 | 841078-C3 | 43.60 | | |
| .078 (5/64) | **.475** (6x) | 3 | 1/8 | 2-1/2 | 877178 | 35.60 | 877178-C3 | 41.50 | | |
| .078 (5/64) | **.550** (7x) | 3 | 1/8 | 2-1/2 | 861478 | 37.20 | 861478-C3 | 43.10 | | |
| .078 (5/64) | **.625** (8x) | 3 | 1/8 | 2-1/2 | 34078 | 38.50 | 34078-C3 | 44.40 | 34078-C4 | 53.50 |
| .078 (5/64) | **.625** (8x) | 4 | 1/8 | 2-1/2 | 845578 | 41.90 | 845578-C3 | 47.90 | | |
| .078 (5/64) | **.940** (12x) | 3 | 1/8 | 2-1/2 | 35178 | 68.80 | 35178-C3 | 74.70 | 35178-C4 | 84.60 |
| .078 (5/64) | **1.187** (15x) | 3 | 1/8 | 2-1/2 | 36078 | 93.80 | 36078-C3 | 99.80 | 36078-C4 | 109.60 |
| .080 | **.750** (9x) | 3 | 1/8 | 2-1/2 | 12880 | 38.70 | 12880-C3 | 44.60 | 12880-C4 | 53.80 |
| .085 | **.750** (9x) | 3 | 1/8 | 2-1/2 | 12885 | 38.70 | 12885-C3 | 44.60 | 12885-C4 | 54.50 |
| .090 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 12890 | 38.70 | 12890-C3 | 44.60 | 12890-C4 | 53.80 |
| .093 (3/32) | **.375** (4x) | 3 | 1/8 | 2-1/2 | 895793 | 34.20 | 895793-C3 | 40.10 | 895793-C4 | 49.90 |
| .093 (3/32) | **.375** (4x) | 4 | 1/8 | 2-1/2 | 801593 | 34.20 | 801593-C3 | 40.10 | | |
| .093 (3/32) | **.500** (5x) | 3 | 1/8 | 2-1/2 | 32293 | 34.20 | 32293-C3 | 40.10 | 32293-C4 | 49.70 |
| .093 (3/32) | **.500** (5x) | 4 | 1/8 | 2-1/2 | 841093 | 37.70 | 841093-C3 | 43.60 | | |
| .093 (3/32) | **.585** (6x) | 3 | 1/8 | 2-1/2 | 877193 | 35.60 | 877193-C3 | 41.50 | | |
| .093 (3/32) | **.670** (7x) | 3 | 1/8 | 2-1/2 | 861493 | 37.20 | 861493-C3 | 43.10 | | |
| .093 (3/32) | **.750** (8x) | 3 | 1/8 | 2-1/2 | 34093 | 38.50 | 34093-C3 | 44.40 | 34093-C4 | 53.50 |
| .093 (3/32) | **.750** (8x) | 4 | 1/8 | 2-1/2 | 845593 | 41.90 | 845593-C3 | 47.90 | | |
| .093 (3/32) | **.950** (10x) | 3 | 1/8 | 2-1/2 | 957293 | 52.60 | 957293-C3 | 58.50 | | |
| .093 (3/32) | **1.125** (12x) | 3 | 1/8 | 2-1/2 | 35193 | 68.80 | 35193-C3 | 74.70 | 35193-C4 | 84.60 |
| .093 (3/32) | **1.400** (15x) | 3 | 1/8 | 3 | 36093 | 96.20 | 36093-C3 | 102.10 | 36093-C4 | 112.00 |
| .095 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 12895 | 39.10 | 12895-C3 | 45.00 | 12895-C4 | 54.90 |
| .100 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 32299 | 34.30 | 32299-C3 | 40.20 | | |
| .100 | **.750** (7.5x) | 3 | 1/8 | 2-1/2 | 12899 | 38.70 | 12899-C3 | 44.60 | 12899-C4 | 53.80 |
| .109 (7/64) | **.570** (5x) | 3 | 1/8 | 2-1/2 | 32302 | 34.20 | 32302-C3 | 40.10 | | |
| .109 (7/64) | **.900** (8x) | 3 | 1/8 | 2-1/2 | 34102 | 38.50 | 34102-C3 | 44.40 | | |
| .118 (3 mm) | **.475** (4x) | 3 | 1/8 | 2-1/2 | 895705 | 34.20 | 895705-C3 | 40.10 | | |
| .118 (3 mm) | **.625** (5x) | 3 | 1/8 | 2-1/2 | 32305 | 34.20 | 32305-C3 | 40.10 | 32305-C4 | 49.90 |
| .118 (3 mm) | **.950** (8x) | 3 | 1/8 | 2-1/2 | 34105 | 38.50 | 34105-C3 | 44.40 | 34105-C4 | 54.30 |
| .118 (3 mm) | **.950** (8x) | 4 | 1/8 | 2-1/2 | 845605 | 42.80 | 845605-C3 | 48.70 | | |
| .118 (3 mm) | **1.420** (12x) | 3 | 1/8 | 3 | 35205 | 96.20 | 35205-C3 | 102.10 | | |

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NEW SIZES!

# MINIATURE END MILLS

## Ball – Long Flute (cont.)

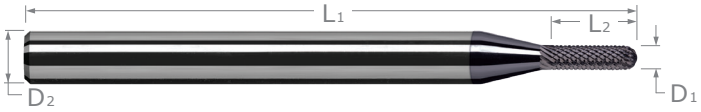
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| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| .125 (1/8) | **.500** (4x) | 3 | 1/8 | 2-1/2 | 895808 | 31.60 | 895808-C3 | 37.50 | 895808-C4 | 47.00 | |
| .125 (1/8) | **.500** (4x) | 4 | 1/8 | 2-1/2 | 801608 | 34.80 | 801608-C3 | 40.70 | | | |
| .125 (1/8) | **.625** (5x) | 3 | 1/8 | 2-1/2 | 32308 | 31.60 | 32308-C3 | 37.50 | 32308-C4 | 47.00 | |
| .125 (1/8) | **.625** (5x) | 4 | 1/8 | 2-1/2 | 12608 | 34.80 | 12608-C3 | 40.70 | | | |
| .125 (1/8) | **.750** (6x) | 3 | 1/8 | 2-1/2 | 877208 | 33.40 | 877208-C3 | 39.30 | 877208-C4 | 49.00 | |
| .125 (1/8) | **.750** (6x) | 4 | 1/8 | 2-1/2 | 750308 | 37.70 | 750308-C3 | 43.60 | | | |
| .125 (1/8) | **.875** (7x) | 3 | 1/8 | 2-1/2 | 861508 | 34.90 | 861508-C3 | 40.80 | | | |
| .125 (1/8) | **1.000** (8x) | 3 | 1/8 | 2-1/2 | 34108 | 34.90 | 34108-C3 | 40.80 | 34108-C4 | 49.90 | |
| .125 (1/8) | **1.000** (8x) | 4 | 1/8 | 2-1/2 | 845608 | 38.50 | 845608-C3 | 44.40 | | | |
| .125 (1/8) | **1.250** (10x) | 3 | 1/8 | 2-1/2 | 957308 | 52.00 | 957308-C3 | 57.90 | | | |
| .125 (1/8) | **1.500** (12x) | 3 | 1/8 | 3 | 35208 | 72.30 | 35208-C3 | 78.30 | 35208-C4 | 87.30 | |
| .125 (1/8) | **1.875** (15x) | 3 | 1/8 | 3 | 36108 | 96.20 | 36108-C3 | 102.10 | 36108-C4 | 111.30 | |
| .140 (9/64) | **.562** (4x) | 4 | 3/16 | 3 | 801609 | 37.40 | 801609-C3 | 44.00 | | | NEW |
| .140 (9/64) | **.750** (5x) | 4 | 3/16 | 3 | 12609 | 37.40 | 12609-C3 | 43.80 | | | |
| .140 (9/64) | **1.125** (8x) | 4 | 3/16 | 3 | 34109 | 41.60 | 34109-C3 | 48.30 | | | |
| .156 (5/32) | **.625** (4x) | 4 | 3/16 | 3 | 801610 | 34.00 | 801610-C3 | 40.70 | | | |
| .156 (5/32) | **.750** (5x) | 4 | 3/16 | 3 | 841110 | 34.00 | 841110-C3 | 40.50 | 841110-C4 | 51.90 | |
| .156 (5/32) | **1.000** (6x) | 4 | 3/16 | 3 | 12610 | 37.40 | 12610-C3 | 43.80 | 12610-C4 | 58.00 | |
| .156 (5/32) | **1.093** (7x) | 4 | 3/16 | 3 | 856310 | 44.10 | 856310-C3 | 50.80 | | | |
| .156 (5/32) | **1.250** (8x) | 4 | 3/16 | 3 | 34110 | 41.60 | 34110-C3 | 48.10 | | | |
| .187 (3/16) | **.750** (4x) | 4 | 3/16 | 3 | 837012 | 34.00 | 837012-C3 | 40.50 | | | |
| .187 (3/16) | **1.000** (5x) | 4 | 3/16 | 3 | 841112 | 34.00 | 841112-C3 | 40.50 | | | |
| .187 (3/16) | **1.125** (6x) | 4 | 3/16 | 3 | 12612 | 37.40 | 12612-C3 | 43.80 | 77112 | 58.00 | |
| .187 (3/16) | **1.312** (7x) | 4 | 3/16 | 3 | 856312 | 39.40 | 856312-C3 | 46.10 | | | |
| .187 (3/16) | **1.500** (8x) | 4 | 3/16 | 3 | 34112 | 41.60 | 34112-C3 | 48.10 | | | |
| .187 (3/16) | **1.875** (10x) | 4 | 3/16 | 3 | 957312 | 58.50 | 957312-C3 | 65.20 | | | |
| .218 (7/32) | **1.125** (5x) | 4 | 1/4 | 4 | 841114 | 39.70 | 841114-C3 | 48.30 | | | NEW |
| .218 (7/32) | **1.750** (8x) | 4 | 1/4 | 4 | 845614 | 46.40 | 845614-C3 | 55.00 | | | NEW |
| .250 (1/4) | **1.000** (4x) | 4 | 1/4 | 4 | 837016 | 39.70 | 837016-C3 | 48.30 | | | |
| .250 (1/4) | **1.250** (5x) | 4 | 1/4 | 4 | 841116 | 39.70 | 841116-C3 | 48.30 | | | |
| .250 (1/4) | **1.500** (6x) | 4 | 1/4 | 4 | 12616 | 41.90 | 12616-C3 | 50.60 | 77116 | 65.40 | |
| .250 (1/4) | **1.750** (7x) | 4 | 1/4 | 4 | 856316 | 44.10 | 856316-C3 | 52.70 | | | |
| .250 (1/4) | **2.000** (8x) | 4 | 1/4 | 4 | 34116 | 46.40 | 34116-C3 | 56.50 | 34116-C4 | 69.20 | |
| .250 (1/4) | **2.500** (10x) | 4 | 1/4 | 4 | 957316 | 61.70 | 957316-C3 | 71.90 | | | |
| .312 (5/16) | **1.625** (5x) | 4 | 5/16 | 4 | 12620 | 57.30 | 12620-C3 | 67.70 | | | |
| .375 (3/8) | **1.750** (5x) | 4 | 3/8 | 4 | 12624 | 72.10 | 12624-C3 | 88.00 | | | |
| .375 (3/8) | **3.000** (8x) | 4 | 3/8 | 6 | 845624 | 81.00 | 845624-C3 | 98.80 | | | |
| .500 (1/2) | **2.000** (4x) | 4 | 1/2 | 4 | 12632 | 87.70 | 12632-C3 | 104.30 | | | |

# MINIATURE END MILLS

## Ball – Deburring End Mill




**End Mill Tolerances with Bur-Style Geometry!**

- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Bur geometry is optimized for removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern • Center cutting (2 flutes to center)
- Solid carbide • CNC ground in the USA



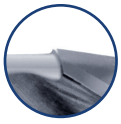
| | CUTTER DIAMETER | LENGTH OF CUT | RIGHT HAND TEETH | LEFT HAND TEETH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.020''}_{-.000''}$ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .015 (1/64) | **.045** (3x) | 12 | 10 | 1/8 | 2-1/2 | 892115 | 35.30 | 892115-C3 | 41.20 |
| | .020 | **.060** (3x) | 12 | 10 | 1/8 | 2-1/2 | 892120 | 35.30 | 892120-C3 | 41.20 |
| NEW | .031 (1/32) | **.047** (1.5x) | 6 | 5 | 1/8 | 2-1/2 | 697831 | 35.00 | 697831-C3 | 40.90 |
| | .031 (1/32) | **.093** (3x) | 12 | 10 | 1/8 | 2-1/2 | 892131 | 35.00 | 892131-C3 | 40.90 |
| | .047 (3/64) | **.141** (3x) | 12 | 10 | 1/8 | 2-1/2 | 892147 | 35.30 | 892147-C3 | 41.20 |
| NEW | .062 (1/16) | **.093** (1.5x) | 8 | 6 | 1/8 | 2-1/2 | 697862 | 33.60 | 697862-C3 | 39.50 |
| | .062 (1/16) | **.186** (3x) | 14 | 12 | 1/8 | 2-1/2 | 892162 | 33.60 | 892162-C3 | 39.50 |
| | .078 (5/64) | **.234** (3x) | 14 | 12 | 1/8 | 2-1/2 | 892178 | 35.30 | 892178-C3 | 41.20 |
| NEW | .093 (3/32) | **.140** (1.5x) | 8 | 6 | 1/8 | 2-1/2 | 697893 | 33.60 | 697893-C3 | 39.50 |
| | .093 (3/32) | **.279** (3x) | 14 | 12 | 1/8 | 2-1/2 | 892193 | 33.60 | 892193-C3 | 39.50 |
| | $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .125 (1/8) | **.375** (3x) | 16 | 13 | 1/8 | 2-1/2 | 892208 | 32.30 | 892208-C3 | 38.20 |
| | .187 (3/16) | **.561** (3x) | 16 | 13 | 3/16 | 2-1/2 | 892212 | 44.80 | 892212-C3 | 51.50 |
| | .250 (1/4) | **.750** (3x) | 16 | 13 | 1/4 | 2-1/2 | 892216 | 57.00 | 892216-C3 | 65.80 |

NEW SIZES!

# MINIATURE END MILLS

## Ball – Long Reach, Standard Flute



Reduced Neck Diameter to Avoid Heeling

- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

BALL

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIA. | OAL | | UNCOATED | | | AlTiN COATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | $D_2$ | $L_1$ | | 2 FL | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ | |
| .010 | .030 | .050 (5x) | 1/8 | 1-1/2 | | 948610 | 982810 | 77.00 | 982810-C3 | 82.90 | 982810-C4 | 92.00 | NEW |
| .010 | .030 | .080 (8x) | 1/8 | 1-1/2 | | 76610 | 76810 | 77.30 | 76810-C3 | 83.20 | | | |
| .010 | .030 | .125 (12x) | 1/8 | 1-1/2 | | 950210 | 991110 | 78.50 | 991110-C3 | 84.40 | | | |
| .012 (.3 mm) | .036 | .060 (5x) | 1/8 | 1-1/2 | | | 982812 | 59.80 | 982812-C3 | 65.70 | | | NEW |
| .012 (.3 mm) | .036 | .096 (8x) | 1/8 | 1-1/2 | | | 76812 | 60.90 | 76812-C3 | 66.80 | | | NEW |
| .015 (1/64) | .045 | .078 (5x) | 1/8 | 1-1/2 | | 948615 | 982815 | 59.80 | 982815-C3 | 65.70 | | | |
| .015 (1/64) | .045 | .128 (8x) | 1/8 | 1-1/2 | | 76615 | 76815 | 60.90 | 76815-C3 | 66.80 | | | |
| .015 (1/64) | .045 | .156 (10x) | 1/8 | 1-1/2 | | | 851015 | 63.10 | 851015-C3 | 69.00 | | | |
| .015 (1/64) | .045 | .187 (12x) | 1/8 | 1-1/2 | | 950215 | 991115 | 64.50 | 991115-C3 | 70.40 | | | |
| .015 (1/64) | .045 | .225 (15x) | 1/8 | 1-1/2 | | | 861215 | 67.40 | 861215-C3 | 73.30 | | | |
| .020 (.5 mm) | .060 | .100 (5x) | 1/8 | 1-1/2 | | 948620 | 982820 | 58.40 | 982820-C3 | 64.40 | 982820-C4 | 73.40 | |
| .020 (.5 mm) | .060 | .120 (6x) | 1/8 | 1-1/2 | | | 805720 | 59.80 | 805720-C3 | 65.70 | | | |
| .020 (.5 mm) | .060 | .140 (7x) | 1/8 | 1-1/2 | | | 805520 | 59.80 | 805520-C3 | 65.70 | | | |
| .020 (.5 mm) | .060 | .170 (8x) | 1/8 | 1-1/2 | | 76620 | 76820 | 58.60 | 76820-C3 | 64.60 | 76820-C4 | 73.60 | |
| .020 (.5 mm) | .060 | .200 (10x) | 1/8 | 1-1/2 | | | 851020 | 60.50 | 851020-C3 | 66.40 | | | |
| .020 (.5 mm) | .060 | .250 (12x) | 1/8 | 1-1/2 | | 950220 | 991120 | 60.50 | 991120-C3 | 66.40 | | | |
| .020 (.5 mm) | .060 | .300 (15x) | 1/8 | 1-1/2 | | | 861220 | 64.90 | 861220-C3 | 70.80 | | | |
| .025 | .075 | .125 (5x) | 1/8 | 1-1/2 | | 948625 | 982825 | 53.40 | 982825-C3 | 59.30 | | | |
| .025 | .075 | .213 (8x) | 1/8 | 1-1/2 | | 76625 | 76825 | 53.70 | 76825-C3 | 59.60 | | | |
| .025 | .075 | .312 (12x) | 1/8 | 1-1/2 | | 950225 | 991125 | 55.60 | 991125-C3 | 61.60 | | | |
| .030 | .090 | .156 (5x) | 1/8 | 1-1/2 | | 948630 | 982830 | 53.40 | 982830-C3 | 59.30 | | | |
| .030 | .090 | .270 (9x) | 1/8 | 1-1/2 | | 76630 | 76830 | 53.70 | 76830-C3 | 59.60 | | | |
| .030 | .090 | .375 (12x) | 1/8 | 1-1/2 | | 950230 | 991130 | 55.60 | 991130-C3 | 61.60 | | | |
| .031 (1/32) | .093 | .156 (5x) | 1/8 | 1-1/2 | | 948631 | 982831 | 52.40 | 982831-C3 | 58.30 | 982831-C4 | 67.40 | |
| .031 (1/32) | .093 | .187 (6x) | 1/8 | 1-1/2 | | | 805731 | 54.60 | 805731-C3 | 60.50 | | | |
| .031 (1/32) | .093 | .218 (7x) | 1/8 | 1-1/2 | | | 805531 | 54.60 | 805531-C3 | 60.50 | | | |
| .031 (1/32) | .093 | .250 (8x) | 1/8 | 1-1/2 | | 903831 | 904431 | 53.70 | 904431-C3 | 59.60 | | | |
| .031 (1/32) | .093 | .250 (8x) | 1/8 | 2-1/2 | LONG | | 734931 | 58.80 | 734931-C3 | 64.70 | | | |
| .031 (1/32) | .093 | .279 (9x) | 1/8 | 1-1/2 | | 76631 | 76831 | 53.70 | 76831-C3 | 59.60 | 76831-C4 | 68.60 | |
| .031 (1/32) | .093 | .312 (10x) | 1/8 | 1-1/2 | | 811031 | 851031 | 55.60 | 851031-C3 | 61.60 | | | |
| .031 (1/32) | .093 | .375 (12x) | 1/8 | 1-1/2 | | 950231 | 991131 | 55.60 | 991131-C3 | 61.60 | | | |
| .031 (1/32) | .093 | .470 (15x) | 1/8 | 1-1/2 | | 753431 | 861231 | 59.70 | 861231-C3 | 65.60 | | | NEW |
| .035 (.9 mm) | .105 | .187 (5x) | 1/8 | 1-1/2 | | 948635 | 982835 | 52.40 | 982835-C3 | 58.30 | | | |
| .035 (.9 mm) | .105 | .315 (9x) | 1/8 | 1-1/2 | | 76635 | 76835 | 53.70 | 76835-C3 | 59.60 | | | |
| .039 (1 mm) | .117 | .203 (5x) | 1/8 | 1-1/2 | | 948639 | 982839 | 52.40 | 982839-C3 | 58.30 | | | |
| .039 (1 mm) | .117 | .325 (8x) | 1/8 | 1-1/2 | | 903839 | 904439 | 53.70 | 904439-C3 | 59.60 | | | |
| .040 | .120 | .203 (5x) | 1/8 | 1-1/2 | | 948640 | 982840 | 52.40 | 982840-C3 | 58.30 | | | |
| .040 | .120 | .325 (8x) | 1/8 | 1-1/2 | | | 904440 | 53.70 | 904440-C3 | 59.60 | | | |
| .040 | .120 | .360 (9x) | 1/8 | 1-1/2 | | 76640 | 76840 | 53.70 | 76840-C3 | 59.60 | | | |
| .040 | .120 | .480 (12x) | 1/8 | 1-1/2 | | 950240 | 991140 | 55.60 | 991140-C3 | 61.60 | | | |

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# MINIATURE END MILLS

## Ball – Long Reach, Standard Flute (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIA. | OAL | | UNCOATED | | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | $D_2$ | $L_1$ | | 2 FL | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
| .045 | .135 | .405 (9x) | 1/8 | 1-1/2 | | 76645 | 76845 | 52.00 | 76845-C3 | 57.90 | | |
| .047 (3/64) | .141 | .250 (5x) | 1/8 | 1-1/2 | | 948647 | 982847 | 50.80 | 982847-C3 | 56.70 | | |
| .047 (3/64) | .141 | .375 (8x) | 1/8 | 1-1/2 | | | 904447 | 52.00 | 904447-C3 | 57.90 | | |
| .047 (3/64) | .141 | .423 (9x) | 1/8 | 1-1/2 | | 76647 | 76847 | 52.00 | 76847-C3 | 57.90 | | |
| .047 (3/64) | .141 | .480 (10x) | 1/8 | 1-1/2 | | | 851047 | 53.70 | 851047-C3 | 59.60 | | |
| .047 (3/64) | .141 | .570 (12x) | 1/8 | 1-1/2 | | 950247 | 991147 | 53.70 | 991147-C3 | 59.60 | | |
| .047 (3/64) | .141 | .710 (15x) | 1/8 | 2 | | | 861247 | 57.80 | 861247-C3 | 63.70 | | |
| .050 | .150 | .250 (5x) | 1/8 | 1-1/2 | | 948650 | 982850 | 50.80 | 982850-C3 | 56.70 | | |
| .050 | .150 | .500 (10x) | 1/8 | 1-1/2 | | 76650 | 76850 | 52.00 | 76850-C3 | 57.90 | | |
| .055 (1.4 mm) | .165 | .500 (9x) | 1/8 | 1-1/2 | | 76655 | 76855 | 52.00 | 76855-C3 | 57.90 | | |
| .060 | .180 | .312 (5x) | 1/8 | 1-1/2 | | | 982860 | 50.80 | 982860-C3 | 56.70 | | |
| .060 | .180 | .500 (8x) | 1/8 | 1-1/2 | | 76660 | 76860 | 52.00 | 76860-C3 | 57.90 | | |
| .060 | .180 | .720 (12x) | 1/8 | 2 | | 950260 | 991160 | 53.70 | 991160-C3 | 59.60 | | |
| .062 (1/16) | .186 | .312 (5x) | 1/8 | 1-1/2 | | 948662 | 982862 | 50.80 | 982862-C3 | 56.70 | 982862-C4 | 65.70 |
| .062 (1/16) | .186 | .375 (6x) | 1/8 | 1-1/2 | | 755062 | 805762 | 52.00 | 805762-C3 | 57.90 | | |
| .062 (1/16) | .186 | .437 (7x) | 1/8 | 1-1/2 | | 753862 | 805562 | 52.00 | 805562-C3 | 57.90 | | |
| .062 (1/16) | .186 | .500 (8x) | 1/8 | 1-1/2 | | 76662 | 76862 | 52.00 | 76862-C3 | 57.90 | 76862-C4 | 67.00 |
| .062 (1/16) | .186 | .500 (8x) | 1/8 | 2-1/2 | LONG | | 734962 | 57.10 | 734962-C3 | 63.00 | | |
| .062 (1/16) | .186 | .625 (10x) | 1/8 | 2 | | 811062 | 851062 | 53.70 | 851062-C3 | 59.60 | | |
| .062 (1/16) | .186 | .750 (12x) | 1/8 | 2 | | 950262 | 991162 | 53.70 | 991162-C3 | 59.60 | | |
| .062 (1/16) | .186 | .950 (15x) | 1/8 | 2 | | 753462 | 861262 | 57.80 | 861262-C3 | 63.70 | | |
| .065 | .195 | .500 (8x) | 1/8 | 1-1/2 | | 76665 | 76865 | 52.00 | 76865-C3 | 57.90 | | |
| .070 | .210 | .500 (7x) | 1/8 | 1-1/2 | | 76670 | 76870 | 52.00 | 76870-C3 | 57.90 | | |
| .075 | .225 | .500 (7x) | 1/8 | 1-1/2 | | 76675 | 76875 | 52.00 | 76875-C3 | 57.90 | | |
| .078 (5/64) | .234 | .406 (5x) | 1/8 | 1-1/2 | | | 982878 | 51.70 | 982878-C3 | 57.60 | | |
| NEW .078 (5/64) | .234 | .500 (6x) | 1/8 | 1-1/2 | | 76678 | 76878 | 52.00 | 76878-C3 | 57.90 | 76878-C4 | 67.00 |
| .078 (5/64) | .234 | .475 (6x) | 1/8 | 2-1/2 | LONG | | 734778 | 57.10 | 734778-C3 | 63.00 | | |
| .078 (5/64) | .234 | .625 (8x) | 1/8 | 2 | | | 904478 | 52.00 | 904478-C3 | 57.90 | | |
| .078 (5/64) | .234 | .800 (10x) | 1/8 | 2 | | | 851078 | 53.70 | 851078-C3 | 59.60 | | |
| .078 (5/64) | .234 | .940 (12x) | 1/8 | 2 | | 950278 | 991178 | 53.70 | 991178-C3 | 59.60 | | |
| .078 (5/64) | .234 | 1.187 (15x) | 1/8 | 2-1/2 | | | 861278 | 57.80 | 861278-C3 | 63.70 | | |
| .080 | .240 | .500 (6x) | 1/8 | 1-1/2 | | 76680 | 76880 | 52.00 | 76880-C3 | 57.90 | | |
| .085 | .255 | .500 (6x) | 1/8 | 1-1/2 | | 76685 | 76885 | 51.00 | 76885-C3 | 56.90 | | |
| .090 | .270 | .625 (7x) | 1/8 | 1-1/2 | | 76690 | 76890 | 52.00 | 76890-C3 | 57.90 | | |
| .093 (3/32) | .279 | .500 (5x) | 1/8 | 1-1/2 | | 948693 | 982893 | 51.80 | 982893-C3 | 57.70 | 982893-C4 | 66.70 |
| .093 (3/32) | .279 | .585 (6x) | 1/8 | 1-1/2 | | | 805793 | 53.00 | 805793-C3 | 59.00 | | |
| .093 (3/32) | .279 | .625 (7x) | 1/8 | 1-1/2 | | 76693 | 76893 | 52.00 | 76893-C3 | 57.90 | 76893-C4 | 67.00 |
| .093 (3/32) | .279 | .670 (7x) | 1/8 | 3 | LONG | | 734593 | 57.10 | 734593-C3 | 63.00 | | |
| .093 (3/32) | .279 | .750 (8x) | 1/8 | 2 | | | 904493 | 53.00 | 904493-C3 | 59.00 | | |
| .093 (3/32) | .279 | .950 (10x) | 1/8 | 2 | | | 851093 | 53.70 | 851093-C3 | 59.60 | | |
| .093 (3/32) | .279 | 1.125 (12x) | 1/8 | 2 | | 950293 | 991193 | 53.70 | 991193-C3 | 59.60 | | |
| .093 (3/32) | .279 | 1.400 (15x) | 1/8 | 2-1/2 | | | 861293 | 57.80 | 861293-C3 | 63.70 | | |
| .095 | .285 | .625 (6x) | 1/8 | 1-1/2 | | 76695 | 76895 | 53.00 | 76895-C3 | 59.00 | | |
| .100 | .300 | .625 (6x) | 1/8 | 1-1/2 | | 76700 | 76900 | 52.00 | 76900-C3 | 57.90 | | |
| .109 (7/64) | .327 | .570 (5x) | 1/8 | 1-1/2 | | 948602 | 982902 | 51.80 | 982902-C3 | 57.70 | | |
| .109 (7/64) | .327 | .900 (8x) | 1/8 | 2 | | 903802 | 904402 | 53.70 | 904402-C3 | 59.60 | | |
| .118 (3 mm) | .354 | .625 (5x) | 1/8 | 1-1/2 | | 948705 | 982905 | 51.80 | 982905-C3 | 57.70 | | |
| .118 (3 mm) | .354 | .950 (8x) | 1/8 | 2 | | 903805 | 904405 | 53.70 | 904405-C3 | 59.60 | | |

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NEW SIZES!

# MINIATURE END MILLS

## Ball – Long Reach, Standard Flute (cont.)

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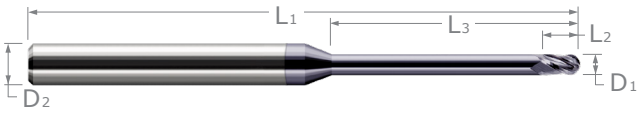
| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIA. | OAL | UNCOATED | | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
| .125 (1/8) | .375 | .625 (5x) | 1/8 | 1-1/2 | 948708 | 982908 | 51.80 | 982908-C3 | 57.70 | 982908-C4 | 66.70 |
| .125 (1/8) | .375 | .750 (6x) | 1/8 | 2 | | 805808 | 52.00 | 805808-C3 | 57.90 | | |
| .125 (1/8) | .375 | .875 (7x) | 1/8 | 2 | | 805608 | 52.00 | 805608-C3 | 57.90 | | |
| .125 (1/8) | .375 | 1.000 (8x) | 1/8 | 2 | 76708 | 76908 | 52.00 | 76908-C3 | 57.90 | 76908-C4 | 67.00 |
| .125 (1/8) | .375 | 1.250 (10x) | 1/8 | 2-1/2 | | 851108 | 55.30 | 851108-C3 | 61.20 | | |
| .125 (1/8) | .375 | 1.500 (12x) | 1/8 | 2-1/2 | 950308 | 991208 | 55.30 | 991208-C3 | 61.20 | | |
| .125 (1/8) | .375 | 1.875 (15x) | 1/8 | 3 | | 861308 | 60.90 | 861308-C3 | 66.80 | | |
| .140 (9/64) | .425 | .750 (5x) | 3/16 | 2 | | 982909 | 62.20 | 982909-C3 | 68.40 | | |
| .140 (9/64) | .425 | 1.125 (8x) | 3/16 | 2-1/2 | | 76909 | 62.70 | 76909-C3 | 69.30 | | |
| .156 (5/32) | .470 | .750 (5x) | 3/16 | 2 | | 982910 | 59.80 | 982910-C3 | 66.30 | | |
| .156 (5/32) | .470 | 1.250 (8x) | 3/16 | 2-1/2 | | 76910 | 60.00 | 76910-C3 | 66.60 | | |
| .187 (3/16) | .570 | 1.000 (5x) | 3/16 | 2 | 948712 | 982912 | 59.80 | 982912-C3 | 66.30 | | |
| .187 (3/16) | .570 | 1.500 (8x) | 3/16 | 2-1/2 | 76712 | 76912 | 60.00 | 76912-C3 | 66.60 | | |
| .250 (1/4) | .750 | 1.250 (5x) | 1/4 | 2-1/2 | 948716 | 982916 | 65.30 | 982916-C3 | 74.10 | | |
| .250 (1/4) | .750 | 2.000 (8x) | 1/4 | 4 | 76716 | 76916 | 65.60 | 76916-C3 | 75.90 | | |

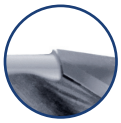
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# MINIATURE END MILLS

## Ball – Long Reach, Stub Flute



Reduced Neck Diameter to Avoid Heeling

- **Long length design for deep cavities**
- Stub flutes for maximum rigidity
- Length of cut = 1½x diameter
- Center cutting • Solid carbide • CNC ground in the USA



| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .005 | .007 | .025 (5x) | 3 | 1/8 | 2-1/2 | 33405 | 72.10 | | | | |
| .005 | .007 | .040 (8x) | 3 | 1/8 | 2-1/2 | 34205 | 72.80 | | | | |
| .008 | .012 | .040 (5x) | 3 | 1/8 | 2-1/2 | 33408 | 70.80 | | | | |
| .008 | .012 | .064 (8x) | 3 | 1/8 | 2-1/2 | 34208 | 71.40 | | | | |
| .010 | .015 | .030 (3x) | 3 | 1/8 | 2-1/2 | 47910 | 70.80 | 47910-C3 | 76.70 | | |
| .010 | .015 | .050 (5x) | 3 | 1/8 | 2-1/2 | 33410 | 70.80 | 33410-C3 | 76.70 | 33410-C4 | 85.80 |
| .010 | .015 | .050 (5x) | 4 | 1/8 | 2-1/2 | 803110 | 70.80 | 803110-C3 | 76.70 | | |
| .010 | .015 | .080 (8x) | 3 | 1/8 | 2-1/2 | 34210 | 71.40 | 34210-C3 | 77.30 | 34210-C4 | 86.40 |
| .010 | .015 | .080 (8x) | 4 | 1/8 | 2-1/2 | 801310 | 71.40 | 801310-C3 | 77.30 | | |
| .010 | .015 | .100 (10x) | 3 | 1/8 | 2-1/2 | 966010 | 74.60 | 966010-C3 | 80.50 | 966010-C4 | 89.50 |
| .010 | .015 | .125 (12x) | 3 | 1/8 | 2-1/2 | 35610 | 74.60 | 35610-C3 | 80.50 | 35610-C4 | 89.50 |
| .010 | .015 | .150 (15x) | 3 | 1/8 | 2-1/2 | 49210 | 84.00 | 49210-C3 | 89.90 | 49210-C4 | 99.00 |
| .010 | .015 | .180 (18x) | 3 | 1/8 | 2-1/2 | 970710 | 96.50 | 970710-C3 | 102.50 | | |
| .011 | .016 | .055 (5x) | 3 | 1/8 | 2-1/2 | 33411 | 72.10 | 33411-C3 | 78.10 | | |
| .011 | .016 | .088 (8x) | 3 | 1/8 | 2-1/2 | 34211 | 72.80 | 34211-C3 | 78.70 | | |
| .012 (.3 mm) | .018 | .060 (5x) | 3 | 1/8 | 2-1/2 | 33412 | 70.80 | 33412-C3 | 76.70 | | |
| .012 (.3 mm) | .018 | .096 (8x) | 3 | 1/8 | 2-1/2 | 34212 | 71.40 | 34212-C3 | 77.30 | | |
| .013 | .019 | .065 (5x) | 3 | 1/8 | 2-1/2 | 33413 | 72.10 | 33413-C3 | 78.10 | | |
| .013 | .019 | .104 (8x) | 3 | 1/8 | 2-1/2 | 34213 | 72.80 | 34213-C3 | 78.70 | | |
| .014 | .021 | .070 (5x) | 3 | 1/8 | 2-1/2 | 33414 | 70.80 | 33414-C3 | 76.70 | | |
| .014 | .021 | .112 (8x) | 3 | 1/8 | 2-1/2 | 34214 | 71.40 | 34214-C3 | 77.30 | | |
| .015 (1/64) | .022 | .045 (3x) | 3 | 1/8 | 2-1/2 | 47915 | 59.00 | 47915-C3 | 64.90 | | |
| .015 (1/64) | .022 | .062 (4x) | 3 | 1/8 | 2-1/2 | 844415 | 59.00 | 844415-C3 | 64.90 | | |
| .015 (1/64) | .022 | .078 (5x) | 3 | 1/8 | 2-1/2 | 33415 | 59.00 | 33415-C3 | 64.90 | 33415-C4 | 74.00 |
| .015 (1/64) | .022 | .078 (5x) | 4 | 1/8 | 2-1/2 | 803115 | 60.10 | 803115-C3 | 66.00 | | |
| .015 (1/64) | .022 | .093 (6x) | 3 | 1/8 | 2-1/2 | 860615 | 59.00 | 860615-C3 | 64.90 | | |
| .015 (1/64) | .022 | .109 (7x) | 3 | 1/8 | 2-1/2 | 868215 | 59.00 | 868215-C3 | 64.90 | | |
| .015 (1/64) | .022 | .125 (8x) | 3 | 1/8 | 2-1/2 | 34215 | 60.30 | 34215-C3 | 66.20 | 34215-C4 | 75.40 |
| .015 (1/64) | .022 | .125 (8x) | 4 | 1/8 | 2-1/2 | 801315 | 61.40 | 801315-C3 | 67.40 | | |
| .015 (1/64) | .022 | .156 (10x) | 3 | 1/8 | 2-1/2 | 966015 | 62.10 | 966015-C3 | 68.00 | 966015-C4 | 77.00 |
| .015 (1/64) | .022 | .187 (12x) | 3 | 1/8 | 2-1/2 | 35615 | 62.10 | 35615-C3 | 68.00 | 35615-C4 | 77.00 |
| .015 (1/64) | .022 | .225 (15x) | 3 | 1/8 | 2-1/2 | 49215 | 68.60 | 49215-C3 | 74.50 | 49215-C4 | 83.60 |
| .015 (1/64) | .022 | .270 (18x) | 3 | 1/8 | 2-1/2 | 970715 | 80.80 | 970715-C3 | 86.70 | | |
| .015 (1/64) | .022 | .300 (20x) | 3 | 1/8 | 2-1/2 | 59415 | 80.80 | 59415-C3 | 86.70 | 59415-C4 | 95.80 |
| .015 (1/64) | .022 | .375 (25x) | 3 | 1/8 | 2-1/2 | 40115 | 102.20 | 40115-C3 | 108.20 | | |
| .016 (.4 mm) | .024 | .080 (5x) | 3 | 1/8 | 2-1/2 | 33416 | 63.10 | 33416-C3 | 69.00 | | |
| .016 (.4 mm) | .024 | .128 (8x) | 3 | 1/8 | 2-1/2 | 34216 | 63.10 | 34216-C3 | 69.00 | | |

continued on next page

# MINIATURE END MILLS

## Ball – Long Reach, Stub Flute (cont.)

continued from previous page



| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .017 | .026 | .085 (5x) | 3 | 1/8 | 2-1/2 | 33417 | 63.10 | 33417-C3 | 69.00 | | |
| .017 | .026 | .136 (8x) | 3 | 1/8 | 2-1/2 | 34217 | 64.50 | 34217-C3 | 70.40 | | |
| .018 | .027 | .090 (5x) | 3 | 1/8 | 2-1/2 | 33418 | 62.10 | 33418-C3 | 68.00 | | |
| .018 | .027 | .144 (8x) | 3 | 1/8 | 2-1/2 | 34218 | 64.50 | 34218-C3 | 70.40 | | |
| .019 | .029 | .095 (5x) | 3 | 1/8 | 2-1/2 | 33419 | 62.10 | 33419-C3 | 68.00 | | |
| .019 | .029 | .152 (8x) | 3 | 1/8 | 2-1/2 | 34219 | 63.10 | 34219-C3 | 69.00 | | |
| .020 (.5 mm) | .030 | .060 (3x) | 3 | 1/8 | 2-1/2 | 47920 | 57.00 | 47920-C3 | 62.90 | 47920-C4 | 72.00 |
| .020 (.5 mm) | .030 | .080 (4x) | 3 | 1/8 | 2-1/2 | 844420 | 57.00 | 844420-C3 | 62.90 | | |
| .020 (.5 mm) | .030 | .100 (5x) | 3 | 1/8 | 2-1/2 | 33420 | 57.00 | 33420-C3 | 62.90 | 33420-C4 | 72.00 |
| .020 (.5 mm) | .030 | .100 (5x) | 4 | 1/8 | 2-1/2 | 803120 | 57.00 | 803120-C3 | 62.90 | | |
| .020 (.5 mm) | .030 | .120 (6x) | 3 | 1/8 | 2-1/2 | 860620 | 57.00 | 860620-C3 | 62.90 | 860620-C4 | 72.80 |
| .020 (.5 mm) | .030 | .120 (6x) | 4 | 1/8 | 2-1/2 | 753020 | 57.00 | 753020-C3 | 62.90 | | |
| .020 (.5 mm) | .030 | .140 (7x) | 3 | 1/8 | 2-1/2 | 868220 | 57.00 | 868220-C3 | 62.90 | | |
| .020 (.5 mm) | .030 | .160 (8x) | 3 | 1/8 | 2-1/2 | 34220 | 58.50 | 34220-C3 | 64.50 | 34220-C4 | 73.50 |
| .020 (.5 mm) | .030 | .160 (8x) | 4 | 1/8 | 2-1/2 | 801320 | 58.50 | 801320-C3 | 64.50 | | |
| .020 (.5 mm) | .030 | .200 (10x) | 3 | 1/8 | 2-1/2 | 966020 | 60.10 | 966020-C3 | 66.00 | 966020-C4 | 75.00 |
| .020 (.5 mm) | .030 | .250 (12x) | 3 | 1/8 | 2-1/2 | 35620 | 60.10 | 35620-C3 | 66.00 | 35620-C4 | 75.00 |
| .020 (.5 mm) | .030 | .300 (15x) | 3 | 1/8 | 2-1/2 | 49220 | 66.40 | 49220-C3 | 72.30 | 49220-C4 | 81.30 |
| .020 (.5 mm) | .030 | .360 (18x) | 3 | 1/8 | 2-1/2 | 970720 | 80.20 | 970720-C3 | 86.20 | | |
| .020 (.5 mm) | .030 | .400 (20x) | 3 | 1/8 | 2-1/2 | 59420 | 80.20 | 59420-C3 | 86.20 | 59420-C4 | 95.20 |
| .020 (.5 mm) | .030 | .500 (25x) | 3 | 1/8 | 2-1/2 | 40120 | 99.90 | 40120-C3 | 105.80 | 40120-C4 | 115.00 |
| .020 (.5 mm) | .030 | .600 (30x) | 3 | 1/8 | 2-1/2 | 922720 | 112.70 | 922720-C3 | 118.60 | **30x Diameter!** | |
| .021 | .031 | .105 (5x) | 3 | 1/8 | 2-1/2 | 33421 | 63.10 | 33421-C3 | 69.00 | | |
| .021 | .031 | .168 (8x) | 3 | 1/8 | 2-1/2 | 34221 | 64.50 | 34221-C3 | 70.40 | | |
| .022 | .033 | .110 (5x) | 3 | 1/8 | 2-1/2 | 33422 | 63.10 | 33422-C3 | 69.00 | | |
| .022 | .033 | .176 (8x) | 3 | 1/8 | 2-1/2 | 34222 | 63.10 | 34222-C3 | 69.00 | | |
| .023 | .035 | .115 (5x) | 3 | 1/8 | 2-1/2 | 33423 | 63.10 | 33423-C3 | 69.00 | | |
| .023 | .035 | .187 (8x) | 3 | 1/8 | 2-1/2 | 34223 | 63.10 | 34223-C3 | 69.00 | | |
| .024 (.6 mm) | .036 | .120 (5x) | 3 | 1/8 | 2-1/2 | 33424 | 62.10 | 33424-C3 | 68.00 | | |
| .024 (.6 mm) | .036 | .192 (8x) | 3 | 1/8 | 2-1/2 | 34224 | 63.10 | 34224-C3 | 69.00 | | |
| .025 | .037 | .075 (3x) | 3 | 1/8 | 2-1/2 | 47925 | 49.50 | 47925-C3 | 55.40 | | |
| .025 | .037 | .125 (5x) | 3 | 1/8 | 2-1/2 | 33425 | 49.50 | 33425-C3 | 55.40 | 33425-C4 | 64.40 |
| .025 | .037 | .125 (5x) | 4 | 1/8 | 2-1/2 | 803125 | 49.50 | 803125-C3 | 55.40 | | |
| .025 | .037 | .150 (6x) | 3 | 1/8 | 2-1/2 | 860625 | 50.30 | 860625-C3 | 56.30 | | |
| .025 | .037 | .175 (7x) | 3 | 1/8 | 2-1/2 | 868225 | 51.20 | 868225-C3 | 57.10 | | |
| .025 | .037 | .203 (8x) | 3 | 1/8 | 2-1/2 | 34225 | 50.30 | 34225-C3 | 56.30 | 34225-C4 | 65.30 |
| .025 | .037 | .250 (10x) | 3 | 1/8 | 2-1/2 | 966025 | 52.00 | 966025-C3 | 57.90 | | |
| .025 | .037 | .312 (12x) | 3 | 1/8 | 2-1/2 | 35625 | 52.00 | 35625-C3 | 57.90 | 35625-C4 | 67.10 |
| .025 | .037 | .312 (12x) | 4 | 1/8 | 2-1/2 | 768025 | 52.00 | 768025-C3 | 57.90 | | |
| .025 | .037 | .375 (15x) | 3 | 1/8 | 2-1/2 | 49225 | 59.60 | 49225-C3 | 65.50 | 49225-C4 | 74.60 |
| .026 | .039 | .130 (5x) | 3 | 1/8 | 2-1/2 | 33426 | 63.10 | 33426-C3 | 69.00 | | |
| .026 | .039 | .208 (8x) | 3 | 1/8 | 2-1/2 | 34226 | 64.50 | 34226-C3 | 70.40 | | |
| .027 | .041 | .135 (5x) | 3 | 1/8 | 2-1/2 | 33427 | 63.10 | 33427-C3 | 69.00 | | |
| .027 | .041 | .216 (8x) | 3 | 1/8 | 2-1/2 | 34227 | 64.50 | 34227-C3 | 70.40 | | |
| .028 (.7 mm) | .042 | .140 (5x) | 3 | 1/8 | 2-1/2 | 33428 | 62.10 | 33428-C3 | 68.00 | | |
| .028 (.7 mm) | .042 | .224 (8x) | 3 | 1/8 | 2-1/2 | 34228 | 63.10 | 34228-C3 | 69.00 | | |

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# MINIATURE END MILLS

## Ball – Long Reach, Stub Flute (cont.)

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| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .029 | .043 | .145 (5x) | 3 | 1/8 | 2-1/2 | 33429 | 63.10 | 33429-C3 | 69.00 | | |
| .029 | .043 | .232 (8x) | 3 | 1/8 | 2-1/2 | 34229 | 64.50 | 34229-C3 | 70.40 | | |
| .030 | .045 | .090 (3x) | 3 | 1/8 | 2-1/2 | 47930 | 49.50 | 47930-C3 | 55.40 | | |
| .030 | .045 | .156 (5x) | 3 | 1/8 | 2-1/2 | 33430 | 49.50 | 33430-C3 | 55.40 | 33430-C4 | 64.40 |
| .030 | .045 | .250 (8x) | 3 | 1/8 | 2-1/2 | 34230 | 50.30 | 34230-C3 | 56.30 | 34230-C4 | 65.30 |
| .030 | .045 | .312 (10x) | 3 | 1/8 | 2-1/2 | 966030 | 52.00 | 966030-C3 | 57.90 | 966030-C4 | 67.80 |
| .030 | .045 | .375 (12x) | 3 | 1/8 | 2-1/2 | 35630 | 52.00 | 35630-C3 | 57.90 | 35630-C4 | 67.10 |
| .030 | .045 | .450 (15x) | 3 | 1/8 | 2-1/2 | 49230 | 59.60 | 49230-C3 | 65.50 | 49230-C4 | 74.60 |
| .030 | .045 | .540 (18x) | 3 | 1/8 | 2-1/2 | 970730 | 72.80 | 970730-C3 | 78.70 | | |
| .031 (1/32) | .046 | .093 (3x) | 3 | 1/8 | 2-1/2 | 47931 | 49.50 | 47931-C3 | 55.40 | 47931-C4 | 64.40 |
| .031 (1/32) | .046 | .125 (4x) | 3 | 1/8 | 2-1/2 | 844431 | 49.50 | 844431-C3 | 55.40 | 844431-C4 | 65.30 |
| .031 (1/32) | .046 | .156 (5x) | 3 | 1/8 | 2-1/2 | 33431 | 49.50 | 33431-C3 | 55.40 | 33431-C4 | 64.40 |
| .031 (1/32) | .046 | .156 (5x) | 4 | 1/8 | 2-1/2 | 803131 | 49.50 | 803131-C3 | 55.40 | | |
| .031 (1/32) | .046 | .187 (6x) | 3 | 1/8 | 2-1/2 | 860631 | 49.50 | 860631-C3 | 55.40 | 860631-C4 | 64.40 |
| .031 (1/32) | .046 | .218 (7x) | 3 | 1/8 | 2-1/2 | 868231 | 49.50 | 868231-C3 | 55.40 | | |
| .031 (1/32) | .046 | .250 (8x) | 3 | 1/8 | 2-1/2 | 34231 | 50.30 | 34231-C3 | 56.30 | 34231-C4 | 65.30 |
| .031 (1/32) | .046 | .250 (8x) | 4 | 1/8 | 2-1/2 | 801331 | 50.30 | 801331-C3 | 56.30 | | |
| .031 (1/32) | .046 | .312 (10x) | 3 | 1/8 | 2-1/2 | 966031 | 52.00 | 966031-C3 | 57.90 | 966031-C4 | 67.10 |
| .031 (1/32) | .046 | .312 (10x) | 4 | 1/8 | 2-1/2 | 769231 | 52.00 | 769231-C3 | 57.90 | | |
| .031 (1/32) | .046 | .375 (12x) | 3 | 1/8 | 2-1/2 | 35631 | 52.00 | 35631-C3 | 57.90 | 35631-C4 | 67.10 |
| .031 (1/32) | .046 | .375 (12x) | 4 | 1/8 | 2-1/2 | 768031 | 53.00 | 768031-C3 | 59.00 | | |
| .031 (1/32) | .046 | .470 (15x) | 3 | 1/8 | 2-1/2 | 49231 | 59.60 | 49231-C3 | 65.50 | 49231-C4 | 74.60 |
| .031 (1/32) | .046 | .565 (18x) | 3 | 1/8 | 2-1/2 | 970731 | 72.80 | 970731-C3 | 78.70 | 970731-C4 | 87.90 |
| .031 (1/32) | .046 | .625 (20x) | 3 | 1/8 | 2-1/2 | 59431 | 72.80 | 59431-C3 | 78.70 | 59431-C4 | 87.90 |
| .031 (1/32) | .046 | .775 (25x) | 3 | 1/8 | 2-1/2 | 40131 | 87.00 | 40131-C3 | 92.90 | 40131-C4 | 102.10 |
| .031 (1/32) | .046 | .937 (30x) | 3 | 1/8 | 2-1/2 | 922731 | 104.50 | 922731-C3 | 110.40 | **30x Diameter!** | |
| .035 (.9 mm) | .052 | .187 (5x) | 3 | 1/8 | 2-1/2 | 33435 | 49.50 | 33435-C3 | 55.40 | 33435-C4 | 65.30 |
| .035 (.9 mm) | .052 | .281 (8x) | 3 | 1/8 | 2-1/2 | 34235 | 50.30 | 34235-C3 | 56.30 | 34235-C4 | 66.10 |
| .035 (.9 mm) | .052 | .425 (12x) | 3 | 1/8 | 2-1/2 | 35635 | 52.60 | 35635-C3 | 58.50 | 35635-C4 | 68.40 |
| .035 (.9 mm) | .052 | .525 (15x) | 3 | 1/8 | 2-1/2 | 49235 | 59.60 | 49235-C3 | 65.50 | | |
| .039 (1 mm) | .059 | .203 (5x) | 3 | 1/8 | 2-1/2 | 33439 | 49.70 | 33439-C3 | 55.60 | | |
| .039 (1 mm) | .059 | .203 (5x) | 4 | 1/8 | 2-1/2 | 803139 | 49.70 | 803139-C3 | 55.60 | | |
| .039 (1 mm) | .059 | .240 (6x) | 3 | 1/8 | 2-1/2 | 860639 | 49.70 | 860639-C3 | 55.60 | | |
| .039 (1 mm) | .059 | .281 (7x) | 3 | 1/8 | 2-1/2 | 868239 | 50.70 | 868239-C3 | 56.60 | | |
| .039 (1 mm) | .059 | .325 (8x) | 3 | 1/8 | 2-1/2 | 34239 | 50.30 | 34239-C3 | 56.30 | | |
| .039 (1 mm) | .059 | .400 (10x) | 3 | 1/8 | 2-1/2 | 966039 | 52.60 | 966039-C3 | 58.50 | | |
| .040 | .060 | .120 (3x) | 3 | 1/8 | 2-1/2 | 47940 | 49.50 | 47940-C3 | 55.40 | 47940-C4 | 65.30 |
| .040 | .060 | .160 (4x) | 3 | 1/8 | 2-1/2 | 844440 | 50.40 | 844440-C3 | 56.40 | | |
| .040 | .060 | .203 (5x) | 3 | 1/8 | 2-1/2 | 33440 | 49.50 | 33440-C3 | 55.40 | 33440-C4 | 64.40 |
| .040 | .060 | .203 (5x) | 4 | 1/8 | 2-1/2 | 803140 | 49.50 | 803140-C3 | 55.40 | | |
| .040 | .060 | .240 (6x) | 3 | 1/8 | 2-1/2 | 860640 | 49.50 | 860640-C3 | 55.40 | | |
| .040 | .060 | .281 (7x) | 3 | 1/8 | 2-1/2 | 868240 | 49.50 | 868240-C3 | 55.40 | | |
| .040 | .060 | .325 (8x) | 3 | 1/8 | 2-1/2 | 34240 | 50.30 | 34240-C3 | 56.30 | 34240-C4 | 65.30 |
| .040 | .060 | .325 (8x) | 4 | 1/8 | 2-1/2 | 801340 | 50.30 | 801340-C3 | 56.30 | | |
| .040 | .060 | .400 (10x) | 3 | 1/8 | 2-1/2 | 966040 | 52.60 | 966040-C3 | 58.50 | 966040-C4 | 67.60 |
| .040 | .060 | .480 (12x) | 3 | 1/8 | 2-1/2 | 35640 | 52.60 | 35640-C3 | 58.50 | 35640-C4 | 67.60 |

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# MINIATURE END MILLS

## Ball – Long Reach, Stub Flute (cont.)

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| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .040 | .060 | .600 (15x) | 3 | 1/8 | 2-1/2 | 49240 | 59.60 | 49240-C3 | 65.50 | 49240-C4 | 74.60 |
| .040 | .060 | .720 (18x) | 3 | 1/8 | 2-1/2 | 970740 | 72.80 | 970740-C3 | 78.70 | | |
| .040 | .060 | .800 (20x) | 3 | 1/8 | 2-1/2 | 59440 | 72.80 | 59440-C3 | 78.70 | 59440-C4 | 87.90 |
| .040 | .060 | 1.000 (25x) | 3 | 1/8 | 2-1/2 | 40140 | 87.00 | 40140-C3 | 92.90 | **25x Diameter!** | |
| .045 | .067 | .225 (5x) | 3 | 1/8 | 2-1/2 | 33445 | 48.20 | 33445-C3 | 54.10 | 33445-C4 | 63.90 |
| .045 | .067 | .375 (8x) | 3 | 1/8 | 2-1/2 | 34245 | 49.30 | 34245-C3 | 55.20 | 34245-C4 | 65.10 |
| .045 | .067 | .550 (12x) | 3 | 1/8 | 2-1/2 | 35645 | 50.70 | 35645-C3 | 56.60 | 35645-C4 | 66.40 |
| .045 | .067 | .680 (15x) | 3 | 1/8 | 2-1/2 | 49245 | 57.30 | 49245-C3 | 63.20 | | |
| .047 (3/64) | .070 | .141 (3x) | 3 | 1/8 | 2-1/2 | 47947 | 48.20 | 47947-C3 | 54.10 | | |
| .047 (3/64) | .070 | .187 (4x) | 3 | 1/8 | 2-1/2 | 844447 | 48.20 | 844447-C3 | 54.10 | | |
| .047 (3/64) | .070 | .250 (5x) | 3 | 1/8 | 2-1/2 | 33447 | 48.20 | 33447-C3 | 54.10 | 33447-C4 | 63.30 |
| .047 (3/64) | .070 | .250 (5x) | 4 | 1/8 | 2-1/2 | 803147 | 48.20 | 803147-C3 | 54.10 | | |
| .047 (3/64) | .070 | .281 (6x) | 3 | 1/8 | 2-1/2 | 860647 | 48.20 | 860647-C3 | 54.10 | | |
| .047 (3/64) | .070 | .328 (7x) | 3 | 1/8 | 2-1/2 | 868247 | 48.20 | 868247-C3 | 54.10 | | |
| .047 (3/64) | .070 | .375 (8x) | 3 | 1/8 | 2-1/2 | 34247 | 49.30 | 34247-C3 | 55.20 | 34247-C4 | 64.30 |
| .047 (3/64) | .070 | .375 (8x) | 4 | 1/8 | 2-1/2 | 801347 | 49.30 | 801347-C3 | 55.20 | | |
| .047 (3/64) | .070 | .480 (10x) | 3 | 1/8 | 2-1/2 | 966047 | 50.70 | 966047-C3 | 56.60 | 966047-C4 | 65.70 |
| .047 (3/64) | .070 | .480 (10x) | 4 | 1/8 | 2-1/2 | 769247 | 50.70 | 769247-C3 | 56.60 | | |
| .047 (3/64) | .070 | .570 (12x) | 3 | 1/8 | 2-1/2 | 35647 | 50.70 | 35647-C3 | 56.60 | 35647-C4 | 65.70 |
| .047 (3/64) | .070 | .710 (15x) | 3 | 1/8 | 2-1/2 | 49247 | 56.40 | 49247-C3 | 62.30 | 49247-C4 | 71.40 |
| .047 (3/64) | .070 | .850 (18x) | 3 | 1/8 | 2-1/2 | 970747 | 68.50 | 970747-C3 | 74.40 | | |
| .047 (3/64) | .070 | .950 (20x) | 3 | 1/8 | 2-1/2 | 59447 | 68.50 | 59447-C3 | 74.40 | 59447-C4 | 83.50 |
| .047 (3/64) | .070 | 1.187 (25x) | 3 | 1/8 | 2-1/2 | 40147 | 84.00 | 40147-C3 | 89.90 | **25x Diameter!** | |
| .050 | .075 | .150 (3x) | 3 | 1/8 | 2-1/2 | 47950 | 48.20 | 47950-C3 | 54.10 | | |
| .050 | .075 | .250 (5x) | 3 | 1/8 | 2-1/2 | 33450 | 48.20 | 33450-C3 | 54.10 | 33450-C4 | 63.30 |
| .050 | .075 | .400 (8x) | 3 | 1/8 | 2-1/2 | 34250 | 49.30 | 34250-C3 | 55.20 | 34250-C4 | 65.10 |
| .050 | .075 | .500 (10x) | 3 | 1/8 | 2-1/2 | 966050 | 50.70 | 966050-C3 | 56.60 | | |
| .050 | .075 | .600 (12x) | 3 | 1/8 | 2-1/2 | 35650 | 50.70 | 35650-C3 | 56.60 | 35650-C4 | 65.70 |
| .050 | .075 | .750 (15x) | 3 | 1/8 | 2-1/2 | 49250 | 56.40 | 49250-C3 | 62.30 | | |
| .055 (1.4 mm) | .082 | .165 (3x) | 3 | 1/8 | 2-1/2 | 47955 | 48.20 | 47955-C3 | 54.10 | | |
| .055 (1.4 mm) | .082 | .275 (5x) | 3 | 1/8 | 2-1/2 | 33455 | 48.20 | 33455-C3 | 54.10 | 33455-C4 | 63.90 |
| .055 (1.4 mm) | .082 | .330 (6x) | 3 | 1/8 | 2-1/2 | 860655 | 48.20 | 860655-C3 | 54.10 | | |
| .055 (1.4 mm) | .082 | .450 (8x) | 3 | 1/8 | 2-1/2 | 34255 | 49.30 | 34255-C3 | 55.20 | 34255-C4 | 64.30 |
| .055 (1.4 mm) | .082 | .560 (10x) | 3 | 1/8 | 2-1/2 | 966055 | 51.60 | 966055-C3 | 57.50 | | |
| .055 (1.4 mm) | .082 | .660 (12x) | 3 | 1/8 | 2-1/2 | 35655 | 50.70 | 35655-C3 | 56.60 | 35655-C4 | 65.70 |
| .060 | .090 | .180 (3x) | 3 | 1/8 | 2-1/2 | 47960 | 48.20 | 47960-C3 | 54.10 | | |
| .060 | .090 | .312 (5x) | 3 | 1/8 | 2-1/2 | 33460 | 48.20 | 33460-C3 | 54.10 | 33460-C4 | 63.30 |
| .060 | .090 | .375 (6x) | 3 | 1/8 | 2-1/2 | 860660 | 49.30 | 860660-C3 | 55.20 | | |
| .060 | .090 | .437 (7x) | 3 | 1/8 | 2-1/2 | 868260 | 49.30 | 868260-C3 | 55.20 | | |
| .060 | .090 | .500 (8x) | 3 | 1/8 | 2-1/2 | 34260 | 49.30 | 34260-C3 | 55.20 | 34260-C4 | 64.30 |
| .060 | .090 | .625 (10x) | 3 | 1/8 | 2-1/2 | 966060 | 50.70 | 966060-C3 | 56.60 | | |
| .060 | .090 | .720 (12x) | 3 | 1/8 | 2-1/2 | 35660 | 50.70 | 35660-C3 | 56.60 | 35660-C4 | 65.70 |
| .060 | .090 | .900 (15x) | 3 | 1/8 | 2-1/2 | 49260 | 56.40 | 49260-C3 | 62.30 | | |
| .060 | .090 | 1.062 (18x) | 3 | 1/8 | 2-1/2 | 970760 | 68.50 | 970760-C3 | 74.40 | | |
| .060 | .090 | 1.200 (20x) | 3 | 1/8 | 2-1/2 | 59460 | 68.50 | 59460-C3 | 74.40 | | |

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# MINIATURE END MILLS

## Ball – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .062 (1/16) | .093 | .186 (3x) | 3 | 1/8 | 2-1/2 | 47962 | 48.20 | 47962-C3 | 54.10 | 47962-C4 | 63.90 |
| .062 (1/16) | .093 | .250 (4x) | 3 | 1/8 | 2-1/2 | 844462 | 48.20 | 844462-C3 | 54.10 | 844462-C4 | 63.90 |
| .062 (1/16) | .093 | .250 (4x) | 4 | 1/8 | 2-1/2 | 754362 | 48.20 | 754362-C3 | 54.10 | | |
| .062 (1/16) | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 33462 | 48.20 | 33462-C3 | 54.10 | 33462-C4 | 63.30 |
| .062 (1/16) | .093 | .312 (5x) | 4 | 1/8 | 2-1/2 | 803162 | 48.20 | 803162-C3 | 54.10 | | |
| .062 (1/16) | .093 | .375 (6x) | 3 | 1/8 | 2-1/2 | 860662 | 48.20 | 860662-C3 | 54.10 | 860662-C4 | 63.30 |
| .062 (1/16) | .093 | .375 (6x) | 4 | 1/8 | 2-1/2 | 753062 | 48.20 | 753062-C3 | 54.10 | | |
| .062 (1/16) | .093 | .437 (7x) | 3 | 1/8 | 2-1/2 | 868262 | 48.20 | 868262-C3 | 54.10 | 868262-C4 | 63.30 |
| .062 (1/16) | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 34262 | 49.30 | 34262-C3 | 55.20 | 34262-C4 | 64.30 |
| .062 (1/16) | .093 | .500 (8x) | 4 | 1/8 | 2-1/2 | 801362 | 49.30 | 801362-C3 | 55.20 | | |
| .062 (1/16) | .093 | .558 (9x) | 3 | 1/8 | 2-1/2 | 805362 | 50.70 | 805362-C3 | 56.60 | | |
| .062 (1/16) | .093 | .625 (10x) | 3 | 1/8 | 2-1/2 | 966062 | 50.70 | 966062-C3 | 56.60 | 966062-C4 | 65.70 |
| .062 (1/16) | .093 | .625 (10x) | 4 | 1/8 | 2-1/2 | 769262 | 50.70 | 769262-C3 | 56.60 | | |
| .062 (1/16) | .093 | .750 (12x) | 3 | 1/8 | 2-1/2 | 35662 | 50.70 | 35662-C3 | 56.60 | 35662-C4 | 65.70 |
| .062 (1/16) | .093 | .750 (12x) | 4 | 1/8 | 2-1/2 | 768062 | 50.70 | 768062-C3 | 56.60 | | |
| .062 (1/16) | .093 | .950 (15x) | 3 | 1/8 | 2-1/2 | 49262 | 56.40 | 49262-C3 | 62.30 | 49262-C4 | 71.40 |
| .062 (1/16) | .093 | .950 (15x) | 4 | 1/8 | 2-1/2 | 752262 | 57.30 | 752262-C3 | 63.20 | | |
| .062 (1/16) | .093 | 1.125 (18x) | 3 | 1/8 | 2-1/2 | 970762 | 68.50 | 970762-C3 | 74.40 | 970762-C4 | 83.50 |
| .062 (1/16) | .093 | 1.250 (20x) | 3 | 1/8 | 2-1/2 | 59462 | 68.50 | 59462-C3 | 74.40 | 59462-C4 | 83.50 |
| .062 (1/16) | .093 | 1.550 (25x) | 3 | 1/8 | 3 | 40162 | 84.00 | 40162-C3 | 89.90 | 40162-C4 | 99.00 |
| .062 (1/16) | .093 | 1.875 (30x) | 3 | 1/8 | 3 | 922762 | 109.60 | 922762-C3 | 115.50 | **30x Diameter!** | |
| .065 | .097 | .325 (5x) | 3 | 1/8 | 2-1/2 | 33465 | 48.20 | 33465-C3 | 54.10 | | |
| .065 | .097 | .530 (8x) | 3 | 1/8 | 2-1/2 | 34265 | 49.30 | 34265-C3 | 55.20 | 34265-C4 | 65.10 |
| .070 | .105 | .375 (5x) | 3 | 1/8 | 2-1/2 | 33470 | 48.20 | 33470-C3 | 54.10 | | |
| .070 | .105 | .570 (8x) | 3 | 1/8 | 2-1/2 | 34270 | 49.30 | 34270-C3 | 55.20 | 34270-C4 | 64.30 |
| .075 | .112 | .375 (5x) | 3 | 1/8 | 2-1/2 | 33475 | 48.20 | 33475-C3 | 54.10 | | |
| .075 | .112 | .625 (8x) | 3 | 1/8 | 2-1/2 | 34275 | 49.30 | 34275-C3 | 55.20 | 34275-C4 | 65.10 |
| .078 (5/64) | .117 | .234 (3x) | 3 | 1/8 | 2-1/2 | 47978 | 48.20 | 47978-C3 | 54.10 | | |
| .078 (5/64) | .117 | .312 (4x) | 3 | 1/8 | 2-1/2 | 844478 | 48.20 | 844478-C3 | 54.10 | | |
| .078 (5/64) | .117 | .406 (5x) | 3 | 1/8 | 2-1/2 | 33478 | 48.20 | 33478-C3 | 54.10 | 33478-C4 | 63.30 |
| .078 (5/64) | .117 | .406 (5x) | 4 | 1/8 | 2-1/2 | 803178 | 48.20 | 803178-C3 | 54.10 | | |
| .078 (5/64) | .117 | .475 (6x) | 3 | 1/8 | 2-1/2 | 860678 | 48.20 | 860678-C3 | 54.10 | | |
| .078 (5/64) | .117 | .550 (7x) | 3 | 1/8 | 2-1/2 | 868278 | 48.20 | 868278-C3 | 54.10 | | |
| .078 (5/64) | .117 | .625 (8x) | 3 | 1/8 | 2-1/2 | 34278 | 49.30 | 34278-C3 | 55.20 | 34278-C4 | 65.10 |
| .078 (5/64) | .117 | .625 (8x) | 4 | 1/8 | 2-1/2 | 801378 | 49.30 | 801378-C3 | 55.20 | | |
| .078 (5/64) | .117 | .800 (10x) | 3 | 1/8 | 2-1/2 | 966078 | 50.70 | 966078-C3 | 56.60 | | |
| .078 (5/64) | .117 | .940 (12x) | 3 | 1/8 | 2-1/2 | 35678 | 50.70 | 35678-C3 | 56.60 | 35678-C4 | 65.70 |
| .078 (5/64) | .117 | 1.187 (15x) | 3 | 1/8 | 2-1/2 | 49278 | 56.40 | 49278-C3 | 62.30 | 49278-C4 | 71.40 |
| .078 (5/64) | .117 | 1.400 (18x) | 3 | 1/8 | 3 | 970778 | 68.50 | 970778-C3 | 74.40 | | |
| .078 (5/64) | .117 | 1.562 (20x) | 3 | 1/8 | 3 | 59478 | 68.50 | 59478-C3 | 74.40 | | |
| .078 (5/64) | .117 | 1.950 (25x) | 3 | 1/8 | 3 | 40178 | 84.00 | 40178-C3 | 89.90 | **25x Diameter!** | |
| .080 | .120 | .406 (5x) | 3 | 1/8 | 2-1/2 | 33480 | 48.20 | 33480-C3 | 54.10 | | |
| .080 | .120 | .650 (8x) | 3 | 1/8 | 2-1/2 | 34280 | 49.30 | 34280-C3 | 55.20 | 34280-C4 | 65.10 |
| .085 | .127 | .425 (5x) | 3 | 1/8 | 2-1/2 | 33485 | 48.20 | 33485-C3 | 54.10 | | |
| .085 | .127 | .700 (8x) | 3 | 1/8 | 2-1/2 | 34285 | 49.30 | 34285-C3 | 55.20 | 34285-C4 | 65.10 |
| .090 | .135 | .450 (5x) | 3 | 1/8 | 2-1/2 | 33490 | 49.00 | 33490-C3 | 54.90 | | |
| .090 | .135 | .750 (8x) | 3 | 1/8 | 2-1/2 | 34290 | 49.30 | 34290-C3 | 55.20 | 34290-C4 | 65.10 |

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# MINIATURE END MILLS

## Ball – Long Reach, Stub Flute (cont.)

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| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .093 (3/32) | .139 | .279 (3x) | 3 | 1/8 | 2-1/2 | 47993 | 48.20 | 47993-C3 | 54.10 | | |
| .093 (3/32) | .139 | .375 (4x) | 3 | 1/8 | 2-1/2 | 844493 | 48.20 | 844493-C3 | 54.10 | | |
| .093 (3/32) | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 33493 | 48.20 | 33493-C3 | 54.10 | 33493-C4 | 63.30 |
| .093 (3/32) | .139 | .500 (5x) | 4 | 1/8 | 2-1/2 | 803193 | 48.20 | 803193-C3 | 54.10 | | |
| .093 (3/32) | .139 | .585 (6x) | 3 | 1/8 | 2-1/2 | 860693 | 48.20 | 860693-C3 | 54.10 | | |
| .093 (3/32) | .139 | .670 (7x) | 3 | 1/8 | 2-1/2 | 868293 | 48.20 | 868293-C3 | 54.10 | | |
| .093 (3/32) | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 34293 | 49.30 | 34293-C3 | 55.20 | 34293-C4 | 64.30 |
| .093 (3/32) | .139 | .750 (8x) | 4 | 1/8 | 2-1/2 | 801393 | 49.30 | 801393-C3 | 55.20 | | |
| .093 (3/32) | .139 | .950 (10x) | 3 | 1/8 | 2-1/2 | 966093 | 50.70 | 966093-C3 | 56.60 | 966093-C4 | 65.70 |
| .093 (3/32) | .139 | 1.125 (12x) | 3 | 1/8 | 2-1/2 | 35693 | 50.70 | 35693-C3 | 56.60 | 35693-C4 | 65.70 |
| .093 (3/32) | .139 | 1.400 (15x) | 3 | 1/8 | 3 | 49293 | 59.30 | 49293-C3 | 65.20 | 49293-C4 | 74.30 |
| .093 (3/32) | .139 | 1.675 (18x) | 3 | 1/8 | 3 | 970793 | 72.70 | 970793-C3 | 78.60 | | |
| .093 (3/32) | .139 | 1.875 (20x) | 3 | 1/8 | 4 | 59493 | 75.70 | 59493-C3 | 82.00 | | |
| .093 (3/32) | .139 | 2.312 (25x) | 3 | 1/8 | 4 | 40193 | 86.80 | 40193-C3 | 93.10 | **25x Diameter!** | |
| .093 (3/32) | .139 | 2.812 (30x) | 3 | 1/8 | 4 | 922793 | 119.40 | 922793-C3 | 125.70 | **30x Diameter!** | |
| .095 | .142 | .500 (5x) | 3 | 1/8 | 2-1/2 | 33495 | 48.20 | 33495-C3 | 54.10 | | |
| .095 | .142 | .750 (8x) | 3 | 1/8 | 2-1/2 | 34295 | 49.30 | 34295-C3 | 55.20 | 34295-C4 | 65.10 |
| .100 | .150 | .300 (3x) | 3 | 1/8 | 2-1/2 | 978500 | 48.20 | 978500-C3 | 54.10 | | |
| .100 | .150 | .500 (5x) | 3 | 1/8 | 2-1/2 | 33500 | 48.20 | 33500-C3 | 54.10 | | |
| .100 | .150 | .800 (8x) | 3 | 1/8 | 2-1/2 | 34300 | 49.30 | 34300-C3 | 55.20 | 34300-C4 | 64.30 |
| .100 | .150 | 1.000 (10x) | 3 | 1/8 | 2-1/2 | 966100 | 50.70 | 966100-C3 | 56.60 | | |
| .100 | .150 | 1.200 (12x) | 3 | 1/8 | 2-1/2 | 35700 | 50.70 | 35700-C3 | 56.60 | | |
| .109 (7/64) | .163 | .570 (5x) | 3 | 1/8 | 2-1/2 | 33502 | 48.20 | 33502-C3 | 54.10 | | |
| .109 (7/64) | .163 | .900 (8x) | 3 | 1/8 | 2-1/2 | 34302 | 49.30 | 34302-C3 | 55.20 | | |
| .118 (3 mm) | .177 | .475 (4x) | 3 | 1/8 | 2-1/2 | 844505 | 48.20 | 844505-C3 | 54.10 | | |
| .118 (3 mm) | .177 | .625 (5x) | 3 | 1/8 | 2-1/2 | 33505 | 48.20 | 33505-C3 | 54.10 | | |
| .118 (3 mm) | .177 | .625 (5x) | 4 | 1/8 | 2-1/2 | 803105 | 48.20 | 803105-C3 | 54.10 | | |
| .118 (3 mm) | .177 | .950 (8x) | 3 | 1/8 | 2-1/2 | 34305 | 49.30 | 34305-C3 | 55.20 | | |
| .118 (3 mm) | .177 | 1.187 (10x) | 3 | 1/8 | 2-1/2 | 966105 | 50.70 | 966105-C3 | 56.60 | | |
| .118 (3 mm) | .177 | 1.420 (12x) | 3 | 1/8 | 3 | 35605 | 51.90 | 35605-C3 | 57.80 | | |

| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .187 | .375 (3x) | 3 | 1/8 | 2-1/2 | 978508 | 48.20 | 978508-C3 | 54.10 | 978508-C4 | 63.90 |
| .125 (1/8) | .187 | .375 (3x) | 4 | 1/8 | 2-1/2 | 751908 | 49.00 | 751908-C3 | 54.90 | | |
| .125 (1/8) | .187 | .500 (4x) | 3 | 1/8 | 2-1/2 | 844508 | 48.20 | 844508-C3 | 54.10 | | |
| .125 (1/8) | .187 | .625 (5x) | 3 | 1/8 | 2-1/2 | 33508 | 48.20 | 33508-C3 | 54.10 | 33508-C4 | 63.30 |
| .125 (1/8) | .187 | .625 (5x) | 4 | 1/8 | 2-1/2 | 803208 | 48.20 | 803208-C3 | 54.10 | | |
| .125 (1/8) | .187 | .750 (6x) | 3 | 1/8 | 2-1/2 | 860708 | 48.20 | 860708-C3 | 54.10 | 860708-C4 | 63.30 |
| .125 (1/8) | .187 | .875 (7x) | 3 | 1/8 | 2-1/2 | 868308 | 48.20 | 868308-C3 | 54.10 | | |
| .125 (1/8) | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 34308 | 49.30 | 34308-C3 | 55.20 | 34308-C4 | 64.30 |
| .125 (1/8) | .187 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 801408 | 49.30 | 801408-C3 | 55.20 | | |
| .125 (1/8) | .187 | 1.125 (9x) | 3 | 1/8 | 2-1/2 | 805408 | 52.90 | 805408-C3 | 58.90 | | |
| .125 (1/8) | .187 | 1.250 (10x) | 3 | 1/8 | 2-1/2 | 966108 | 52.90 | 966108-C3 | 58.90 | 966108-C4 | 67.90 |
| .125 (1/8) | .187 | 1.250 (10x) | 4 | 1/8 | 2-1/2 | 769308 | 52.90 | 769308-C3 | 58.90 | | |

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# MINIATURE END MILLS

## Ball – Long Reach, Stub Flute (cont.)

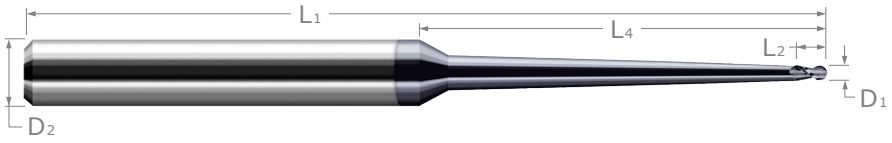


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| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .125 (1/8) | .187 | 1.500 (12x) | 3 | 1/8 | 3 | 35708 | 52.90 | 35708-C3 | 58.90 | 35708-C4 | 67.90 |
| .125 (1/8) | .187 | 1.500 (12x) | 4 | 1/8 | 3 | 768108 | 52.90 | 768108-C3 | 58.90 | | |
| .125 (1/8) | .187 | 1.875 (15x) | 3 | 1/8 | 3 | 49308 | 59.30 | 49308-C3 | 65.20 | 49308-C4 | 74.30 |
| .125 (1/8) | .187 | 2.250 (18x) | 3 | 1/8 | 4 | 970808 | 72.70 | 970808-C3 | 79.00 | 970808-C4 | 89.50 |
| .125 (1/8) | .187 | 2.500 (20x) | 3 | 1/8 | 4 | 59508 | 72.70 | 59508-C3 | 79.00 | 59508-C4 | 89.50 |
| .125 (1/8) | .187 | 3.125 (25x) | 3 | 1/8 | 4 | 959108 | 92.90 | 959108-C3 | 99.20 | **25x Diameter!** | |
| .125 (1/8) | .187 | 3.750 (30x) | 3 | 1/8 | 6 | 922808 | 111.40 | 922808-C3 | 119.40 | **30x Diameter!** | |
| .140 (9/64) | .220 | .750 (5x) | 3 | 3/16 | 3 | 33509 | 53.10 | 33509-C3 | 59.80 | | |
| .140 (9/64) | .220 | 1.125 (8x) | 3 | 3/16 | 3 | 34309 | 54.30 | 34309-C3 | 60.90 | | |
| .140 (9/64) | .220 | 1.450 (10x) | 3 | 3/16 | 3 | 966109 | 57.90 | 966109-C3 | 64.60 | | |
| .156 (5/32) | .234 | .470 (3x) | 3 | 3/16 | 3 | 978510 | 53.10 | 978510-C3 | 59.80 | | |
| .156 (5/32) | .234 | .750 (5x) | 3 | 3/16 | 3 | 33510 | 53.10 | 33510-C3 | 59.80 | | |
| .156 (5/32) | .234 | 1.250 (8x) | 3 | 3/16 | 3 | 34310 | 54.30 | 34310-C3 | 60.90 | 34310-C4 | 72.10 |
| .156 (5/32) | .234 | 1.570 (10x) | 3 | 3/16 | 3 | 966110 | 57.90 | 966110-C3 | 64.60 | | |
| .156 (5/32) | .234 | 1.875 (12x) | 3 | 3/16 | 4 | 35710 | 57.90 | 35710-C3 | 66.70 | | |
| .156 (5/32) | .234 | 2.375 (15x) | 3 | 3/16 | 4 | 49310 | 62.50 | 49310-C3 | 71.30 | | |
| .187 (3/16) | .281 | .570 (3x) | 3 | 3/16 | 3 | 978512 | 53.10 | 978512-C3 | 59.80 | | |
| .187 (3/16) | .281 | 1.000 (5x) | 3 | 3/16 | 3 | 33512 | 53.10 | 33512-C3 | 59.80 | 33512-C4 | 73.90 |
| .187 (3/16) | .281 | 1.000 (5x) | 4 | 3/16 | 3 | 803212 | 53.10 | 803212-C3 | 59.80 | | |
| .187 (3/16) | .281 | 1.156 (6x) | 3 | 3/16 | 3 | 860712 | 54.30 | 860712-C3 | 60.90 | | |
| .187 (3/16) | .281 | 1.312 (7x) | 3 | 3/16 | 3 | 868312 | 54.30 | 868312-C3 | 60.90 | | |
| .187 (3/16) | .281 | 1.500 (8x) | 3 | 3/16 | 3 | 34312 | 54.30 | 34312-C3 | 60.90 | 34312-C4 | 74.90 |
| .187 (3/16) | .281 | 1.500 (8x) | 4 | 3/16 | 3 | 801412 | 54.30 | 801412-C3 | 60.90 | | |
| .187 (3/16) | .281 | 1.875 (10x) | 3 | 3/16 | 4 | 966112 | 57.90 | 966112-C3 | 66.70 | 966112-C4 | 80.00 |
| .187 (3/16) | .281 | 2.250 (12x) | 3 | 3/16 | 4 | 35712 | 57.90 | 35712-C3 | 66.70 | 35712-C4 | 77.00 |
| .187 (3/16) | .281 | 2.812 (15x) | 3 | 3/16 | 4 | 49312 | 61.10 | 49312-C3 | 70.00 | 49312-C4 | 80.20 |
| .187 (3/16) | .281 | 3.375 (18x) | 3 | 3/16 | 6 | 970812 | 84.80 | 970812-C3 | 93.20 | | |
| .187 (3/16) | .281 | 3.750 (20x) | 3 | 3/16 | 6 | 59512 | 88.10 | 59512-C3 | 96.50 | | |
| .218 (7/32) | .330 | 1.125 (5x) | 3 | 1/4 | 4 | 33514 | 61.90 | 33514-C3 | 72.00 | | |
| .218 (7/32) | .330 | 1.750 (8x) | 3 | 1/4 | 4 | 34314 | 62.50 | 34314-C3 | 72.70 | | |
| .250 (1/4) | .375 | .750 (3x) | 3 | 1/4 | 4 | 978516 | 58.60 | 978516-C3 | 68.80 | | |
| .250 (1/4) | .375 | 1.250 (5x) | 3 | 1/4 | 4 | 33516 | 58.60 | 33516-C3 | 68.80 | 33516-C4 | 82.20 |
| .250 (1/4) | .375 | 1.250 (5x) | 4 | 1/4 | 4 | 803216 | 59.80 | 803216-C3 | 70.00 | | |
| .250 (1/4) | .375 | 2.000 (8x) | 3 | 1/4 | 4 | 34316 | 60.10 | 34316-C3 | 70.30 | 34316-C4 | 83.60 |
| .250 (1/4) | .375 | 2.000 (8x) | 4 | 1/4 | 4 | 801416 | 60.10 | 801416-C3 | 70.30 | | |
| .250 (1/4) | .375 | 2.500 (10x) | 3 | 1/4 | 4 | 966116 | 67.10 | 966116-C3 | 77.40 | 966116-C4 | 89.90 |
| .250 (1/4) | .375 | 3.000 (12x) | 3 | 1/4 | 6 | 35716 | 72.10 | 35716-C3 | 83.70 | 35716-C4 | 98.80 |
| .250 (1/4) | .375 | 3.750 (15x) | 3 | 1/4 | 6 | 49316 | 73.90 | 49316-C3 | 85.50 | | |
| .250 (1/4) | .375 | 5.000 (20x) | 3 | 1/4 | 8 | 59516 | 149.40 | 59516-C3 | 166.80 | | |
| .312 (5/16) | .470 | 1.625 (5x) | 3 | 5/16 | 4 | 33520 | 77.50 | 33520-C3 | 87.90 | | |
| .312 (5/16) | .470 | 2.500 (8x) | 3 | 5/16 | 4 | 34320 | 95.70 | 34320-C3 | 106.10 | | |
| .375 (3/8) | .570 | 2.000 (5x) | 3 | 3/8 | 4 | 33524 | 102.50 | 33524-C3 | 114.70 | | |
| .375 (3/8) | .570 | 3.000 (8x) | 3 | 3/8 | 6 | 34324 | 138.20 | 34324-C3 | 156.00 | | |

# MINIATURE END MILLS

## Ball – Tapered Reach (Clearance Cutters)




**Maximum Reach & Maximum Rigidity!**



- Designed for deep cavity profiling
- 2° tapered neck design minimizes deflection and maximizes wall clearance
- Length of cut = 1½ x diameter • Neck behind length of cut is reduced for 1x diameter
- h6 shank tolerance for high precision tool holders • Center cutting
- Solid carbide • CNC ground in the USA

| CUTTER DIA. | LOC | EFFECTIVE OVERALL REACH | EFFECTIVE WALL ANGLE | SHANK DIA. | OAL | INTERFERENCE DEPTH AT WALL ANGLE* | | | UNCOATED | | | AlTiN NANO COATED | | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.020″ −.000″ | $L_4$ +.020″ −.000″ | | $D_2$ (h6) | $L_1$ | 0° | .5° | 1° | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ | 2 FL | USD$ |
| .010 | .015 | 1/2 | 6.6° | 1/8 | 2-1/2 | .054 | .070 | .102 | 29810 | | 84.30 | 29810-C6 | | 93.10 | | |
| .015 | .023 | 1/2 | 6.4° | 1/8 | 2-1/2 | .060 | .080 | .120 | 29815 | 778115 | 83.10 | 29815-C6 | 778115-C6 | 91.90 | 29815-C4 | 98.10 |
| .015 | .023 | 1 | 6.7° | 1/4 | 4 | .060 | .080 | .120 | 17715 | | 99.00 | 17715-C6 | | 111.80 | | |
| .020 | .030 | 1/2 | 6.1° | 1/8 | 2-1/2 | .070 | .095 | .140 | 29820 | | 84.30 | 29820-C6 | | 93.10 | | |
| .020 | .030 | 1 | 6.6° | 1/4 | 4 | .070 | .095 | .140 | 17720 | | 99.00 | 17720-C6 | | 109.50 | | |
| .031 | .047 | 1/2 | 5.5° | 1/8 | 2-1/2 | .115 | .150 | .220 | 29831 | 778131 | 65.00 | 29831-C6 | 778131-C6 | 73.70 | 29831-C4 | 80.00 |
| .031 | .047 | 1 | 6.3° | 1/4 | 4 | .115 | .150 | .220 | 17731 | 777231 | 81.40 | 17731-C6 | 777231-C6 | 94.40 | 17731-C4 | 104.20 |
| .031 | .047 | 1-1/2 | 4.2° | 1/4 | 4 | .115 | .150 | .220 | 24831 | 776231 | 87.70 | 24831-C6 | 776231-C6 | 100.60 | 24831-C4 | 110.50 |
| .031 | .047 | 2 | 3.2° | 1/4 | 4 | .115 | .150 | .220 | 18831 | 775231 | 100.20 | 18831-C6 | 775231-C6 | 110.70 | 18831-C4 | 123.90 |
| .039 | .059 | 1/2 | 5.1° | 1/8 | 2-1/2 | .150 | .195 | .285 | 29839 | | 65.80 | 29839-C6 | | 74.60 | | |
| .039 | .059 | 1 | 6.1° | 1/4 | 4 | .150 | .195 | .285 | 17739 | | 81.40 | 17739-C6 | | 91.90 | | |
| .047 | .071 | 1/2 | 4.7° | 1/8 | 2-1/2 | .180 | .235 | .350 | 29847 | 778147 | 65.00 | 29847-C6 | 778147-C6 | 73.70 | 29847-C4 | 80.80 |
| .047 | .071 | 1 | 5.9° | 1/4 | 4 | .180 | .235 | .350 | 17747 | 777247 | 81.40 | 17747-C6 | 777247-C6 | 94.40 | 17747-C4 | 104.20 |
| .047 | .071 | 1-1/2 | 3.9° | 1/4 | 4 | .180 | .235 | .350 | 24847 | | 87.70 | 24847-C6 | | 100.60 | 24847-C4 | 110.50 |
| .047 | .071 | 2 | 2.9° | 1/4 | 4 | .180 | .235 | .350 | 18847 | | 100.20 | 18847-C6 | | 113.20 | 18847-C4 | 123.00 |
| .062 | .093 | 1/2 | 3.8° | 1/8 | 2-1/2 | .220 | .285 | .370 | 29862 | 778162 | 62.90 | 29862-C6 | 778162-C6 | 71.70 | 29862-C4 | 77.90 |
| .062 | .093 | 1 | 5.5° | 1/4 | 4 | .220 | .285 | .415 | 17762 | 777262 | 78.90 | 17762-C6 | 777262-C6 | 91.80 | 17762-C4 | 102.50 |
| .062 | .093 | 1-1/2 | 3.7° | 1/4 | 4 | .220 | .285 | .415 | 24862 | 776262 | 84.60 | 24862-C6 | 776262-C6 | 97.50 | 24862-C4 | 108.20 |
| .062 | .093 | 2 | 2.7° | 1/4 | 4 | .220 | .285 | .415 | 18862 | 775262 | 97.70 | 18862-C6 | 775262-C6 | 110.70 | 18862-C4 | 121.50 |
| .062 | .093 | 2-1/2 | 2.2° | 1/4 | 4 | .220 | .285 | .415 | 21362 | | 100.10 | 21362-C6 | | 110.50 | | |
| .078 | .118 | 1 | 5.1° | 1/4 | 4 | .305 | .395 | .575 | 17778 | 777278 | 78.90 | 17778-C6 | 777278-C6 | 89.40 | 17778-C4 | 101.70 |
| .078 | .118 | 1-1/2 | 3.4° | 1/4 | 4 | .305 | .395 | .575 | 24878 | | 84.60 | 24878-C6 | | 97.50 | 24878-C4 | 107.40 |
| .078 | .118 | 2 | 2.5° | 1/4 | 4 | .305 | .395 | .575 | 18878 | | 97.70 | 18878-C6 | | 110.70 | 18878-C4 | 120.50 |
| .093 | .140 | 1 | 4.7° | 1/4 | 4 | .340 | .440 | .640 | 17793 | 777293 | 79.90 | 17793-C6 | 777293-C6 | 92.70 | 17793-C4 | 102.80 |
| .093 | .140 | 1-1/2 | 3.1° | 1/4 | 4 | .340 | .440 | .640 | 24893 | 776293 | 84.60 | 24893-C6 | 776293-C6 | 97.50 | 24893-C4 | 108.20 |
| .093 | .140 | 2 | 2.3° | 1/4 | 4 | .340 | .440 | .640 | 18893 | 775293 | 95.20 | 18893-C6 | 775293-C6 | 105.70 | 18893-C4 | 118.00 |
| .118 | .177 | 1 | 4.0° | 1/4 | 4 | .438 | .565 | .756 | 17805 | | 80.70 | 17805-C6 | | 91.10 | | |
| .118 | .177 | 1-1/2 | 2.6° | 1/4 | 4 | .438 | .565 | .818 | 24905 | | 85.40 | 24905-C6 | | 95.90 | | |
| .125 | .188 | 1 | 3.8° | 1/4 | 4 | .450 | .580 | .750 | 17808 | 777308 | 79.90 | 17808-C6 | 777308-C6 | 92.70 | 17808-C4 | 103.40 |
| .125 | .188 | 1-1/2 | 2.5° | 1/4 | 4 | .450 | .580 | .840 | 24908 | 776308 | 84.60 | 24908-C6 | 776308-C6 | 97.50 | 24908-C4 | 108.20 |
| .125 | .188 | 2 | 1.8° | 1/4 | 4 | .450 | .580 | .840 | 18908 | 775308 | 95.20 | 18908-C6 | 775308-C6 | 108.10 | 18908-C4 | 118.90 |
| .125 | .188 | 2-1/2 | 2.2° | 5/16 | 4 | .450 | .580 | .840 | 21408 | 734408 | 99.90 | 21408-C6 | 734408-C6 | 114.40 | | |

*Values are approximate and may vary due to tolerancing. †Tapered neck angle is 1.85°.

continued on next page

For detailed interference charts with more angles, scan the QR code or visit www.harveytool.com/resources

# MINIATURE END MILLS

## Ball – Tapered Reach (Clearance Cutters) (cont.)

continued from previous page

| CUTTER DIA. | LOC | EFFECTIVE OVERALL REACH | WALL ANGLE | SHANK DIA. | OAL | INTERFERENCE DEPTH AT WALL ANGLE* | | | UNCOATED | | | AlTiN NANO COATED | | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.020″ −.000″ | $L_4$ +.020″ −.000″ | | $D_2$ (h6) | $L_1$ | 0° | .5° | 1° | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ | 2 FL | USD$ |
| .140 | .211 | 1-1/2 | 2.2° | 1/4 | 4 | .495 | .636 | .919 | 24909 | | 85.10 | 24909-C6 | | 95.60 | | |
| .140 | .211 | 2 | 1.6° | 1/4 | 4 | .495 | .636 | .919 | 18909 | | 95.20 | 18909-C6 | | 105.70 | | |
| .156 | .234 | 1 | 2.9° | 1/4 | 4 | .525 | .680 | .775 | 17810 | | 79.90 | 17810-C6 | | 92.70 | 17810-C4 | 102.80 |
| .156 | .234 | 1-1/2 | 1.9° | 1/4 | 4 | .525 | .680 | .980 | 24910 | | 84.60 | 24910-C6 | | 97.50 | 24910-C4 | 107.40 |
| .156 | .234 | 2 | 1.4° | 1/4 | 4 | .540 | .710 | 1.085 | 18910† | 775310† | 95.20 | 18910-C6† | 775310-C6† | 105.70 | 18910-C4† | 118.00 |
| .187 | .281 | 1-1/2 | 1.3° | 1/4 | 4 | .605 | .775 | 1.120 | 24912 | 776312 | 86.80 | 24912-C6 | 776312-C6 | 99.70 | 24912-C4 | 109.60 |
| .187 | .281 | 2 | 2.7° | 3/8 | 4 | .605 | .775 | 1.120 | 18912 | 775312 | 127.80 | 18912-C6 | 775312-C6 | 142.40 | 18912-C4 | 156.40 |
| .187 | .281 | 2-1/2 | 2.2° | 3/8 | 4 | .605 | .775 | 1.120 | 21412 | 734512 | 132.00 | 21412-C6 | 734512-C6 | 147.10 | | |
| .250 | .375 | 1-1/2 | 2.6° | 3/8 | 4 | .760 | .975 | 1.260 | 24916 | 776316 | 111.40 | 24916-C6 | 776316-C6 | 125.90 | 24916-C4 | 140.70 |
| .250 | .375 | 2 | 1.8° | 3/8 | 4 | .760 | .975 | 1.405 | 18916 | 775316 | 127.80 | 18916-C6 | 775316-C6 | 142.40 | 18916-C4 | 156.40 |
| .250 | .375 | 2-1/2 | 1.5° | 3/8 | 4 | .760 | .975 | 1.405 | 21416 | | 132.00 | 21416-C6 | | 146.60 | | |
| .312 | .468 | 2 | 2.7° | 1/2 | 4 | .915 | 1.170 | 1.685 | 18920 | | 173.20 | 18920-C6 | | 193.60 | 18920-C4 | 217.70 |
| .375 | .563 | 2 | 1.8° | 1/2 | 4 | 1.075 | 1.370 | 1.770 | 18924 | | 173.20 | 18924-C6 | | 193.60 | 18924-C4 | 207.50 |

*Values are approximate and may vary due to tolerancing. †Tapered neck angle is 1.85°.

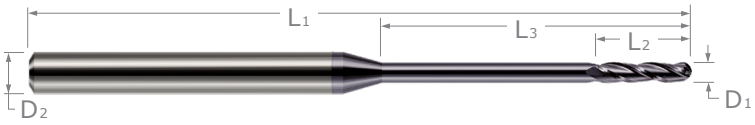


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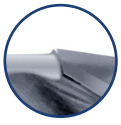
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# MINIATURE END MILLS

## Ball – Long Reach, Long Flute




- **Long length design for deep cavities**
- Long flutes for deep pocket milling
- Length of cut > 5x diameter
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

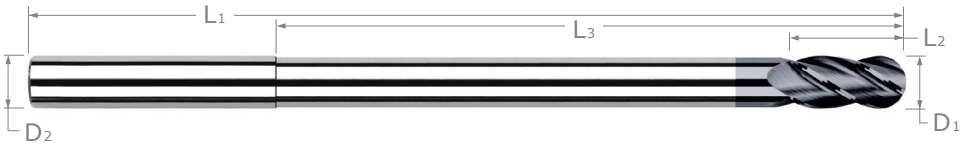


| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| .010 | .050 | .100 (10x) | 1/8 | 2-1/2 | 13810 | 74.90 | 13810-C3 | 80.90 | 10210 | 89.90 |
| .012 | .060 | .120 (10x) | 1/8 | 2-1/2 | 13812 | 72.30 | 13812-C3 | 78.30 | | |
| .015 (1/64) | .075 | .150 (10x) | 1/8 | 2-1/2 | 13815 | 63.80 | 13815-C3 | 69.80 | 10215 | 79.00 |
| .020 (.5 mm) | .100 | .200 (10x) | 1/8 | 2-1/2 | 13820 | 62.10 | 13820-C3 | 68.00 | 10220 | 77.20 |
| .025 | .125 | .250 (10x) | 1/8 | 2-1/2 | 13825 | 53.60 | 13825-C3 | 59.50 | 10225 | 69.30 |
| .030 | .150 | .300 (10x) | 1/8 | 2-1/2 | 13830 | 53.60 | 13830-C3 | 59.50 | 10230 | 69.30 |
| .031 (1/32) | .155 | .250 (8x) | 1/8 | 2-1/2 | 750431 | 52.30 | 750431-C3 | 58.20 | | |
| .031 (1/32) | .155 | .310 (10x) | 1/8 | 2-1/2 | 13831 | 53.60 | 13831-C3 | 59.50 | 10231 | 69.00 |
| .031 (1/32) | .155 | .470 (15x) | 1/8 | 2-1/2 | 724031 | 53.60 | 724031-C3 | 59.50 | | |
| .035 (.9 mm) | .175 | .350 (10x) | 1/8 | 2-1/2 | 13835 | 54.00 | 13835-C3 | 59.90 | 10235 | 69.80 |
| .040 | .200 | .400 (10x) | 1/8 | 2-1/2 | 13840 | 53.60 | 13840-C3 | 59.50 | 10240 | 69.00 |
| .045 | .225 | .450 (10x) | 1/8 | 2-1/2 | 13845 | 52.30 | 13845-C3 | 58.20 | 10245 | 67.80 |
| .047 (3/64) | .250 | .500 (10x) | 1/8 | 2-1/2 | 13847 | 52.30 | 13847-C3 | 58.20 | 10247 | 67.80 |
| .050 | .300 | .600 (12x) | 1/8 | 2-1/2 | 13850 | 52.30 | 13850-C3 | 58.20 | 10250 | 68.10 |
| .055 (1.4 mm) | .385 | .770 (14x) | 1/8 | 2-1/2 | 13855 | 52.30 | 13855-C3 | 58.20 | 10255 | 68.10 |
| .060 | .500 | 1.000 (16x) | 1/8 | 2-1/2 | 13860 | 53.50 | 13860-C3 | 59.40 | 10260 | 69.20 |
| .062 (1/16) | .312 | .500 (8x) | 1/8 | 2-1/2 | 750462 | 51.00 | 750462-C3 | 56.90 | | |
| .062 (1/16) | .500 | .625 (10x) | 1/8 | 2-1/2 | 803562 | 52.30 | 803562-C3 | 58.20 | 803362 | 67.80 |
| .062 (1/16) | .500 | 1.000 (16x) | 1/8 | 2-1/2 | 13862 | 53.50 | 13862-C3 | 59.40 | 10262 | 68.90 |
| .065 | .500 | 1.000 (15x) | 1/8 | 2-1/2 | 13865 | 52.80 | 13865-C3 | 58.80 | 10265 | 68.60 |
| .070 | .500 | 1.000 (14x) | 1/8 | 2-1/2 | 13870 | 52.30 | 13870-C3 | 58.20 | 10270 | 68.10 |
| .075 | .500 | 1.000 (13x) | 1/8 | 2-1/2 | 13875 | 52.30 | 13875-C3 | 58.20 | 10275 | 68.10 |
| .078 (5/64) | .500 | 1.000 (12x) | 1/8 | 2-1/2 | 13878 | 52.30 | 13878-C3 | 58.20 | 10278 | 68.10 |
| .080 | .750 | 1.250 (15x) | 1/8 | 2-1/2 | 13880 | 52.30 | 13880-C3 | 58.20 | 10280 | 68.10 |
| .085 | .750 | 1.250 (14x) | 1/8 | 2-1/2 | 13885 | 52.30 | 13885-C3 | 58.20 | 10285 | 68.10 |
| .090 | .750 | 1.250 (13x) | 1/8 | 2-1/2 | 13890 | 52.80 | 13890-C3 | 58.80 | 10290 | 68.60 |
| .093 (3/32) | .500 | .750 (8x) | 1/8 | 2-1/2 | 750493 | 51.00 | 750493-C3 | 56.90 | | |
| .093 (3/32) | .750 | 1.250 (13x) | 1/8 | 2-1/2 | 13893 | 52.30 | 13893-C3 | 58.20 | 10293 | 68.10 |
| .095 | .750 | 1.250 (13x) | 1/8 | 2-1/2 | 13895 | 52.30 | 13895-C3 | 58.20 | 10295 | 68.10 |
| .100 | .750 | 1.250 (12x) | 1/8 | 2-1/2 | 14800 | 52.30 | 14800-C3 | 58.20 | 10300 | 67.80 |

| $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | $L_3$ +.020″ −.000″ | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | 1.000 | 1.500 (12x) | 1/8 | 2-1/2 | 14808 | 52.30 | 14808-C3 | 58.20 | 10308 | 67.80 |
| .187 (3/16) | 1.125 | 1.625 (8x) | 3/16 | 3 | 14812 | 56.60 | 14812-C3 | 63.20 | 10312 | 77.40 |
| .250 (1/4) | 1.500 | 2.000 (8x) | 1/4 | 4 | 14816 | 63.40 | 14816-C3 | 70.40 | 10316 | 86.30 |

# MINIATURE END MILLS

## Ball – Extra Long Length



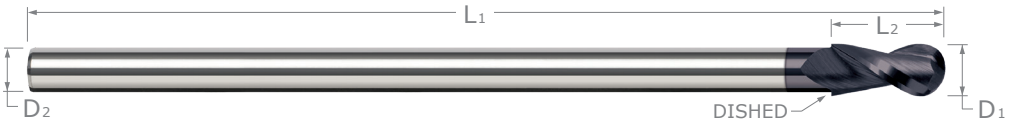

- **Up to 8" overall length**
- Longest overall length carbide end mill available in stock
- Extended reach
- 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA



| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | ALTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000" −.002" | $L_2$ +.030" −.000" | $L_3$ +.030" −.000" | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .250 (1/4) | .375 | **4.375** (17.5x) | 1/4 | 6 | 14916 | 114.50 | 14916-C3 | 126.10 |
| .312 (5/16) | .470 | **4.343** (14x) | 5/16 | 6 | 14920 | 138.40 | 14920-C3 | 155.80 |
| .375 (3/8) | .562 | **4.312** (11.5x) | 3/8 | 6 | 14924 | 156.90 | 14924-C3 | 174.90 |
| .500 (1/2) | .750 | **5.750** (11.5x) | 1/2 | 8 | 14932 | 273.30 | 14932-C3 | 308.90 |
| .625 (5/8) | .937 | **5.687** (9x) | 5/8 | 8 | 14940 | 461.90 | | |
| .750 (3/4) | 1.125 | **5.625** (7.5x) | 3/4 | 8 | 14948 | 555.20 | | |

# MINIATURE END MILLS

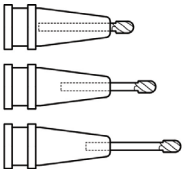
## Ball – Reduced Shank






- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Length of cut = 1½x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

**Chuck at Any Depth!**



| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| **1/8** | 3/16 | 2 | **3 mm** | 2-1/2 | 24708 | 114.50 | 24708-C3 | 120.40 |
| **1/8** | 3/16 | 4 | **3 mm** | 2-1/2 | 804208 | 118.50 | 804208-C3 | 124.50 |
| **5/32** | 15/64 | 2 | **1/8** | 2-1/2 | 24710 | 114.50 | 24710-C3 | 121.10 |
| **3/16** | 9/32 | 2 | **1/8** | 2-1/2 | 24712 | 115.50 | 24712-C3 | 122.20 |
| **3/16** | 9/32 | 2 | **5/32** | 2-1/2 | 24713 | 118.20 | 24713-C3 | 124.90 |
| **3/16** | 9/32 | 4 | **5/32** | 2-1/2 | 804212 | 123.50 | 804212-C3 | 130.20 |
| **1/4** | 3/8 | 2 | **3/16** | 3 | 24716 | 124.00 | 24716-C3 | 132.80 |
| **1/4** | 3/8 | 4 | **3/16** | 3 | 804216 | 128.40 | 804216-C3 | 136.50 |
| **5/16** | 15/32 | 2 | **1/4** | 4 | 24720 | 152.40 | 24720-C3 | 162.80 |
| **3/8** | 9/16 | 2 | **5/16** | 4 | 24724 | 180.00 | 24724-C3 | 195.90 |
| **7/16** | 21/32 | 2 | **3/8** | 6 | 24728 | 267.90 | 24728-C3 | 284.40 |
| **1/2** | 3/4 | 2 | **7/16** | 6 | 24732 | 279.90 | 24732-C3 | 299.40 |
| **5/8** | 15/16 | 2 | **1/2** | 6 | 24740 | 363.00 | 24740-C3 | 385.40 |
| **3/4** | 1-1/8 | 2 | **5/8** | 6 | 24748 | 448.60 | 24748-C3 | 475.40 |

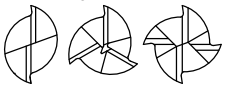
**For Square Reduced Shank, please see page 48.**
**For Corner Radius Reduced Shank, please see page 102.**

NEW SIZES!

# MINIATURE END MILLS

## Corner Radius – Stub & Standard







- Corner radius for improved strength
- Center cutting
- Solid carbide
- CNC ground in the USA

| | CUTTER DIA. | CORNER RADIUS | LOC | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0005″ −.0005″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 3 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| | .008 | .002 | .012 (1.5x) | 1/8 | 1-1/2 | | | 856008 | 59.30 | | 856008-C3 | 65.20 | | | |
| | .008 | .002 | .024 (3x) | 1/8 | 1-1/2 | | | 854208 | 59.30 | | 854208-C3 | 65.20 | | | |
| | .010 | .003 | .015 (1.5x) | 1/8 | 1-1/2 | | | 987510 | 53.40 | | 987510-C3 | 59.30 | | | |
| | .010 | .003 | .030 (3x) | 1/8 | 1-1/2 | | | 47210 | 53.40 | | 47210-C3 | 59.30 | | | |
| | .012 | .003 | .018 (1.5x) | 1/8 | 1-1/2 | | | 987512 | 54.40 | | 987512-C3 | 60.30 | | | |
| | .012 | .003 | .036 (3x) | 1/8 | 1-1/2 | | | 47212 | 54.40 | | 47212-C3 | 60.30 | | | |
| | .015 (1/64) | .003 | .023 (1.5x) | 1/8 | 1-1/2 | | | 987515 | 53.40 | | 987515-C3 | 59.30 | | | |
| | .015 (1/64) | .003 | .045 (3x) | 1/8 | 1-1/2 | 45415 | | 47215 | 53.40 | | 47215-C3 | 59.30 | | 47215-C4 | 68.30 |
| | .015 (1/64) | .005 | .023 (1.5x) | 1/8 | 1-1/2 | | | 993815 | 53.40 | | 993815-C3 | 59.30 | | | |
| | .015 (1/64) | .005 | .045 (3x) | 1/8 | 1-1/2 | 44715 | | 26315 | 53.40 | | 26315-C3 | 59.30 | | | |
| | .018 | .005 | .027 (1.5x) | 1/8 | 1-1/2 | | | 993818 | 53.40 | | 993818-C3 | 59.30 | | | |
| | .018 | .005 | .054 (3x) | 1/8 | 1-1/2 | | | 26318 | 53.40 | | 26318-C3 | 59.30 | | | |
| | .020 (.5 mm) | .003 | .030 (1.5x) | 1/8 | 1-1/2 | | | 987520 | 51.10 | | 987520-C3 | 57.00 | | | |
| | .020 (.5 mm) | .003 | .060 (3x) | 1/8 | 1-1/2 | | | 47220 | 51.10 | | 47220-C3 | 57.00 | | | |
| NEW | .020 (.5 mm) | .005 | .016 (0.8x) | 1/8 | 1-1/2 | | | 720420 | 52.00 | | 720420-C3 | 57.90 | | | |
| | .020 (.5 mm) | .005 | .030 (1.5x) | 1/8 | 1-1/2 | | | 993820 | 51.10 | | 993820-C3 | 57.00 | | | |
| | .020 (.5 mm) | .005 | .060 (3x) | 1/8 | 1-1/2 | 44720 | 848320 | 26320 | 51.10 | 848320-C3 | 26320-C3 | 57.00 | | 26320-C4 | 66.00 |
| | .022 | .005 | .066 (3x) | 1/8 | 1-1/2 | | | 26322 | 46.50 | | 26322-C3 | 52.40 | | | |
| | .024 (.6 mm) | .005 | .072 (3x) | 1/8 | 1-1/2 | | | 26324 | 46.50 | | 26324-C3 | 52.40 | | | |
| | .025 | .003 | .038 (1.5x) | 1/8 | 1-1/2 | | | 987525 | 46.50 | | 987525-C3 | 52.40 | | | |
| | .025 | .003 | .075 (3x) | 1/8 | 1-1/2 | | | 47225 | 46.50 | | 47225-C3 | 52.40 | | | |
| NEW | .025 | .005 | .020 (0.8x) | 1/8 | 1-1/2 | | | 720425 | 48.10 | | 720425-C3 | 54.00 | | | |
| | .025 | .005 | .038 (1.5x) | 1/8 | 1-1/2 | | | 993825 | 46.50 | | 993825-C3 | 52.40 | | | |
| | .025 | .005 | .075 (3x) | 1/8 | 1-1/2 | 44725 | | 26325 | 46.50 | | 26325-C3 | 52.40 | | 26325-C4 | 61.40 |
| | .025 | .008 | .038 (1.5x) | 1/8 | 1-1/2 | | | 994525 | 46.50 | | 994525-C3 | 52.40 | | | |
| | .025 | .008 | .075 (3x) | 1/8 | 1-1/2 | | | 953025 | 46.50 | | 953025-C3 | 52.40 | | | |
| | .028 (.7mm) | .005 | .084 (3x) | 1/8 | 1-1/2 | | | 26328 | 43.10 | | 26328-C3 | 49.00 | | | |
| | .030 | .003 | .090 (3x) | 1/8 | 1-1/2 | | | 47230 | 43.10 | | 47230-C3 | 49.00 | | | |
| | .030 | .005 | .045 (1.5x) | 1/8 | 1-1/2 | | | 993830 | 43.10 | | 993830-C3 | 49.00 | | | |
| | .030 | .005 | .090 (3x) | 1/8 | 1-1/2 | 44730 | | 26330 | 43.10 | | 26330-C3 | 49.00 | | 26330-C4 | 58.00 |
| | .030 | .008 | .090 (3x) | 1/8 | 1-1/2 | | | 953030 | 43.10 | | 953030-C3 | 49.00 | | | |
| | .030 | .010 | .045 (1.5x) | 1/8 | 1-1/2 | | | 994530 | 43.10 | | 994530-C3 | 49.00 | | | |
| | .030 | .010 | .090 (3x) | 1/8 | 1-1/2 | 45230 | | 27230 | 43.10 | | 27230-C3 | 49.00 | | 27230-C4 | 58.00 |
| | .031 (1/32) | .003 | .047 (1.5x) | 1/8 | 1-1/2 | | | 987531 | 43.10 | | 987531-C3 | 49.00 | | | |
| | .031 (1/32) | .003 | .093 (3x) | 1/8 | 1-1/2 | | | 47231 | 43.10 | | 47231-C3 | 49.00 | | 47231-C4 | 58.00 |
| | .031 (1/32) | .005 | .025 (0.8x) | 1/8 | 1-1/2 | | | 720431 | 44.60 | | 720431-C3 | 50.60 | | | |
| | .031 (1/32) | .005 | .047 (1.5x) | 1/8 | 1-1/2 | | | 993831 | 43.10 | | 993831-C3 | 49.00 | | | |
| | .031 (1/32) | .005 | .093 (3x) | 1/8 | 1-1/2 | 44731 | 848331 | 26331 | 43.10 | 848331-C3 | 26331-C3 | 49.00 | 44731-C4 | 26331-C4 | 58.00 |
| | .031 (1/32) | .008 | .047 (1.5x) | 1/8 | 1-1/2 | | | 913731 | 43.10 | | 913731-C3 | 49.00 | | | |
| | .031 (1/32) | .008 | .093 (3x) | 1/8 | 1-1/2 | | | 953031 | 43.10 | | 953031-C3 | 49.00 | | | |
| | .031 (1/32) | .010 | .025 (0.8x) | 1/8 | 1-1/2 | | | 720331 | 44.60 | | 720331-C3 | 50.60 | | | |
| | .031 (1/32) | .010 | .047 (1.5x) | 1/8 | 1-1/2 | | | 994531 | 43.10 | | 994531-C3 | 49.00 | | | |
| | .031 (1/32) | .010 | .093 (3x) | 1/8 | 1-1/2 | 45231 | 854131 | 27231 | 43.10 | 854131-C3 | 27231-C3 | 49.00 | | 27231-C4 | 58.00 |

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NEW SIZES!

# MINIATURE END MILLS

## Corner Radius – Stub & Standard (cont.)

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| CUTTER DIA. | CORNER RADIUS | LOC | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | AMORPHOUS DIAMOND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005"}_{-.0005"}$ | R $^{+.001"}_{-.001"}$ | $L_2$ $^{+.010"}_{-.000"}$ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 3 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ | |
| .034 | .005 | .102 (3x) | 1/8 | 1-1/2 | | | 26334 | 36.10 | | 26334-C3 | 42.00 | | | | |
| .035 (.9 mm) | .005 | .053 (1.5x) | 1/8 | 1-1/2 | | | 993835 | 36.10 | | 993835-C3 | 42.00 | | | | |
| .035 (.9 mm) | .005 | .105 (3x) | 1/8 | 1-1/2 | 44735 | | 26335 | 36.10 | | 26335-C3 | 42.00 | | 26335-C4 | 51.10 | |
| .035 (.9 mm) | .010 | .053 (1.5x) | 1/8 | 1-1/2 | | | 994535 | 36.10 | | 994535-C3 | 42.00 | | | | |
| .035 (.9 mm) | .010 | .105 (3x) | 1/8 | 1-1/2 | 45235 | | 27235 | 36.10 | | 27235-C3 | 42.00 | | 27235-C4 | 51.10 | |
| .037 | .005 | .111 (3x) | 1/8 | 1-1/2 | | | 26337 | 36.10 | | 26337-C3 | 42.00 | | | | |
| .039 (1 mm) | .003 | .059 (1.5x) | 1/8 | 1-1/2 | | | 987539 | 28.00 | | 987539-C3 | 33.90 | | | | |
| .039 (1 mm) | .003 | .117 (3x) | 1/8 | 1-1/2 | | | 47239 | 28.00 | | 47239-C3 | 33.90 | | | | |
| .039 (1 mm) | .005 | .031 (0.8x) | 1/8 | 1-1/2 | | | 720439 | 29.60 | | 720439-C3 | 35.50 | | | | NEW |
| .039 (1 mm) | .005 | .059 (1.5x) | 1/8 | 1-1/2 | 804539 | | 993839 | 28.00 | | 993839-C3 | 33.90 | | | | |
| .039 (1 mm) | .005 | .117 (3x) | 1/8 | 1-1/2 | 44739 | | 26339 | 28.00 | | 26339-C3 | 33.90 | | | | |
| .039 (1 mm) | .008 | .059 (1.5x) | 1/8 | 1-1/2 | | | 913739 | 28.00 | | 913739-C3 | 33.90 | | | | |
| .039 (1 mm) | .008 | .117 (3x) | 1/8 | 1-1/2 | | | 953039 | 28.00 | | 953039-C3 | 33.90 | | | | |
| .039 (1 mm) | .010 | .059 (1.5x) | 1/8 | 1-1/2 | | | 994539 | 28.00 | | 994539-C3 | 33.90 | | | | |
| .039 (1 mm) | .010 | .117 (3x) | 1/8 | 1-1/2 | | | 27239 | 28.00 | | 27239-C3 | 33.90 | | | | |
| .040 | .003 | .120 (3x) | 1/8 | 1-1/2 | | | 47240 | 27.50 | | 47240-C3 | 33.40 | | | | |
| .040 | .005 | .032 (0.8x) | 1/8 | 1-1/2 | | | 720440 | 29.10 | | 720440-C3 | 35.00 | | | | NEW |
| .040 | .005 | .060 (1.5x) | 1/8 | 1-1/2 | 804540 | 865140 | 993840 | 27.50 | 865140-C3 | 993840-C3 | 33.40 | | | | |
| .040 | .005 | .120 (3x) | 1/8 | 1-1/2 | 44740 | 848340 | 26340 | 27.50 | 848340-C3 | 26340-C3 | 33.40 | | 26340-C4 | 42.50 | |
| .040 | .008 | .120 (3x) | 1/8 | 1-1/2 | | | 953040 | 27.50 | | 953040-C3 | 33.40 | | | | |
| .040 | .010 | .060 (1.5x) | 1/8 | 1-1/2 | | | 994540 | 27.50 | | 994540-C3 | 33.40 | | | | |
| .040 | .010 | .120 (3x) | 1/8 | 1-1/2 | 45240 | | 27240 | 27.50 | | 27240-C3 | 33.40 | | 27240-C4 | 42.50 | |
| .045 | .005 | .068 (1.5x) | 1/8 | 1-1/2 | | | 993845 | 27.50 | | 993845-C3 | 33.40 | | | | |
| .045 | .005 | .135 (3x) | 1/8 | 1-1/2 | 44745 | | 26345 | 27.50 | | 26345-C3 | 33.40 | | 26345-C4 | 42.50 | |
| .045 | .010 | .068 (1.5x) | 1/8 | 1-1/2 | | | 994545 | 27.50 | | 994545-C3 | 33.40 | | | | |
| .045 | .010 | .135 (3x) | 1/8 | 1-1/2 | 45245 | | 27245 | 27.50 | | 27245-C3 | 33.40 | | 27245-C4 | 42.50 | |
| .045 | .015 | .068 (1.5x) | 1/8 | 1-1/2 | | | 997945 | 27.50 | | 997945-C3 | 33.40 | | | | |
| .045 | .015 | .135 (3x) | 1/8 | 1-1/2 | 45545 | | 28145 | 27.50 | | 28145-C3 | 33.40 | | 28145-C4 | 42.50 | |
| .046 | .005 | .138 (3x) | 1/8 | 1-1/2 | | | 26346 | 27.50 | | 26346-C3 | 33.40 | | | | |
| .047 (3/64) | .003 | .071 (1.5x) | 1/8 | 1-1/2 | | | 987547 | 27.50 | | 987547-C3 | 33.40 | | | | |
| .047 (3/64) | .003 | .141 (3x) | 1/8 | 1-1/2 | | | 47247 | 27.50 | | 47247-C3 | 33.40 | | | | |
| .047 (3/64) | .005 | .038 (0.8x) | 1/8 | 1-1/2 | | | 720447 | 29.10 | | 720447-C3 | 35.00 | | | | NEW |
| .047 (3/64) | .005 | .071 (1.5x) | 1/8 | 1-1/2 | 804547 | 865147 | 993847 | 27.50 | 865147-C3 | 993847-C3 | 33.40 | | | | |
| .047 (3/64) | .005 | .141 (3x) | 1/8 | 1-1/2 | 44747 | 848347 | 26347 | 27.50 | 848347-C3 | 26347-C3 | 33.40 | | 26347-C4 | 42.50 | |
| .047 (3/64) | .008 | .071 (1.5x) | 1/8 | 1-1/2 | | | 913747 | 27.50 | | 913747-C3 | 33.40 | | | | |
| .047 (3/64) | .008 | .141 (3x) | 1/8 | 1-1/2 | | | 953047 | 27.50 | | 953047-C3 | 33.40 | | | | |
| .047 (3/64) | .010 | .071 (1.5x) | 1/8 | 1-1/2 | | | 994547 | 27.50 | | 994547-C3 | 33.40 | | | | |
| .047 (3/64) | .010 | .141 (3x) | 1/8 | 1-1/2 | 45247 | 854147 | 27247 | 27.50 | 854147-C3 | 27247-C3 | 33.40 | | 27247-C4 | 42.50 | NEW |
| .047 (3/64) | .012 | .141 (3x) | 1/8 | 1-1/2 | | | 966947 | 27.50 | | 966947-C3 | 33.40 | | | | |
| .047 (3/64) | .015 | .071 (1.5x) | 1/8 | 1-1/2 | 830147 | 860847 | 997947 | 27.50 | 860847-C3 | 997947-C3 | 33.40 | | | | |
| .047 (3/64) | .015 | .141 (3x) | 1/8 | 1-1/2 | 45547 | 867247 | 28147 | 27.50 | 867247-C3 | 28147-C3 | 33.40 | | 28147-C4 | 42.50 | |

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# MINIATURE END MILLS

## Corner Radius – Stub & Standard (cont.)

continued from previous page

| | CUTTER DIA. | CORNER RADIUS | LOC | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0005″ −.0005″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 3 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| | .050 | .003 | .150 (3x) | 1/8 | 1-1/2 | | | 47250 | 27.50 | | 47250-C3 | 33.40 | | | |
| | .050 | .005 | .075 (1.5x) | 1/8 | 1-1/2 | | | 993850 | 27.50 | | 993850-C3 | 33.40 | | | |
| | .050 | .005 | .150 (3x) | 1/8 | 1-1/2 | 44750 | 848350 | 26350 | 27.50 | 848350-C3 | 26350-C3 | 33.40 | | 26350-C4 | 42.50 |
| | .050 | .008 | .075 (1.5x) | 1/8 | 1-1/2 | | | 913750 | 28.10 | | 913750-C3 | 34.00 | | | |
| | .050 | .008 | .150 (3x) | 1/8 | 1-1/2 | | | 953050 | 27.50 | | 953050-C3 | 33.40 | | | |
| NEW | .050 | .010 | .040 (0.8x) | 1/8 | 1-1/2 | | | 720350 | 29.10 | | 720350-C3 | 35.00 | | | |
| | .050 | .010 | .075 (1.5x) | 1/8 | 1-1/2 | | | 994550 | 27.50 | | 994550-C3 | 33.40 | | | |
| | .050 | .010 | .150 (3x) | 1/8 | 1-1/2 | 45250 | | 27250 | 27.50 | | 27250-C3 | 33.40 | | 27250-C4 | 42.50 |
| | .050 | .012 | .150 (3x) | 1/8 | 1-1/2 | | | 966950 | 28.10 | | 966950-C3 | 34.00 | | | |
| | .050 | .015 | .075 (1.5x) | 1/8 | 1-1/2 | | | 997950 | 27.50 | | 997950-C3 | 33.40 | | | |
| | .050 | .015 | .150 (3x) | 1/8 | 1-1/2 | 45550 | | 28150 | 27.50 | | 28150-C3 | 33.40 | | 28150-C4 | 42.50 |
| | .055 (1.4 mm) | .003 | .165 (3x) | 1/8 | 1-1/2 | | | 47255 | 27.50 | | 47255-C3 | 33.40 | | | |
| NEW | .055 (1.4 mm) | .005 | .044 (0.8x) | 1/8 | 1-1/2 | | | 720455 | 29.10 | | 720455-C3 | 35.00 | | | |
| NEW | .055 (1.4 mm) | .005 | .083 (1.5x) | 1/8 | 1-1/2 | 804555 | | 993855 | 27.50 | | 993855-C3 | 33.40 | | | |
| | .055 (1.4 mm) | .005 | .165 (3x) | 1/8 | 1-1/2 | 44755 | | 26355 | 27.50 | | 26355-C3 | 33.40 | | 26355-C4 | 42.50 |
| | .055 (1.4 mm) | .008 | .165 (3x) | 1/8 | 1-1/2 | | | 953055 | 27.50 | | 953055-C3 | 33.40 | | | |
| | .055 (1.4 mm) | .010 | .083 (1.5x) | 1/8 | 1-1/2 | | | 994555 | 27.50 | | 994555-C3 | 33.40 | | | |
| | .055 (1.4 mm) | .010 | .165 (3x) | 1/8 | 1-1/2 | 45255 | | 27255 | 27.50 | | 27255-C3 | 33.40 | | 27255-C4 | 42.50 |
| | .055 (1.4 mm) | .015 | .083 (1.5x) | 1/8 | 1-1/2 | | | 997955 | 27.50 | | 997955-C3 | 33.40 | | | |
| | .055 (1.4 mm) | .015 | .165 (3x) | 1/8 | 1-1/2 | 45555 | | 28155 | 27.50 | | 28155-C3 | 33.40 | | 28155-C4 | 42.50 |
| | .059 | .005 | .177 (3x) | 1/8 | 1-1/2 | | | 26359 | 27.50 | | 26359-C3 | 33.40 | | | |
| | .060 | .003 | .180 (3x) | 1/8 | 1-1/2 | | | 47260 | 27.50 | | 47260-C3 | 33.40 | | | |
| | .060 | .005 | .090 (1.5x) | 1/8 | 1-1/2 | | | 993860 | 27.50 | | 993860-C3 | 33.40 | | | |
| | .060 | .005 | .180 (3x) | 1/8 | 1-1/2 | 44760 | 848360 | 26360 | 27.50 | 848360-C3 | 26360-C3 | 33.40 | | 26360-C4 | 42.50 |
| | .060 | .008 | .180 (3x) | 1/8 | 1-1/2 | | | 953060 | 27.50 | | 953060-C3 | 33.40 | | | |
| | .060 | .010 | .090 (1.5x) | 1/8 | 1-1/2 | | | 994560 | 27.50 | | 994560-C3 | 33.40 | | | |
| | .060 | .010 | .180 (3x) | 1/8 | 1-1/2 | 45260 | | 27260 | 27.50 | | 27260-C3 | 33.40 | | 27260-C4 | 42.50 |
| | .060 | .015 | .090 (1.5x) | 1/8 | 1-1/2 | | | 997960 | 27.50 | | 997960-C3 | 33.40 | | | |
| | .060 | .015 | .180 (3x) | 1/8 | 1-1/2 | 45560 | | 28160 | 27.50 | | 28160-C3 | 33.40 | | 28160-C4 | 42.50 |
| | .060 | .020 | .090 (1.5x) | 1/8 | 1-1/2 | | | 966460 | 27.50 | | 966460-C3 | 33.40 | | | |
| | .060 | .020 | .180 (3x) | 1/8 | 1-1/2 | | | 51660 | 27.50 | | 51660-C3 | 33.40 | | | |
| | .062 (1/16) | .003 | .093 (1.5x) | 1/8 | 1-1/2 | | | 987562 | 27.50 | | 987562-C3 | 33.40 | | | |
| | .062 (1/16) | .003 | .186 (3x) | 1/8 | 1-1/2 | 45462 | | 47262 | 27.50 | | 47262-C3 | 33.40 | | | |
| | .062 (1/16) | .005 | .050 (0.8x) | 1/8 | 1-1/2 | | | 720462 | 29.20 | | 720462-C3 | 35.10 | | | |
| | .062 (1/16) | .005 | .093 (1.5x) | 1/8 | 1-1/2 | 804562 | 865162 | 993862 | 27.50 | 865162-C3 | 993862-C3 | 33.40 | | 993862-C4 | 42.50 |
| | .062 (1/16) | .005 | .186 (3x) | 1/8 | 1-1/2 | 44762 | 848362 | 26362 | 27.50 | 848362-C3 | 26362-C3 | 33.40 | 44762-C4 | 26362-C4 | 42.50 |
| | .062 (1/16) | .008 | .093 (1.5x) | 1/8 | 1-1/2 | | | 913762 | 27.50 | | 913762-C3 | 33.40 | | | |
| | .062 (1/16) | .008 | .186 (3x) | 1/8 | 1-1/2 | 843962 | | 953062 | 27.50 | | 953062-C3 | 33.40 | | | |
| | .062 (1/16) | .010 | .050 (0.8x) | 1/8 | 1-1/2 | | | 720362 | 29.20 | | 720362-C3 | 35.10 | | | |
| | .062 (1/16) | .010 | .093 (1.5x) | 1/8 | 1-1/2 | 830362 | 864662 | 994562 | 27.50 | 864662-C3 | 994562-C3 | 33.40 | | 994562-C4 | 42.50 |
| | .062 (1/16) | .010 | .186 (3x) | 1/8 | 1-1/2 | 45262 | 854162 | 27262 | 27.50 | 854162-C3 | 27262-C3 | 33.40 | 45262-C4 | 27262-C4 | 42.50 |
| | .062 (1/16) | .012 | .093 (1.5x) | 1/8 | 1-1/2 | | | 904862 | 27.50 | | 904862-C3 | 33.40 | | | |
| | .062 (1/16) | .012 | .186 (3x) | 1/8 | 1-1/2 | | | 966962 | 27.50 | | 966962-C3 | 33.40 | | | |
| | .062 (1/16) | .015 | .093 (1.5x) | 1/8 | 1-1/2 | 830162 | 860862 | 997962 | 27.50 | 860862-C3 | 997962-C3 | 33.40 | | | |
| | .062 (1/16) | .015 | .186 (3x) | 1/8 | 1-1/2 | 45562 | 867262 | 28162 | 27.50 | 867262-C3 | 28162-C3 | 33.40 | 45562-C4 | 28162-C4 | 42.50 |
| NEW | .062 (1/16) | .020 | .050 (0.8x) | 1/8 | 1-1/2 | | | 697762 | 29.20 | | 697762-C3 | 35.10 | | | |
| | .062 (1/16) | .020 | .093 (1.5x) | 1/8 | 1-1/2 | 810662 | 858762 | 966462 | 27.50 | 858762-C3 | 966462-C3 | 33.40 | | | |
| | .062 (1/16) | .020 | .186 (3x) | 1/8 | 1-1/2 | 51362 | 857762 | 51662 | 27.50 | 857762-C3 | 51662-C3 | 33.40 | 51362-C4 | 51662-C4 | 42.50 |

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NEW SIZES!

# MINIATURE END MILLS

## Corner Radius – Stub & Standard (cont.)

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| CUTTER DIA. | CORNER RADIUS | LOC | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 3 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| .065 | .005 | .098 (1.5x) | 1/8 | 1-1/2 | | | 993865 | 27.50 | | 993865-C3 | 33.40 | | | |
| .065 | .005 | .195 (3x) | 1/8 | 1-1/2 | 44765 | | 26365 | 27.50 | | 26365-C3 | 33.40 | | 26365-C4 | 42.50 |
| .065 | .010 | .098 (1.5x) | 1/8 | 1-1/2 | | | 994565 | 27.50 | | 994565-C3 | 33.40 | | | |
| .065 | .010 | .195 (3x) | 1/8 | 1-1/2 | 45265 | | 27265 | 27.50 | | 27265-C3 | 33.40 | | 27265-C4 | 42.50 |
| .065 | .015 | .195 (3x) | 1/8 | 1-1/2 | 45565 | | 28165 | 27.50 | | 28165-C3 | 33.40 | | 28165-C4 | 42.50 |
| .065 | .020 | .195 (3x) | 1/8 | 1-1/2 | | | 51665 | 28.10 | | 51665-C3 | 34.00 | | | |
| .070 | .003 | .210 (3x) | 1/8 | 1-1/2 | | | 47270 | 27.50 | | 47270-C3 | 33.40 | | | |
| .070 | .005 | .105 (1.5x) | 1/8 | 1-1/2 | | | 993870 | 27.50 | | 993870-C3 | 33.40 | | | |
| .070 | .005 | .210 (3x) | 1/8 | 1-1/2 | 44770 | | 26370 | 27.50 | | 26370-C3 | 33.40 | | 26370-C4 | 42.50 |
| .070 | .008 | .210 (3x) | 1/8 | 1-1/2 | | | 953070 | 27.50 | | 953070-C3 | 33.40 | | | |
| .070 | .010 | .105 (1.5x) | 1/8 | 1-1/2 | | | 994570 | 27.50 | | 994570-C3 | 33.40 | | | |
| .070 | .010 | .210 (3x) | 1/8 | 1-1/2 | 45270 | | 27270 | 27.50 | | 27270-C3 | 33.40 | | 27270-C4 | 42.50 |
| .070 | .015 | .210 (3x) | 1/8 | 1-1/2 | 45570 | | 28170 | 27.50 | | 28170-C3 | 33.40 | | 28170-C4 | 42.50 |
| .070 | .020 | .105 (1.5x) | 1/8 | 1-1/2 | | | 966470 | 28.10 | | 966470-C3 | 34.00 | | | |
| .070 | .020 | .210 (3x) | 1/8 | 1-1/2 | | | 51670 | 27.50 | | 51670-C3 | 33.40 | | | |
| .075 | .005 | .113 (1.5x) | 1/8 | 1-1/2 | | | 993875 | 27.50 | | 993875-C3 | 33.40 | | | |
| .075 | .005 | .225 (3x) | 1/8 | 1-1/2 | 44775 | | 26375 | 27.50 | | 26375-C3 | 33.40 | | 26375-C4 | 42.50 |
| .075 | .010 | .113 (1.5x) | 1/8 | 1-1/2 | | | 994575 | 27.50 | | 994575-C3 | 33.40 | | | |
| .075 | .010 | .225 (3x) | 1/8 | 1-1/2 | 45275 | | 27275 | 27.50 | | 27275-C3 | 33.40 | | 27275-C4 | 42.50 |
| .075 | .015 | .225 (3x) | 1/8 | 1-1/2 | 45575 | | 28175 | 27.50 | | 28175-C3 | 33.40 | | 28175-C4 | 42.50 |
| .078 (5/64) | .003 | .117 (1.5x) | 1/8 | 1-1/2 | | | 987578 | 27.50 | | 987578-C3 | 33.40 | | | |
| .078 (5/64) | .003 | .234 (3x) | 1/8 | 1-1/2 | | | 47278 | 27.50 | | 47278-C3 | 33.40 | | | |
| .078 (5/64) | .005 | .117 (1.5x) | 1/8 | 1-1/2 | 804578 | | 993878 | 27.50 | | 993878-C3 | 33.40 | | | |
| .078 (5/64) | .005 | .234 (3x) | 1/8 | 1-1/2 | 44778 | 848378 | 26378 | 27.50 | 848378-C3 | 26378-C3 | 33.40 | | 26378-C4 | 42.50 |
| .078 (5/64) | .008 | .117 (1.5x) | 1/8 | 1-1/2 | | | 913778 | 27.50 | | 913778-C3 | 33.40 | | | |
| .078 (5/64) | .008 | .234 (3x) | 1/8 | 1-1/2 | | | 953078 | 27.50 | | 953078-C3 | 33.40 | | | |
| .078 (5/64) | .010 | .062 (0.8x) | 1/8 | 1-1/2 | | | 720378 | 29.20 | | 720378-C3 | 35.10 | | | NEW |
| .078 (5/64) | .010 | .117 (1.5x) | 1/8 | 1-1/2 | 830378 | 864678 | 994578 | 27.50 | 864678-C3 | 994578-C3 | 33.40 | | 994578-C4 | 42.50 |
| .078 (5/64) | .010 | .234 (3x) | 1/8 | 1-1/2 | 45278 | 854178 | 27278 | 27.50 | 854178-C3 | 27278-C3 | 33.40 | 45278-C4 | 27278-C4 | 42.50 |
| .078 (5/64) | .012 | .234 (3x) | 1/8 | 1-1/2 | | | 966978 | 27.50 | | 966978-C3 | 33.40 | | | |
| .078 (5/64) | .015 | .117 (1.5x) | 1/8 | 1-1/2 | 830178 | 860878 | 997978 | 27.50 | 860878-C3 | 997978-C3 | 33.40 | | | |
| .078 (5/64) | .015 | .234 (3x) | 1/8 | 1-1/2 | 45578 | 867278 | 28178 | 27.50 | 867278-C3 | 28178-C3 | 33.40 | | 28178-C4 | 42.50 |
| .078 (5/64) | .020 | .117 (1.5x) | 1/8 | 1-1/2 | 810678 | | 966478 | 27.50 | | 966478-C3 | 33.40 | | | |
| .078 (5/64) | .020 | .234 (3x) | 1/8 | 1-1/2 | 51378 | 857778 | 51678 | 27.50 | 857778-C3 | 51678-C3 | 33.40 | 51378-C4 | 51678-C4 | 42.50 |
| .078 (5/64) | .025 | .117 (1.5x) | 1/8 | 1-1/2 | | | 964078 | 27.50 | | 964078-C3 | 33.40 | | | |
| .078 (5/64) | .025 | .234 (3x) | 1/8 | 1-1/2 | 706778 | 842678 | 957178 | 27.50 | 842678-C3 | 957178-C3 | 33.40 | | | |
| .080 | .003 | .240 (3x) | 1/8 | 1-1/2 | | | 47280 | 27.50 | | 47280-C3 | 33.40 | | | |
| .080 | .005 | .120 (1.5x) | 1/8 | 1-1/2 | | | 993880 | 27.50 | | 993880-C3 | 33.40 | | | |
| .080 | .005 | .240 (3x) | 1/8 | 1-1/2 | 44780 | | 26380 | 27.50 | | 26380-C3 | 33.40 | | 26380-C4 | 42.50 |
| .080 | .008 | .240 (3x) | 1/8 | 1-1/2 | | | 953080 | 28.10 | | 953080-C3 | 34.00 | | | |
| .080 | .010 | .120 (1.5x) | 1/8 | 1-1/2 | | | 994580 | 27.50 | | 994580-C3 | 33.40 | | | |
| .080 | .010 | .240 (3x) | 1/8 | 1-1/2 | 45280 | | 27280 | 27.50 | | 27280-C3 | 33.40 | | 27280-C4 | 42.50 |
| .080 | .015 | .240 (3x) | 1/8 | 1-1/2 | 45580 | | 28180 | 27.50 | | 28180-C3 | 33.40 | | 28180-C4 | 42.50 |
| .080 | .020 | .240 (3x) | 1/8 | 1-1/2 | | | 51680 | 27.50 | | 51680-C3 | 33.40 | | | |
| .080 | .025 | .240 (3x) | 1/8 | 1-1/2 | | | 957180 | 27.50 | | 957180-C3 | 33.40 | | | |

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# MINIATURE END MILLS

## Corner Radius – Stub & Standard (cont.)

continued from previous page

| CUTTER DIA. | CORNER RADIUS | LOC | SHANK DIA. | OAL | UNCOATED | | | | ALTiN COATED | | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 3 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| .085 | .005 | .128 (1.5x) | 1/8 | 1-1/2 | | | 993885 | 27.50 | | 993885-C3 | 33.40 | | | |
| .085 | .005 | .255 (3x) | 1/8 | 1-1/2 | 44785 | | 26385 | 27.50 | | 26385-C3 | 33.40 | | 26385-C4 | 42.50 |
| .085 | .010 | .128 (1.5x) | 1/8 | 1-1/2 | | | 994585 | 27.50 | | 994585-C3 | 33.40 | | | |
| .085 | .010 | .255 (3x) | 1/8 | 1-1/2 | 45285 | | 27285 | 27.50 | | 27285-C3 | 33.40 | | 27285-C4 | 42.50 |
| .085 | .015 | .128 (1.5x) | 1/8 | 1-1/2 | | | 997985 | 27.50 | | 997985-C3 | 33.40 | | | |
| .085 | .015 | .255 (3x) | 1/8 | 1-1/2 | 45585 | | 28185 | 27.50 | | 28185-C3 | 33.40 | | 28185-C4 | 42.50 |
| .085 | .020 | .255 (3x) | 1/8 | 1-1/2 | | | 51685 | 27.50 | | 51685-C3 | 33.40 | | | |
| .090 | .003 | .270 (3x) | 1/8 | 1-1/2 | | | 47290 | 28.10 | | 47290-C3 | 34.00 | | | |
| .090 | .005 | .135 (1.5x) | 1/8 | 1-1/2 | | | 993890 | 27.50 | | 993890-C3 | 33.40 | | | |
| .090 | .005 | .270 (3x) | 1/8 | 1-1/2 | 44790 | | 26390 | 27.50 | | 26390-C3 | 33.40 | | 26390-C4 | 42.50 |
| .090 | .008 | .135 (1.5x) | 1/8 | 1-1/2 | | | 913790 | 27.50 | | 913790-C3 | 33.40 | | | |
| .090 | .008 | .270 (3x) | 1/8 | 1-1/2 | | | 953090 | 27.50 | | 953090-C3 | 33.40 | | | |
| .090 | .010 | .135 (1.5x) | 1/8 | 1-1/2 | | | 994590 | 27.50 | | 994590-C3 | 33.40 | | | |
| .090 | .010 | .270 (3x) | 1/8 | 1-1/2 | 45290 | | 27290 | 27.50 | | 27290-C3 | 33.40 | | 27290-C4 | 42.50 |
| .090 | .015 | .135 (1.5x) | 1/8 | 1-1/2 | | | 997990 | 27.50 | | 997990-C3 | 33.40 | | | |
| .090 | .015 | .270 (3x) | 1/8 | 1-1/2 | 45590 | | 28190 | 27.50 | | 28190-C3 | 33.40 | | 28190-C4 | 42.50 |
| .090 | .020 | .135 (1.5x) | 1/8 | 1-1/2 | | | 966490 | 27.50 | | 966490-C3 | 33.40 | | | |
| .090 | .020 | .270 (3x) | 1/8 | 1-1/2 | | | 51690 | 27.50 | | 51690-C3 | 33.40 | | | |
| .090 | .025 | .270 (3x) | 1/8 | 1-1/2 | | | 957190 | 27.50 | | 957190-C3 | 33.40 | | | |
| .090 | .030 | .135 (1.5x) | 1/8 | 1-1/2 | | | 958890 | 27.50 | | 958890-C3 | 33.40 | | | |
| .090 | .030 | .270 (3x) | 1/8 | 1-1/2 | | | 28690 | 27.50 | | 28690-C3 | 33.40 | | | |
| .093 (3/32) | .003 | .140 (1.5x) | 1/8 | 1-1/2 | | | 987593 | 27.50 | | 987593-C3 | 33.40 | | | |
| .093 (3/32) | .003 | .279 (3x) | 1/8 | 1-1/2 | 45493 | | 47293 | 27.50 | | 47293-C3 | 33.40 | | | |
| .093 (3/32) | .005 | .074 (0.8x) | 1/8 | 1-1/2 | | | 720493 | 29.20 | | 720493-C3 | 35.10 | | | |
| .093 (3/32) | .005 | .140 (1.5x) | 1/8 | 1-1/2 | 804593 | 865193 | 993893 | 27.50 | 865193-C3 | 993893-C3 | 33.40 | | | |
| .093 (3/32) | .005 | .279 (3x) | 1/8 | 1-1/2 | 44793 | 848393 | 26393 | 27.50 | 848393-C3 | 26393-C3 | 33.40 | | 26393-C4 | 42.50 |
| .093 (3/32) | .008 | .140 (1.5x) | 1/8 | 1-1/2 | | | 913793 | 27.50 | | 913793-C3 | 33.40 | | | |
| .093 (3/32) | .008 | .279 (3x) | 1/8 | 1-1/2 | 843993 | | 953093 | 27.50 | | 953093-C3 | 33.40 | | | |
| .093 (3/32) | .010 | .074 (0.8x) | 1/8 | 1-1/2 | | | 720393 | 29.20 | | 720393-C3 | 35.10 | | | |
| .093 (3/32) | .010 | .140 (1.5x) | 1/8 | 1-1/2 | 830393 | 864693 | 994593 | 27.50 | 864693-C3 | 994593-C3 | 33.40 | | 994593-C4 | 42.50 |
| .093 (3/32) | .010 | .279 (3x) | 1/8 | 1-1/2 | 45293 | 854193 | 27293 | 27.50 | 854193-C3 | 27293-C3 | 33.40 | 45293-C4 | 27293-C4 | 42.50 |
| .093 (3/32) | .012 | .140 (1.5x) | 1/8 | 1-1/2 | | | 904893 | 27.50 | | 904893-C3 | 33.40 | | | |
| .093 (3/32) | .012 | .279 (3x) | 1/8 | 1-1/2 | | | 966993 | 27.50 | | 966993-C3 | 33.40 | | | |
| .093 (3/32) | .015 | .140 (1.5x) | 1/8 | 1-1/2 | 830193 | 860893 | 997993 | 27.50 | 860893-C3 | 997993-C3 | 33.40 | | 997993-C4 | 42.50 |
| .093 (3/32) | .015 | .279 (3x) | 1/8 | 1-1/2 | 45593 | 867293 | 28193 | 27.50 | 867293-C3 | 28193-C3 | 33.40 | 45593-C4 | 28193-C4 | 42.50 |
| NEW .093 (3/32) | .020 | .074 (0.8x) | 1/8 | 1-1/2 | | | 697793 | 29.20 | | 697793-C3 | 35.10 | | | |
| .093 (3/32) | .020 | .140 (1.5x) | 1/8 | 1-1/2 | 810693 | 858793 | 966493 | 27.50 | 858793-C3 | 966493-C3 | 33.40 | | | |
| .093 (3/32) | .020 | .279 (3x) | 1/8 | 1-1/2 | 51393 | 857793 | 51693 | 27.50 | 857793-C3 | 51693-C3 | 33.40 | 51393-C4 | 51693-C4 | 42.50 |
| .093 (3/32) | .025 | .140 (1.5x) | 1/8 | 1-1/2 | | | 964093 | 27.50 | | 964093-C3 | 33.40 | | | |
| .093 (3/32) | .025 | .279 (3x) | 1/8 | 1-1/2 | | | 957193 | 27.50 | | 957193-C3 | 33.40 | | | |
| .093 (3/32) | .030 | .140 (1.5x) | 1/8 | 1-1/2 | 759093 | 758693 | 958893 | 27.50 | 758693-C3 | 958893-C3 | 33.40 | | | |
| .093 (3/32) | .030 | .279 (3x) | 1/8 | 1-1/2 | 73993 | 853493 | 28693 | 27.50 | 853493-C3 | 28693-C3 | 33.40 | 73993-C4 | 28693-C4 | 42.50 |
| .095 | .005 | .143 (1.5x) | 1/8 | 1-1/2 | | | 993895 | 27.50 | | 993895-C3 | 33.40 | | | |
| .095 | .005 | .285 (3x) | 1/8 | 1-1/2 | 44795 | | 26395 | 27.50 | | 26395-C3 | 33.40 | | 26395-C4 | 42.50 |
| .095 | .010 | .143 (1.5x) | 1/8 | 1-1/2 | | | 994595 | 27.50 | | 994595-C3 | 33.40 | | | |
| .095 | .010 | .285 (3x) | 1/8 | 1-1/2 | 45295 | | 27295 | 27.50 | | 27295-C3 | 33.40 | | 27295-C4 | 42.50 |
| .095 | .015 | .285 (3x) | 1/8 | 1-1/2 | 45595 | | 28195 | 27.50 | | 28195-C3 | 33.40 | | 28195-C4 | 42.50 |
| .095 | .020 | .285 (3x) | 1/8 | 1-1/2 | | | 51695 | 27.50 | | 51695-C3 | 33.40 | | | |
| .095 | .030 | .285 (3x) | 1/8 | 1-1/2 | | | 28695 | 27.50 | | 28695-C3 | 33.40 | | | |

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NEW SIZES!

# MINIATURE END MILLS

## Corner Radius – Stub & Standard (cont.)

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| CUTTER DIA. | CORNER RADIUS | LOC | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 3 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| .100 | .003 | .300 (3x) | 1/8 | 1-1/2 | | | 47300 | 27.50 | | 47300-C3 | 33.40 | | | |
| .100 | .005 | .150 (1.5x) | 1/8 | 1-1/2 | | | 993899 | 27.50 | | 993899-C3 | 33.40 | | | |
| .100 | .005 | .300 (3x) | 1/8 | 1-1/2 | 44799 | | 26399 | 27.50 | | 26399-C3 | 33.40 | | 26399-C4 | 42.50 |
| .100 | .008 | .300 (3x) | 1/8 | 1-1/2 | | | 953099 | 27.50 | | 953099-C3 | 33.40 | | | |
| .100 | .010 | .150 (1.5x) | 1/8 | 1-1/2 | | | 994599 | 27.50 | | 994599-C3 | 33.40 | | | |
| .100 | .010 | .300 (3x) | 1/8 | 1-1/2 | 45299 | | 27299 | 27.50 | | 27299-C3 | 33.40 | | 27299-C4 | 42.50 |
| .100 | .015 | .150 (1.5x) | 1/8 | 1-1/2 | | | 997999 | 27.50 | | 997999-C3 | 33.40 | | | |
| .100 | .015 | .300 (3x) | 1/8 | 1-1/2 | 45599 | | 28199 | 27.50 | | 28199-C3 | 33.40 | | 28199-C4 | 42.50 |
| .100 | .020 | .150 (1.5x) | 1/8 | 1-1/2 | | | 966499 | 27.50 | | 966499-C3 | 33.40 | | | |
| .100 | .020 | .300 (3x) | 1/8 | 1-1/2 | | | 51699 | 27.50 | | 51699-C3 | 33.40 | | | |
| .100 | .030 | .150 (1.5x) | 1/8 | 1-1/2 | | | 958899 | 27.50 | | 958899-C3 | 33.40 | | | |
| .100 | .030 | .300 (3x) | 1/8 | 1-1/2 | | | 28699 | 27.50 | | 28699-C3 | 33.40 | | | |
| .109 (7/64) | .003 | .327 (3x) | 1/8 | 1-1/2 | | | 10802 | 27.50 | | 10802-C3 | 33.40 | | | |
| .109 (7/64) | .005 | .164 (1.5x) | 1/8 | 1-1/2 | | | 941402 | 27.50 | | 941402-C3 | 33.40 | | | |
| .109 (7/64) | .005 | .327 (3x) | 1/8 | 1-1/2 | 44802 | | 72902 | 27.50 | | 72902-C3 | 33.40 | | | |
| .109 (7/64) | .008 | .164 (1.5x) | 1/8 | 1-1/2 | | | 913802 | 27.50 | | 913802-C3 | 33.40 | | | |
| .109 (7/64) | .008 | .327 (3x) | 1/8 | 1-1/2 | | | 75502 | 27.50 | | 75502-C3 | 33.40 | | | |
| .109 (7/64) | .010 | .164 (1.5x) | 1/8 | 1-1/2 | | | 936902 | 27.50 | | 936902-C3 | 33.40 | | | |
| .109 (7/64) | .010 | .327 (3x) | 1/8 | 1-1/2 | | | 75802 | 27.50 | | 75802-C3 | 33.40 | | 75802-C4 | 42.50 |
| .109 (7/64) | .015 | .164 (1.5x) | 1/8 | 1-1/2 | | | 935002 | 27.50 | | 935002-C3 | 33.40 | | | |
| .109 (7/64) | .015 | .327 (3x) | 1/8 | 1-1/2 | | | 74202 | 27.50 | | 74202-C3 | 33.40 | | | |
| .109 (7/64) | .020 | .087 (0.8x) | 1/8 | 1-1/2 | | | 697802 | 29.20 | | 697802-C3 | 35.10 | | | NEW |
| .109 (7/64) | .020 | .164 (1.5x) | 1/8 | 1-1/2 | | | 872002 | 27.50 | | 872002-C3 | 33.40 | | | |
| .109 (7/64) | .020 | .327 (3x) | 1/8 | 1-1/2 | | | 986302 | 27.50 | | 986302-C3 | 33.40 | | | |
| .109 (7/64) | .025 | .164 (1.5x) | 1/8 | 1-1/2 | | | 964102 | 27.50 | | 964102-C3 | 33.40 | | | NEW |
| .109 (7/64) | .025 | .327 (3x) | 1/8 | 1-1/2 | | | 957109 | 27.50 | | 957109-C3 | 33.40 | | | |
| .109 (7/64) | .030 | .164 (1.5x) | 1/8 | 1-1/2 | | | 892402 | 27.50 | | 892402-C3 | 33.40 | | | |
| .109 (7/64) | .030 | .327 (3x) | 1/8 | 1-1/2 | | | 937602 | 27.50 | | 937602-C3 | 33.40 | | 937602-C4 | 42.50 |
| .118 (3 mm) | .003 | .354 (3x) | 1/8 | 1-1/2 | | | 47305 | 28.00 | | 47305-C3 | 33.90 | | | |
| .118 (3 mm) | .005 | .177 (1.5x) | 1/8 | 1-1/2 | | | 941405 | 28.00 | | 941405-C3 | 33.90 | | | |
| .118 (3 mm) | .005 | .354 (3x) | 1/8 | 1-1/2 | | | 72905 | 28.00 | | 72905-C3 | 33.90 | | | |
| .118 (3 mm) | .008 | .177 (1.5x) | 1/8 | 1-1/2 | | | 913805 | 28.00 | | 913805-C3 | 33.90 | | | |
| .118 (3 mm) | .008 | .354 (3x) | 1/8 | 1-1/2 | | | 916705 | 28.00 | | 916705-C3 | 33.90 | | | |
| .118 (3 mm) | .010 | .177 (1.5x) | 1/8 | 1-1/2 | | | 936905 | 28.00 | | 936905-C3 | 33.90 | | | |
| .118 (3 mm) | .010 | .354 (3x) | 1/8 | 1-1/2 | | | 75805 | 28.00 | | 75805-C3 | 33.90 | | | |
| .118 (3 mm) | .015 | .177 (1.5x) | 1/8 | 1-1/2 | | | 935005 | 28.00 | | 935005-C3 | 33.90 | | | |
| .118 (3 mm) | .015 | .354 (3x) | 1/8 | 1-1/2 | 45605 | | 74205 | 28.00 | | 74205-C3 | 33.90 | | | |
| .118 (3 mm) | .020 | .177 (1.5x) | 1/8 | 1-1/2 | | | 872005 | 28.00 | | 872005-C3 | 33.90 | | | |
| .118 (3 mm) | .020 | .354 (3x) | 1/8 | 1-1/2 | | | 986305 | 28.00 | | 986305-C3 | 33.90 | | | |
| .118 (3 mm) | .025 | .354 (3x) | 1/8 | 1-1/2 | | | 957205 | 28.00 | | 957205-C3 | 33.90 | | | |
| .118 (3 mm) | .030 | .177 (1.5x) | 1/8 | 1-1/2 | | | 892405 | 28.00 | | 892405-C3 | 33.90 | | | |
| .118 (3 mm) | .030 | .354 (3x) | 1/8 | 1-1/2 | | | 937605 | 28.00 | | 937605-C3 | 33.90 | | 937605-C4 | 43.00 |
| .118 (3 mm) | .040 | .177 (1.5x) | 1/8 | 1-1/2 | | | 734105 | 28.00 | | 734105-C3 | 33.90 | | | |
| .118 (3 mm) | .040 | .354 (3x) | 1/8 | 1-1/2 | | | 874005 | 28.00 | | 874005-C3 | 33.90 | | | |

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# MINIATURE END MILLS

## Corner Radius – Stub & Standard (cont.)

continued from previous page

| CUTTER DIA. | CORNER RADIUS | LOC | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 3 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| .125 (1/8) | .003 | .187 (1.5x) | 1/8 | 1-1/2 | | | 980203 | 25.50 | | 980203-C3 | 31.50 | | | |
| .125 (1/8) | .003 | .500 (4x) | 1/8 | 1-1/2 | 46403 | | 32403 | 25.50 | | 32403-C3 | 31.50 | | | |
| .125 (1/8) | .005 | .100 (0.8x) | 1/8 | 1-1/2 | | | 720205 | 27.20 | | 720205-C3 | 33.10 | | | |
| .125 (1/8) | .005 | .187 (1.5x) | 1/8 | 1-1/2 | 832905 | 833405 | 980205 | 27.50 | 833405-C3 | 980205-C3 | 33.40 | | | |
| .125 (1/8) | .005 | .500 (4x) | 1/8 | 1-1/2 | 46405 | 870905 | 32405 | 27.50 | 870905-C3 | 32405-C3 | 33.40 | | 32405-C4 | 42.50 |
| .125 (1/8) | .008 | .187 (1.5x) | 1/8 | 1-1/2 | | | 980208 | 27.50 | | 980208-C3 | 33.40 | | 980208-C4 | 42.50 |
| .125 (1/8) | .008 | .500 (4x) | 1/8 | 1-1/2 | 46408 | | 32408 | 27.50 | | 32408-C3 | 33.40 | | | |
| .125 (1/8) | .010 | .100 (0.8x) | 1/8 | 1-1/2 | | | 720210 | 29.20 | | 720210-C3 | 35.10 | | | |
| .125 (1/8) | .010 | .187 (1.5x) | 1/8 | 1-1/2 | 832910 | 833410 | 980210 | 25.50 | 833410-C3 | 980210-C3 | 31.50 | | 980210-C4 | 40.50 |
| .125 (1/8) | .010 | .500 (4x) | 1/8 | 1-1/2 | 46410 | 870910 | 32410 | 25.50 | 870910-C3 | 32410-C3 | 31.50 | 46410-C4 | 32410-C4 | 40.50 |
| .125 (1/8) | .012 | .187 (1.5x) | 1/8 | 1-1/2 | | | 980212 | 27.50 | | 980212-C3 | 33.40 | | | |
| .125 (1/8) | .012 | .500 (4x) | 1/8 | 1-1/2 | | | 32412 | 27.50 | | 32412-C3 | 33.40 | | | |
| .125 (1/8) | .015 | .187 (1.5x) | 1/8 | 1-1/2 | 832915 | 833415 | 980215 | 25.50 | 833415-C3 | 980215-C3 | 31.50 | | 980215-C4 | 40.50 |
| .125 (1/8) | .015 | .500 (4x) | 1/8 | 1-1/2 | 46415 | 870915 | 32415 | 25.50 | 870915-C3 | 32415-C3 | 31.50 | | 32415-C4 | 40.50 |
| .125 (1/8) | .020 | .187 (1.5x) | 1/8 | 1-1/2 | 832920 | 833420 | 980220 | 25.50 | 833420-C3 | 980220-C3 | 31.50 | | 980220-C4 | 40.50 |
| .125 (1/8) | .020 | .500 (4x) | 1/8 | 1-1/2 | 46420 | 870920 | 32420 | 25.50 | 870920-C3 | 32420-C3 | 31.50 | 46420-C4 | 32420-C4 | 40.50 |
| .125 (1/8) | .025 | .187 (1.5x) | 1/8 | 1-1/2 | | | 980225 | 27.50 | | 980225-C3 | 33.40 | | | |
| .125 (1/8) | .025 | .500 (4x) | 1/8 | 1-1/2 | 46425 | | 32425 | 27.50 | | 32425-C3 | 33.40 | | 32425-C4 | 42.50 |
| .125 (1/8) | .030 | .187 (1.5x) | 1/8 | 1-1/2 | 832930 | 833430 | 980230 | 25.50 | 833430-C3 | 980230-C3 | 31.50 | | 980230-C4 | 40.50 |
| .125 (1/8) | .030 | .500 (4x) | 1/8 | 1-1/2 | 46430 | 870930 | 32430 | 25.50 | 870930-C3 | 32430-C3 | 31.50 | 46430-C4 | 32430-C4 | 40.50 |
| .125 (1/8) | .035 | .500 (4x) | 1/8 | 1-1/2 | | | 32435 | 27.50 | | 32435-C3 | 33.40 | | | |
| .125 (1/8) | .040 | .187 (1.5x) | 1/8 | 1-1/2 | 832940 | 833440 | 980240 | 27.50 | 833440-C3 | 980240-C3 | 33.40 | | | |
| .125 (1/8) | .040 | .500 (4x) | 1/8 | 1-1/2 | 46440 | 870940 | 32440 | 27.50 | 870940-C3 | 32440-C3 | 33.40 | | | |
| .125 (1/8) | .045 | .187 (1.5x) | 1/8 | 1-1/2 | | | 980245 | 25.50 | | 980245-C3 | 31.50 | | | |
| .125 (1/8) | .045 | .500 (4x) | 1/8 | 1-1/2 | | | 32445 | 25.50 | | 32445-C3 | 31.50 | | | |
| .140 (9/64) | .005 | .220 (1.5x) | 3/16 | 2 | | | 857105 | 33.40 | | 857105-C3 | 39.90 | | | |
| .140 (9/64) | .005 | .425 (3x) | 3/16 | 2 | | | 966705 | 33.40 | | 966705-C3 | 39.90 | | | |
| .140 (9/64) | .008 | .425 (3x) | 3/16 | 2 | | | 966708 | 33.40 | | 966708-C3 | 39.70 | | | |
| NEW .140 (9/64) | .010 | .112 (0.8x) | 3/16 | 2 | | | 697610 | 33.00 | | 697610-C3 | 39.20 | | | |
| .140 (9/64) | .010 | .220 (1.5x) | 3/16 | 2 | | | 857110 | 30.90 | | 857110-C3 | 37.30 | | | |
| .140 (9/64) | .010 | .425 (3x) | 3/16 | 2 | 810910 | | 966710 | 30.90 | | 966710-C3 | 37.30 | | | |
| .140 (9/64) | .012 | .425 (3x) | 3/16 | 2 | | | 966712 | 31.80 | | 966712-C3 | 38.30 | | | |
| .140 (9/64) | .015 | .220 (1.5x) | 3/16 | 2 | | 833315 | 857115 | 30.90 | 833315-C3 | 857115-C3 | 37.30 | | | |
| .140 (9/64) | .015 | .425 (3x) | 3/16 | 2 | 810915 | 832115 | 966715 | 30.90 | 832115-C3 | 966715-C3 | 37.30 | | | |
| .140 (9/64) | .020 | .220 (1.5x) | 3/16 | 2 | | | 857120 | 30.90 | | 857120-C3 | 37.30 | | | |
| .140 (9/64) | .020 | .425 (3x) | 3/16 | 2 | | | 966720 | 30.90 | | 966720-C3 | 37.30 | | | |
| .140 (9/64) | .025 | .425 (3x) | 3/16 | 2 | | | 966725 | 30.90 | | 966725-C3 | 37.20 | | | |
| .140 (9/64) | .030 | .220 (1.5x) | 3/16 | 2 | | | 857130 | 30.90 | | 857130-C3 | 37.30 | | | |
| .140 (9/64) | .030 | .425 (3x) | 3/16 | 2 | | | 966730 | 30.90 | | 966730-C3 | 37.30 | | | |
| .140 (9/64) | .040 | .220 (1.5x) | 3/16 | 2 | | | 857140 | 33.40 | | 857140-C3 | 39.90 | | | |
| .140 (9/64) | .040 | .425 (3x) | 3/16 | 2 | | | 966740 | 33.40 | | 966740-C3 | 39.90 | | | |
| .140 (9/64) | .045 | .220 (1.5x) | 3/16 | 2 | | | 857145 | 30.90 | | 857145-C3 | 37.30 | | | |
| .140 (9/64) | .045 | .425 (3x) | 3/16 | 2 | | | 966745 | 30.90 | | 966745-C3 | 37.30 | | | |

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NEW SIZES!

# MINIATURE END MILLS

## Corner Radius – Stub & Standard (cont.)

continued from previous page

CORNER RADIUS

| CUTTER DIA. | CORNER RADIUS | LOC | SHANK DIA. | OAL | UNCOATED | | | | ALTiN COATED | | | AMORPHOUS DIAMOND | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 3 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ | |
| .156 (5/32) | .005 | .235 (1.5x) | 3/16 | 2 | | | 954805 | 30.50 | | 954805-C3 | 37.10 | | | | |
| .156 (5/32) | .005 | .562 (3x) | 3/16 | 2 | | | 75205 | 30.50 | | 75205-C3 | 37.10 | | | | |
| .156 (5/32) | .008 | .562 (3x) | 3/16 | 2 | | | 75208 | 30.50 | | 75208-C3 | 37.10 | | | | |
| .156 (5/32) | .010 | .235 (1.5x) | 3/16 | 2 | | | 954810 | 28.20 | | 954810-C3 | 34.70 | | | | |
| .156 (5/32) | .010 | .562 (3x) | 3/16 | 2 | 71910 | | 75210 | 28.20 | | 75210-C3 | 34.70 | | | | |
| .156 (5/32) | .015 | .235 (1.5x) | 3/16 | 2 | | | 954815 | 28.20 | | 954815-C3 | 34.70 | | | | |
| .156 (5/32) | .015 | .562 (3x) | 3/16 | 2 | 71915 | | 75215 | 28.20 | | 75215-C3 | 34.70 | | | | |
| .156 (5/32) | .020 | .125 (0.8x) | 3/16 | 2 | | | 697520 | 30.30 | | 697520-C3 | 36.50 | | | | NEW |
| .156 (5/32) | .020 | .235 (1.5x) | 3/16 | 2 | | | 954820 | 28.20 | | 954820-C3 | 34.70 | | | | |
| .156 (5/32) | .020 | .562 (3x) | 3/16 | 2 | 71920 | | 75220 | 28.20 | | 75220-C3 | 34.70 | | 75220-C4 | 46.60 | |
| .156 (5/32) | .025 | .235 (1.5x) | 3/16 | 2 | | | 954825 | 28.20 | | 954825-C3 | 34.50 | | | | |
| .156 (5/32) | .025 | .562 (3x) | 3/16 | 2 | | | 75225 | 28.20 | | 75225-C3 | 34.70 | | | | |
| .156 (5/32) | .030 | .235 (1.5x) | 3/16 | 2 | 734030 | | 954830 | 28.20 | | 954830-C3 | 34.70 | | | | |
| .156 (5/32) | .030 | .562 (3x) | 3/16 | 2 | 71930 | 832030 | 75230 | 28.20 | 832030-C3 | 75230-C3 | 34.70 | | 75230-C4 | 46.60 | |
| .156 (5/32) | .040 | .235 (1.5x) | 3/16 | 2 | | | 954840 | 30.50 | | 954840-C3 | 37.10 | | | | |
| .156 (5/32) | .040 | .562 (3x) | 3/16 | 2 | | | 75240 | 30.50 | | 75240-C3 | 37.10 | | | | |
| .156 (5/32) | .045 | .235 (1.5x) | 3/16 | 2 | | | 954845 | 28.20 | | 954845-C3 | 34.70 | | | | |
| .156 (5/32) | .045 | .562 (3x) | 3/16 | 2 | | | 75245 | 28.20 | | 75245-C3 | 34.70 | | | | |
| .172 (11/64) | .005 | .515 (3x) | 3/16 | 2 | | | 855305 | 30.50 | | 855305-C3 | 37.10 | | | | |
| .172 (11/64) | .010 | .260 (1.5x) | 3/16 | 2 | | | 758710 | 30.50 | | 758710-C3 | 37.10 | | | | |
| .172 (11/64) | .010 | .515 (3x) | 3/16 | 2 | | | 855310 | 28.20 | | 855310-C3 | 34.70 | | | | |
| .172 (11/64) | .020 | .515 (3x) | 3/16 | 2 | | | 855320 | 30.50 | | 855320-C3 | 37.10 | | | | |
| .172 (11/64) | .030 | .260 (1.5x) | 3/16 | 2 | | | 758730 | 30.50 | | 758730-C3 | 36.70 | | | | |
| .172 (11/64) | .030 | .515 (3x) | 3/16 | 2 | | | 855330 | 28.20 | | 855330-C3 | 34.70 | | | | |
| .187 (3/16) | .003 | .625 (3x) | 3/16 | 2 | | | 34803 | 30.50 | | 34803-C3 | 37.10 | | | | |
| .187 (3/16) | .005 | .285 (1.5x) | 3/16 | 2 | | | 937905 | 30.50 | | 937905-C3 | 37.10 | | 937905-C4 | 47.20 | |
| .187 (3/16) | .005 | .625 (3x) | 3/16 | 2 | 46705 | | 34805 | 30.50 | | 34805-C3 | 37.10 | | 34805-C4 | 47.20 | |
| .187 (3/16) | .008 | .285 (1.5x) | 3/16 | 2 | | | 937908 | 30.50 | | 937908-C3 | 37.10 | | | | |
| .187 (3/16) | .008 | .625 (3x) | 3/16 | 2 | | 831908 | 34808 | 30.50 | 831908-C3 | 34808-C3 | 37.10 | | | | |
| .187 (3/16) | .010 | .285 (1.5x) | 3/16 | 2 | | 833210 | 937910 | 28.20 | 833210-C3 | 937910-C3 | 34.70 | | 937910-C4 | 46.60 | |
| .187 (3/16) | .010 | .625 (3x) | 3/16 | 2 | 46710 | 831910 | 34810 | 28.20 | 831910-C3 | 34810-C3 | 34.70 | 46710-C4 | 34810-C4 | 46.60 | |
| .187 (3/16) | .012 | .285 (1.5x) | 3/16 | 2 | | | 937912 | 30.50 | | 937912-C3 | 37.10 | | | | |
| .187 (3/16) | .012 | .625 (3x) | 3/16 | 2 | | | 34812 | 30.50 | | 34812-C3 | 37.10 | | | | |
| .187 (3/16) | .015 | .285 (1.5x) | 3/16 | 2 | | | 937915 | 28.20 | | 937915-C3 | 34.70 | | | | |
| .187 (3/16) | .015 | .625 (3x) | 3/16 | 2 | 46715 | | 34815 | 28.20 | | 34815-C3 | 34.70 | 46715-C4 | 34815-C4 | 46.60 | |
| .187 (3/16) | .020 | .150 (0.8x) | 3/16 | 2 | | | 697512 | 30.60 | | 697512-C3 | 36.80 | | | | NEW |
| .187 (3/16) | .020 | .285 (1.5x) | 3/16 | 2 | 810520 | 833220 | 937920 | 28.50 | 833220-C3 | 937920-C3 | 34.90 | | | | NEW |
| .187 (3/16) | .020 | .625 (3x) | 3/16 | 2 | 46720 | | 34820 | 28.20 | | 34820-C3 | 34.70 | | | | |
| .187 (3/16) | .025 | .285 (1.5x) | 3/16 | 2 | | | 937925 | 30.50 | | 937925-C3 | 37.10 | | | | |
| .187 (3/16) | .025 | .625 (3x) | 3/16 | 2 | 46725 | | 34825 | 30.50 | | 34825-C3 | 37.10 | | | | |
| .187 (3/16) | .030 | .285 (1.5x) | 3/16 | 2 | 810530 | | 937930 | 28.50 | | 937930-C3 | 34.90 | | 937930-C4 | 46.80 | |
| .187 (3/16) | .030 | .625 (3x) | 3/16 | 2 | 46730 | 831930 | 34830 | 28.20 | 831930-C3 | 34830-C3 | 34.70 | 46730-C4 | 34830-C4 | 46.60 | |
| .187 (3/16) | .035 | .625 (3x) | 3/16 | 2 | | | 34835 | 30.50 | | 34835-C3 | 36.70 | | | | |

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# MINIATURE END MILLS

## Corner Radius – Stub & Standard (cont.)

continued from previous page

| | CUTTER DIA. | CORNER RADIUS | LOC | SHANK DIA. | OAL | UNCOATED | | | | ALTiN COATED | | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.002″ | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 3 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| | .187 (3/16) | .040 | .285 (1.5x) | 3/16 | 2 | | | 937940 | 30.50 | | 937940-C3 | 37.10 | | | |
| | .187 (3/16) | .040 | .625 (3x) | 3/16 | 2 | 46740 | | 34840 | 30.50 | | 34840-C3 | 37.10 | | 34840-C4 | 47.20 |
| | .187 (3/16) | .045 | .285 (1.5x) | 3/16 | 2 | | | 937945 | 28.20 | | 937945-C3 | 34.70 | | | |
| | .187 (3/16) | .045 | .625 (3x) | 3/16 | 2 | 46745 | | 34845 | 28.20 | | 34845-C3 | 34.70 | | 34845-C4 | 44.90 |
| | .187 (3/16) | .050 | .285 (1.5x) | 3/16 | 2 | | | 937950 | 30.50 | | 937950-C3 | 37.10 | | | |
| | .187 (3/16) | .050 | .625 (3x) | 3/16 | 2 | | | 34850 | 30.50 | | 34850-C3 | 37.10 | | 34850-C4 | 47.20 |
| | .187 (3/16) | .060 | .285 (1.5x) | 3/16 | 2 | 810560 | 833260 | 937960 | 28.20 | 833260-C3 | 937960-C3 | 34.70 | | | |
| | .187 (3/16) | .060 | .625 (3x) | 3/16 | 2 | 46760 | 831960 | 34860 | 28.20 | 831960-C3 | 34860-C3 | 34.70 | | 34860-C4 | 46.60 |
| | .203 (13/64) | .010 | .610 (3x) | 1/4 | 2-1/2 | | | 865610 | 35.20 | | 865610-C3 | 43.90 | | | |
| | .203 (13/64) | .030 | .610 (3x) | 1/4 | 2-1/2 | | | 865630 | 35.20 | | 865630-C3 | 43.90 | | | |
| | .203 (13/64) | .040 | .610 (3x) | 1/4 | 2-1/2 | | | 865640 | 35.90 | | 865640-C3 | 44.00 | | | |
| | .218 (7/32) | .010 | .660 (3x) | 1/4 | 2-1/2 | | | 863910 | 34.90 | | 863910-C3 | 43.50 | | | |
| | .218 (7/32) | .020 | .660 (3x) | 1/4 | 2-1/2 | | | 863920 | 35.40 | | 863920-C3 | 43.50 | | | |
| | .218 (7/32) | .030 | .660 (3x) | 1/4 | 2-1/2 | | | 863930 | 34.90 | | 863930-C3 | 43.50 | | | |
| | .218 (7/32) | .040 | .660 (3x) | 1/4 | 2-1/2 | | | 863940 | 34.90 | | 863940-C3 | 43.50 | | | |
| | .234 (15/64) | .010 | .355 (1.5x) | 1/4 | 2-1/2 | | | 734210 | 35.40 | | 734210-C3 | 43.50 | | | |
| | .234 (15/64) | .030 | .355 (1.5x) | 1/4 | 2-1/2 | | | 734230 | 35.20 | | 734230-C3 | 43.30 | | | |
| | .234 (15/64) | .010 | .705 (3x) | 1/4 | 2-1/2 | | | 863510 | 34.90 | | 863510-C3 | 43.50 | | | |
| | .234 (15/64) | .030 | .705 (3x) | 1/4 | 2-1/2 | | | 863530 | 34.90 | | 863530-C3 | 43.50 | | | |
| | .234 (15/64) | .040 | .705 (3x) | 1/4 | 2-1/2 | | | 863540 | 35.90 | | 863540-C3 | 44.50 | | | |
| | .250 (1/4) | .003 | .750 (3x) | 1/4 | 2-1/2 | | | 36203 | 37.70 | | 36203-C3 | 46.30 | | | |
| | .250 (1/4) | .005 | .375 (1.5x) | 1/4 | 2-1/2 | 810805 | 833005 | 941105 | 37.70 | 833005-C3 | 941105-C3 | 46.30 | | | |
| | .250 (1/4) | .005 | .750 (3x) | 1/4 | 2-1/2 | 47405 | 831805 | 36205 | 37.70 | 831805-C3 | 36205-C3 | 46.30 | | 36205-C4 | 59.10 |
| | .250 (1/4) | .008 | .375 (1.5x) | 1/4 | 2-1/2 | | | 941108 | 37.70 | | 941108-C3 | 46.30 | | | |
| | .250 (1/4) | .008 | .750 (3x) | 1/4 | 2-1/2 | | | 36208 | 37.70 | | 36208-C3 | 46.30 | | | |
| | .250 (1/4) | .010 | .375 (1.5x) | 1/4 | 2-1/2 | 810810 | 833010 | 941110 | 34.90 | 833010-C3 | 941110-C3 | 43.50 | | | |
| | .250 (1/4) | .010 | .750 (3x) | 1/4 | 2-1/2 | 47410 | 831810 | 36210 | 34.90 | 831810-C3 | 36210-C3 | 43.50 | 47410-C4 | 36210-C4 | 56.30 |
| | .250 (1/4) | .012 | .750 (3x) | 1/4 | 2-1/2 | | | 36212 | 37.70 | | 36212-C3 | 46.30 | | | |
| | .250 (1/4) | .015 | .375 (1.5x) | 1/4 | 2-1/2 | | 833015 | 941115 | 34.90 | 833015-C3 | 941115-C3 | 43.50 | | | |
| | .250 (1/4) | .015 | .750 (3x) | 1/4 | 2-1/2 | 47415 | 831815 | 36215 | 34.90 | 831815-C3 | 36215-C3 | 43.50 | | 36215-C4 | 56.30 |
| | .250 (1/4) | .020 | .375 (1.5x) | 1/4 | 2-1/2 | | | 941120 | 34.90 | | 941120-C3 | 43.50 | | 941120-C4 | 56.30 |
| | .250 (1/4) | .020 | .750 (3x) | 1/4 | 2-1/2 | 47420 | | 36220 | 34.90 | | 36220-C3 | 43.50 | | 36220-C4 | 56.30 |
| | .250 (1/4) | .025 | .375 (1.5x) | 1/4 | 2-1/2 | | 833025 | 941125 | 37.70 | 833025-C3 | 941125-C3 | 46.30 | | | |
| | .250 (1/4) | .025 | .750 (3x) | 1/4 | 2-1/2 | | 831825 | 36225 | 37.70 | 831825-C3 | 36225-C3 | 45.80 | | | |
| NEW | .250 (1/4) | .030 | .200 (0.8x) | 1/4 | 2-1/2 | | | 697416 | 37.00 | | 697416-C3 | 45.00 | | | |
| NEW | .250 (1/4) | .030 | .375 (1.5x) | 1/4 | 2-1/2 | 810830 | 833030 | 941130 | 34.90 | 833030-C3 | 941130-C3 | 43.50 | | 941130-C4 | 56.30 |
| | .250 (1/4) | .030 | .750 (3x) | 1/4 | 2-1/2 | 47430 | 831830 | 36230 | 34.90 | 831830-C3 | 36230-C3 | 43.50 | 47430-C4 | 36230-C4 | 56.30 |
| | .250 (1/4) | .035 | .750 (3x) | 1/4 | 2-1/2 | | | 36235 | 37.70 | | 36235-C3 | 45.80 | | | |
| | .250 (1/4) | .040 | .375 (1.5x) | 1/4 | 2-1/2 | 810840 | 833040 | 941140 | 37.70 | 833040-C3 | 941140-C3 | 46.30 | | | |
| | .250 (1/4) | .040 | .750 (3x) | 1/4 | 2-1/2 | 47440 | 831840 | 36240 | 37.70 | 831840-C3 | 36240-C3 | 46.30 | | | |
| | .250 (1/4) | .045 | .375 (1.5x) | 1/4 | 2-1/2 | | | 941145 | 34.90 | | 941145-C3 | 43.50 | | | |
| | .250 (1/4) | .045 | .750 (3x) | 1/4 | 2-1/2 | 47445 | | 36245 | 34.90 | | 36245-C3 | 43.50 | | 36245-C4 | 56.30 |
| | .250 (1/4) | .050 | .375 (1.5x) | 1/4 | 2-1/2 | | | 941150 | 37.70 | | 941150-C3 | 46.30 | | | |
| | .250 (1/4) | .050 | .750 (3x) | 1/4 | 2-1/2 | 47450 | | 36250 | 37.70 | | 36250-C3 | 46.30 | | 36250-C4 | 59.10 |
| | .250 (1/4) | .060 | .375 (1.5x) | 1/4 | 2-1/2 | | | 941160 | 34.90 | | 941160-C3 | 43.50 | | | |
| | .250 (1/4) | .060 | .750 (3x) | 1/4 | 2-1/2 | 47460 | 831860 | 36260 | 34.90 | 831860-C3 | 36260-C3 | 43.50 | 47460-C4 | 36260-C4 | 56.30 |
| | .250 (1/4) | .075 | .375 (1.5x) | 1/4 | 2-1/2 | | | 941175 | 37.70 | | 941175-C3 | 46.30 | | | |
| | .250 (1/4) | .075 | .750 (3x) | 1/4 | 2-1/2 | 47475 | | 36275 | 37.70 | | 36275-C3 | 46.30 | | | |

continued on next page

NEW SIZES!

# MINIATURE END MILLS

## Corner Radius – Stub & Standard (cont.)

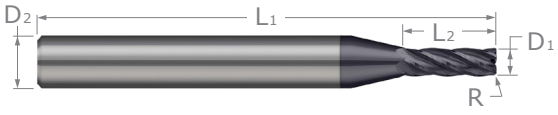
continued from previous page



| CUTTER DIA. | CORNER RADIUS | LOC | SHANK DIA. | OAL | UNCOATED | | | | AlTiN COATED | | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | 3 FL | 4 FL | USD$ | 3 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| .312 (5/16) | .005 | 1.000 (3x) | 5/16 | 2-1/2 | | | 945105 | 42.10 | | 945105-C3 | 52.40 | | | |
| .312 (5/16) | .010 | 1.000 (3x) | 5/16 | 2-1/2 | | | 945110 | 38.90 | | 945110-C3 | 49.10 | | | |
| .312 (5/16) | .020 | 1.000 (3x) | 5/16 | 2-1/2 | | | 945120 | 38.90 | | 945120-C3 | 48.60 | | | |
| .312 (5/16) | .030 | 1.000 (3x) | 5/16 | 2-1/2 | | | 945130 | 38.90 | | 945130-C3 | 49.10 | | | |
| .312 (5/16) | .040 | 1.000 (3x) | 5/16 | 2-1/2 | | | 945140 | 38.90 | | 945140-C3 | 49.10 | | | |
| .312 (5/16) | .060 | 1.000 (3x) | 5/16 | 2-1/2 | | | 945160 | 38.90 | | 945160-C3 | 49.10 | | | |
| .375 (3/8) | .005 | .570 (1.5x) | 3/8 | 2-1/2 | | | 915205 | 57.30 | | 915205-C3 | 68.70 | | | |
| .375 (3/8) | .005 | 1.000 (3x) | 3/8 | 2-1/2 | 804305 | | 72805 | 57.30 | | 72805-C3 | 68.70 | | 72805-C4 | 87.70 |
| .375 (3/8) | .008 | 1.000 (3x) | 3/8 | 2-1/2 | | | 72808 | 57.30 | | 72808-C3 | 68.70 | | | |
| .375 (3/8) | .010 | .570 (1.5x) | 3/8 | 2-1/2 | | | 915210 | 52.90 | | 915210-C3 | 64.40 | | | |
| .375 (3/8) | .010 | 1.000 (3x) | 3/8 | 2-1/2 | | | 72810 | 52.90 | | 72810-C3 | 64.40 | | | |
| .375 (3/8) | .015 | .570 (1.5x) | 3/8 | 2-1/2 | | | 915215 | 53.60 | | 915215-C3 | 65.00 | | | |
| .375 (3/8) | .015 | 1.000 (3x) | 3/8 | 2-1/2 | | | 72815 | 52.90 | | 72815-C3 | 64.40 | | | |
| .375 (3/8) | .020 | .570 (1.5x) | 3/8 | 2-1/2 | | | 915220 | 53.60 | | 915220-C3 | 65.00 | | | |
| .375 (3/8) | .020 | 1.000 (3x) | 3/8 | 2-1/2 | 804320 | | 72820 | 52.90 | | 72820-C3 | 64.40 | | 72820-C4 | 82.50 |
| .375 (3/8) | .025 | .570 (1.5x) | 3/8 | 2-1/2 | | | 915225 | 53.20 | | 915225-C3 | 64.70 | | | |
| .375 (3/8) | .025 | 1.000 (3x) | 3/8 | 2-1/2 | | | 72825 | 52.90 | | 72825-C3 | 64.40 | | | |
| .375 (3/8) | .030 | .570 (1.5x) | 3/8 | 2-1/2 | | | 915230 | 52.90 | | 915230-C3 | 64.40 | | 915230-C4 | 82.50 |
| .375 (3/8) | .030 | 1.000 (3x) | 3/8 | 2-1/2 | | | 72830 | 52.90 | | 72830-C3 | 64.40 | | 72830-C4 | 82.50 |
| .375 (3/8) | .040 | .570 (1.5x) | 3/8 | 2-1/2 | | | 915240 | 57.30 | | 915240-C3 | 68.70 | | | |
| .375 (3/8) | .040 | 1.000 (3x) | 3/8 | 2-1/2 | 804340 | 831740 | 72840 | 57.30 | 831740-C3 | 72840-C3 | 68.70 | | 72840-C4 | 86.60 |
| .375 (3/8) | .045 | .570 (1.5x) | 3/8 | 2-1/2 | | | 915245 | 53.20 | | 915245-C3 | 64.70 | | | |
| .375 (3/8) | .045 | 1.000 (3x) | 3/8 | 2-1/2 | | | 72845 | 52.90 | | 72845-C3 | 64.40 | | | |
| .375 (3/8) | .050 | .570 (1.5x) | 3/8 | 2-1/2 | | | 915250 | 52.90 | | 915250-C3 | 64.40 | | | |
| .375 (3/8) | .050 | 1.000 (3x) | 3/8 | 2-1/2 | | | 72850 | 52.90 | | 72850-C3 | 64.40 | | | |
| .375 (3/8) | .060 | .570 (1.5x) | 3/8 | 2-1/2 | | | 915260 | 53.60 | | 915260-C3 | 65.00 | | | |
| .375 (3/8) | .060 | 1.000 (3x) | 3/8 | 2-1/2 | | 831760 | 72860 | 52.90 | 831760-C3 | 72860-C3 | 64.40 | | | |
| .375 (3/8) | .075 | .570 (1.5x) | 3/8 | 2-1/2 | | | 915275 | 53.60 | | 915275-C3 | 65.00 | | | |
| .375 (3/8) | .075 | 1.000 (3x) | 3/8 | 2-1/2 | | | 72875 | 52.90 | | 72875-C3 | 64.40 | | | |
| .375 (3/8) | .090 | 1.000 (3x) | 3/8 | 2-1/2 | | | 72890 | 52.90 | | 72890-C3 | 64.40 | | | |
| .375 (3/8) | .125 | 1.000 (3x) | 3/8 | 2-1/2 | | | 72908 | 52.90 | | 72908-C3 | 64.40 | | | |
| .500 (1/2) | .005 | 1.000 (2x) | 1/2 | 3 | | | 74505 | 82.10 | | 74505-C3 | 97.70 | | | |
| .500 (1/2) | .010 | 1.000 (2x) | 1/2 | 3 | | | 74510 | 82.10 | | 74510-C3 | 99.10 | | | |
| .500 (1/2) | .015 | 1.000 (2x) | 1/2 | 3 | | | 74515 | 82.10 | | 74515-C3 | 99.10 | | | |
| .500 (1/2) | .020 | 1.000 (2x) | 1/2 | 3 | | | 74520 | 82.10 | | 74520-C3 | 99.10 | | 74520-C4 | 123.50 |
| .500 (1/2) | .025 | 1.000 (2x) | 1/2 | 3 | | | 74525 | 82.10 | | 74525-C3 | 97.70 | | | |
| .500 (1/2) | .030 | 1.000 (2x) | 1/2 | 3 | 733930 | | 74530 | 82.10 | | 74530-C3 | 99.10 | | 74530-C4 | 118.00 |
| .500 (1/2) | .040 | 1.000 (2x) | 1/2 | 3 | | | 74540 | 82.10 | | 74540-C3 | 99.10 | | | |
| .500 (1/2) | .045 | 1.000 (2x) | 1/2 | 3 | | | 74545 | 82.80 | | 74545-C3 | 99.80 | | | |
| .500 (1/2) | .050 | 1.000 (2x) | 1/2 | 3 | 733950 | | 74550 | 82.10 | | 74550-C3 | 99.10 | | 74550-C4 | 123.50 |
| .500 (1/2) | .060 | 1.000 (2x) | 1/2 | 3 | | | 74560 | 82.10 | | 74560-C3 | 99.10 | | 74560-C4 | 118.00 |
| .500 (1/2) | .075 | 1.000 (2x) | 1/2 | 3 | | | 74575 | 82.10 | | 74575-C3 | 97.70 | | | |
| .500 (1/2) | .090 | 1.000 (2x) | 1/2 | 3 | | | 74590 | 82.10 | | 74590-C3 | 99.10 | | | |
| .500 (1/2) | .125 | 1.000 (2x) | 1/2 | 3 | | | 74608 | 82.10 | | 74608-C3 | 97.70 | | | |

# MINIATURE END MILLS

## Corner Radius – Stub & Standard – 5 Flute




- Corner radius for improved strength
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 5 FL | USD$ | 5 FL | USD$ |
| .020 (.5 mm) | **.005** | .030 (1.5x) | 1/8 | 1-1/2 | 720020 | 33.60 | 720020-C3 | 39.50 |
| .020 (.5 mm) | **.005** | .060 (3x) | 1/8 | 1-1/2 | 720120 | 35.40 | 720120-C3 | 41.30 |
| .031 (1/32) | **.005** | .047 (1.5x) | 1/8 | 1-1/2 | 720031 | 29.50 | 720031-C3 | 35.40 |
| .031 (1/32) | **.005** | .093 (3x) | 1/8 | 1-1/2 | 720131 | 31.90 | 720131-C3 | 37.80 |
| .047 (3/64) | **.005** | .071 (1.5x) | 1/8 | 1-1/2 | 720047 | 30.10 | 720047-C3 | 36.00 |
| .047 (3/64) | **.005** | .141 (3x) | 1/8 | 1-1/2 | 720147 | 31.70 | 720147-C3 | 37.60 |
| .062 (1/16) | **.005** | .093 (1.5x) | 1/8 | 1-1/2 | 720062 | 31.00 | 720062-C3 | 37.00 |
| .062 (1/16) | **.005** | .186 (3x) | 1/8 | 1-1/2 | 720162 | 32.40 | 720162-C3 | 38.30 |
| .078 (5/64) | **.005** | .118 (1.5x) | 1/8 | 1-1/2 | 720078 | 31.00 | 720078-C3 | 37.00 |
| .078 (5/64) | **.005** | .234 (3x) | 1/8 | 1-1/2 | 720178 | 32.40 | 720178-C3 | 38.30 |
| .093 (3/32) | **.005** | .143 (1.5x) | 1/8 | 1-1/2 | 720093 | 31.00 | 720093-C3 | 37.00 |
| .093 (3/32) | **.005** | .285 (3x) | 1/8 | 1-1/2 | 720193 | 32.40 | 720193-C3 | 38.30 |
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 5 FL | USD$ | 5 FL | USD$ |
| .125 (1/8) | **.010** | .187 (1.5x) | 1/8 | 1-1/2 | 719610 | 28.50 | 719610-C3 | 34.50 |
| .125 (1/8) | **.010** | .375 (3x) | 1/8 | 1-1/2 | 719910 | 29.80 | 719910-C3 | 35.70 |
| .187 (3/16) | **.010** | .285 (1.5x) | 3/16 | 2 | 719510 | 32.40 | 719510-C3 | 38.60 |
| .187 (3/16) | **.010** | .570 (3x) | 3/16 | 2 | 719810 | 33.90 | 719810-C3 | 40.20 |
| .250 (1/4) | **.010** | .375 (1.5x) | 1/4 | 2-1/2 | 719410 | 38.10 | 719410-C3 | 46.20 |
| .250 (1/4) | **.010** | .750 (3x) | 1/4 | 2-1/2 | 719710 | 39.80 | 719710-C3 | 47.90 |

NEW

# MINIATURE END MILLS

## Corner Radius – Stub & Standard – Metric




- All dimensions and tolerances in metric values
- Cutter diameter down to 1.00mm
- Corner radius for improved strength
- Center cutting • Solid carbide • CNC ground in the USA

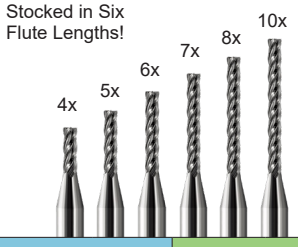


| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.00mm}_{-.02mm}$ | R $^{+.025mm}_{-.025mm}$ | $L_2$ $^{+.25mm}_{-.00mm}$ | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | |
| 1.00 mm | **.20 mm** | 1.50 mm (1.5x) | 3 mm | 38 mm | 740922 | 27.50 | 740922-C3 | 33.40 | NEW |
| 1.00 mm | **.20 mm** | 3.00 mm (3x) | 3 mm | 38 mm | 744122 | 27.50 | 744122-C3 | 33.40 | NEW |
| 1.50 mm | **.20 mm** | 2.20 mm (1.5x) | 3 mm | 38 mm | 740933 | 27.50 | 740933-C3 | 33.40 | NEW |
| 1.50 mm | **.20 mm** | 4.50 mm (3x) | 3 mm | 38 mm | 744133 | 27.50 | 744133-C3 | 33.40 | NEW |
| 2.00 mm | **.20 mm** | 3.00 mm (1.5x) | 3 mm | 38 mm | 740945 | 27.50 | 740945-C3 | 33.40 | NEW |
| 2.00 mm | **.20 mm** | 6.00 mm (3x) | 3 mm | 38 mm | 744145 | 27.50 | 744145-C3 | 33.40 | NEW |
| 3.00 mm | **.20 mm** | 4.50 mm (1.5x) | 3 mm | 38 mm | 740957 | 27.50 | 740957-C3 | 33.40 | NEW |
| 3.00 mm | **.20 mm** | 9.00 mm (3x) | 3 mm | 38 mm | 744157 | 27.50 | 744157-C3 | 33.40 | NEW |
| $D_1$ $^{+.00mm}_{-.04mm}$ | R $^{+.025mm}_{-.025mm}$ | $L_2$ $^{+.75mm}_{-.00mm}$ | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | |
| 4.00 mm | **.50 mm** | 6.00 mm (1.5x) | 4 mm | 50 mm | 740661 | 28.20 | 740661-C3 | 34.20 | NEW |
| 4.00 mm | **.50 mm** | 12.00 mm (3x) | 4 mm | 50 mm | 742661 | 28.20 | 742661-C3 | 34.20 | NEW |
| 4.00 mm | **1.00 mm** | 6.00 mm (1.5x) | 4 mm | 50 mm | 740561 | 28.20 | 740561-C3 | 34.20 | NEW |
| 4.00 mm | **1.00 mm** | 12.00 mm (3x) | 4 mm | 50 mm | 742561 | 28.20 | 742561-C3 | 34.20 | NEW |
| 5.00 mm | **.50 mm** | 7.50 mm (1.5x) | 5 mm | 50 mm | 740664 | 28.20 | 740664-C3 | 34.20 | NEW |
| 5.00 mm | **.50 mm** | 15.00 mm (3x) | 5 mm | 50 mm | 742664 | 28.20 | 742664-C3 | 34.20 | NEW |
| 5.00 mm | **1.00 mm** | 7.50 mm (1.5x) | 5 mm | 50 mm | 740564 | 28.20 | 740564-C3 | 34.20 | NEW |
| 5.00 mm | **1.00 mm** | 15.00 mm (3x) | 5 mm | 50 mm | 742564 | 28.20 | 742564-C3 | 34.20 | NEW |
| 6.00 mm | **.50 mm** | 9.00 mm (1.5x) | 6 mm | 50 mm | 740666 | 34.90 | 740666-C3 | 40.90 | NEW |
| 6.00 mm | **.50 mm** | 18.00 mm (3x) | 6 mm | 50 mm | 742666 | 34.90 | 742666-C3 | 40.90 | NEW |
| 6.00 mm | **1.00 mm** | 9.00 mm (1.5x) | 6 mm | 50 mm | 740566 | 34.90 | 740566-C3 | 40.90 | NEW |
| 6.00 mm | **1.00 mm** | 18.00 mm (3x) | 6 mm | 50 mm | 742566 | 34.90 | 742566-C3 | 40.90 | NEW |
| 8.00 mm | **.50 mm** | 12.00 mm (1.5x) | 8 mm | 63 mm | 740670 | 38.90 | 740670-C3 | 44.90 | NEW |
| 8.00 mm | **.50 mm** | 24.00 mm (3x) | 8 mm | 63 mm | 742670 | 38.90 | 742670-C3 | 44.90 | NEW |
| 8.00 mm | **1.00 mm** | 12.00 mm (1.5x) | 8 mm | 63 mm | 740570 | 38.90 | 740570-C3 | 44.90 | NEW |
| 8.00 mm | **1.00 mm** | 24.00 mm (3x) | 8 mm | 63 mm | 742570 | 38.90 | 742570-C3 | 44.90 | NEW |
| 10.00 mm | **.50 mm** | 15.00 mm (1.5x) | 10 mm | 75 mm | 740673 | 52.90 | 740673-C3 | 58.90 | NEW |
| 10.00 mm | **.50 mm** | 30.00 mm (3x) | 10 mm | 75 mm | 742673 | 52.90 | 742673-C3 | 58.90 | NEW |
| 10.00 mm | **1.00 mm** | 15.00 mm (1.5x) | 10 mm | 75 mm | 740573 | 52.90 | 740573-C3 | 58.90 | NEW |
| 10.00 mm | **1.00 mm** | 30.00 mm (3x) | 10 mm | 75 mm | 742573 | 52.90 | 742573-C3 | 58.90 | NEW |
| 12.00 mm | **.50 mm** | 18.00 mm (1.5x) | 12 mm | 75 mm | 740676 | 82.10 | 740676-C3 | 88.10 | NEW |
| 12.00 mm | **.50 mm** | 36.00 mm (3x) | 12 mm | 75 mm | 742676 | 82.10 | 742676-C3 | 88.10 | NEW |
| 12.00 mm | **1.00 mm** | 18.00 mm (1.5x) | 12 mm | 75 mm | 740576 | 82.10 | 740576-C3 | 88.10 | NEW |
| 12.00 mm | **1.00 mm** | 36.00 mm (3x) | 12 mm | 75 mm | 742576 | 82.10 | 742576-C3 | 88.10 | NEW |

# MINIATURE END MILLS

## Corner Radius – Long Flute




- **Long flute and long shank design for deep cavities**
- Mills deep pockets • 4 flutes
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
| .015 (1/64) | .003 | .078 (5x) | 4 | 1/8 | 2-1/2 | 981415 | 82.40 | 981415-C3 | 88.30 | | |
| .015 (1/64) | .003 | .125 (8x) | 4 | 1/8 | 2-1/2 | 933615 | 94.50 | 933615-C3 | 100.40 | | |
| .020 (.5 mm) | .003 | .100 (5x) | 4 | 1/8 | 2-1/2 | 981420 | 72.50 | 981420-C3 | 78.40 | | |
| .020 (.5 mm) | .003 | .160 (8x) | 4 | 1/8 | 2-1/2 | 933620 | 84.20 | 933620-C3 | 90.10 | | |
| .020 (.5 mm) | .005 | .100 (5x) | 4 | 1/8 | 2-1/2 | 959620 | 72.50 | 959620-C3 | 78.40 | | |
| .020 (.5 mm) | .005 | .160 (8x) | 4 | 1/8 | 2-1/2 | 949820 | 84.20 | 949820-C3 | 90.10 | | |
| .025 | .005 | .125 (5x) | 4 | 1/8 | 2-1/2 | 959625 | 68.90 | 959625-C3 | 74.80 | | |
| .025 | .005 | .203 (8x) | 4 | 1/8 | 2-1/2 | 949825 | 80.80 | 949825-C3 | 86.70 | | |
| .031 (1/32) | .005 | .125 (4x) | 4 | 1/8 | 2-1/2 | 787531 | 65.50 | 787531-C3 | 71.40 | | |
| .031 (1/32) | .005 | .156 (5x) | 4 | 1/8 | 2-1/2 | 959631 | 66.80 | 959631-C3 | 72.80 | | |
| .031 (1/32) | .005 | .187 (6x) | 4 | 1/8 | 2-1/2 | 801131 | 70.70 | 801131-C3 | 76.60 | | |
| .031 (1/32) | .005 | .218 (7x) | 4 | 1/8 | 2-1/2 | 800931 | 73.30 | 800931-C3 | 79.20 | | |
| .031 (1/32) | .005 | .250 (8x) | 4 | 1/8 | 2-1/2 | 949831 | 78.50 | 949831-C3 | 84.40 | | |
| .031 (1/32) | .008 | .156 (5x) | 4 | 1/8 | 2-1/2 | 884231 | 67.10 | 884231-C3 | 73.00 | | |
| .031 (1/32) | .008 | .250 (8x) | 4 | 1/8 | 2-1/2 | 887431 | 78.50 | 887431-C3 | 84.40 | | |
| .031 (1/32) | .010 | .156 (5x) | 4 | 1/8 | 2-1/2 | 964331 | 66.80 | 964331-C3 | 72.80 | | |
| .031 (1/32) | .010 | .187 (6x) | 4 | 1/8 | 2-1/2 | 739831 | 70.70 | 739831-C3 | 76.60 | | |
| .031 (1/32) | .010 | .250 (8x) | 4 | 1/8 | 2-1/2 | 938031 | 78.50 | 938031-C3 | 84.40 | | |
| .039 (1 mm) | .005 | .203 (5x) | 4 | 1/8 | 2-1/2 | 959639 | 63.50 | 959639-C3 | 69.40 | | |
| .039 (1 mm) | .005 | .325 (8x) | 4 | 1/8 | 2-1/2 | 949839 | 71.00 | 949839-C3 | 76.90 | | |
| .039 (1 mm) | .010 | .203 (5x) | 4 | 1/8 | 2-1/2 | 964339 | 63.50 | 964339-C3 | 69.40 | | |
| .039 (1 mm) | .010 | .325 (8x) | 4 | 1/8 | 2-1/2 | 938039 | 71.00 | 938039-C3 | 76.90 | | |
| .040 | .005 | .203 (5x) | 4 | 1/8 | 2-1/2 | 959640 | 63.50 | 959640-C3 | 69.40 | | |
| .040 | .005 | .325 (8x) | 4 | 1/8 | 2-1/2 | 949840 | 71.00 | 949840-C3 | 76.90 | | |
| .040 | .010 | .203 (5x) | 4 | 1/8 | 2-1/2 | 964340 | 63.50 | 964340-C3 | 69.40 | | |
| .040 | .010 | .325 (8x) | 4 | 1/8 | 2-1/2 | 938040 | 71.00 | 938040-C3 | 76.90 | | |
| .047 (3/64) | .005 | .250 (5x) | 4 | 1/8 | 2-1/2 | 959647 | 34.90 | 959647-C3 | 40.80 | | |
| .047 (3/64) | .005 | .375 (8x) | 4 | 1/8 | 2-1/2 | 949847 | 39.70 | 949847-C3 | 45.60 | | |
| .047 (3/64) | .010 | .187 (4x) | 4 | 1/8 | 2-1/2 | 787347 | 33.50 | 787347-C3 | 39.40 | | |
| .047 (3/64) | .010 | .250 (5x) | 4 | 1/8 | 2-1/2 | 964347 | 34.90 | 964347-C3 | 40.80 | | |
| .047 (3/64) | .010 | .375 (8x) | 4 | 1/8 | 2-1/2 | 938047 | 39.70 | 938047-C3 | 45.60 | | |
| .047 (3/64) | .015 | .250 (5x) | 4 | 1/8 | 2-1/2 | 885047 | 34.90 | 885047-C3 | 40.80 | | |
| .047 (3/64) | .015 | .375 (8x) | 4 | 1/8 | 2-1/2 | 888247 | 39.70 | 888247-C3 | 45.60 | | |
| .050 | .005 | .250 (5x) | 4 | 1/8 | 2-1/2 | 959650 | 34.90 | 959650-C3 | 40.80 | | |
| .050 | .005 | .400 (8x) | 4 | 1/8 | 2-1/2 | 949850 | 40.50 | 949850-C3 | 46.40 | | |
| .060 | .005 | .312 (5x) | 4 | 1/8 | 2-1/2 | 959660 | 34.90 | 959660-C3 | 40.80 | | |
| .060 | .005 | .500 (8x) | 4 | 1/8 | 2-1/2 | 949860 | 40.50 | 949860-C3 | 46.40 | | |

continued on next page

NEW SIZES!

# MINIATURE END MILLS

## Corner Radius – Long Flute (cont.)

continued from previous page



| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
| .062 (1/16) | .005 | .250 (4x) | 4 | 1/8 | 2-1/2 | 787562 | 33.50 | 787562-C3 | 39.40 | | |
| .062 (1/16) | .005 | .312 (5x) | 4 | 1/8 | 2-1/2 | 959662 | 34.90 | 959662-C3 | 40.80 | | |
| .062 (1/16) | .005 | .375 (6x) | 4 | 1/8 | 2-1/2 | 801162 | 37.20 | 801162-C3 | 43.10 | | |
| .062 (1/16) | .005 | .437 (7x) | 4 | 1/8 | 2-1/2 | 800962 | 37.60 | 800962-C3 | 43.50 | | |
| .062 (1/16) | .005 | .500 (8x) | 4 | 1/8 | 2-1/2 | 949862 | 39.70 | 949862-C3 | 45.60 | | |
| .062 (1/16) | .005 | .625 (10x) | 4 | 1/8 | 2-1/2 | 870562 | 46.30 | 870562-C3 | 52.20 | | |
| .062 (1/16) | .008 | .312 (5x) | 4 | 1/8 | 2-1/2 | 884262 | 35.30 | 884262-C3 | 41.20 | | |
| .062 (1/16) | .008 | .500 (8x) | 4 | 1/8 | 2-1/2 | 887462 | 40.50 | 887462-C3 | 46.40 | | |
| .062 (1/16) | .010 | .250 (4x) | 4 | 1/8 | 2-1/2 | 787362 | 33.50 | 787362-C3 | 39.40 | | |
| .062 (1/16) | .010 | .312 (5x) | 4 | 1/8 | 2-1/2 | 964362 | 34.90 | 964362-C3 | 40.80 | 964362-C4 | 49.90 |
| .062 (1/16) | .010 | .375 (6x) | 4 | 1/8 | 2-1/2 | 739862 | 37.20 | 739862-C3 | 43.10 | | |
| .062 (1/16) | .010 | .500 (8x) | 4 | 1/8 | 2-1/2 | 938062 | 39.70 | 938062-C3 | 45.60 | 938062-C4 | 55.40 |
| .062 (1/16) | .010 | .625 (10x) | 4 | 1/8 | 2-1/2 | 849262 | 46.30 | 849262-C3 | 52.20 | | |
| .062 (1/16) | .015 | .312 (5x) | 4 | 1/8 | 2-1/2 | 885062 | 34.90 | 885062-C3 | 40.80 | | |
| .062 (1/16) | .015 | .500 (8x) | 4 | 1/8 | 2-1/2 | 888262 | 39.70 | 888262-C3 | 45.60 | | |
| .062 (1/16) | .020 | .312 (5x) | 4 | 1/8 | 2-1/2 | 885862 | 34.90 | 885862-C3 | 40.80 | 885862-C4 | 50.70 |
| .062 (1/16) | .020 | .375 (6x) | 4 | 1/8 | 2-1/2 | 733762 | 37.20 | 733762-C3 | 43.10 | | |
| .062 (1/16) | .020 | .500 (8x) | 4 | 1/8 | 2-1/2 | 889062 | 39.70 | 889062-C3 | 45.60 | | |
| .062 (1/16) | .020 | .625 (10x) | 4 | 1/8 | 2-1/2 | 762662 | 46.30 | 762662-C3 | 52.20 | | |
| .078 (5/64) | .005 | .406 (5x) | 4 | 1/8 | 2-1/2 | 959678 | 34.90 | 959678-C3 | 40.80 | | |
| .078 (5/64) | .005 | .625 (8x) | 4 | 1/8 | 2-1/2 | 949878 | 39.70 | 949878-C3 | 45.60 | | |
| .078 (5/64) | .010 | .312 (4x) | 4 | 1/8 | 2-1/2 | 787378 | 33.50 | 787378-C3 | 39.40 | | |
| .078 (5/64) | .010 | .406 (5x) | 4 | 1/8 | 2-1/2 | 964378 | 34.90 | 964378-C3 | 40.80 | 964378-C4 | 50.70 |
| .078 (5/64) | .010 | .625 (8x) | 4 | 1/8 | 2-1/2 | 938078 | 39.70 | 938078-C3 | 45.60 | | |
| .078 (5/64) | .015 | .406 (5x) | 4 | 1/8 | 2-1/2 | 885078 | 34.90 | 885078-C3 | 40.80 | | |
| .078 (5/64) | .015 | .625 (8x) | 4 | 1/8 | 2-1/2 | 888278 | 39.70 | 888278-C3 | 45.60 | | |
| .078 (5/64) | .020 | .406 (5x) | 4 | 1/8 | 2-1/2 | 885878 | 34.90 | 885878-C3 | 40.80 | | |
| .078 (5/64) | .020 | .625 (8x) | 4 | 1/8 | 2-1/2 | 889078 | 39.70 | 889078-C3 | 45.60 | | |
| .078 (5/64) | .025 | .406 (5x) | 4 | 1/8 | 2-1/2 | 719378 | 34.90 | 719378-C3 | 40.80 | | |
| .093 (3/32) | .005 | .375 (4x) | 4 | 1/8 | 2-1/2 | 787593 | 33.50 | 787593-C3 | 39.40 | | |
| .093 (3/32) | .005 | .500 (5x) | 4 | 1/8 | 2-1/2 | 959693 | 34.90 | 959693-C3 | 40.80 | | |
| .093 (3/32) | .005 | .585 (6x) | 4 | 1/8 | 2-1/2 | 801193 | 37.20 | 801193-C3 | 43.10 | | |
| .093 (3/32) | .005 | .670 (7x) | 4 | 1/8 | 2-1/2 | 800993 | 37.60 | 800993-C3 | 43.50 | | |
| .093 (3/32) | .005 | .750 (8x) | 4 | 1/8 | 2-1/2 | 949893 | 39.70 | 949893-C3 | 45.60 | | |
| .093 (3/32) | .005 | .950 (10x) | 4 | 1/8 | 2-1/2 | 870593 | 47.10 | 870593-C3 | 53.00 | | |
| .093 (3/32) | .008 | .500 (5x) | 4 | 1/8 | 2-1/2 | 884293 | 35.30 | 884293-C3 | 41.20 | | |
| .093 (3/32) | .008 | .750 (8x) | 4 | 1/8 | 2-1/2 | 887493 | 40.50 | 887493-C3 | 46.40 | | |
| .093 (3/32) | .010 | .375 (4x) | 4 | 1/8 | 2-1/2 | 787393 | 33.50 | 787393-C3 | 39.40 | | |
| .093 (3/32) | .010 | .500 (5x) | 4 | 1/8 | 2-1/2 | 964393 | 34.90 | 964393-C3 | 40.80 | 964393-C4 | 50.70 |
| .093 (3/32) | .010 | .750 (8x) | 4 | 1/8 | 2-1/2 | 938093 | 39.70 | 938093-C3 | 45.60 | | |
| .093 (3/32) | .010 | .950 (10x) | 4 | 1/8 | 2-1/2 | 849293 | 46.30 | 849293-C3 | 52.20 | | |
| .093 (3/32) | .015 | .500 (5x) | 4 | 1/8 | 2-1/2 | 885093 | 34.90 | 885093-C3 | 40.80 | | |
| .093 (3/32) | .015 | .750 (8x) | 4 | 1/8 | 2-1/2 | 888293 | 39.70 | 888293-C3 | 45.60 | | |
| .093 (3/32) | .020 | .500 (5x) | 4 | 1/8 | 2-1/2 | 885893 | 34.90 | 885893-C3 | 40.80 | | |
| .093 (3/32) | .020 | .750 (8x) | 4 | 1/8 | 2-1/2 | 889093 | 39.70 | 889093-C3 | 45.60 | | |

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# MINIATURE END MILLS

## Corner Radius – Long Flute (cont.)

continued from previous page

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
| .093 (3/32) | .020 | .950 (10x) | 4 | 1/8 | 2-1/2 | 762693 | 47.10 | 762693-C3 | 53.00 | | |
| .093 (3/32) | .025 | .500 (5x) | 4 | 1/8 | 2-1/2 | 719393 | 34.90 | 719393-C3 | 40.80 | | |
| .093 (3/32) | .030 | .375 (4x) | 4 | 1/8 | 2-1/2 | 719293 | 33.50 | 719293-C3 | 39.40 | | |
| .093 (3/32) | .030 | .500 (5x) | 4 | 1/8 | 2-1/2 | 886693 | 34.90 | 886693-C3 | 40.80 | | |
| .093 (3/32) | .030 | .750 (8x) | 4 | 1/8 | 2-1/2 | 889893 | 39.70 | 889893-C3 | 45.60 | | |
| .100 | .005 | .500 (5x) | 4 | 1/8 | 2-1/2 | 959700 | 34.90 | 959700-C3 | 40.80 | | |
| .100 | .010 | .500 (5x) | 4 | 1/8 | 2-1/2 | 964400 | 34.90 | 964400-C3 | 40.80 | | |
| .100 | .010 | .800 (8x) | 4 | 1/8 | 2-1/2 | 938100 | 39.70 | 938100-C3 | 45.60 | | |
| .109 (7/64) | .005 | .570 (5x) | 4 | 1/8 | 2-1/2 | 912502 | 34.90 | 912502-C3 | 40.80 | | |
| .118 (3 mm) | .005 | .625 (5x) | 4 | 1/8 | 2-1/2 | 912505 | 34.90 | 912505-C3 | 40.80 | | |
| .118 (3 mm) | .005 | .950 (8x) | 4 | 1/8 | 2-1/2 | 905305 | 39.70 | 905305-C3 | 45.60 | | |
| .118 (3 mm) | .010 | .625 (5x) | 4 | 1/8 | 2-1/2 | 912605 | 34.90 | 912605-C3 | 40.80 | | |
| .118 (3 mm) | .010 | .950 (8x) | 4 | 1/8 | 2-1/2 | 905405 | 39.70 | 905405-C3 | 45.60 | | |
| NEW .118 (3 mm) | .020 | .625 (5x) | 4 | 1/8 | 2-1/2 | 885905 | 34.90 | 885905-C3 | 40.80 | | |
| NEW .118 (3 mm) | .020 | .950 (8x) | 4 | 1/8 | 2-1/2 | 889105 | 39.70 | 889105-C3 | 45.60 | | |

| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .005 | .625 (5x) | 4 | 1/8 | 2-1/2 | 950905 | 33.00 | 950905-C3 | 38.90 | | |
| .125 (1/8) | .005 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 981905 | 36.10 | 981905-C3 | 42.00 | | |
| .125 (1/8) | .010 | .625 (5x) | 4 | 1/8 | 2-1/2 | 950910 | 33.00 | 950910-C3 | 38.90 | 950910-C4 | 48.50 |
| .125 (1/8) | .010 | .750 (6x) | 4 | 1/8 | 2-1/2 | 733810 | 34.60 | 733810-C3 | 40.50 | | |
| .125 (1/8) | .010 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 981910 | 36.10 | 981910-C3 | 42.00 | | |
| .125 (1/8) | .010 | 1.250 (10x) | 4 | 1/8 | 3 | 762210 | 42.40 | 762210-C3 | 48.30 | | |
| .125 (1/8) | .015 | .625 (5x) | 4 | 1/8 | 2-1/2 | 950915 | 33.00 | 950915-C3 | 38.90 | | |
| .125 (1/8) | .015 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 981915 | 36.10 | 981915-C3 | 42.00 | | |
| .125 (1/8) | .020 | .625 (5x) | 4 | 1/8 | 2-1/2 | 950920 | 33.00 | 950920-C3 | 38.90 | | |
| .125 (1/8) | .020 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 981920 | 36.10 | 981920-C3 | 42.00 | | |
| .125 (1/8) | .020 | 1.250 (10x) | 4 | 1/8 | 3 | 762220 | 42.40 | 762220-C3 | 48.30 | | |
| .125 (1/8) | .025 | .625 (5x) | 4 | 1/8 | 2-1/2 | 950925 | 33.00 | 950925-C3 | 38.90 | | |
| .125 (1/8) | .030 | .625 (5x) | 4 | 1/8 | 2-1/2 | 950930 | 33.00 | 950930-C3 | 38.90 | 950930-C4 | 48.80 |
| .125 (1/8) | .030 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 981930 | 36.10 | 981930-C3 | 42.00 | | |
| .125 (1/8) | .030 | 1.250 (10x) | 4 | 1/8 | 3 | 762230 | 42.40 | 762230-C3 | 48.30 | | |
| .125 (1/8) | .040 | .625 (5x) | 4 | 1/8 | 2-1/2 | 950940 | 33.00 | 950940-C3 | 38.90 | | |
| .125 (1/8) | .040 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 981940 | 36.10 | 981940-C3 | 42.00 | | |
| .140 (9/64) | .010 | .750 (5x) | 4 | 3/16 | 3 | 793610 | 40.80 | 793610-C3 | 47.30 | | |
| .140 (9/64) | .015 | .750 (5x) | 4 | 3/16 | 3 | 793615 | 41.60 | 793615-C3 | 48.10 | | |
| .140 (9/64) | .030 | .750 (5x) | 4 | 3/16 | 3 | 793630 | 41.60 | 793630-C3 | 48.30 | | |
| .156 (5/32) | .010 | .750 (5x) | 4 | 3/16 | 3 | 830910 | 40.80 | 830910-C3 | 47.30 | | |
| .156 (5/32) | .010 | 1.250 (8x) | 4 | 3/16 | 3 | 739710 | 41.90 | 739710-C3 | 48.40 | | |
| .156 (5/32) | .030 | .750 (5x) | 4 | 3/16 | 3 | 830930 | 40.80 | 830930-C3 | 47.30 | | |
| .156 (5/32) | .030 | 1.250 (8x) | 4 | 3/16 | 3 | 738330 | 41.90 | 738330-C3 | 48.60 | | |

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NEW SIZES!

# MINIATURE END MILLS

## Corner Radius – Long Flute (cont.)

continued from previous page



| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
| .187 (3/16) | .005 | 1.000 (5x) | 4 | 3/16 | 3 | 932405 | 38.80 | 932405-C3 | 45.50 | | |
| .187 (3/16) | .010 | 1.000 (5x) | 4 | 3/16 | 3 | 932410 | 38.80 | 932410-C3 | 45.50 | | |
| .187 (3/16) | .010 | 1.500 (8x) | 4 | 3/16 | 3 | 830810 | 40.00 | 830810-C3 | 46.30 | | |
| .187 (3/16) | .020 | 1.000 (5x) | 4 | 3/16 | 3 | 932420 | 38.80 | 932420-C3 | 45.50 | | |
| .187 (3/16) | .020 | 1.500 (8x) | 4 | 3/16 | 3 | 830820 | 40.00 | 830820-C3 | 46.30 | | |
| .187 (3/16) | .025 | 1.000 (5x) | 4 | 3/16 | 3 | 932425 | 38.80 | 932425-C3 | 45.50 | | |
| .187 (3/16) | .030 | 1.000 (5x) | 4 | 3/16 | 3 | 932430 | 38.80 | 932430-C3 | 45.50 | 932430-C4 | 59.50 |
| .187 (3/16) | .030 | 1.500 (8x) | 4 | 3/16 | 3 | 830830 | 40.00 | 830830-C3 | 46.30 | | |
| .187 (3/16) | .040 | 1.000 (5x) | 4 | 3/16 | 3 | 932450 | 38.80 | 932450-C3 | 45.50 | | |
| .250 (1/4) | .005 | 1.250 (5x) | 4 | 1/4 | 4 | 917105 | 43.50 | 917105-C3 | 52.10 | | |
| .250 (1/4) | .010 | 1.250 (5x) | 4 | 1/4 | 4 | 917110 | 43.50 | 917110-C3 | 52.10 | | |
| .250 (1/4) | .020 | 1.250 (5x) | 4 | 1/4 | 4 | 917120 | 43.50 | 917120-C3 | 52.10 | | |
| .250 (1/4) | .020 | 2.000 (8x) | 4 | 1/4 | 4 | 763020 | 44.90 | 763020-C3 | 53.60 | | |
| .250 (1/4) | .025 | 1.250 (5x) | 4 | 1/4 | 4 | 917125 | 43.50 | 917125-C3 | 52.10 | | |
| .250 (1/4) | .030 | 1.250 (5x) | 4 | 1/4 | 4 | 917130 | 43.50 | 917130-C3 | 52.10 | 917130-C4 | 66.90 |
| .250 (1/4) | .030 | 2.000 (8x) | 4 | 1/4 | 4 | 763030 | 44.90 | 763030-C3 | 53.60 | | |
| .250 (1/4) | .040 | 1.250 (5x) | 4 | 1/4 | 4 | 917140 | 43.50 | 917140-C3 | 52.10 | | |
| .375 (3/8) | .005 | 2.000 (5x) | 4 | 3/8 | 4 | 800805 | 59.00 | 800805-C3 | 74.70 | | |
| .375 (3/8) | .010 | 2.000 (5x) | 4 | 3/8 | 4 | 800810 | 59.00 | 800810-C3 | 74.70 | | |
| .375 (3/8) | .030 | 2.000 (5x) | 4 | 3/8 | 4 | 800830 | 59.00 | 800830-C3 | 71.20 | | |
| .375 (3/8) | .040 | 2.000 (5x) | 4 | 3/8 | 4 | 800840 | 59.00 | 800840-C3 | 74.70 | | |

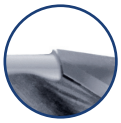
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# MINIATURE END MILLS

## Corner Radius – Long Reach, Standard Flute



Reduced Neck Diameter to Avoid Heeling

- Corner radius for improved strength
- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

| | CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | | ALTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0005″ −.0005″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | $D_2$ | $L_1$ | 2 FL | 4 FL | USD$ | 4 FL | USD$ |
| | .020 | .005 | .060 | .100 (5x) | 1/8 | 1-1/2 | | 864120 | 54.00 | 864120-C3 | 59.90 |
| | .020 | .005 | .060 | .160 (8x) | 1/8 | 1-1/2 | | 865720 | 56.20 | 865720-C3 | 62.10 |
| | .031 (1/32) | .005 | .093 | .156 (5x) | 1/8 | 1-1/2 | 864131 | 875231 | 52.60 | 875231-C3 | 58.50 |
| | .031 (1/32) | .005 | .093 | .250 (8x) | 1/8 | 1-1/2 | 865731 | 876831 | 53.70 | 876831-C3 | 59.60 |
| | .031 (1/32) | .010 | .093 | .156 (5x) | 1/8 | 1-1/2 | 864931 | 876031 | 52.60 | 876031-C3 | 58.50 |
| | .031 (1/32) | .010 | .093 | .250 (8x) | 1/8 | 1-1/2 | 866531 | 877631 | 53.70 | 877631-C3 | 59.60 |
| | .039 (1 mm) | .005 | .117 | .203 (5x) | 1/8 | 1-1/2 | | 875239 | 53.70 | 875239-C3 | 59.60 |
| | .039 (1 mm) | .005 | .117 | .325 (8x) | 1/8 | 1-1/2 | | 865739 | 53.70 | 865739-C3 | 59.60 |
| | .039 (1 mm) | .010 | .117 | .325 (8x) | 1/8 | 1-1/2 | | 876039 | 53.70 | 876039-C3 | 59.60 |
| | .040 | .005 | .120 | .203 (5x) | 1/8 | 1-1/2 | | 875240 | 53.70 | 875240-C3 | 59.60 |
| | .040 | .005 | .120 | .325 (8x) | 1/8 | 1-1/2 | | 865740 | 53.70 | 865740-C3 | 59.60 |
| | .047 (3/64) | .005 | .141 | .250 (5x) | 1/8 | 1-1/2 | 864147 | 875247 | 51.00 | 875247-C3 | 56.90 |
| | .047 (3/64) | .005 | .141 | .375 (8x) | 1/8 | 1-1/2 | 865747 | 876847 | 52.00 | 876847-C3 | 57.90 |
| | .047 (3/64) | .010 | .141 | .250 (5x) | 1/8 | 1-1/2 | 864947 | 876047 | 51.00 | 876047-C3 | 56.90 |
| | .047 (3/64) | .010 | .141 | .281 (6x) | 1/8 | 1-1/2 | | 730647 | 51.00 | 730647-C3 | 56.90 |
| | .047 (3/64) | .010 | .141 | .375 (8x) | 1/8 | 1-1/2 | 866547 | 877647 | 52.00 | 877647-C3 | 57.90 |
| | .047 (3/64) | .010 | .141 | .480 (10x) | 1/8 | 1-1/2 | | 730447 | 52.60 | 730447-C3 | 58.50 |
| | .062 (1/16) | .005 | .186 | .312 (5x) | 1/8 | 1-1/2 | 864162 | 875262 | 51.00 | 875262-C3 | 56.90 |
| | .062 (1/16) | .005 | .186 | .500 (8x) | 1/8 | 1-1/2 | 865762 | 876862 | 52.00 | 876862-C3 | 57.90 |
| | .062 (1/16) | .010 | .186 | .312 (5x) | 1/8 | 1-1/2 | 864962 | 876062 | 51.00 | 876062-C3 | 56.90 |
| | .062 (1/16) | .010 | .186 | .375 (6x) | 1/8 | 1-1/2 | | 730662 | 51.00 | 730662-C3 | 56.90 |
| | .062 (1/16) | .010 | .186 | .500 (8x) | 1/8 | 1-1/2 | 866562 | 877662 | 52.00 | 877662-C3 | 57.90 |
| | .062 (1/16) | .010 | .186 | .625 (10x) | 1/8 | 2 | | 730462 | 52.60 | 730462-C3 | 58.50 |
| NEW | .062 (1/16) | .015 | .186 | .312 (5x) | 1/8 | 1-1/2 | | 697162 | 51.00 | 697162-C3 | 56.90 |
| NEW | .062 (1/16) | .015 | .186 | .500 (8x) | 1/8 | 1-1/2 | | 696962 | 51.00 | 696962-C3 | 56.90 |
| | .062 (1/16) | .020 | .186 | .312 (5x) | 1/8 | 1-1/2 | | 764362 | 51.00 | 764362-C3 | 56.90 |
| | .062 (1/16) | .020 | .186 | .500 (8x) | 1/8 | 1-1/2 | | 759362 | 52.00 | 759362-C3 | 57.90 |
| | .078 (5/64) | .005 | .234 | .406 (5x) | 1/8 | 1-1/2 | 864178 | 875278 | 51.00 | 875278-C3 | 56.90 |
| | .078 (5/64) | .005 | .234 | .625 (8x) | 1/8 | 2 | 865778 | 876878 | 52.60 | 876878-C3 | 58.50 |
| | .078 (5/64) | .010 | .234 | .406 (5x) | 1/8 | 1-1/2 | 864978 | 876078 | 51.00 | 876078-C3 | 56.90 |
| | .078 (5/64) | .010 | .234 | .475 (6x) | 1/8 | 1-1/2 | | 730678 | 51.00 | 730678-C3 | 56.90 |
| | .078 (5/64) | .010 | .234 | .625 (8x) | 1/8 | 2 | 866578 | 877678 | 52.60 | 877678-C3 | 58.50 |
| | .078 (5/64) | .020 | .234 | .406 (5x) | 1/8 | 1-1/2 | | 764378 | 52.60 | 764378-C3 | 58.50 |
| | .078 (5/64) | .020 | .234 | .625 (8x) | 1/8 | 2 | | 759378 | 52.60 | 759378-C3 | 58.50 |
| | .093 (3/32) | .005 | .279 | .500 (5x) | 1/8 | 1-1/2 | 864193 | 875293 | 52.00 | 875293-C3 | 57.90 |
| | .093 (3/32) | .005 | .279 | .750 (8x) | 1/8 | 2 | 865793 | 876893 | 52.60 | 876893-C3 | 58.50 |
| | .093 (3/32) | .010 | .279 | .500 (5x) | 1/8 | 1-1/2 | 864993 | 876093 | 52.00 | 876093-C3 | 57.90 |
| | .093 (3/32) | .010 | .279 | .585 (6x) | 1/8 | 1-1/2 | | 730693 | 52.00 | 730693-C3 | 57.90 |

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NEW SIZES!

# MINIATURE END MILLS

## Corner Radius – Long Reach, Standard Flute (cont.)

continued from previous page

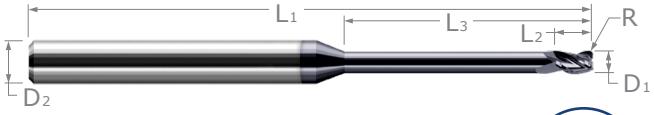
| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | 4 FL | USD$ | 4 FL | USD$ |
| .093 (3/32) | .010 | .279 | .750 (8x) | 1/8 | 2 | 866593 | 877693 | 52.60 | 877693-C3 | 58.50 |
| .093 (3/32) | .010 | .279 | .950 (10x) | 1/8 | 2 | | 730493 | 52.60 | 730493-C3 | 58.50 |
| .093 (3/32) | .020 | .279 | .500 (5x) | 1/8 | 1-1/2 | | 764393 | 52.00 | 764393-C3 | 57.90 |
| .093 (3/32) | .020 | .279 | .750 (8x) | 1/8 | 2 | | 759393 | 52.60 | 759393-C3 | 58.50 |
| .093 (3/32) | .030 | .279 | .500 (5x) | 1/8 | 1-1/2 | | 762793 | 52.00 | 762793-C3 | 57.90 |
| .093 (3/32) | .030 | .279 | .750 (8x) | 1/8 | 2 | | 762093 | 52.60 | 762093-C3 | 58.50 |
| .109 (7/64) | .010 | .327 | .900 (8x) | 1/8 | 2 | | 877702 | 52.60 | 877702-C3 | 58.50 |
| .118 (3 mm) | .010 | .354 | .950 (8x) | 1/8 | 2 | | 866605 | 53.20 | 866605-C3 | 59.20 |
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | 4 FL | USD$ | 4 FL | USD$ |
| .125 (1/8) | .005 | .375 | .625 (5x) | 1/8 | 1-1/2 | 864208 | 875308 | 52.00 | 875308-C3 | 57.90 |
| .125 (1/8) | .005 | .375 | 1.000 (8x) | 1/8 | 2 | 865808 | 876908 | 52.00 | 876908-C3 | 57.90 |
| .125 (1/8) | .010 | .375 | .625 (5x) | 1/8 | 1-1/2 | 865008 | 876108 | 52.00 | 876108-C3 | 57.90 |
| .125 (1/8) | .010 | .375 | .750 (6x) | 1/8 | 2 | | 730708 | 52.00 | 730708-C3 | 57.90 |
| .125 (1/8) | .010 | .375 | 1.000 (8x) | 1/8 | 2 | 866608 | 877708 | 52.00 | 877708-C3 | 57.90 |
| .125 (1/8) | .010 | .375 | 1.250 (10x) | 1/8 | 2-1/2 | | 730508 | 53.00 | 730508-C3 | 59.00 |
| .125 (1/8) | .020 | .375 | .625 (5x) | 1/8 | 1-1/2 | | 764408 | 53.00 | 764408-C3 | 59.00 |
| .125 (1/8) | .020 | .375 | 1.000 (8x) | 1/8 | 2-1/2 | | 759408 | 53.00 | 759408-C3 | 59.00 |
| .125 (1/8) | .030 | .375 | .625 (5x) | 1/8 | 1-1/2 | | 762808 | 52.00 | 762808-C3 | 57.90 |
| .125 (1/8) | .030 | .375 | 1.000 (8x) | 1/8 | 2-1/2 | | 762108 | 52.00 | 762108-C3 | 57.90 |
| .140 (9/64) | .010 | .422 | .750 (5x) | 3/16 | 2 | | 876109 | 60.70 | 876109-C3 | 67.00 |
| .140 (9/64) | .010 | .422 | 1.125 (8x) | 3/16 | 2-1/2 | | 877709 | 61.60 | 877709-C3 | 68.20 |
| .156 (5/32) | .010 | .469 | .750 (5x) | 3/16 | 2 | | 876110 | 60.70 | 876110-C3 | 67.00 |
| .156 (5/32) | .010 | .469 | 1.250 (8x) | 3/16 | 2-1/2 | | 877710 | 61.60 | 877710-C3 | 68.20 |
| .187 (3/16) | .010 | .563 | 1.000 (5x) | 3/16 | 2 | | 876112 | 60.70 | 876112-C3 | 67.30 |
| .187 (3/16) | .010 | .563 | 1.500 (8x) | 3/16 | 2-1/2 | | 877712 | 60.70 | 877712-C3 | 67.40 |
| .187 (3/16) | .030 | .563 | 1.000 (5x) | 3/16 | 2 | | 762812 | 60.70 | 762812-C3 | 67.00 |
| .250 (1/4) | .010 | .750 | 1.250 (5x) | 1/4 | 2-1/2 | | 876116 | 68.40 | 876116-C3 | 77.10 |
| .250 (1/4) | .010 | .750 | 2.000 (8x) | 1/4 | 4 | | 877716 | 69.50 | 877716-C3 | 79.90 |
| .250 (1/4) | .030 | .750 | 1.250 (5x) | 1/4 | 2-1/2 | | 762816 | 68.40 | 762816-C3 | 76.50 |



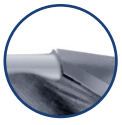
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# MINIATURE END MILLS

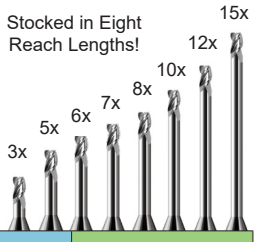
## Corner Radius – Long Reach, Stub Flute




- **Long length design for deep cavities**
- Corner radius for improved strength
- Length of cut = 1½ x diameter
- Solid carbide • CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling




| CUTTER DIA. | CORNER RADIUS | LOC | OVERALL REACH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .010 | .003 | .015 | .050 (5x) | 3 | 1/8 | 2-1/2 | 968210 | 65.40 | 968210-C3 | 71.30 | | |
| .010 | .003 | .015 | .080 (8x) | 3 | 1/8 | 2-1/2 | 972710 | 66.40 | 972710-C3 | 72.30 | | |
| .015 (1/64) | .003 | .022 | .078 (5x) | 3 | 1/8 | 2-1/2 | 968215 | 58.40 | 968215-C3 | 64.40 | | |
| .015 (1/64) | .003 | .022 | .125 (8x) | 3 | 1/8 | 2-1/2 | 972715 | 60.00 | 972715-C3 | 65.90 | | |
| .015 (1/64) | .003 | .022 | .125 (8x) | 4 | 1/8 | 2-1/2 | 729615 | 60.00 | 729615-C3 | 65.90 | | |
| .015 (1/64) | .003 | .022 | .156 (10x) | 3 | 1/8 | 2-1/2 | 719115 | 63.50 | 719115-C3 | 69.40 | | |
| .015 (1/64) | .005 | .022 | .078 (5x) | 3 | 1/8 | 2-1/2 | 37115 | 58.60 | 37115-C3 | 64.60 | | |
| .015 (1/64) | .005 | .022 | .125 (8x) | 3 | 1/8 | 2-1/2 | 38315 | 60.00 | 38315-C3 | 65.90 | | |
| .020 (.5 mm) | .003 | .030 | .100 (5x) | 3 | 1/8 | 2-1/2 | 968220 | 56.60 | 968220-C3 | 62.50 | | |
| .020 (.5 mm) | .005 | .030 | .100 (5x) | 3 | 1/8 | 2-1/2 | 37120 | 56.60 | 37120-C3 | 62.50 | | |
| .020 (.5 mm) | .005 | .030 | .160 (8x) | 3 | 1/8 | 2-1/2 | 38320 | 58.10 | 38320-C3 | 64.00 | | |
| .020 (.5 mm) | .005 | .030 | .160 (8x) | 4 | 1/8 | 2-1/2 | 729420 | 58.10 | 729420-C3 | 64.00 | | |
| .020 (.5 mm) | .005 | .030 | .200 (10x) | 3 | 1/8 | 2-1/2 | 917820 | 61.80 | 917820-C3 | 67.70 | | |
| .025 | .005 | .037 | .125 (5x) | 3 | 1/8 | 2-1/2 | 37125 | 56.60 | 37125-C3 | 62.50 | | |
| .025 | .005 | .037 | .125 (5x) | 4 | 1/8 | 2-1/2 | 800525 | 56.60 | 800525-C3 | 62.50 | | |
| .025 | .005 | .037 | .203 (8x) | 3 | 1/8 | 2-1/2 | 38325 | 58.10 | 38325-C3 | 64.00 | 38325-C4 | 73.10 |
| .025 | .005 | .037 | .250 (10x) | 3 | 1/8 | 2-1/2 | 917825 | 61.80 | 917825-C3 | 67.70 | | |
| .030 | .005 | .045 | .156 (5x) | 3 | 1/8 | 2-1/2 | 37130 | 48.60 | 37130-C3 | 54.50 | | |
| .030 | .005 | .045 | .250 (8x) | 3 | 1/8 | 2-1/2 | 38330 | 50.00 | 38330-C3 | 55.90 | | |
| .031 (1/32) | .003 | .046 | .156 (5x) | 3 | 1/8 | 2-1/2 | 968231 | 48.60 | 968231-C3 | 54.50 | | |
| .031 (1/32) | .003 | .046 | .250 (8x) | 3 | 1/8 | 2-1/2 | 972731 | 50.00 | 972731-C3 | 55.90 | | |
| .031 (1/32) | .005 | .046 | .156 (5x) | 3 | 1/8 | 2-1/2 | 37131 | 48.60 | 37131-C3 | 54.50 | 37131-C4 | 63.70 |
| .031 (1/32) | .005 | .046 | .156 (5x) | 4 | 1/8 | 2-1/2 | 800531 | 52.20 | 800531-C3 | 58.10 | | |
| .031 (1/32) | .005 | .046 | .250 (8x) | 3 | 1/8 | 2-1/2 | 38331 | 50.00 | 38331-C3 | 55.90 | 38331-C4 | 65.00 |
| .031 (1/32) | .005 | .046 | .250 (8x) | 4 | 1/8 | 2-1/2 | 800331 | 53.40 | 800331-C3 | 59.30 | | |
| .031 (1/32) | .005 | .046 | .312 (10x) | 3 | 1/8 | 2-1/2 | 917831 | 53.60 | 917831-C3 | 59.50 | | |
| .031 (1/32) | .005 | .046 | .375 (12x) | 3 | 1/8 | 2-1/2 | 39431 | 53.60 | 39431-C3 | 59.50 | 39431-C4 | 69.00 |
| .031 (1/32) | .008 | .046 | .156 (5x) | 3 | 1/8 | 2-1/2 | 912731 | 48.60 | 912731-C3 | 54.50 | | |
| .031 (1/32) | .008 | .046 | .250 (8x) | 3 | 1/8 | 2-1/2 | 909331 | 50.00 | 909331-C3 | 55.90 | | |
| .031 (1/32) | .010 | .046 | .093 (3x) | 3 | 1/8 | 2-1/2 | 925631 | 48.60 | 925631-C3 | 54.50 | | |
| .031 (1/32) | .010 | .046 | .156 (5x) | 3 | 1/8 | 2-1/2 | 41531 | 48.60 | 41531-C3 | 54.50 | | |
| .031 (1/32) | .010 | .046 | .156 (5x) | 4 | 1/8 | 2-1/2 | 730231 | 48.60 | 730231-C3 | 54.50 | | |
| .031 (1/32) | .010 | .046 | .250 (8x) | 3 | 1/8 | 2-1/2 | 41731 | 50.00 | 41731-C3 | 55.90 | | |
| .031 (1/32) | .010 | .046 | .312 (10x) | 3 | 1/8 | 2-1/2 | 953731 | 53.60 | 953731-C3 | 59.50 | | |
| .031 (1/32) | .010 | .046 | .375 (12x) | 3 | 1/8 | 2-1/2 | 41931 | 53.60 | 41931-C3 | 59.50 | | |
| .031 (1/32) | .010 | .046 | .470 (15x) | 3 | 1/8 | 2-1/2 | 947831 | 61.60 | 947831-C3 | 67.50 | | |
| .039 (1 mm) | .005 | .059 | .203 (5x) | 3 | 1/8 | 2-1/2 | 37139 | 48.60 | 37139-C3 | 54.50 | | |
| .039 (1 mm) | .005 | .059 | .325 (8x) | 3 | 1/8 | 2-1/2 | 38339 | 50.00 | 38339-C3 | 55.90 | | |
| .039 (1 mm) | .005 | .059 | .325 (8x) | 4 | 1/8 | 2-1/2 | 729439 | 50.00 | 729439-C3 | 55.90 | | |
| .039 (1 mm) | .005 | .059 | .400 (10x) | 3 | 1/8 | 2-1/2 | 917839 | 53.60 | 917839-C3 | 59.50 | | |
| .039 (1 mm) | .010 | .059 | .325 (8x) | 3 | 1/8 | 2-1/2 | 41739 | 50.00 | 41739-C3 | 55.90 | | |

continued on next page

# MINIATURE END MILLS

## Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page



| CUTTER DIA. | CORNER RADIUS | LOC | OVERALL REACH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .040 | .005 | .060 | .203 (5x) | 3 | 1/8 | 2-1/2 | 37140 | 48.60 | 37140-C3 | 54.50 | | |
| .040 | .005 | .060 | .325 (8x) | 3 | 1/8 | 2-1/2 | 38340 | 50.00 | 38340-C3 | 55.90 | | |
| .040 | .010 | .060 | .203 (5x) | 3 | 1/8 | 2-1/2 | 41540 | 48.60 | 41540-C3 | 54.50 | | |
| .040 | .010 | .060 | .325 (8x) | 3 | 1/8 | 2-1/2 | 41740 | 50.00 | 41740-C3 | 55.90 | | |
| .047 (3/64) | .005 | .070 | .250 (5x) | 3 | 1/8 | 2-1/2 | 37147 | 47.90 | 37147-C3 | 53.80 | 37147-C4 | 63.60 |
| .047 (3/64) | .005 | .070 | .375 (8x) | 3 | 1/8 | 2-1/2 | 38347 | 48.80 | 38347-C3 | 54.70 | 38347-C4 | 63.90 |
| .047 (3/64) | .005 | .070 | .375 (8x) | 4 | 1/8 | 2-1/2 | 729447 | 48.80 | 729447-C3 | 54.70 | | |
| .047 (3/64) | .005 | .070 | .480 (10x) | 3 | 1/8 | 2-1/2 | 917847 | 52.30 | 917847-C3 | 58.20 | | |
| .047 (3/64) | .005 | .070 | .570 (12x) | 3 | 1/8 | 2-1/2 | 39447 | 52.30 | 39447-C3 | 58.20 | 39447-C4 | 67.80 |
| .047 (3/64) | .010 | .070 | .141 (3x) | 3 | 1/8 | 2-1/2 | 925647 | 47.90 | 925647-C3 | 53.80 | | |
| .047 (3/64) | .010 | .070 | .250 (5x) | 3 | 1/8 | 2-1/2 | 41547 | 47.90 | 41547-C3 | 53.80 | 41547-C4 | 62.70 |
| .047 (3/64) | .010 | .070 | .375 (8x) | 3 | 1/8 | 2-1/2 | 41747 | 48.80 | 41747-C3 | 54.70 | | |
| .047 (3/64) | .010 | .070 | .480 (10x) | 3 | 1/8 | 2-1/2 | 953747 | 52.30 | 953747-C3 | 58.20 | | |
| .047 (3/64) | .010 | .070 | .570 (12x) | 3 | 1/8 | 2-1/2 | 41947 | 51.60 | 41947-C3 | 57.50 | | |
| .047 (3/64) | .010 | .070 | .710 (15x) | 3 | 1/8 | 2-1/2 | 947847 | 59.00 | 947847-C3 | 64.90 | | |
| .047 (3/64) | .015 | .070 | .250 (5x) | 3 | 1/8 | 2-1/2 | 42747 | 47.90 | 42747-C3 | 53.80 | | |
| .047 (3/64) | .015 | .070 | .375 (8x) | 3 | 1/8 | 2-1/2 | 42947 | 48.80 | 42947-C3 | 54.70 | | |
| .050 | .005 | .075 | .250 (5x) | 3 | 1/8 | 2-1/2 | 37150 | 47.90 | 37150-C3 | 53.80 | | |
| .050 | .005 | .075 | .400 (8x) | 3 | 1/8 | 2-1/2 | 38350 | 48.80 | 38350-C3 | 54.70 | | |
| .050 | .010 | .075 | .250 (5x) | 3 | 1/8 | 2-1/2 | 41550 | 47.90 | 41550-C3 | 53.80 | | |
| .050 | .010 | .075 | .400 (8x) | 3 | 1/8 | 2-1/2 | 41750 | 48.80 | 41750-C3 | 54.70 | | |
| .060 | .005 | .090 | .312 (5x) | 3 | 1/8 | 2-1/2 | 37160 | 47.90 | 37160-C3 | 53.80 | | |
| .060 | .005 | .090 | .500 (8x) | 3 | 1/8 | 2-1/2 | 38360 | 48.80 | 38360-C3 | 54.70 | | |
| .060 | .010 | .090 | .312 (5x) | 3 | 1/8 | 2-1/2 | 41560 | 47.90 | 41560-C3 | 53.80 | | |
| .060 | .010 | .090 | .500 (8x) | 3 | 1/8 | 2-1/2 | 41760 | 48.80 | 41760-C3 | 54.70 | | |
| .060 | .015 | .090 | .500 (8x) | 3 | 1/8 | 2-1/2 | 42960 | 48.80 | 42960-C3 | 54.70 | | |
| .060 | .020 | .090 | .500 (8x) | 3 | 1/8 | 2-1/2 | 970160 | 48.80 | 970160-C3 | 54.70 | | |
| .062 (1/16) | .003 | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 968262 | 47.90 | 968262-C3 | 53.80 | | |
| .062 (1/16) | .003 | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 972762 | 48.80 | 972762-C3 | 54.70 | | |
| .062 (1/16) | .005 | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 37162 | 47.90 | 37162-C3 | 53.80 | 37162-C4 | 63.60 |
| .062 (1/16) | .005 | .093 | .312 (5x) | 4 | 1/8 | 2-1/2 | 800562 | 51.20 | 800562-C3 | 57.10 | | |
| .062 (1/16) | .005 | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 38362 | 48.80 | 38362-C3 | 54.70 | 38362-C4 | 63.90 |
| .062 (1/16) | .005 | .093 | .500 (8x) | 4 | 1/8 | 2-1/2 | 800362 | 52.40 | 800362-C3 | 58.30 | | |
| .062 (1/16) | .005 | .093 | .625 (10x) | 3 | 1/8 | 2-1/2 | 917862 | 52.30 | 917862-C3 | 58.20 | | |
| .062 (1/16) | .005 | .093 | .750 (12x) | 3 | 1/8 | 2-1/2 | 39462 | 52.30 | 39462-C3 | 58.20 | | |
| .062 (1/16) | .005 | .093 | .750 (12x) | 4 | 1/8 | 2-1/2 | 706362 | 52.30 | 706362-C3 | 58.20 | | |
| .062 (1/16) | .005 | .093 | .950 (15x) | 3 | 1/8 | 2-1/2 | 727662 | 59.00 | 727662-C3 | 64.90 | | |
| .062 (1/16) | .008 | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 912762 | 47.90 | 912762-C3 | 53.80 | | |
| .062 (1/16) | .008 | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 909362 | 48.80 | 909362-C3 | 54.70 | | |
| .062 (1/16) | .010 | .093 | .187 (3x) | 3 | 1/8 | 2-1/2 | 925662 | 47.90 | 925662-C3 | 53.80 | | |
| .062 (1/16) | .010 | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 41562 | 47.90 | 41562-C3 | 53.80 | 41562-C4 | 62.70 |
| .062 (1/16) | .010 | .093 | .312 (5x) | 4 | 1/8 | 2-1/2 | 730262 | 47.90 | 730262-C3 | 53.80 | | |
| .062 (1/16) | .010 | .093 | .375 (6x) | 3 | 1/8 | 2-1/2 | 768462 | 47.90 | 768462-C3 | 53.80 | | |
| .062 (1/16) | .010 | .093 | .437 (7x) | 3 | 1/8 | 2-1/2 | 766862 | 48.80 | 766862-C3 | 54.70 | | |
| .062 (1/16) | .010 | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 41762 | 48.80 | 41762-C3 | 54.70 | 41762-C4 | 63.90 |
| .062 (1/16) | .010 | .093 | .500 (8x) | 4 | 1/8 | 2-1/2 | 729862 | 48.80 | 729862-C3 | 54.70 | | |
| .062 (1/16) | .010 | .093 | .625 (10x) | 3 | 1/8 | 2-1/2 | 953762 | 52.30 | 953762-C3 | 58.20 | | |
| .062 (1/16) | .010 | .093 | .750 (12x) | 3 | 1/8 | 2-1/2 | 41962 | 52.30 | 41962-C3 | 58.20 | 41962-C4 | 67.80 |

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# MINIATURE END MILLS

## Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIA. | CORNER RADIUS | LOC | OVERALL REACH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .062 (1/16) | .010 | .093 | .950 (15x) | 3 | 1/8 | 2-1/2 | 947862 | 59.00 | 947862-C3 | 64.90 | | |
| .062 (1/16) | .012 | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 901962 | 47.90 | 901962-C3 | 53.80 | | |
| .062 (1/16) | .012 | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 913562 | 48.80 | 913562-C3 | 54.70 | | |
| .062 (1/16) | .015 | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 42762 | 47.90 | 42762-C3 | 53.80 | 42762-C4 | 63.60 |
| .062 (1/16) | .015 | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 42962 | 48.80 | 42962-C3 | 54.70 | 42962-C4 | 64.60 |
| .062 (1/16) | .015 | .093 | .625 (10x) | 3 | 1/8 | 2-1/2 | 965662 | 52.30 | 965662-C3 | 58.20 | | |
| .062 (1/16) | .015 | .093 | .750 (12x) | 3 | 1/8 | 2-1/2 | 43162 | 52.30 | 43162-C3 | 58.20 | | |
| .062 (1/16) | .020 | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 953562 | 47.90 | 953562-C3 | 53.80 | 953562-C4 | 63.60 |
| .062 (1/16) | .020 | .093 | .312 (5x) | 4 | 1/8 | 2-1/2 | 730062 | 47.90 | 730062-C3 | 53.80 | | |
| .062 (1/16) | .020 | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 970162 | 48.80 | 970162-C3 | 54.70 | 970162-C4 | 63.90 |
| .062 (1/16) | .020 | .093 | .625 (10x) | 3 | 1/8 | 2-1/2 | 923262 | 52.30 | 923262-C3 | 58.20 | | |
| .062 (1/16) | .020 | .093 | .750 (12x) | 3 | 1/8 | 2-1/2 | 872662 | 52.30 | 872662-C3 | 58.20 | | |
| .070 | .005 | .105 | .375 (5x) | 3 | 1/8 | 2-1/2 | 37170 | 47.90 | 37170-C3 | 53.80 | | |
| .070 | .005 | .105 | .570 (8x) | 3 | 1/8 | 2-1/2 | 38370 | 48.80 | 38370-C3 | 54.70 | | |
| .070 | .010 | .105 | .375 (5x) | 3 | 1/8 | 2-1/2 | 41570 | 47.90 | 41570-C3 | 53.80 | | |
| .070 | .010 | .105 | .570 (8x) | 3 | 1/8 | 2-1/2 | 41770 | 48.80 | 41770-C3 | 54.70 | | |
| .078 (5/64) | .005 | .117 | .406 (5x) | 3 | 1/8 | 2-1/2 | 37178 | 47.90 | 37178-C3 | 53.80 | | |
| .078 (5/64) | .005 | .117 | .406 (5x) | 4 | 1/8 | 2-1/2 | 800578 | 47.90 | 800578-C3 | 53.80 | | |
| .078 (5/64) | .005 | .117 | .475 (6x) | 3 | 1/8 | 2-1/2 | 729278 | 47.90 | 729278-C3 | 53.80 | | |
| .078 (5/64) | .005 | .117 | .550 (7x) | 3 | 1/8 | 2-1/2 | 729078 | 48.80 | 729078-C3 | 54.70 | | |
| .078 (5/64) | .005 | .117 | .625 (8x) | 3 | 1/8 | 2-1/2 | 38378 | 48.80 | 38378-C3 | 54.70 | | |
| .078 (5/64) | .005 | .117 | .800 (10x) | 3 | 1/8 | 2-1/2 | 917878 | 52.30 | 917878-C3 | 58.20 | | |
| .078 (5/64) | .005 | .117 | .940 (12x) | 3 | 1/8 | 2-1/2 | 39478 | 52.30 | 39478-C3 | 58.20 | | |
| .078 (5/64) | .010 | .117 | .406 (5x) | 3 | 1/8 | 2-1/2 | 41578 | 47.90 | 41578-C3 | 53.80 | 41578-C4 | 62.70 |
| .078 (5/64) | .010 | .117 | .406 (5x) | 4 | 1/8 | 2-1/2 | 730278 | 47.90 | 730278-C3 | 53.80 | | |
| .078 (5/64) | .010 | .117 | .475 (6x) | 3 | 1/8 | 2-1/2 | 768478 | 47.90 | 768478-C3 | 53.80 | | |
| .078 (5/64) | .010 | .117 | .550 (7x) | 3 | 1/8 | 2-1/2 | 766878 | 48.80 | 766878-C3 | 54.70 | | |
| .078 (5/64) | .010 | .117 | .625 (8x) | 3 | 1/8 | 2-1/2 | 41778 | 48.80 | 41778-C3 | 54.70 | 41778-C4 | 63.90 |
| .078 (5/64) | .010 | .117 | .800 (10x) | 3 | 1/8 | 2-1/2 | 953778 | 52.30 | 953778-C3 | 58.20 | | |
| .078 (5/64) | .010 | .117 | .940 (12x) | 3 | 1/8 | 2-1/2 | 41978 | 52.30 | 41978-C3 | 58.20 | 41978-C4 | 67.80 |
| .078 (5/64) | .015 | .117 | .234 (3x) | 3 | 1/8 | 2-1/2 | 944978 | 47.90 | 944978-C3 | 53.80 | | |
| .078 (5/64) | .015 | .117 | .406 (5x) | 3 | 1/8 | 2-1/2 | 42778 | 47.90 | 42778-C3 | 53.80 | | |
| .078 (5/64) | .015 | .117 | .625 (8x) | 3 | 1/8 | 2-1/2 | 42978 | 48.80 | 42978-C3 | 54.70 | | |
| .078 (5/64) | .015 | .117 | .800 (10x) | 3 | 1/8 | 2-1/2 | 965678 | 52.30 | 965678-C3 | 58.20 | | |
| .078 (5/64) | .015 | .117 | .940 (12x) | 3 | 1/8 | 2-1/2 | 43178 | 52.80 | 43178-C3 | 58.80 | | |
| .078 (5/64) | .015 | .117 | 1.187 (15x) | 3 | 1/8 | 2-1/2 | 939378 | 59.00 | 939378-C3 | 64.90 | | |
| .078 (5/64) | .020 | .117 | .406 (5x) | 3 | 1/8 | 2-1/2 | 953578 | 47.90 | 953578-C3 | 53.80 | | |
| .078 (5/64) | .020 | .117 | .625 (8x) | 3 | 1/8 | 2-1/2 | 970178 | 48.80 | 970178-C3 | 54.70 | | |
| .078 (5/64) | .020 | .117 | .800 (10x) | 3 | 1/8 | 2-1/2 | 923278 | 52.30 | 923278-C3 | 58.20 | | |
| .080 | .005 | .120 | .406 (5x) | 3 | 1/8 | 2-1/2 | 37180 | 47.90 | 37180-C3 | 53.80 | | |
| .080 | .005 | .120 | .650 (8x) | 3 | 1/8 | 2-1/2 | 38380 | 48.80 | 38380-C3 | 54.70 | | |
| .080 | .010 | .120 | .406 (5x) | 3 | 1/8 | 2-1/2 | 41580 | 47.90 | 41580-C3 | 53.80 | | |
| .080 | .010 | .120 | .650 (8x) | 3 | 1/8 | 2-1/2 | 41780 | 48.80 | 41780-C3 | 54.70 | | |
| .090 | .005 | .135 | .450 (5x) | 3 | 1/8 | 2-1/2 | 37190 | 47.90 | 37190-C3 | 53.80 | | |
| .090 | .005 | .135 | .750 (8x) | 3 | 1/8 | 2-1/2 | 38390 | 48.80 | 38390-C3 | 54.70 | | |
| .090 | .010 | .135 | .450 (5x) | 3 | 1/8 | 2-1/2 | 41590 | 47.90 | 41590-C3 | 53.80 | | |
| .090 | .010 | .135 | .750 (8x) | 3 | 1/8 | 2-1/2 | 41790 | 48.80 | 41790-C3 | 54.70 | | |

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# MINIATURE END MILLS

## Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page



| CUTTER DIA. | CORNER RADIUS | LOC | OVERALL REACH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .093 (3/32) | .003 | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 968293 | 47.90 | 968293-C3 | 53.80 | | |
| .093 (3/32) | .003 | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 972793 | 49.80 | 972793-C3 | 55.70 | | |
| .093 (3/32) | .005 | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 37193 | 47.90 | 37193-C3 | 53.80 | 37193-C4 | 62.70 |
| .093 (3/32) | .005 | .139 | .500 (5x) | 4 | 1/8 | 2-1/2 | 800593 | 51.20 | 800593-C3 | 57.10 | | |
| .093 (3/32) | .005 | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 38393 | 48.80 | 38393-C3 | 54.70 | | |
| .093 (3/32) | .005 | .139 | .750 (8x) | 4 | 1/8 | 2-1/2 | 800393 | 52.40 | 800393-C3 | 58.30 | | |
| .093 (3/32) | .005 | .139 | .950 (10x) | 3 | 1/8 | 2-1/2 | 917893 | 52.30 | 917893-C3 | 58.20 | | |
| .093 (3/32) | .005 | .139 | 1.125 (12x) | 3 | 1/8 | 2-1/2 | 39493 | 52.30 | 39493-C3 | 58.20 | | |
| .093 (3/32) | .008 | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 912793 | 47.90 | 912793-C3 | 53.80 | | |
| .093 (3/32) | .008 | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 909393 | 48.60 | 909393-C3 | 54.50 | | |
| .093 (3/32) | .010 | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 41593 | 47.90 | 41593-C3 | 53.80 | 41593-C4 | 62.70 |
| .093 (3/32) | .010 | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 41793 | 48.80 | 41793-C3 | 54.70 | | |
| .093 (3/32) | .010 | .139 | .950 (10x) | 3 | 1/8 | 2-1/2 | 953793 | 52.30 | 953793-C3 | 58.20 | | |
| .093 (3/32) | .010 | .139 | 1.125 (12x) | 3 | 1/8 | 2-1/2 | 41993 | 52.30 | 41993-C3 | 58.20 | | |
| .093 (3/32) | .012 | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 901993 | 48.70 | 901993-C3 | 54.60 | | |
| .093 (3/32) | .012 | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 913593 | 49.80 | 913593-C3 | 55.70 | | |
| .093 (3/32) | .015 | .139 | .279 (3x) | 3 | 1/8 | 2-1/2 | 944993 | 47.90 | 944993-C3 | 53.80 | | |
| .093 (3/32) | .015 | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 42793 | 47.90 | 42793-C3 | 53.80 | 42793-C4 | 62.70 |
| .093 (3/32) | .015 | .139 | .500 (5x) | 4 | 1/8 | 2-1/2 | 728893 | 47.90 | 728893-C3 | 53.80 | | |
| .093 (3/32) | .015 | .139 | .585 (6x) | 3 | 1/8 | 2-1/2 | 765893 | 47.90 | 765893-C3 | 53.80 | | |
| .093 (3/32) | .015 | .139 | .670 (7x) | 3 | 1/8 | 2-1/2 | 766093 | 48.80 | 766093-C3 | 54.70 | | |
| .093 (3/32) | .015 | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 42993 | 48.80 | 42993-C3 | 54.70 | 42993-C4 | 63.90 |
| .093 (3/32) | .015 | .139 | .950 (10x) | 3 | 1/8 | 2-1/2 | 965693 | 52.30 | 965693-C3 | 58.20 | | |
| .093 (3/32) | .015 | .139 | 1.125 (12x) | 3 | 1/8 | 2-1/2 | 43193 | 52.30 | 43193-C3 | 58.20 | 43193-C4 | 68.10 |
| .093 (3/32) | .015 | .139 | 1.400 (15x) | 3 | 1/8 | 3 | 939393 | 59.00 | 939393-C3 | 64.90 | | |
| .093 (3/32) | .020 | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 953593 | 47.90 | 953593-C3 | 53.80 | | |
| .093 (3/32) | .020 | .139 | .500 (5x) | 4 | 1/8 | 2-1/2 | 730093 | 47.90 | 730093-C3 | 53.80 | | |
| .093 (3/32) | .020 | .139 | .585 (6x) | 3 | 1/8 | 2-1/2 | 728493 | 47.90 | 728493-C3 | 53.80 | | |
| .093 (3/32) | .020 | .139 | .670 (7x) | 3 | 1/8 | 2-1/2 | 728293 | 48.80 | 728293-C3 | 54.70 | | |
| .093 (3/32) | .020 | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 970193 | 48.80 | 970193-C3 | 54.70 | | |
| .093 (3/32) | .020 | .139 | .750 (8x) | 4 | 1/8 | 2-1/2 | 706593 | 48.80 | 706593-C3 | 54.70 | | |
| .093 (3/32) | .020 | .139 | .950 (10x) | 3 | 1/8 | 2-1/2 | 923293 | 52.30 | 923293-C3 | 58.20 | | |
| .093 (3/32) | .030 | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 42193 | 47.90 | 42193-C3 | 53.80 | 42193-C4 | 62.70 |
| .093 (3/32) | .030 | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 42393 | 48.80 | 42393-C3 | 54.70 | | |
| .093 (3/32) | .030 | .139 | .950 (10x) | 3 | 1/8 | 2-1/2 | 921493 | 52.30 | 921493-C3 | 58.20 | | |
| .100 | .005 | .150 | .500 (5x) | 3 | 1/8 | 2-1/2 | 37200 | 47.90 | 37200-C3 | 53.80 | | |
| .100 | .005 | .150 | .800 (8x) | 3 | 1/8 | 2-1/2 | 38400 | 48.80 | 38400-C3 | 54.70 | | |
| .100 | .010 | .150 | .500 (5x) | 3 | 1/8 | 2-1/2 | 41600 | 47.90 | 41600-C3 | 53.80 | | |
| .100 | .010 | .150 | .800 (8x) | 3 | 1/8 | 2-1/2 | 41800 | 48.80 | 41800-C3 | 54.70 | | |
| .109 (7/64) | .005 | .163 | .570 (5x) | 3 | 1/8 | 2-1/2 | 37202 | 47.90 | 37202-C3 | 53.80 | | |
| .109 (7/64) | .005 | .163 | .900 (8x) | 3 | 1/8 | 2-1/2 | 38402 | 48.80 | 38402-C3 | 54.70 | | |
| .109 (7/64) | .010 | .163 | .570 (5x) | 3 | 1/8 | 2-1/2 | 41602 | 47.90 | 41602-C3 | 53.80 | | |
| .109 (7/64) | .010 | .163 | .900 (8x) | 3 | 1/8 | 2-1/2 | 41802 | 48.80 | 41802-C3 | 54.70 | | |
| .118 (3 mm) | .005 | .177 | .950 (8x) | 3 | 1/8 | 2-1/2 | 38405 | 48.80 | 38405-C3 | 54.70 | | |
| .118 (3 mm) | .010 | .177 | .950 (8x) | 3 | 1/8 | 2-1/2 | 41805 | 48.80 | 41805-C3 | 54.70 | | |
| .118 (3 mm) | .030 | .177 | .950 (8x) | 3 | 1/8 | 2-1/2 | 42405 | 48.80 | 42405-C3 | 54.70 | | |

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# MINIATURE END MILLS

## Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIA. | CORNER RADIUS | LOC | OVERALL REACH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .125 (1/8) | .005 | .187 | .625 (5x) | 3 | 1/8 | 2-1/2 | 37208 | 47.90 | 37208-C3 | 53.80 | 37208-C4 | 62.70 |
| .125 (1/8) | .005 | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 38408 | 48.80 | 38408-C3 | 54.70 | | |
| .125 (1/8) | .005 | .187 | 1.250 (10x) | 3 | 1/8 | 2-1/2 | 917908 | 54.30 | 917908-C3 | 60.20 | | |
| .125 (1/8) | .005 | .187 | 1.500 (12x) | 3 | 1/8 | 3 | 39508 | 52.60 | 39508-C3 | 58.50 | | |
| .125 (1/8) | .008 | .187 | .625 (5x) | 3 | 1/8 | 2-1/2 | 912808 | 47.90 | 912808-C3 | 53.80 | | |
| .125 (1/8) | .008 | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 909408 | 48.60 | 909408-C3 | 54.50 | | |
| .125 (1/8) | .010 | .187 | .375 (3x) | 3 | 1/8 | 2-1/2 | 925708 | 47.90 | 925708-C3 | 53.80 | | |
| .125 (1/8) | .010 | .187 | .625 (5x) | 3 | 1/8 | 2-1/2 | 41608 | 47.90 | 41608-C3 | 53.80 | 41608-C4 | 62.70 |
| .125 (1/8) | .010 | .187 | .625 (5x) | 4 | 1/8 | 2-1/2 | 800208 | 52.70 | 800208-C3 | 58.60 | | |
| .125 (1/8) | .010 | .187 | .750 (6x) | 3 | 1/8 | 2-1/2 | 768508 | 47.90 | 768508-C3 | 53.80 | | |
| .125 (1/8) | .010 | .187 | .875 (7x) | 3 | 1/8 | 2-1/2 | 766908 | 48.80 | 766908-C3 | 54.70 | | |
| .125 (1/8) | .010 | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 41808 | 48.80 | 41808-C3 | 54.70 | | |
| .125 (1/8) | .010 | .187 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 800008 | 53.90 | 800008-C3 | 59.80 | | |
| .125 (1/8) | .010 | .187 | 1.250 (10x) | 3 | 1/8 | 2-1/2 | 953808 | 52.40 | 953808-C3 | 58.30 | | |
| .125 (1/8) | .010 | .187 | 1.500 (12x) | 3 | 1/8 | 3 | 42008 | 52.60 | 42008-C3 | 58.50 | | |
| .125 (1/8) | .010 | .187 | 1.875 (15x) | 3 | 1/8 | 3 | 947908 | 59.60 | 947908-C3 | 65.50 | | |
| .125 (1/8) | .015 | .187 | .625 (5x) | 3 | 1/8 | 2-1/2 | 42808 | 47.90 | 42808-C3 | 53.80 | 42808-C4 | 62.70 |
| .125 (1/8) | .015 | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 43008 | 48.80 | 43008-C3 | 54.70 | 43008-C4 | 63.90 |
| .125 (1/8) | .015 | .187 | 1.250 (10x) | 3 | 1/8 | 2-1/2 | 965708 | 52.40 | 965708-C3 | 58.30 | | |
| .125 (1/8) | .015 | .187 | 1.500 (12x) | 3 | 1/8 | 3 | 43208 | 52.60 | 43208-C3 | 58.50 | 43208-C4 | 67.60 |
| .125 (1/8) | .015 | .187 | 1.875 (15x) | 3 | 1/8 | 3 | 939408 | 59.40 | 939408-C3 | 65.30 | | |
| .125 (1/8) | .020 | .187 | .625 (5x) | 3 | 1/8 | 2-1/2 | 953608 | 47.90 | 953608-C3 | 53.80 | 953608-C4 | 63.60 |
| .125 (1/8) | .020 | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 970208 | 48.80 | 970208-C3 | 54.70 | | |
| .125 (1/8) | .020 | .187 | 1.250 (10x) | 3 | 1/8 | 2-1/2 | 923308 | 52.40 | 923308-C3 | 58.30 | | |
| .125 (1/8) | .025 | .187 | .625 (5x) | 3 | 1/8 | 2-1/2 | 839908 | 47.90 | 839908-C3 | 53.80 | | |
| .125 (1/8) | .025 | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 840208 | 48.60 | 840208-C3 | 54.50 | | |
| .125 (1/8) | .030 | .187 | .375 (3x) | 3 | 1/8 | 2-1/2 | 827108 | 47.90 | 827108-C3 | 53.80 | | |
| .125 (1/8) | .030 | .187 | .625 (5x) | 3 | 1/8 | 2-1/2 | 42208 | 47.90 | 42208-C3 | 53.80 | 42208-C4 | 63.60 |
| .125 (1/8) | .030 | .187 | .625 (5x) | 4 | 1/8 | 2-1/2 | 728108 | 47.90 | 728108-C3 | 53.80 | | |
| .125 (1/8) | .030 | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 42408 | 48.80 | 42408-C3 | 54.70 | 42408-C4 | 64.60 |
| .125 (1/8) | .030 | .187 | 1.250 (10x) | 3 | 1/8 | 2-1/2 | 921508 | 52.60 | 921508-C3 | 58.50 | | |
| .125 (1/8) | .030 | .187 | 1.500 (12x) | 3 | 1/8 | 3 | 42608 | 52.60 | 42608-C3 | 58.50 | | |
| .125 (1/8) | .030 | .187 | 1.875 (15x) | 3 | 1/8 | 3 | 919708 | 59.40 | 919708-C3 | 65.30 | | |
| .125 (1/8) | .040 | .187 | .625 (5x) | 3 | 1/8 | 2-1/2 | 930208 | 47.90 | 930208-C3 | 53.80 | | |
| .125 (1/8) | .040 | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 924308 | 48.60 | 924308-C3 | 54.50 | | |
| .140 (9/64) | .010 | .220 | .750 (5x) | 3 | 3/16 | 3 | 41609 | 47.90 | 41609-C3 | 54.30 | | |
| .140 (9/64) | .010 | .220 | 1.125 (8x) | 3 | 3/16 | 3 | 41809 | 48.80 | 41809-C3 | 55.40 | | |
| .140 (9/64) | .015 | .220 | .750 (5x) | 3 | 3/16 | 3 | 42809 | 47.90 | 42809-C3 | 54.30 | | |
| .140 (9/64) | .015 | .220 | 1.125 (8x) | 3 | 3/16 | 3 | 43009 | 49.80 | 43009-C3 | 56.20 | | |
| .140 (9/64) | .030 | .220 | .750 (5x) | 3 | 3/16 | 3 | 42209 | 47.90 | 42209-C3 | 54.50 | | |
| .140 (9/64) | .030 | .220 | 1.125 (8x) | 3 | 3/16 | 3 | 42409 | 49.80 | 42409-C3 | 56.50 | | |
| .156 (5/32) | .010 | .234 | .750 (5x) | 3 | 3/16 | 3 | 41610 | 52.60 | 41610-C3 | 59.10 | | |
| .156 (5/32) | .010 | .234 | .750 (5x) | 4 | 3/16 | 3 | 800210 | 52.60 | 800210-C3 | 59.30 | | |
| .156 (5/32) | .010 | .234 | 1.250 (8x) | 3 | 3/16 | 3 | 41810 | 53.70 | 41810-C3 | 60.30 | | |
| .156 (5/32) | .010 | .234 | 1.570 (10x) | 3 | 3/16 | 3 | 953810 | 57.00 | 953810-C3 | 63.60 | | |
| .156 (5/32) | .015 | .234 | .750 (5x) | 3 | 3/16 | 3 | 42810 | 52.60 | 42810-C3 | 59.10 | | |
| .156 (5/32) | .015 | .234 | 1.250 (8x) | 3 | 3/16 | 3 | 43010 | 53.70 | 43010-C3 | 60.30 | | |
| .156 (5/32) | .015 | .234 | 1.570 (10x) | 3 | 3/16 | 3 | 965710 | 57.00 | 965710-C3 | 63.60 | | |
| .156 (5/32) | .020 | .234 | .750 (5x) | 3 | 3/16 | 3 | 953610 | 52.60 | 953610-C3 | 59.10 | | |

continued on next page

# MINIATURE END MILLS

## Corner Radius – Long Reach, Stub Flute (cont.)

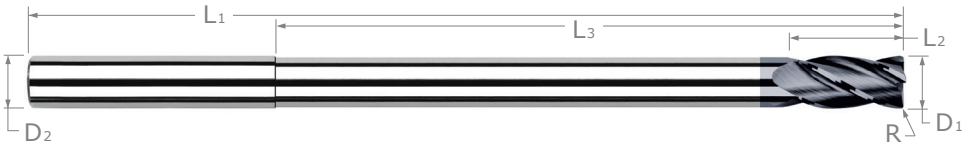
continued from previous page



| CUTTER DIA. | CORNER RADIUS | LOC | OVERALL REACH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .156 (5/32) | .020 | .234 | 1.250 (8x) | 3 | 3/16 | 3 | 970210 | 53.70 | 970210-C3 | 60.30 | | |
| .156 (5/32) | .030 | .234 | .750 (5x) | 3 | 3/16 | 3 | 42210 | 52.60 | 42210-C3 | 59.10 | | |
| .156 (5/32) | .030 | .234 | 1.250 (8x) | 3 | 3/16 | 3 | 42410 | 53.70 | 42410-C3 | 60.30 | | |
| .156 (5/32) | .030 | .234 | 1.570 (10x) | 3 | 3/16 | 3 | 921510 | 57.00 | 921510-C3 | 63.60 | | |
| .187 (3/16) | .005 | .281 | 1.000 (5x) | 3 | 3/16 | 3 | 37212 | 52.60 | 37212-C3 | 59.10 | | |
| .187 (3/16) | .010 | .281 | 1.000 (5x) | 3 | 3/16 | 3 | 41612 | 52.60 | 41612-C3 | 59.10 | | |
| .187 (3/16) | .010 | .281 | 1.500 (8x) | 3 | 3/16 | 3 | 41812 | 53.70 | 41812-C3 | 60.30 | | |
| .187 (3/16) | .015 | .281 | 1.000 (5x) | 3 | 3/16 | 3 | 42812 | 52.60 | 42812-C3 | 59.10 | 42812-C4 | 73.30 |
| .187 (3/16) | .015 | .281 | 1.000 (5x) | 4 | 3/16 | 3 | 728912 | 52.60 | 728912-C3 | 59.30 | | |
| .187 (3/16) | .015 | .281 | 1.500 (8x) | 3 | 3/16 | 3 | 43012 | 53.70 | 43012-C3 | 60.30 | 43012-C4 | 74.30 |
| .187 (3/16) | .015 | .281 | 1.875 (10x) | 3 | 3/16 | 4 | 965712 | 57.00 | 965712-C3 | 65.80 | | |
| .187 (3/16) | .015 | .281 | 2.250 (12x) | 3 | 3/16 | 4 | 43212 | 57.20 | 43212-C3 | 66.00 | 43212-C4 | 79.30 |
| .187 (3/16) | .020 | .281 | 1.000 (5x) | 3 | 3/16 | 3 | 953612 | 52.60 | 953612-C3 | 59.10 | | |
| .187 (3/16) | .020 | .281 | 1.500 (8x) | 3 | 3/16 | 3 | 970212 | 53.70 | 970212-C3 | 60.30 | | |
| .187 (3/16) | .030 | .281 | 1.000 (5x) | 3 | 3/16 | 3 | 42212 | 52.60 | 42212-C3 | 59.10 | 42212-C4 | 70.50 |
| .187 (3/16) | .030 | .281 | 1.156 (6x) | 3 | 3/16 | 3 | 766512 | 53.70 | 766512-C3 | 60.30 | | |
| .187 (3/16) | .030 | .281 | 1.312 (7x) | 3 | 3/16 | 3 | 765712 | 53.70 | 765712-C3 | 60.30 | | |
| .187 (3/16) | .030 | .281 | 1.500 (8x) | 3 | 3/16 | 3 | 42412 | 53.70 | 42412-C3 | 60.30 | 42412-C4 | 71.50 |
| .187 (3/16) | .030 | .281 | 1.875 (10x) | 3 | 3/16 | 4 | 921512 | 57.20 | 921512-C3 | 66.00 | | |
| .187 (3/16) | .030 | .281 | 2.250 (12x) | 3 | 3/16 | 4 | 42612 | 57.20 | 42612-C3 | 66.00 | | |
| .187 (3/16) | .045 | .281 | 1.000 (5x) | 3 | 3/16 | 3 | 978812 | 52.60 | 978812-C3 | 59.10 | | |
| .187 (3/16) | .045 | .281 | 1.500 (8x) | 3 | 3/16 | 3 | 961812 | 53.70 | 961812-C3 | 60.30 | | |
| .187 (3/16) | .060 | .281 | 1.000 (5x) | 3 | 3/16 | 3 | 949112 | 52.60 | 949112-C3 | 59.10 | | |
| .187 (3/16) | .060 | .281 | 1.500 (8x) | 3 | 3/16 | 3 | 866012 | 53.40 | 866012-C3 | 60.00 | | |
| .187 (3/16) | .060 | .281 | 1.875 (10x) | 3 | 3/16 | 4 | 727912 | 57.20 | 727912-C3 | 64.40 | | |
| .250 (1/4) | .005 | .375 | 1.250 (5x) | 3 | 1/4 | 4 | 37216 | 58.10 | 37216-C3 | 65.30 | | |
| .250 (1/4) | .005 | .375 | 2.000 (8x) | 3 | 1/4 | 4 | 38416 | 59.60 | 38416-C3 | 68.20 | | |
| .250 (1/4) | .010 | .375 | 1.250 (5x) | 3 | 1/4 | 4 | 41616 | 58.10 | 41616-C3 | 68.40 | | |
| .250 (1/4) | .010 | .375 | 2.000 (8x) | 3 | 1/4 | 4 | 41816 | 59.60 | 41816-C3 | 69.90 | | |
| .250 (1/4) | .015 | .375 | 1.250 (5x) | 3 | 1/4 | 4 | 42816 | 58.10 | 42816-C3 | 68.40 | | |
| .250 (1/4) | .015 | .375 | 2.000 (8x) | 3 | 1/4 | 4 | 43016 | 59.60 | 43016-C3 | 69.90 | | |
| .250 (1/4) | .015 | .375 | 3.000 (12x) | 3 | 1/4 | 6 | 43216 | 68.30 | 43216-C3 | 79.90 | | |
| .250 (1/4) | .020 | .375 | 1.250 (5x) | 3 | 1/4 | 4 | 953616 | 58.10 | 953616-C3 | 68.40 | | |
| .250 (1/4) | .020 | .375 | 2.000 (8x) | 3 | 1/4 | 4 | 970216 | 60.70 | 970216-C3 | 70.90 | | |
| .250 (1/4) | .030 | .375 | 1.250 (5x) | 3 | 1/4 | 4 | 42216 | 58.10 | 42216-C3 | 68.40 | 42216-C4 | 81.70 |
| .250 (1/4) | .030 | .375 | 1.250 (5x) | 4 | 1/4 | 4 | 728116 | 58.10 | 728116-C3 | 66.70 | | |
| .250 (1/4) | .030 | .375 | 2.000 (8x) | 3 | 1/4 | 4 | 42416 | 59.60 | 42416-C3 | 69.90 | 42416-C4 | 83.10 |
| .250 (1/4) | .030 | .375 | 3.000 (12x) | 3 | 1/4 | 6 | 42616 | 68.30 | 42616-C3 | 79.90 | 42616-C4 | 96.90 |
| .250 (1/4) | .045 | .375 | 1.250 (5x) | 3 | 1/4 | 4 | 978816 | 58.10 | 978816-C3 | 68.40 | | |
| .250 (1/4) | .060 | .375 | 1.250 (5x) | 3 | 1/4 | 4 | 949116 | 58.10 | 949116-C3 | 68.40 | 949116-C4 | 81.00 |
| .250 (1/4) | .060 | .375 | 2.000 (8x) | 3 | 1/4 | 4 | 866016 | 60.70 | 866016-C3 | 70.90 | | |
| .312 (5/16) | .015 | .470 | 1.625 (5x) | 3 | 5/16 | 4 | 42820 | 92.80 | 42820-C3 | 105.00 | | |
| .312 (5/16) | .015 | .470 | 2.500 (8x) | 3 | 5/16 | 4 | 43020 | 94.40 | 43020-C3 | 106.80 | | |
| .375 (3/8) | .030 | .570 | 2.000 (5x) | 3 | 3/8 | 4 | 42224 | 98.10 | 42224-C3 | 110.30 | | |
| .375 (3/8) | .030 | .570 | 3.000 (8x) | 3 | 3/8 | 6 | 42424 | 133.20 | 42424-C3 | 151.00 | | |
| .375 (3/8) | .060 | .570 | 2.000 (5x) | 3 | 3/8 | 4 | 949124 | 98.10 | 949124-C3 | 110.30 | | |
| .375 (3/8) | .060 | .570 | 3.000 (8x) | 3 | 3/8 | 6 | 866024 | 135.70 | 866024-C3 | 150.00 | | |

# MINIATURE END MILLS

## Corner Radius – Extra Long Length




- **Up to 8" overall length**
- Extended reach
- 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA



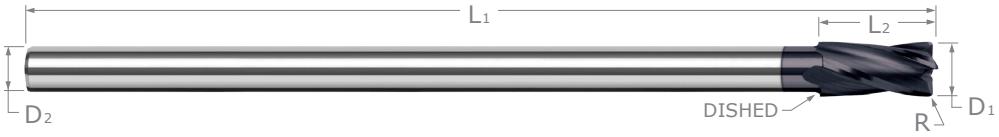
| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.00''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .250 (1/4) | **.015** | .375 | 4.375 (17.5x) | 1/4 | 6 | 24016 | 110.20 | 24016-C3 | 121.90 |
| .312 (5/16) | **.015** | .470 | 4.343 (14x) | 5/16 | 6 | 24020 | 130.10 | 24020-C3 | 147.40 |
| .375 (3/8) | **.030** | .562 | 4.312 (11.5x) | 3/8 | 6 | 24024 | 147.60 | 24024-C3 | 165.50 |
| .500 (1/2) | **.030** | .750 | 5.750 (11.5x) | 1/2 | 8 | 24032 | 257.00 | 24032-C3 | 292.60 |
| .625 (5/8) | **.030** | .937 | 5.687 (9x) | 5/8 | 8 | 24040 | 429.80 | 24040-C3 | 456.30 |
| .750 (3/4) | **.030** | 1.125 | 5.625 (7.5x) | 3/4 | 8 | 24048 | 535.60 | 24048-C3 | 567.30 |

**Access Simulation Files in DXF Format for Every Harvey Tool Product**

harveytool.com/resources/simulation-files

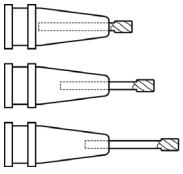
# END MILLS

## Corner Radius – Reduced Shank




- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Corner radius for improved strength
- Length of cut = 1½x diameter
- Center cutting
- 4 flutes
- Solid carbide
- CNC ground in the USA

**Chuck at Any Depth!**





| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| **1/8** | .010 | 3/16 | **3 mm** | 2-1/2 | 17608 | 108.40 | 17608-C3 | 114.30 |
| **1/8** | .015 | 3/16 | **3 mm** | 2-1/2 | 829008 | 108.40 | 829008-C3 | 114.30 |
| **5/32** | .010 | 15/64 | **1/8** | 2-1/2 | 17610 | 108.40 | 17610-C3 | 115.00 |
| **5/32** | .015 | 15/64 | **1/8** | 2-1/2 | 829010 | 108.40 | 829010-C3 | 115.00 |
| **3/16** | .015 | 9/32 | **1/8** | 2-1/2 | 17612 | 108.40 | 17612-C3 | 115.00 |
| **3/16** | .015 | 9/32 | **5/32** | 2-1/2 | 17613 | 111.50 | 17613-C3 | 118.10 |
| **3/16** | .030 | 9/32 | **1/8** | 2-1/2 | 844912 | 112.60 | 844912-C3 | 119.30 |
| **1/4** | .015 | 3/8 | **3/16** | 3 | 17616 | 117.30 | 17616-C3 | 126.10 |
| **1/4** | .030 | 3/8 | **3/16** | 3 | 844916 | 117.30 | 844916-C3 | 124.70 |
| **5/16** | .015 | 15/32 | **1/4** | 4 | 17620 | 142.90 | 17620-C3 | 155.30 |
| **5/16** | .030 | 15/32 | **1/4** | 4 | 844920 | 142.90 | 844920-C3 | 155.30 |
| **3/8** | .015 | 9/16 | **5/16** | 4 | 829024 | 171.60 | 829024-C3 | 183.80 |
| **3/8** | .030 | 9/16 | **5/16** | 4 | 17624 | 170.00 | 17624-C3 | 186.00 |
| **3/8** | .060 | 9/16 | **5/16** | 4 | 766324 | 173.10 | 766324-C3 | 185.40 |
| **7/16** | .015 | 21/32 | **3/8** | 6 | 829028 | 252.20 | 829028-C3 | 268.70 |
| **7/16** | .030 | 21/32 | **3/8** | 6 | 17628 | 249.80 | 17628-C3 | 269.30 |
| **1/2** | .015 | 3/4 | **7/16** | 6 | 829032 | 264.10 | 829032-C3 | 275.60 |
| **1/2** | .030 | 3/4 | **7/16** | 6 | 17632 | 264.10 | 17632-C3 | 281.30 |
| **1/2** | .060 | 3/4 | **7/16** | 6 | 766332 | 265.20 | 766332-C3 | 284.60 |
| **5/8** | .030 | 15/16 | **1/2** | 6 | 17640 | 342.90 | 17640-C3 | 365.30 |
| **3/4** | .030 | 1-1/8 | **5/8** | 6 | 17648 | 423.20 | 17648-C3 | 450.00 |
| **3/4** | .060 | 1-1/8 | **5/8** | 6 | 766348 | 425.90 | 766348-C3 | 452.70 |

**For Square Reduced Shank, please see page 48.**
**For Ball Reduced Shank, please see page 76.**

# MINIATURE END MILLS

## Corner Chamfer – Stub & Standard




4 Flutes



Stub Flute & Standard Length




- Chamfered corner creates consistent heat and wear along chamfer by distributing forces evenly
- 45° corner chamfer protects corners on the end mill and can create small chamfers and edge breaks
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | CORNER CHAMFER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_4$ $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .047 (3/64) | **.005** | .141 (3x) | 1/8 | 1-1/2 | 805147 | 27.50 | 805147-C3 | 33.40 |
| .062 (1/16) | **.005** | .093 (1.5x) | 1/8 | 1-1/2 | 727462 | 27.50 | 727462-C3 | 33.40 |
| .062 (1/16) | **.005** | .187 (3x) | 1/8 | 1-1/2 | 805162 | 27.50 | 805162-C3 | 33.40 |
| .062 (1/16) | **.010** | .187 (3x) | 1/8 | 1-1/2 | 804962 | 27.50 | 804962-C3 | 33.40 |
| .078 (5/64) | **.005** | .234 (3x) | 1/8 | 1-1/2 | 805178 | 27.50 | 805178-C3 | 33.40 |
| .093 (3/32) | **.005** | .279 (3x) | 1/8 | 1-1/2 | 805193 | 28.10 | 805193-C3 | 34.00 |
| .093 (3/32) | **.010** | .140 (1.5x) | 1/8 | 1-1/2 | 727293 | 27.50 | 727293-C3 | 33.40 |
| .093 (3/32) | **.010** | .279 (3x) | 1/8 | 1-1/2 | 804993 | 27.50 | 804993-C3 | 33.40 |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_4$ $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .125 (1/8) | **.005** | .375 (3x) | 1/8 | 1-1/2 | 805208 | 28.10 | 805208-C3 | 34.00 |
| .125 (1/8) | **.010** | .375 (3x) | 1/8 | 1-1/2 | 805008 | 27.50 | 805008-C3 | 33.40 |
| .125 (1/8) | **.020** | .187 (1.5x) | 1/8 | 1-1/2 | 727108 | 27.50 | 727108-C3 | 33.40 |
| .125 (1/8) | **.020** | .375 (3x) | 1/8 | 1-1/2 | 804808 | 27.50 | 804808-C3 | 33.40 |
| .125 (1/8) | **.030** | .375 (3x) | 1/8 | 1-1/2 | 751108 | 28.10 | 751108-C3 | 34.00 |
| .187 (3/16) | **.005** | .570 (3x) | 3/16 | 2 | 805212 | 30.50 | 805212-C3 | 37.10 |
| .187 (3/16) | **.010** | .570 (3x) | 3/16 | 2 | 805012 | 30.50 | 805012-C3 | 37.10 |
| .187 (3/16) | **.020** | .285 (1.5x) | 3/16 | 2 | 727112 | 30.50 | 727112-C3 | 36.70 |
| .187 (3/16) | **.020** | .570 (3x) | 3/16 | 2 | 804812 | 30.50 | 804812-C3 | 37.10 |
| .187 (3/16) | **.030** | .570 (3x) | 3/16 | 2 | 751112 | 30.50 | 751112-C3 | 37.10 |
| .250 (1/4) | **.005** | .750 (3x) | 1/4 | 2-1/2 | 805216 | 37.70 | 805216-C3 | 46.30 |
| .250 (1/4) | **.010** | .750 (3x) | 1/4 | 2-1/2 | 805016 | 37.70 | 805016-C3 | 45.80 |
| .250 (1/4) | **.020** | .375 (1.5x) | 1/4 | 2-1/2 | 727116 | 37.70 | 727116-C3 | 45.80 |
| .250 (1/4) | **.020** | .750 (3x) | 1/4 | 2-1/2 | 804816 | 37.70 | 804816-C3 | 46.30 |
| .250 (1/4) | **.030** | .750 (3x) | 1/4 | 2-1/2 | 751116 | 37.70 | 751116-C3 | 46.30 |
| .375 (3/8) | **.005** | 1.125 (3x) | 3/8 | 2-1/2 | 805224 | 55.00 | 805224-C3 | 66.40 |
| .375 (3/8) | **.010** | 1.125 (3x) | 3/8 | 2-1/2 | 805024 | 55.00 | 805024-C3 | 66.40 |
| .375 (3/8) | **.020** | 1.125 (3x) | 3/8 | 2-1/2 | 804824 | 55.00 | 804824-C3 | 66.40 |
| .375 (3/8) | **.030** | 1.125 (3x) | 3/8 | 2-1/2 | 751124 | 55.00 | 751124-C3 | 66.40 |
| .500 (1/2) | **.005** | 1.500 (3x) | 1/2 | 3 | 805232 | 85.10 | 805232-C3 | 100.70 |
| .500 (1/2) | **.010** | 1.500 (3x) | 1/2 | 3 | 805032 | 85.10 | 805032-C3 | 100.70 |
| .500 (1/2) | **.020** | 1.500 (3x) | 1/2 | 3 | 804832 | 85.10 | 804832-C3 | 100.70 |
| .500 (1/2) | **.030** | 1.500 (3x) | 1/2 | 3 | 751132 | 85.10 | 751132-C3 | 102.40 |

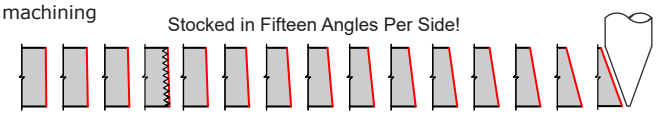
# MINIATURE END MILLS

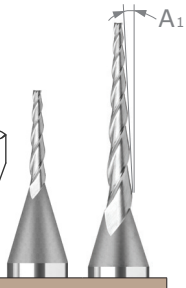
## Tapered – Square




- Length of cut up to 10x end diameter
- Long length design for deep cavity machining
- 3 and 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Stocked in Fifteen Angles Per Side!




| ANGLE PER SIDE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN NANO COATED | | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.020''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 0.5° | .015 (1/64) | .078 (5x) | 3 | 1/8 | 1-1/2 | 997015 | 50.40 | 997015-C6 | 57.30 | | |
| | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 20515 | 83.10 | 20515-C6 | 90.40 | | |
| | .030 | .156 (5x) | 3 | 1/8 | 1-1/2 | 997030 | 42.80 | 997030-C6 | 51.60 | | |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 20530 | 73.90 | 20530-C6 | 82.10 | | |
| | .045 | .250 (5x) | 3 | 1/8 | 1-1/2 | 997045 | 42.80 | 997045-C6 | 51.60 | | |
| | .045 | .450 (10x) | 3 | 3/16 | 3 | 20545 | 73.90 | 20545-C6 | 82.10 | | |
| | .060 | .312 (5x) | 3 | 1/8 | 1-1/2 | 997060 | 42.80 | 997060-C6 | 51.60 | | |
| | .060 | .600 (10x) | 3 | 3/16 | 3 | 20560 | 73.90 | 20560-C6 | 82.10 | | |
| | .075 | .750 (10x) | 3 | 3/16 | 3 | 20575 | 75.30 | 20575-C6 | 83.50 | | |
| | .090 | .500 (5x) | 3 | 1/8 | 1-1/2 | 997090 | 42.80 | 997090-C6 | 51.60 | | |
| | .090 | .900 (10x) | 3 | 1/4 | 4 | 20590 | 81.80 | 20590-C6 | 92.30 | | |
| | .125 (1/8) | .625 (5x) | 3 | 3/16 | 2 | 997099 | 66.60 | 997099-C6 | 76.10 | | |
| | .125 (1/8) | 1.250 (10x) | 3 | 1/4 | 4 | 20599 | 80.40 | 20599-C6 | 90.90 | | |
| 1° | .015 (1/64) | .078 (5x) | 3 | 1/8 | 1-1/2 | 992715 | 50.40 | 992715-C6 | 57.30 | | |
| | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 20615 | 81.50 | 20615-C6 | 88.70 | | |
| | .030 | .156 (5x) | 3 | 1/8 | 1-1/2 | 992730 | 42.80 | 992730-C6 | 51.60 | 992730-C8 | 50.40 |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 20630 | 73.90 | 20630-C6 | 83.30 | 20630-C8 | 83.10 |
| | .045 | .250 (5x) | 3 | 1/8 | 1-1/2 | 992745 | 42.80 | 992745-C6 | 51.60 | | |
| | .045 | .450 (10x) | 3 | 3/16 | 3 | 20645 | 73.90 | 20645-C6 | 82.10 | | |
| | .060 | .312 (5x) | 3 | 1/8 | 1-1/2 | 992760 | 42.80 | 992760-C6 | 51.60 | | |
| | .060 | .600 (10x) | 3 | 3/16 | 3 | 20660 | 73.90 | 20660-C6 | 83.30 | | |
| | .075 | .750 (10x) | 3 | 3/16 | 3 | 20675 | 73.90 | 20675-C6 | 82.10 | | |
| | .090 | .500 (5x) | 3 | 1/8 | 1-1/2 | 992790 | 42.80 | 992790-C6 | 51.60 | | |
| | .090 | .900 (10x) | 3 | 1/4 | 4 | 20690 | 80.40 | 20690-C6 | 90.90 | | |
| | .125 (1/8) | .625 (5x) | 3 | 3/16 | 2 | 992799 | 66.60 | 992799-C6 | 76.10 | | |
| | .125 (1/8) | 1.250 (10x) | 3 | 1/4 | 4 | 20699 | 80.40 | 20699-C6 | 93.20 | | |
| 1.5° | .015 (1/64) | .078 (5x) | 3 | 1/8 | 1-1/2 | 991815 | 50.40 | 991815-C6 | 57.30 | | |
| | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 20715 | 83.10 | 20715-C6 | 90.40 | | |
| | .030 | .156 (5x) | 3 | 1/8 | 1-1/2 | 991830 | 43.70 | 991830-C6 | 50.60 | | |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 20730 | 75.30 | 20730-C6 | 83.50 | | |
| | .045 | .250 (5x) | 3 | 1/8 | 1-1/2 | 991845 | 42.80 | 991845-C6 | 51.60 | | |
| | .045 | .450 (10x) | 3 | 3/16 | 3 | 20745 | 73.90 | 20745-C6 | 82.10 | | |
| | .060 | .312 (5x) | 3 | 1/8 | 1-1/2 | 991860 | 43.70 | 991860-C6 | 50.60 | | |
| | .060 | .600 (10x) | 3 | 3/16 | 3 | 20760 | 75.30 | 20760-C6 | 84.80 | | |
| | .075 | .750 (10x) | 3 | 1/4 | 4 | 20775 | 81.80 | 20775-C6 | 94.70 | | |
| | .090 | .500 (5x) | 3 | 1/8 | 1-1/2 | 991890 | 43.70 | 991890-C6 | 50.60 | | |
| | .090 | .900 (10x) | 3 | 1/4 | 4 | 20790 | 80.40 | 20790-C6 | 90.90 | | |
| | .125 (1/8) | 1.250 (10x) | 3 | 1/4 | 4 | 20799 | 80.40 | 20799-C6 | 93.20 | | |

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# MINIATURE END MILLS

## Tapered – Square (cont.)

continued from previous page

| ANGLE PER SIDE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | ALTiN NANO COATED | | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_1$ $^{+.0005"}_{-.0005"}$ | $L_2$ $^{+.020"}_{-.000"}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 1.8° (N.P.T.) | .200 | .625 (3x) | 3 | 1/4 | 2 | 912282 | 70.30 | 912282-C6 | 83.20 | | |
| | .300 | .900 (3x) | 3 | 3/8 | 2-1/2 | 912286 | 87.70 | 912286-C6 | 102.20 | | |
| | .400 | 1.250 (3x) | 3 | 1/2 | 3 | 912292 | 118.00 | 912292-C6 | 136.90 | | |
| 2° | .015 (1/64) | .078 (5x) | 3 | 1/8 | 1-1/2 | 991015 | 49.50 | 991015-C6 | 56.40 | | |
| | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 20815 | 81.50 | 20815-C6 | 88.70 | | |
| | .030 | .156 (5x) | 3 | 1/8 | 1-1/2 | 991030 | 42.80 | 991030-C6 | 51.60 | | |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 20830 | 73.90 | 20830-C6 | 82.10 | | |
| | .045 | .250 (5x) | 3 | 1/8 | 1-1/2 | 991045 | 42.80 | 991045-C6 | 51.60 | | |
| | .045 | .450 (10x) | 3 | 3/16 | 3 | 20845 | 73.90 | 20845-C6 | 83.30 | | |
| | .060 | .312 (5x) | 3 | 1/8 | 1-1/2 | 991060 | 42.80 | 991060-C6 | 51.60 | | |
| | .060 | .600 (10x) | 3 | 3/16 | 3 | 20860 | 73.90 | 20860-C6 | 83.30 | | |
| | .075 | .750 (10x) | 3 | 1/4 | 4 | 20875 | 81.80 | 20875-C6 | 94.70 | | |
| | .090 | .500 (5x) | 3 | 1/8 | 1-1/2 | 991090 | 42.80 | 991090-C6 | 51.60 | | |
| | .090 | .900 (10x) | 3 | 1/4 | 4 | 20890 | 80.40 | 20890-C6 | 90.90 | | |
| | .125 (1/8) | .625 (5x) | 3 | 3/16 | 2 | 991099 | 66.60 | 991099-C6 | 76.10 | | |
| | .125 (1/8) | 1.250 (10x) | 3 | 1/4 | 4 | 20899 | 80.40 | 20899-C6 | 90.90 | | |
| 3° | .015 (1/64) | .078 (5x) | 3 | 1/8 | 1-1/2 | 990415 | 49.50 | 990415-C6 | 56.40 | | |
| | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 20915 | 81.50 | 20915-C6 | 90.30 | | |
| | .030 | .156 (5x) | 3 | 1/8 | 1-1/2 | 990430 | 42.80 | 990430-C6 | 51.60 | 990430-C8 | 50.40 |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 20930 | 73.90 | 20930-C6 | 83.30 | 20930-C8 | 83.10 |
| | .045 | .250 (5x) | 3 | 1/8 | 1-1/2 | 990445 | 42.80 | 990445-C6 | 51.60 | | |
| | .045 | .450 (10x) | 3 | 3/16 | 3 | 20945 | 73.90 | 20945-C6 | 83.30 | | |
| | .060 | .312 (5x) | 3 | 1/8 | 1-1/2 | 990460 | 42.80 | 990460-C6 | 51.60 | | |
| | .060 | .600 (10x) | 3 | 3/16 | 3 | 20960 | 73.90 | 20960-C6 | 83.30 | | |
| | .075 | .750 (10x) | 3 | 1/4 | 4 | 20975 | 81.80 | 20975-C6 | 94.70 | | |
| | .090 | .500 (5x) | 3 | 3/16 | 2 | 990490 | 66.60 | 990490-C6 | 76.10 | | |
| | .090 | .900 (10x) | 3 | 1/4 | 4 | 20990 | 80.40 | 20990-C6 | 93.20 | | |
| | .125 (1/8) | .625 (5x) | 3 | 1/4 | 2-1/2 | 990499 | 98.10 | 990499-C6 | 107.80 | | |
| | .125 (1/8) | 1.192 (10x) | 3 | 1/4 | 4 | 20999 | 80.40 | 20999-C6 | 93.20 | | |
| 4° | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 996215 | 81.50 | 996215-C6 | 88.70 | | |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 996230 | 73.90 | 996230-C6 | 83.30 | | |
| | .045 | .450 (10x) | 3 | 3/16 | 3 | 996245 | 73.90 | 996245-C6 | 82.10 | | |
| | .060 | .600 (10x) | 3 | 3/16 | 3 | 996260 | 73.90 | 996260-C6 | 83.30 | | |
| | .075 | .750 (10x) | 3 | 1/4 | 4 | 996275 | 81.80 | 996275-C6 | 92.30 | | |
| | .090 | .900 (10x) | 3 | 1/4 | 4 | 996290 | 81.80 | 996290-C6 | 92.30 | | |
| | .125 (1/8) | 1.250 (10x) | 3 | 3/8 | 4 | 996299 | 110.70 | 996299-C6 | 125.10 | | |
| 5° | .010 | .050 (5x) | 3 | 1/8 | 1-1/2 | 989610 | 58.60 | 989610-C6 | 65.50 | | |
| | .010 | .100 (10x) | 3 | 1/8 | 2-1/2 | 27110 | 90.40 | 27110-C6 | 97.70 | | |
| | .015 (1/64) | .078 (5x) | 3 | 1/8 | 1-1/2 | 989615 | 49.50 | 989615-C6 | 56.40 | | |
| | .015 (1/64) | .078 (5x) | 4 | 1/8 | 1-1/2 | 723915 | 50.70 | 723915-C6 | 57.50 | | |
| | .015 (1/64) | .120 (8x) | 3 | 1/8 | 1-1/2 | 761915 | 52.30 | 761915-C6 | 59.20 | | |
| | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 27115 | 81.50 | 27115-C6 | 90.30 | | |
| | .020 | .100 (5x) | 3 | 1/8 | 1-1/2 | 989620 | 48.40 | 989620-C6 | 55.20 | | |
| | .020 | .200 (10x) | 3 | 1/8 | 2-1/2 | 27120 | 80.00 | 27120-C6 | 88.80 | | |
| | .030 | .156 (5x) | 3 | 1/8 | 1-1/2 | 989630 | 42.80 | 989630-C6 | 51.60 | 989630-C8 | 50.40 |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 27130 | 73.90 | 27130-C6 | 83.30 | 27130-C8 | 83.10 |
| | .045 | .250 (5x) | 3 | 1/8 | 1-1/2 | 989645 | 42.80 | 989645-C6 | 51.60 | | |
| | .045 | .450 (10x) | 3 | 3/16 | 3 | 27145 | 73.90 | 27145-C6 | 83.30 | | |

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# MINIATURE END MILLS

## Tapered – Square (cont.)

continued from previous page

| ANGLE PER SIDE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN NANO COATED | | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_1$ $^{+.0005"}_{-.0005"}$ | $L_2$ $^{+.020"}_{-.000"}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 5° | .060 | .312 (5x) | 3 | 1/8 | 1-1/2 | 989660 | 42.80 | 989660-C6 | 51.60 | | |
| | .060 | .600 (10x) | 3 | 3/16 | 3 | 27160 | 73.90 | 27160-C6 | 83.30 | | |
| | .062 (1/16) | .312 (5x) | 3 | 1/8 | 1-1/2 | 989662 | 42.80 | 989662-C6 | 51.60 | | |
| | .062 (1/16) | .620 (10x) | 3 | 3/16 | 3 | 27162 | 73.90 | 27162-C6 | 82.10 | | |
| | .075 | .375 (5x) | 3 | 3/16 | 2 | 989675 | 66.60 | 989675-C6 | 76.10 | | |
| | .075 | .750 (10x) | 3 | 1/4 | 4 | 27175 | 81.80 | 27175-C6 | 94.70 | | |
| | .090 | .500 (5x) | 3 | 3/16 | 2 | 989690 | 66.60 | 989690-C6 | 76.10 | | |
| | .090 | .900 (10x) | 3 | 1/4 | 4 | 27190 | 80.40 | 27190-C6 | 90.90 | | |
| | .093 (3/32) | .500 (5x) | 3 | 3/16 | 2 | 989693 | 66.60 | 989693-C6 | 76.10 | | |
| | .093 (3/32) | .930 (10x) | 3 | 1/4 | 4 | 27193 | 80.40 | 27193-C6 | 90.90 | | |
| | .125 (1/8) | .625 (5x) | 3 | 1/4 | 2-1/2 | 989699 | 98.10 | 989699-C6 | 107.80 | | |
| | .125 (1/8) | 1.250 (10x) | 3 | 3/8 | 4 | 27199 | 108.50 | 27199-C6 | 123.00 | | |
| | .187 (3/16) | 1.000 (5x) | 3 | 3/8 | 2-1/2 | 989681 | 108.50 | 989681-C6 | 123.00 | | |
| | .250 (1/4) | 1.250 (5x) | 3 | 1/2 | 3 | 989684 | 146.70 | 989684-C6 | 165.60 | | |
| 6° | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 993315 | 87.00 | 993315-C6 | 95.80 | | |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 993330 | 80.80 | 993330-C6 | 90.30 | | |
| | .045 | .250 (5x) | 3 | 1/8 | 1-1/2 | 904345 | 70.80 | 904345-C6 | 77.60 | | |
| | .045 | .450 (10x) | 3 | 3/16 | 3 | 993345 | 80.80 | 993345-C6 | 90.30 | | |
| | .060 | .312 (5x) | 3 | 3/16 | 2 | 904360 | 68.30 | 904360-C6 | 77.70 | | |
| | .060 | .600 (10x) | 3 | 3/16 | 3 | 993360 | 80.80 | 993360-C6 | 90.30 | | |
| | .090 | .500 (5x) | 3 | 1/4 | 2-1/2 | 904390 | 102.00 | 904390-C6 | 111.80 | | |
| | .125 (1/8) | .625 (5x) | 3 | 5/16 | 2-1/2 | 904399 | 98.10 | 904399-C6 | 112.70 | | |
| 7° | .015 (1/64) | .078 (5x) | 3 | 1/8 | 1-1/2 | 922615 | 51.40 | 922615-C6 | 58.20 | | |
| | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 28015 | 84.60 | 28015-C6 | 93.40 | | |
| | .030 | .156 (5x) | 3 | 1/8 | 1-1/2 | 922630 | 44.40 | 922630-C6 | 53.20 | | |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 28030 | 76.80 | 28030-C6 | 86.20 | | |
| | .045 | .250 (5x) | 3 | 1/8 | 1-1/2 | 922645 | 44.40 | 922645-C6 | 53.20 | | |
| | .045 | .450 (10x) | 3 | 3/16 | 3 | 28045 | 76.80 | 28045-C6 | 85.00 | | |
| | .060 | .312 (5x) | 3 | 3/16 | 2 | 922660 | 69.20 | 922660-C6 | 78.70 | | |
| | .060 | .600 (10x) | 3 | 1/4 | 4 | 28060 | 83.70 | 28060-C6 | 96.50 | | |
| | .075 | .750 (10x) | 3 | 3/8 | 4 | 28075 | 116.00 | 28075-C6 | 131.10 | | |
| | .090 | .500 (5x) | 3 | 1/4 | 2-1/2 | 922690 | 83.70 | 922690-C6 | 93.40 | | |
| | .090 | .900 (10x) | 3 | 3/8 | 4 | 28090 | 114.20 | 28090-C6 | 128.70 | | |
| | .125 (1/8) | .625 (5x) | 3 | 5/16 | 2-1/2 | 922699 | 98.10 | 922699-C6 | 112.70 | | |
| 8° | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 995415 | 87.00 | 995415-C6 | 94.30 | | |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 995430 | 80.80 | 995430-C6 | 90.30 | | |
| | .045 | .450 (10x) | 3 | 3/16 | 3 | 995445 | 80.80 | 995445-C6 | 90.30 | | |
| | .060 | .600 (10x) | 3 | 1/4 | 4 | 995460 | 86.40 | 995460-C6 | 99.20 | | |
| | .090 | .500 (5x) | 3 | 1/4 | 2-1/2 | 903790 | 83.70 | 903790-C6 | 93.40 | | |
| | .125 (1/8) | .625 (5x) | 3 | 5/16 | 2-1/2 | 903799 | 98.10 | 903799-C6 | 112.70 | | |
| 9° | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 992115 | 87.80 | 992115-C6 | 95.10 | | |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 992130 | 81.60 | 992130-C6 | 89.80 | | |
| | .045 | .450 (10x) | 3 | 3/16 | 3 | 992145 | 81.60 | 992145-C6 | 89.80 | | |
| | .060 | .600 (10x) | 3 | 1/4 | 4 | 992160 | 87.10 | 992160-C6 | 97.60 | | |
| | .090 | .500 (5x) | 3 | 1/4 | 2-1/2 | 902490 | 83.70 | 902490-C6 | 93.40 | | |
| | .125 (1/8) | .625 (5x) | 3 | 3/8 | 2-1/2 | 902499 | 112.80 | 902499-C6 | 127.30 | | |

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# MINIATURE END MILLS

## Tapered – Square (cont.)

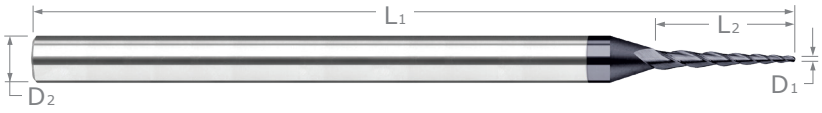
continued from previous page

| ANGLE PER SIDE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | ALTiN NANO COATED | | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_1$ $^{+.0005"}_{-.0005"}$ | $L_2$ $^{+.020"}_{-.000"}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 10° | .010 | .050 (5x) | 3 | 1/8 | 1-1/2 | 988210 | 58.60 | 988210-C6 | 65.50 | | |
| | .010 | .100 (10x) | 3 | 1/8 | 2-1/2 | 29410 | 88.70 | 29410-C6 | 97.50 | | |
| | .015 (1/64) | .078 (5x) | 3 | 1/8 | 1-1/2 | 988215 | 49.50 | 988215-C6 | 56.40 | | |
| | .015 (1/64) | .150 (10x) | 3 | 1/8 | 2-1/2 | 29415 | 81.50 | 29415-C6 | 90.30 | | |
| | .020 | .100 (5x) | 3 | 1/8 | 1-1/2 | 988220 | 49.50 | 988220-C6 | 56.40 | | |
| | .020 | .200 (10x) | 3 | 1/8 | 2-1/2 | 29420 | 80.00 | 29420-C6 | 88.80 | | |
| | .030 | .156 (5x) | 3 | 1/8 | 1-1/2 | 988230 | 42.80 | 988230-C6 | 51.60 | 988230-C8 | 50.40 |
| | .030 | .300 (10x) | 3 | 3/16 | 3 | 29430 | 73.90 | 29430-C6 | 83.30 | 29430-C8 | 83.10 |
| | .045 | .250 (5x) | 3 | 3/16 | 2 | 988245 | 73.90 | 988245-C6 | 83.30 | | |
| | .045 | .360 (8x) | 3 | 3/16 | 3 | 760845 | 75.30 | 760845-C6 | 84.80 | | |
| | .045 | .450 (10x) | 3 | 1/4 | 4 | 29445 | 81.80 | 29445-C6 | 94.70 | | |
| | .060 | .312 (5x) | 3 | 3/16 | 2 | 988260 | 73.90 | 988260-C6 | 83.30 | | |
| | .060 | .312 (5x) | 4 | 3/16 | 2 | 723860 | 75.20 | 723860-C6 | 82.80 | | |
| | .060 | .600 (10x) | 3 | 3/8 | 4 | 29460 | 108.50 | 29460-C6 | 123.00 | | |
| | .075 | .375 (5x) | 3 | 1/4 | 2-1/2 | 988275 | 77.70 | 988275-C6 | 87.50 | | |
| | .075 | .750 (10x) | 3 | 3/8 | 4 | 29475 | 110.70 | 29475-C6 | 125.70 | | |
| | .090 | .500 (5x) | 3 | 5/16 | 2-1/2 | 988290 | 92.00 | 988290-C6 | 106.60 | | |
| | .090 | .720 (8x) | 3 | 3/8 | 4 | 760890 | 93.30 | 760890-C6 | 108.40 | | |
| | .125 (1/8) | .625 (5x) | 3 | 3/8 | 2-1/2 | 988299 | 108.50 | 988299-C6 | 123.00 | | |
| | .187 (3/16) | .890 (5x) | 3 | 1/2 | 3 | 988281 | 146.70 | 988281-C6 | 165.60 | | |
| | .250 (1/4) | 1.065 (5x) | 3 | 5/8 | 3-1/2 | 988284 | 157.70 | 988284-C6 | 179.10 | | |
| 15° | .015 (1/64) | .031 (3x) | 3 | 1/8 | 1-1/2 | 799415 | 47.20 | 799415-C6 | 54.10 | | |
| | .015 (1/64) | .078 (5x) | 3 | 1/8 | 1-1/2 | 919515 | 49.50 | 919515-C6 | 56.40 | | |
| | .015 (1/64) | .078 (5x) | 4 | 1/8 | 1-1/2 | 723715 | 50.70 | 723715-C6 | 57.50 | | |
| | .015 (1/64) | .120 (8x) | 3 | 1/8 | 1-1/2 | 799315 | 54.70 | 799315-C6 | 61.60 | | |
| | .015 (1/64) | .150 (10x) | 3 | 1/8 | 1-1/2 | 41115 | 77.70 | 41115-C6 | 86.50 | | |
| | .030 | .093 (3x) | 3 | 1/8 | 1-1/2 | 799430 | 47.20 | 799430-C6 | 54.10 | | |
| | .030 | .156 (5x) | 3 | 1/8 | 1-1/2 | 919530 | 49.50 | 919530-C6 | 56.40 | | |
| | .030 | .240 (8x) | 3 | 3/16 | 2 | 799330 | 54.70 | 799330-C6 | 62.40 | | |
| | .030 | .294 (10x) | 3 | 3/16 | 2 | 41130 | 75.90 | 41130-C6 | 85.40 | | |
| | .045 | .250 (5x) | 3 | 3/16 | 2 | 919545 | 66.60 | 919545-C6 | 76.10 | | |
| | .045 | .250 (5x) | 4 | 3/16 | 2 | 723745 | 68.00 | 723745-C6 | 75.70 | | |
| | .045 | .383 (8x) | 3 | 1/4 | 2-1/2 | 41145 | 81.50 | 41145-C6 | 91.20 | | |
| | .060 | .312 (5x) | 3 | 1/4 | 2-1/2 | 919560 | 80.00 | 919560-C6 | 89.80 | | |
| | .060 | .312 (5x) | 4 | 1/4 | 2-1/2 | 723760 | 81.30 | 723760-C6 | 91.00 | | |
| | .060 | .480 (8x) | 3 | 3/8 | 2-1/2 | 799360 | 106.80 | 799360-C6 | 120.70 | | |
| | .060 | .588 (10x) | 3 | 3/8 | 2-1/2 | 41160 | 110.70 | 41160-C6 | 125.10 | | |
| | .075 | .750 (10x) | 3 | 1/2 | 3 | 41175 | 154.00 | 41175-C6 | 172.90 | | |
| | .090 | .765 (8x) | 3 | 1/2 | 3 | 41190 | 151.10 | 41190-C6 | 170.00 | | |
| | .125 (1/8) | .625 (5x) | 4 | 1/2 | 3 | 723799 | 153.50 | 723799-C6 | 172.40 | | |
| | .125 (1/8) | .700 (5x) | 3 | 1/2 | 3 | 41199 | 151.10 | 41199-C6 | 170.00 | | |
| 20° | .015 | .078 (5x) | 3 | 1/8 | 1-1/2 | 832815 | 49.50 | 832815-C6 | 56.40 | | |
| | .015 | .120 (8x) | 3 | 1/8 | 1-1/2 | 799215 | 54.70 | 799215-C6 | 61.60 | | |
| | .030 | .156 (5x) | 3 | 3/16 | 2 | 832830 | 49.50 | 832830-C6 | 57.20 | | |
| | .030 | .156 (5x) | 4 | 3/16 | 2 | 723630 | 50.70 | 723630-C6 | 58.30 | | |
| | .030 | .240 (8x) | 3 | 1/4 | 2-1/2 | 799230 | 81.50 | 799230-C6 | 91.20 | | |
| | .045 | .250 (5x) | 3 | 1/4 | 2-1/2 | 832845 | 66.60 | 832845-C6 | 79.60 | | |
| | .045 | .360 (8x) | 3 | 5/16 | 2-1/2 | 799245 | 86.80 | 799245-C6 | 101.20 | | |
| | .060 | .312 (5x) | 3 | 5/16 | 2-1/2 | 832860 | 71.80 | 832860-C6 | 83.60 | | |
| | .060 | .480 (8x) | 3 | 1/2 | 3 | 799260 | 151.10 | 799260-C6 | 170.00 | | |

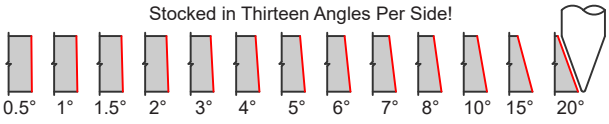
For larger angles, please see Chamfer Cutters on page 333.

# MINIATURE END MILLS

## Tapered – Ball




- Stocked in 0.5° to 20° tapers
- Long length design for deep cavity machining
- 3 and 4 flutes • Center cutting
- Solid carbide • CNC ground in the USA







| ANGLE PER SIDE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_1$ $^{+.0005"}_{-.0005"}$ | $L_2$ $^{+.020"}_{-.000"}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| **0.5°** | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 2-1/2 | 21515 | 88.60 | 21515-C6 | 95.90 |
| | .030 | **.300** (10x) | 3 | 3/16 | 3 | 21530 | 81.20 | 21530-C6 | 89.40 |
| | .045 | **.450** (10x) | 3 | 3/16 | 3 | 21545 | 82.70 | 21545-C6 | 90.90 |
| | .060 | **.600** (10x) | 3 | 3/16 | 3 | 21560 | 81.20 | 21560-C6 | 90.70 |
| | .090 | **.900** (10x) | 3 | 1/4 | 4 | 21590 | 87.30 | 21590-C6 | 97.80 |
| | .125 (1/8) | **1.250** (10x) | 3 | 1/4 | 4 | 21599 | 87.30 | 21599-C6 | 97.80 |
| **1°** | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 2-1/2 | 21615 | 88.60 | 21615-C6 | 95.90 |
| | .030 | **.156** (5x) | 3 | 1/8 | 1-1/2 | 879830 | 47.90 | 879830-C6 | 54.70 |
| | .030 | **.300** (10x) | 3 | 3/16 | 3 | 21630 | 81.20 | 21630-C6 | 89.40 |
| | .045 | **.450** (10x) | 3 | 3/16 | 3 | 21645 | 82.70 | 21645-C6 | 92.20 |
| | .060 | **.312** (5x) | 3 | 1/8 | 1-1/2 | 879860 | 47.90 | 879860-C6 | 54.70 |
| | .060 | **.600** (10x) | 3 | 3/16 | 3 | 21660 | 81.20 | 21660-C6 | 90.70 |
| | .090 | **.900** (10x) | 3 | 1/4 | 4 | 21690 | 85.60 | 21690-C6 | 96.10 |
| | .125 (1/8) | **1.250** (10x) | 3 | 1/4 | 4 | 21699 | 85.60 | 21699-C6 | 98.60 |
| **1.5°** | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 2-1/2 | 21715 | 87.00 | 21715-C6 | 94.30 |
| | .030 | **.300** (10x) | 3 | 3/16 | 3 | 21730 | 81.20 | 21730-C6 | 90.70 |
| | .045 | **.450** (10x) | 3 | 3/16 | 3 | 21745 | 84.30 | 21745-C6 | 92.50 |
| | .060 | **.600** (10x) | 3 | 3/16 | 3 | 21760 | 81.20 | 21760-C6 | 90.70 |
| | .090 | **.900** (10x) | 3 | 1/4 | 4 | 21790 | 87.30 | 21790-C6 | 97.80 |
| | .125 (1/8) | **1.250** (10x) | 3 | 1/4 | 4 | 21799 | 85.60 | 21799-C6 | 96.10 |
| **2°** | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 2-1/2 | 21815 | 87.00 | 21815-C6 | 95.70 |
| | .030 | **.300** (10x) | 3 | 3/16 | 3 | 21830 | 81.20 | 21830-C6 | 90.70 |
| | .045 | **.450** (10x) | 3 | 3/16 | 3 | 21845 | 82.70 | 21845-C6 | 92.20 |
| | .060 | **.600** (10x) | 3 | 3/16 | 3 | 21860 | 81.20 | 21860-C6 | 90.70 |
| | .090 | **.900** (10x) | 3 | 1/4 | 4 | 21890 | 85.60 | 21890-C6 | 96.10 |
| | .125 (1/8) | **1.250** (10x) | 3 | 1/4 | 4 | 21899 | 85.60 | 21899-C6 | 98.60 |
| **3°** | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 2-1/2 | 21915 | 87.00 | 21915-C6 | 95.70 |
| | .030 | **.156** (5x) | 3 | 1/8 | 1-1/2 | 880230 | 47.90 | 880230-C6 | 54.70 |
| | .030 | **.300** (10x) | 3 | 3/16 | 3 | 21930 | 81.20 | 21930-C6 | 90.70 |
| | .045 | **.450** (10x) | 3 | 3/16 | 3 | 21945 | 82.70 | 21945-C6 | 92.20 |
| | .060 | **.312** (5x) | 3 | 1/8 | 1-1/2 | 880260 | 47.90 | 880260-C6 | 54.70 |
| | .060 | **.600** (10x) | 3 | 3/16 | 3 | 21960 | 81.20 | 21960-C6 | 90.70 |
| | .090 | **.900** (10x) | 3 | 1/4 | 4 | 21990 | 85.60 | 21990-C6 | 98.60 |
| | .125 (1/8) | **1.192** (10x) | 3 | 1/4 | 4 | 21999 | 85.60 | 21999-C6 | 98.60 |
| **4°** | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 2-1/2 | 840415 | 91.20 | 840415-C6 | 98.50 |
| | .030 | **.300** (10x) | 3 | 3/16 | 3 | 840430 | 85.00 | 840430-C6 | 93.20 |
| | .060 | **.600** (10x) | 3 | 3/16 | 3 | 840460 | 85.00 | 840460-C6 | 93.20 |
| | .090 | **.900** (10x) | 3 | 1/4 | 4 | 840490 | 89.90 | 840490-C6 | 102.70 |

continued on next page

# MINIATURE END MILLS

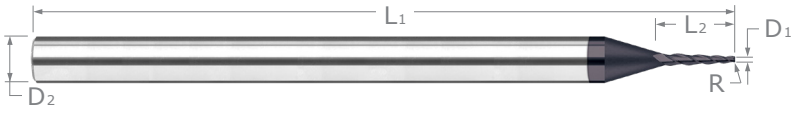
## Tapered – Ball (cont.)

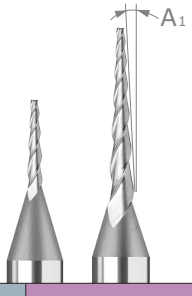
continued from previous page

| ANGLE PER SIDE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_1$ $^{+.0005"}_{-.0005"}$ | $L_2$ $^{+.020"}_{-.000"}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 5° | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 2-1/2 | 32615 | 87.00 | 32615-C6 | 95.70 |
| | .030 | **.156** (5x) | 3 | 1/8 | 1-1/2 | 880630 | 47.90 | 880630-C6 | 54.70 |
| | .030 | **.300** (10x) | 3 | 3/16 | 3 | 32630 | 81.20 | 32630-C6 | 90.70 |
| | .030 | **.300** (10x) | 4 | 3/16 | 3 | 723530 | 84.00 | 723530-C6 | 92.20 |
| | .045 | **.250** (5x) | 3 | 1/8 | 1-1/2 | 880645 | 47.90 | 880645-C6 | 54.70 |
| | .045 | **.450** (10x) | 3 | 3/16 | 3 | 32645 | 82.70 | 32645-C6 | 92.20 |
| | .060 | **.312** (5x) | 3 | 1/8 | 1-1/2 | 880660 | 47.90 | 880660-C6 | 54.70 |
| | .060 | **.480** (8x) | 3 | 3/16 | 2 | 761960 | 74.60 | 761960-C6 | 82.30 |
| | .060 | **.600** (10x) | 3 | 3/16 | 3 | 32660 | 81.20 | 32660-C6 | 90.70 |
| | .060 | **.600** (10x) | 4 | 3/16 | 3 | 723560 | 84.00 | 723560-C6 | 92.20 |
| | .090 | **.900** (10x) | 3 | 1/4 | 4 | 32690 | 85.60 | 32690-C6 | 98.60 |
| | .125 (1/8) | **1.250** (10x) | 3 | 3/8 | 4 | 32699 | 114.20 | 32699-C6 | 128.60 |
| 6° | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 2-1/2 | 835615 | 91.20 | 835615-C6 | 98.50 |
| | .030 | **.300** (10x) | 3 | 3/16 | 3 | 835630 | 84.30 | 835630-C6 | 93.80 |
| | .060 | **.600** (10x) | 3 | 3/16 | 3 | 835660 | 89.10 | 835660-C6 | 98.60 |
| | .090 | **.900** (10x) | 3 | 3/8 | 4 | 835690 | 118.50 | 835690-C6 | 133.60 |
| 7° | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 2-1/2 | 34415 | 90.30 | 34415-C6 | 99.10 |
| | .030 | **.300** (10x) | 3 | 3/16 | 3 | 34430 | 84.30 | 34430-C6 | 92.50 |
| | .045 | **.450** (10x) | 3 | 3/16 | 3 | 34445 | 86.10 | 34445-C6 | 95.40 |
| | .060 | **.600** (10x) | 3 | 1/4 | 4 | 34460 | 89.10 | 34460-C6 | 102.00 |
| | .090 | **.900** (10x) | 3 | 3/8 | 4 | 34490 | 118.50 | 34490-C6 | 133.00 |
| 8° | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 2-1/2 | 853815 | 91.20 | 853815-C6 | 98.50 |
| | .030 | **.300** (10x) | 3 | 3/16 | 3 | 853830 | 85.00 | 853830-C6 | 93.20 |
| | .060 | **.600** (10x) | 3 | 1/4 | 4 | 853860 | 89.10 | 853860-C6 | 99.50 |
| | .090 | **.900** (10x) | 3 | 3/8 | 4 | 853890 | 118.50 | 853890-C6 | 133.00 |
| 10° | .015 (1/64) | **.078** (5x) | 3 | 1/8 | 1-1/2 | 881015 | 49.60 | 881015-C6 | 56.50 |
| | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 2-1/2 | 35315 | 90.30 | 35315-C6 | 99.10 |
| | .015 (1/64) | **.150** (10x) | 4 | 1/8 | 2-1/2 | 723415 | 92.70 | 723415-C6 | 100.00 |
| | .030 | **.156** (5x) | 3 | 1/8 | 1-1/2 | 881030 | 49.60 | 881030-C6 | 56.50 |
| | .030 | **.300** (10x) | 3 | 3/16 | 3 | 35330 | 84.30 | 35330-C6 | 93.80 |
| | .045 | **.250** (5x) | 3 | 3/16 | 2 | 881045 | 81.70 | 881045-C6 | 91.20 |
| | .045 | **.450** (10x) | 3 | 1/4 | 4 | 35345 | 90.30 | 35345-C6 | 100.80 |
| | .060 | **.312** (5x) | 3 | 3/16 | 2 | 881060 | 81.70 | 881060-C6 | 91.20 |
| | .060 | **.600** (10x) | 3 | 3/8 | 4 | 35360 | 118.50 | 35360-C6 | 133.00 |
| | .090 | **.500** (5x) | 3 | 5/16 | 2-1/2 | 881090 | 131.80 | 881090-C6 | 146.40 |
| | .125 (1/8) | **.625** (5x) | 3 | 3/8 | 2-1/2 | 881099 | 162.10 | 881099-C6 | 176.70 |
| | .187 (3/16) | **.937** (5x) | 3 | 1/2 | 3 | 881081 | 185.80 | 881081-C6 | 204.70 |
| | .250 (1/4) | **1.177** (5x) | 3 | 5/8 | 3-1/2 | 881084 | 199.80 | 881084-C6 | 220.40 |
| 15° | .015 (1/64) | **.078** (5x) | 3 | 1/8 | 1-1/2 | 785915 | 48.80 | 785915-C6 | 55.60 |
| | .015 (1/64) | **.150** (10x) | 3 | 1/8 | 1-1/2 | 916115 | 89.60 | 916115-C6 | 98.40 |
| | .030 | **.156** (5x) | 3 | 1/8 | 1-1/2 | 785930 | 48.80 | 785930-C6 | 55.60 |
| | .030 | **.300** (10x) | 3 | 3/16 | 2 | 916130 | 83.50 | 916130-C6 | 92.80 |
| | .030 | **.300** (10x) | 4 | 3/16 | 2 | 723330 | 86.30 | 723330-C6 | 93.90 |
| | .045 | **.402** (9x) | 3 | 1/4 | 2-1/2 | 916145 | 89.60 | 916145-C6 | 99.30 |
| | .060 | **.312** (5x) | 3 | 1/4 | 2 | 785960 | 84.90 | 785960-C6 | 97.70 |
| | .060 | **.600** (10x) | 3 | 3/8 | 2-1/2 | 916160 | 117.80 | 916160-C6 | 132.20 |
| | .060 | **.600** (10x) | 4 | 3/8 | 2-1/2 | 723360 | 120.70 | 723360-C6 | 134.60 |
| 20° | .015 (1/64) | **.078** (5x) | 3 | 1/8 | 1-1/2 | 802115 | 49.60 | 802115-C6 | 56.50 |
| | .030 | **.156** (5x) | 3 | 3/16 | 2 | 802130 | 80.90 | 802130-C6 | 90.40 |
| | .045 | **.250** (5x) | 3 | 1/4 | 2-1/2 | 802145 | 90.80 | 802145-C6 | 100.60 |
| | .060 | **.312** (5x) | 3 | 5/16 | 2-1/2 | 802160 | 131.80 | 802160-C6 | 143.60 |

# MINIATURE END MILLS

## Tapered – Corner Radius




- Corner radius for improved strength
- Long length design for deep cavity machining
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

| ANGLE PER SIDE | CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_1$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.020''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| 5° | .015 (1/64) | .005 | **.078** (5x) | 3 | 1/8 | 1-1/2 | 714715 | 50.00 | 714715-C6 | 56.90 |
| | .015 (1/64) | .005 | **.150** (10x) | 3 | 1/8 | 2-1/2 | 714515 | 82.00 | 714515-C6 | 89.30 |
| | .030 | .005 | **.156** (5x) | 3 | 1/8 | 1-1/2 | 714730 | 44.10 | 714730-C6 | 51.00 |
| | .030 | .005 | **.300** (10x) | 3 | 3/16 | 3 | 714530 | 75.50 | 714530-C6 | 83.70 |
| | .045 | .005 | **.250** (5x) | 3 | 1/8 | 1-1/2 | 714745 | 44.10 | 714745-C6 | 51.00 |
| | .045 | .005 | **.450** (10x) | 3 | 3/16 | 3 | 714545 | 76.10 | 714545-C6 | 84.30 |
| | .060 | .005 | **.312** (5x) | 3 | 1/8 | 1-1/2 | 714760 | 44.10 | 714760-C6 | 51.00 |
| | .060 | .005 | **.600** (10x) | 3 | 3/16 | 3 | 714560 | 75.50 | 714560-C6 | 83.70 |
| | .125 (1/8) | .005 | **.625** (5x) | 3 | 1/4 | 2-1/2 | 714799 | 99.80 | 714799-C6 | 109.50 |
| | .125 (1/8) | .005 | **1.250** (10x) | 3 | 3/8 | 4 | 714599 | 110.00 | 714599-C6 | 125.10 |
| 10° | .015 (1/64) | .005 | **.078** (5x) | 3 | 1/8 | 1-1/2 | 714615 | 47.40 | 714615-C6 | 54.30 |
| | .015 (1/64) | .005 | **.150** (10x) | 3 | 1/8 | 2-1/2 | 714415 | 81.30 | 714415-C6 | 88.50 |
| | .030 | .005 | **.156** (5x) | 3 | 1/8 | 1-1/2 | 714630 | 43.80 | 714630-C6 | 50.70 |
| | .030 | .005 | **.300** (10x) | 3 | 3/16 | 3 | 714430 | 74.80 | 714430-C6 | 83.00 |
| | .045 | .005 | **.250** (5x) | 3 | 3/16 | 2 | 714645 | 73.70 | 714645-C6 | 81.40 |
| | .045 | .005 | **.450** (10x) | 3 | 1/4 | 4 | 714445 | 81.40 | 714445-C6 | 91.90 |
| | .060 | .005 | **.312** (5x) | 3 | 3/16 | 2 | 714660 | 73.70 | 714660-C6 | 81.40 |
| | .060 | .005 | **.600** (10x) | 3 | 3/8 | 4 | 714460 | 107.40 | 714460-C6 | 122.50 |
| | .125 (1/8) | .005 | **.625** (5x) | 3 | 3/8 | 2-1/2 | 714699 | 128.00 | 714699-C6 | 141.90 |
| | .125 (1/8) | .005 | **1.250** (10x) | 3 | 5/8 | 4 | 714499 | 167.40 | 714499-C6 | 191.00 |

# MATERIAL-SPECIFIC END MILLS

## FERROUS MATERIALS

**End Mills for Hardened Steels** mm & in New Sizes! . . . . . 112

Recommended Materials:
hardened steels up to 68 Rc and high temperature alloys

**End Mills for Titanium Alloys** mm & in New! . . . . . 140

Designed & tested specifically for:
Titanium 6Al4V and other titanium alloys

**End Mills for High Temp Alloys** mm & in New Sizes! . . . . . 143

Recommended Materials:
titanium, Inconel, nickel alloys, stainless steels, tool steels, and other difficult-to-machine materials

**End Mills for Medium Alloy Steels** mm & in . . . . . 188

Recommended Materials:
readily machinable medium alloy steels, stainless steels, and tool steels

**End Mills for Free Machining Steels** mm & in . . . . . 211

Recommended Materials:
free machining varieties of carbon steels and stainless steels

## NON-FERROUS MATERIALS

**End Mills for Aluminum Alloys** mm & in New Style & Sizes! . . . . . 219

Recommended Materials:
aluminum, copper, brass, and bronze alloys, high silicon aluminum, magnesium alloys

**End Mills for Non-Ferrous Materials** mm & in New Style & Sizes! . . . . . 251

Recommended Materials:
graphite, composites, green carbides, green ceramics

**End Mills for Plastics** mm & in New Sizes! . . . . . 269

Recommended Materials:
filled and unfilled plastics

**End Mills for Composites** New Sizes! . . . . . 294

Recommended Materials:
abrasive composites, fiber-reinforced materials, layered composites

**End Mills for Wood** . . . . . 301

Recommended Materials:
soft, hard, and engineered woods

# END MILLS FOR HARDENED STEELS

## Square – For Steels Up to 55 Rc




**5 Flute, Variable Helix Design**



- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | | | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | ALTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .015 (1/64) | | .0150 | **.012** (0.8x) | 1/4 | 2-1/2 | 859415-C6 | 91.20 |
| .015 (1/64) | | .0150 | **.023** (1.5x) | 1/4 | 2-1/2 | 907415-C6 | 89.00 |
| .015 (1/64) | | .0150 | **.045** (3x) | 1/4 | 2-1/2 | 915915-C6 | 89.00 |
| .015 (1/64) | | .0150 | **.078** (5x) | 1/4 | 2-1/2 | 885215-C6 | 93.20 |
| .020 | | .0200 | **.030** (1.5x) | 1/4 | 2-1/2 | 907420-C6 | 89.00 |
| .020 | | .0200 | **.060** (3x) | 1/4 | 2-1/2 | 915920-C6 | 89.00 |
| .020 | | .0200 | **.100** (5x) | 1/4 | 2-1/2 | 885220-C6 | 93.20 |
| .025 | | .0250 | **.038** (1.5x) | 1/4 | 2-1/2 | 907425-C6 | 89.00 |
| .025 | | .0250 | **.075** (3x) | 1/4 | 2-1/2 | 915925-C6 | 89.00 |
| .030 | | .0300 | **.045** (1.5x) | 1/4 | 2-1/2 | 907430-C6 | 80.90 |
| .030 | | .0300 | **.090** (3x) | 1/4 | 2-1/2 | 915930-C6 | 81.60 |
| .031 (1/32) | | .0310 | **.025** (0.8x) | 1/4 | 2-1/2 | 859431-C6 | 79.10 |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 1/4 | 2-1/2 | 907431-C6 | 74.80 |
| .031 (1/32) | | .0310 | **.093** (3x) | 1/4 | 2-1/2 | 915931-C6 | 74.80 |
| .031 (1/32) | | .0310 | **.125** (4x) | 1/4 | 2-1/2 | 824931-C6 | 79.10 |
| .031 (1/32) | | .0310 | **.156** (5x) | 1/4 | 2-1/2 | 885231-C6 | 81.70 |
| .035 | | .0350 | **.053** (1.5x) | 1/4 | 2-1/2 | 907435-C6 | 76.00 |
| .035 | | .0350 | **.105** (3x) | 1/4 | 2-1/2 | 915935-C6 | 75.40 |
| .039 | | .0390 | **.059** (1.5x) | 1/4 | 2-1/2 | 907439-C6 | 76.00 |
| .039 | | .0390 | **.117** (3x) | 1/4 | 2-1/2 | 915939-C6 | 75.40 |
| .039 | | .0390 | **.203** (5x) | 1/4 | 2-1/2 | 885239-C6 | 82.40 |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 6 mm | 63 mm | 897822-C6 | 82.90 |
| .040 | | .0400 | **.060** (1.5x) | 1/4 | 2-1/2 | 907440-C6 | 74.80 |
| .040 | | .0400 | **.120** (3x) | 1/4 | 2-1/2 | 915940-C6 | 74.80 |
| .040 | | .0400 | **.203** (5x) | 1/4 | 2-1/2 | 885240-C6 | 81.70 |
| .045 | | .0450 | **.068** (1.5x) | 1/4 | 2-1/2 | 907445-C6 | 75.40 |
| .045 | | .0450 | **.135** (3x) | 1/4 | 2-1/2 | 915945-C6 | 75.40 |
| .047 (3/64) | | .0470 | **.071** (1.5x) | 1/4 | 2-1/2 | 907447-C6 | 74.80 |
| .047 (3/64) | | .0470 | **.141** (3x) | 1/4 | 2-1/2 | 915947-C6 | 74.80 |
| .047 (3/64) | | .0470 | **.187** (4x) | 1/4 | 2-1/2 | 824947-C6 | 78.30 |
| .047 (3/64) | | .0470 | **.250** (5x) | 1/4 | 2-1/2 | 885247-C6 | 81.70 |
| .050 | | .0500 | **.075** (1.5x) | 1/4 | 2-1/2 | 907450-C6 | 75.70 |
| .050 | | .0500 | **.150** (3x) | 1/4 | 2-1/2 | 915950-C6 | 74.80 |
| .055 | | .0550 | **.083** (1.5x) | 1/4 | 2-1/2 | 907455-C6 | 76.00 |
| .055 | | .0550 | **.165** (3x) | 1/4 | 2-1/2 | 915955-C6 | 75.40 |
| .060 | | .0600 | **.090** (1.5x) | 1/4 | 2-1/2 | 907460-C6 | 74.80 |
| .060 | | .0600 | **.180** (3x) | 1/4 | 2-1/2 | 915960-C6 | 74.80 |

continued on next page

# END MILLS FOR HARDENED STEELS

## Square – For Steels Up to 55 Rc (cont.)



continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | ALTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .062 (1/16) | | .0620 | **.050** (0.8x) | 1/4 | 2-1/2 | 859462-C6 | 78.30 |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 1/4 | 2-1/2 | 907462-C6 | 74.80 |
| .062 (1/16) | | .0620 | **.186** (3x) | 1/4 | 2-1/2 | 915962-C6 | 74.80 |
| .062 (1/16) | | .0620 | **.250** (4x) | 1/4 | 2-1/2 | 824962-C6 | 79.10 |
| .062 (1/16) | | .0620 | **.312** (5x) | 1/4 | 2-1/2 | 885262-C6 | 81.70 |
| .070 | | .0700 | **.105** (1.5x) | 1/4 | 2-1/2 | 907470-C6 | 78.30 |
| .070 | | .0700 | **.210** (3x) | 1/4 | 2-1/2 | 915970-C6 | 78.30 |
| .078 (5/64) | | .0780 | **.062** (0.8x) | 1/4 | 2-1/2 | 859478-C6 | 81.80 |
| .078 (5/64) | | .0780 | **.117** (1.5x) | 1/4 | 2-1/2 | 907478-C6 | 78.30 |
| .078 (5/64) | | .0780 | **.234** (3x) | 1/4 | 2-1/2 | 915978-C6 | 78.30 |
| .078 (5/64) | | .0780 | **.312** (4x) | 1/4 | 2-1/2 | 824978-C6 | 82.50 |
| .078 (5/64) | | .0780 | **.406** (5x) | 1/4 | 2-1/2 | 885278-C6 | 85.30 |
| | 2.0 mm | .0787 | **3.00 mm** (1.5x) | 6 mm | 63 mm | 777845-C6 | 87.70 |
| | 2.0 mm | .0787 | **6.00 mm** (3x) | 6 mm | 63 mm | 897845-C6 | 86.80 |
| .080 | | .0800 | **.120** (1.5x) | 1/4 | 2-1/2 | 907480-C6 | 79.10 |
| .080 | | .0800 | **.240** (3x) | 1/4 | 2-1/2 | 915980-C6 | 79.10 |
| .090 | | .0900 | **.135** (1.5x) | 1/4 | 2-1/2 | 907490-C6 | 79.10 |
| .090 | | .0900 | **.270** (3x) | 1/4 | 2-1/2 | 915990-C6 | 78.30 |
| .093 (3/32) | | .0930 | **.074** (0.8x) | 1/4 | 2-1/2 | 859493-C6 | 83.00 |
| .093 (3/32) | | .0930 | **.140** (1.5x) | 1/4 | 2-1/2 | 907493-C6 | 79.50 |
| .093 (3/32) | | .0930 | **.279** (3x) | 1/4 | 2-1/2 | 915993-C6 | 79.50 |
| .093 (3/32) | | .0930 | **.372** (4x) | 1/4 | 2-1/2 | 824993-C6 | 83.60 |
| .093 (3/32) | | .0930 | **.500** (5x) | 1/4 | 2-1/2 | 885293-C6 | 86.20 |
| .100 | | .1000 | **.150** (1.5x) | 1/4 | 2-1/2 | 907500-C6 | 79.50 |
| .100 | | .1000 | **.300** (3x) | 1/4 | 2-1/2 | 916000-C6 | 79.50 |
| .109 (7/64) | | .1090 | **.164** (1.5x) | 1/4 | 2-1/2 | 907502-C6 | 80.10 |
| .109 (7/64) | | .1090 | **.327** (3x) | 1/4 | 2-1/2 | 916002-C6 | 80.10 |
| .109 (7/64) | | .1090 | **.570** (5x) | 1/4 | 2-1/2 | 885302-C6 | 86.80 |
| .118 | | .1180 | **.177** (1.5x) | 1/4 | 2-1/2 | 907505-C6 | 80.90 |
| .118 | | .1180 | **.354** (3x) | 1/4 | 2-1/2 | 916005-C6 | 80.90 |
| | 3.0 mm | .1181 | **9.00 mm** (3x) | 6 mm | 63 mm | 897857-C6 | 88.50 |

| $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equivalent | $L_2$ +.030″ −.000″ +.75mm −.00mm | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
|---|---|---|---|---|---|---|---|
| .125 (1/8) | | .1250 | **.100** (0.8x) | 1/4 | 2-1/2 | 859508-C6 | 83.90 |
| .125 (1/8) | | .1250 | **.187** (1.5x) | 1/4 | 2-1/2 | 907508-C6 | 80.30 |
| .125 (1/8) | | .1250 | **.375** (3x) | 1/4 | 2-1/2 | 916008-C6 | 80.30 |
| .125 (1/8) | | .1250 | **.500** (4x) | 1/4 | 2-1/2 | 825008-C6 | 84.40 |
| .125 (1/8) | | .1250 | **.625** (5x) | 1/4 | 2-1/2 | 885308-C6 | 87.30 |
| .140 (9/64) | | .1406 | **.220** (1.5x) | 1/4 | 2-1/2 | 907509-C6 | 84.50 |
| .140 (9/64) | | .1406 | **.425** (3x) | 1/4 | 2-1/2 | 916009-C6 | 84.50 |
| .140 (9/64) | | .1406 | **.750** (5x) | 1/4 | 2-1/2 | 885309-C6 | 88.00 |
| .156 (5/32) | | .1562 | **.125** (0.8x) | 1/4 | 2-1/2 | 859510-C6 | 83.90 |
| .156 (5/32) | | .1562 | **.235** (1.5x) | 1/4 | 2-1/2 | 907510-C6 | 80.30 |
| .156 (5/32) | | .1562 | **.468** (3x) | 1/4 | 2-1/2 | 916010-C6 | 80.30 |
| .156 (5/32) | | .1562 | **.625** (4x) | 1/4 | 2-1/2 | 825010-C6 | 84.40 |

continued on next page

# END MILLS FOR HARDENED STEELS

## Square – For Steels Up to 55 Rc (cont.)



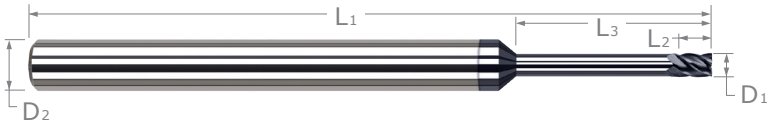
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| CUTTER DIAMETER | | | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equivalent | $L_2$ +.030″ −.000″ +.75mm −.00mm | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .156 (5/32) | | .1562 | **.750** (5x) | 1/4 | 3 | 885310-C6 | 88.00 |
| .172 (11/64) | | .1718 | **.516** (3x) | 1/4 | 2-1/2 | 916011-C6 | 87.00 |
| .187 (3/16) | | .1875 | **.150** (0.8x) | 1/4 | 2-1/2 | 859512-C6 | 85.70 |
| .187 (3/16) | | .1875 | **.285** (1.5x) | 1/4 | 2-1/2 | 907512-C6 | 83.60 |
| .187 (3/16) | | .1875 | **.562** (3x) | 1/4 | 2-1/2 | 916012-C6 | 83.60 |
| .187 (3/16) | | .1875 | **.750** (4x) | 1/4 | 3 | 825012-C6 | 87.00 |
| .187 (3/16) | | .1875 | **1.000** (5x) | 1/4 | 3 | 885312-C6 | 92.10 |
| .218 (7/32) | | .2187 | **.656** (3x) | 1/4 | 2-1/2 | 916014-C6 | 87.00 |
| | 6.0 mm | .2362 | **18.00 mm** (3x) | 6 mm | 63 mm | 897866-C6 | 89.40 |
| .250 (1/4) | | .2500 | **.200** (0.8x) | 1/4 | 2-1/2 | 859516-C6 | 95.30 |
| .250 (1/4) | | .2500 | **.375** (1.5x) | 1/4 | 2-1/2 | 907516-C6 | 93.10 |
| .250 (1/4) | | .2500 | **.750** (3x) | 1/4 | 2-1/2 | 916016-C6 | 93.10 |
| .250 (1/4) | | .2500 | **1.250** (5x) | 1/4 | 4 | 885316-C6 | 101.20 |
| .312 (5/16) | | .3125 | **.470** (1.5x) | 5/16 | 2-1/2 | 907520-C6 | 101.40 |
| .312 (5/16) | | .3125 | **1.000** (3x) | 5/16 | 2-1/2 | 916020-C6 | 102.60 |
| .375 (3/8) | | .3750 | **.570** (1.5x) | 3/8 | 2-1/2 | 907524-C6 | 117.20 |
| .375 (3/8) | | .3750 | **1.125** (3x) | 3/8 | 2-1/2 | 916024-C6 | 117.20 |
| .500 (1/2) | | .5000 | **.750** (1.5x) | 1/2 | 3 | 907532-C6 | 141.70 |
| .500 (1/2) | | .5000 | **1.500** (3x) | 1/2 | 3 | 916032-C6 | 143.00 |

**Please see Speeds & Feeds on page 121**

# END MILLS FOR HARDENED STEELS

## Square – For Steels Up to 55 Rc – Long Reach, Stub Flute




**5 Flute, Variable Helix Design**



- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Stub flute for maximum rigidity
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

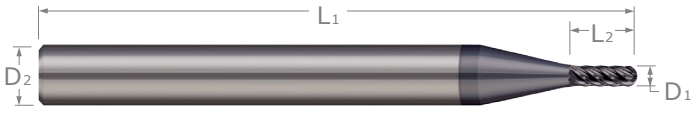
| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .031 (1/32) | .047 | **.156** (5x) | 1/4 | 2-1/2 | 825331-C6 | 84.40 |
| .031 (1/32) | .047 | **.250** (8x) | 1/4 | 2-1/2 | 819031-C6 | 91.10 |
| .047 (3/64) | .071 | **.250** (5x) | 1/4 | 2-1/2 | 825347-C6 | 84.40 |
| .047 (3/64) | .071 | **.375** (8x) | 1/4 | 2-1/2 | 819047-C6 | 91.10 |
| .062 (1/16) | .093 | **.312** (5x) | 1/4 | 2-1/2 | 825362-C6 | 84.40 |
| .062 (1/16) | .093 | **.500** (8x) | 1/4 | 2-1/2 | 819062-C6 | 91.10 |
| .078 (5/64) | .117 | **.406** (5x) | 1/4 | 2-1/2 | 825378-C6 | 84.40 |
| .078 (5/64) | .117 | **.625** (8x) | 1/4 | 2-1/2 | 819078-C6 | 92.10 |
| .093 (3/32) | .140 | **.500** (5x) | 1/4 | 2-1/2 | 825393-C6 | 89.10 |
| .093 (3/32) | .140 | **.750** (8x) | 1/4 | 2-1/2 | 819093-C6 | 95.70 |
| .109 (7/64) | .164 | **.570** (5x) | 1/4 | 2-1/2 | 825402-C6 | 89.10 |
| .109 (7/64) | .164 | **.900** (8x) | 1/4 | 2-1/2 | 819102-C6 | 95.70 |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .125 (1/8) | .187 | **.625** (5x) | 1/4 | 2-1/2 | 825408-C6 | 90.00 |
| .125 (1/8) | .187 | **1.000** (8x) | 1/4 | 2-1/2 | 819108-C6 | 96.70 |
| .156 (5/32) | .235 | **.750** (5x) | 1/4 | 3 | 825410-C6 | 94.90 |
| .156 (5/32) | .235 | **1.250** (8x) | 1/4 | 3 | 819110-C6 | 101.40 |
| .187 (3/16) | .285 | **1.000** (5x) | 1/4 | 3 | 825412-C6 | 94.90 |
| .187 (3/16) | .285 | **1.500** (8x) | 1/4 | 3 | 819112-C6 | 101.40 |
| .250 (1/4) | .375 | **1.250** (5x) | 1/4 | 4 | 825416-C6 | 99.30 |
| .250 (1/4) | .375 | **2.000** (8x) | 1/4 | 4 | 819116-C6 | 106.30 |

**Please see Speeds & Feeds on page 122**

NEW SIZES!

# END MILLS FOR HARDENED STEELS

## Ball – For Steels Up to 55 Rc




**6 Flute, Variable Helix Design**



- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 6 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Ball profile for maximum strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ | |
| .031 (1/32) | .025 (0.8x) | 1/4 | 2-1/2 | 704931-C6 | 59.40 | |
| .031 (1/32) | .047 (1.5x) | 1/4 | 2-1/2 | 798131-C6 | 55.10 | |
| .031 (1/32) | .093 (3x) | 1/4 | 2-1/2 | 843431-C6 | 55.10 | |
| .031 (1/32) | .156 (5x) | 1/4 | 2-1/2 | 789431-C6 | 59.20 | |
| .039 | .059 (1.5x) | 1/4 | 2-1/2 | 798139-C6 | 55.10 | |
| .039 | .117 (3x) | 1/4 | 2-1/2 | 843439-C6 | 55.10 | |
| .040 | .060 (1.5x) | 1/4 | 2-1/2 | 798140-C6 | 55.10 | NEW |
| .040 | .120 (3x) | 1/4 | 2-1/2 | 843440-C6 | 55.10 | |
| .047 (3/64) | .038 (0.8x) | 1/4 | 2-1/2 | 704947-C6 | 59.40 | |
| .047 (3/64) | .071 (1.5x) | 1/4 | 2-1/2 | 798147-C6 | 55.10 | |
| .047 (3/64) | .141 (3x) | 1/4 | 2-1/2 | 843447-C6 | 55.10 | |
| .047 (3/64) | .250 (5x) | 1/4 | 2-1/2 | 789447-C6 | 59.20 | |
| .050 | .075 (1.5x) | 1/4 | 2-1/2 | 798150-C6 | 55.10 | NEW |
| .050 | .150 (3x) | 1/4 | 2-1/2 | 843450-C6 | 55.10 | NEW |
| .060 | .090 (1.5x) | 1/4 | 2-1/2 | 798160-C6 | 55.10 | NEW |
| .060 | .180 (3x) | 1/4 | 2-1/2 | 843460-C6 | 55.10 | NEW |
| .062 (1/16) | .050 (0.8x) | 1/4 | 2-1/2 | 704962-C6 | 56.50 | |
| .062 (1/16) | .093 (1.5x) | 1/4 | 2-1/2 | 798162-C6 | 52.30 | |
| .062 (1/16) | .186 (3x) | 1/4 | 2-1/2 | 843462-C6 | 52.30 | |
| .062 (1/16) | .250 (4x) | 1/4 | 2-1/2 | 718962-C6 | 55.70 | |
| .062 (1/16) | .312 (5x) | 1/4 | 2-1/2 | 789462-C6 | 59.20 | |
| .078 (5/64) | .062 (0.8x) | 1/4 | 2-1/2 | 704978-C6 | 56.50 | |
| .078 (5/64) | .117 (1.5x) | 1/4 | 2-1/2 | 798178-C6 | 52.30 | |
| .078 (5/64) | .234 (3x) | 1/4 | 2-1/2 | 843478-C6 | 52.30 | |
| .078 (5/64) | .406 (5x) | 1/4 | 2-1/2 | 789478-C6 | 59.20 | |
| .093 (3/32) | .074 (0.8x) | 1/4 | 2-1/2 | 704993-C6 | 56.50 | |
| .093 (3/32) | .140 (1.5x) | 1/4 | 2-1/2 | 798193-C6 | 52.30 | |
| .093 (3/32) | .279 (3x) | 1/4 | 2-1/2 | 843493-C6 | 52.30 | |
| .093 (3/32) | .375 (4x) | 1/4 | 2-1/2 | 718993-C6 | 55.70 | |
| .093 (3/32) | .500 (5x) | 1/4 | 2-1/2 | 789493-C6 | 59.20 | |
| .109 (7/64) | .327 (3x) | 1/4 | 2-1/2 | 843502-C6 | 52.30 | |
| .118 | .177 (1.5x) | 1/4 | 2-1/2 | 798205-C6 | 52.30 | |
| .118 | .354 (3x) | 1/4 | 2-1/2 | 843505-C6 | 52.30 | |

continued on next page

**Please see Speeds & Feeds on page 117**

# END MILLS FOR HARDENED STEELS

## Ball – For Steels Up to 55 Rc (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ |
| .125 (1/8) | .100 (0.8x) | 1/4 | 2-1/2 | 705008-C6 | 52.10 |
| .125 (1/8) | .187 (1.5x) | 1/4 | 2-1/2 | 798208-C6 | 48.00 |
| .125 (1/8) | .375 (3x) | 1/4 | 2-1/2 | 843508-C6 | 48.00 |
| .125 (1/8) | .500 (4x) | 1/4 | 2-1/2 | 719008-C6 | 51.40 |
| .125 (1/8) | .625 (5x) | 1/4 | 2-1/2 | 789508-C6 | 54.80 |
| .140 (9/64) | .220 (1.5x) | 1/4 | 2-1/2 | 798209-C6 | 53.00 |
| .140 (9/64) | .425 (3x) | 1/4 | 2-1/2 | 843509-C6 | 53.00 |
| .156 (5/32) | .235 (1.5x) | 1/4 | 2-1/2 | 798210-C6 | 49.40 |
| .156 (5/32) | .468 (3x) | 1/4 | 2-1/2 | 843510-C6 | 49.40 |
| .156 (5/32) | .750 (5x) | 1/4 | 3 | 789510-C6 | 59.40 |
| .187 (3/16) | .150 (0.8x) | 1/4 | 2-1/2 | 705012-C6 | 55.20 |
| .187 (3/16) | .285 (1.5x) | 1/4 | 2-1/2 | 798212-C6 | 51.00 |
| .187 (3/16) | .562 (3x) | 1/4 | 2-1/2 | 843512-C6 | 51.00 |
| .187 (3/16) | 1.000 (5x) | 1/4 | 3 | 789512-C6 | 59.40 |
| .250 (1/4) | .375 (1.5x) | 1/4 | 2-1/2 | 798216-C6 | 61.80 |
| .250 (1/4) | .750 (3x) | 1/4 | 2-1/2 | 843516-C6 | 61.80 |
| .375 (3/8) | 1.125 (3x) | 3/8 | 2-1/2 | 843524-C6 | 97.60 |



## Speeds & Feeds (End Mills for Hardened Steels – Ball – For Steels Up to 55Rc)

**Important Note:** Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter length of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 85%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material | Hardness | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | Radial | Axial |
| Hardened Steels<br>Titanium Alloys<br>Nickel Alloys | 38-44 Rc | 100 | Slotting | .00003 | .00006 | .00009 | .00012 | .00015 | .00018 | .00024 | .00036 | .00049 | .00061 | .00073 | .00097 | 1 x Dia | .30 x Dia |
| | | | Profiling | .00004 | .00007 | .00011 | .00015 | .00018 | .00022 | .00029 | .00044 | .00059 | .00073 | .00088 | .00118 | .3 x Dia | .5 x Dia |
| | 45-55 Rc | 60 | Slotting | .00002 | .00004 | .00006 | .00008 | .00010 | .00012 | .00016 | .00023 | .00031 | .00039 | .00047 | .00062 | 1 x Dia | .15 x Dia |
| | | | Profiling | .00002 | .00004 | .00006 | .00008 | .00011 | .00013 | .00017 | .00026 | .00034 | .00043 | .00051 | .00068 | .15 x Dia | .5 x Dia |

# END MILLS FOR HARDENED STEELS

## Ball – For Steels Up to 55 Rc – Long Reach, Stub Flute




**6 Flute, Variable Helix Design**

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 6 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Stub flute for maximum rigidity
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ |
| .031 (1/32) | .047 | **.156** (5x) | 1/4 | 2-1/2 | 786231-C6 | 83.70 |
| .031 (1/32) | .047 | **.250** (8x) | 1/4 | 2-1/2 | 786031-C6 | 90.30 |
| .047 (3/64) | .071 | **.250** (5x) | 1/4 | 2-1/2 | 786247-C6 | 86.90 |
| .047 (3/64) | .071 | **.375** (8x) | 1/4 | 2-1/2 | 786047-C6 | 93.90 |
| .062 (1/16) | .093 | **.312** (5x) | 1/4 | 2-1/2 | 786262-C6 | 86.10 |
| .062 (1/16) | .093 | **.500** (8x) | 1/4 | 2-1/2 | 786062-C6 | 93.00 |
| .078 (5/64) | .117 | **.406** (5x) | 1/4 | 2-1/2 | 786278-C6 | 89.40 |
| .078 (5/64) | .117 | **.625** (8x) | 1/4 | 2-1/2 | 786078-C6 | 96.40 |
| .093 (3/32) | .140 | **.500** (5x) | 1/4 | 2-1/2 | 786293-C6 | 90.80 |
| .093 (3/32) | .140 | **.750** (8x) | 1/4 | 2-1/2 | 786093-C6 | 98.70 |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ |
| .125 (1/8) | .187 | **.625** (5x) | 1/4 | 2-1/2 | 786308-C6 | 91.80 |
| .125 (1/8) | .187 | **1.000** (8x) | 1/4 | 2-1/2 | 786108-C6 | 98.60 |
| .187 (3/16) | .285 | **1.000** (5x) | 1/4 | 3 | 786312-C6 | 97.60 |
| .187 (3/16) | .285 | **1.500** (8x) | 1/4 | 3 | 786112-C6 | 104.60 |

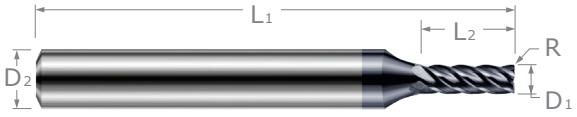
### Speeds & Feeds (End Mills for Hardened Steels – Ball – For Steels Up to 55Rc – Long Reach, Stub Flute)

**Important Note:** Values in tables are in inches and are based on reached (8x Dia) end mills. For shorter reaches, tables values of IPT must be increased (for 5x, increase 125%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material | Hardness | SFM | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | Radial | Axial |
| Hardened Steels | 38 - 44 Rc | 100 | Slotting | .00003 | .00005 | .00008 | .00011 | .00013 | .00016 | .00022 | .00032 | .00043 | .00054 | .00065 | .00086 | 1 x Dia | .28 x Dia |
| | | | Profiling | .00003 | .00006 | .00010 | .00013 | .00016 | .00019 | .00026 | .00039 | .00052 | .00065 | .00078 | .00105 | 1 x Dia | .28 x Dia |
| Titanium Alloys | 45 - 55 Rc | 60 | Slotting | .00002 | .00003 | .00005 | .00007 | .00009 | .00010 | .00014 | .00021 | .00028 | .00035 | .00041 | .00055 | 1 x Dia | .14 x Dia |
| Nickel Alloys | | | Profiling | .00002 | .00004 | .00006 | .00008 | .00009 | .00011 | .00015 | .00023 | .00030 | .00038 | .00046 | .00061 | 1 x Dia | .14 x Dia |

# END MILLS FOR HARDENED STEELS

## Corner Radius – For Steels Up to 55 Rc




**5 Flute, Variable Helix Design**

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Corner radius for improved strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .015 (1/64) | | .0150 | **.003** | .045 (3x) | 1/4 | 2-1/2 | 760415-C6 | 76.70 |
| .020 | | .0200 | **.005** | .030 (1.5x) | 1/4 | 2-1/2 | 920420-C6 | 75.70 |
| .020 | | .0200 | **.005** | .060 (3x) | 1/4 | 2-1/2 | 933220-C6 | 76.00 |
| .031 (1/32) | | .0310 | **.005** | .025 (0.8x) | 1/4 | 2-1/2 | 718731-C6 | 78.30 |
| .031 (1/32) | | .0310 | **.005** | .047 (1.5x) | 1/4 | 2-1/2 | 920431-C6 | 74.80 |
| .031 (1/32) | | .0310 | **.005** | .093 (3x) | 1/4 | 2-1/2 | 933231-C6 | 74.80 |
| .031 (1/32) | | .0310 | **.005** | .156 (5x) | 1/4 | 2-1/2 | 851731-C6 | 81.70 |
| .031 (1/32) | | .0310 | **.010** | .093 (3x) | 1/4 | 2-1/2 | 852131-C6 | 74.80 |
| .039 | | .0390 | **.005** | .117 (3x) | 1/4 | 2-1/2 | 933239-C6 | 76.00 |
| | 1.0 mm | .0393 | **.20 mm** | 3.00 mm (3x) | 6 mm | 63 mm | 894622-C6 | 82.90 |
| .040 | | .0400 | **.005** | .060 (1.5x) | 1/4 | 2-1/2 | 920440-C6 | 75.40 |
| .040 | | .0400 | **.005** | .120 (3x) | 1/4 | 2-1/2 | 933240-C6 | 75.40 |
| .040 | | .0400 | **.010** | .060 (1.5x) | 1/4 | 2-1/2 | 872740-C6 | 75.40 |
| .040 | | .0400 | **.010** | .120 (3x) | 1/4 | 2-1/2 | 852140-C6 | 75.40 |
| .047 (3/64) | | .0470 | **.005** | .071 (1.5x) | 1/4 | 2-1/2 | 920447-C6 | 74.80 |
| .047 (3/64) | | .0470 | **.005** | .141 (3x) | 1/4 | 2-1/2 | 933247-C6 | 74.80 |
| .047 (3/64) | | .0470 | **.005** | .250 (5x) | 1/4 | 2-1/2 | 851747-C6 | 81.70 |
| .047 (3/64) | | .0470 | **.010** | .071 (1.5x) | 1/4 | 2-1/2 | 872747-C6 | 74.80 |
| .047 (3/64) | | .0470 | **.010** | .141 (3x) | 1/4 | 2-1/2 | 852147-C6 | 74.80 |
| .047 (3/64) | | .0470 | **.010** | .250 (5x) | 1/4 | 2-1/2 | 750047-C6 | 82.40 |
| .047 (3/64) | | .0470 | **.015** | .071 (1.5x) | 1/4 | 2-1/2 | 706147-C6 | 74.80 |
| .047 (3/64) | | .0470 | **.015** | .141 (3x) | 1/4 | 2-1/2 | 852747-C6 | 74.80 |
| .050 | | .0500 | **.005** | .150 (3x) | 1/4 | 2-1/2 | 933250-C6 | 75.40 |
| .060 | | .0600 | **.005** | .090 (1.5x) | 1/4 | 2-1/2 | 920460-C6 | 75.70 |
| .060 | | .0600 | **.005** | .180 (3x) | 1/4 | 2-1/2 | 933260-C6 | 75.40 |
| .062 (1/16) | | .0620 | **.005** | .050 (0.8x) | 1/4 | 2-1/2 | 718762-C6 | 79.20 |
| .062 (1/16) | | .0620 | **.005** | .093 (1.5x) | 1/4 | 2-1/2 | 920462-C6 | 75.70 |
| .062 (1/16) | | .0620 | **.005** | .186 (3x) | 1/4 | 2-1/2 | 933262-C6 | 74.80 |
| .062 (1/16) | | .0620 | **.005** | .312 (5x) | 1/4 | 2-1/2 | 851762-C6 | 81.70 |
| .062 (1/16) | | .0620 | **.010** | .093 (1.5x) | 1/4 | 2-1/2 | 872762-C6 | 74.80 |
| .062 (1/16) | | .0620 | **.010** | .186 (3x) | 1/4 | 2-1/2 | 852162-C6 | 74.80 |
| .062 (1/16) | | .0620 | **.010** | .312 (5x) | 1/4 | 2-1/2 | 750062-C6 | 82.40 |
| .062 (1/16) | | .0620 | **.020** | .093 (1.5x) | 1/4 | 2-1/2 | 705962-C6 | 74.80 |
| .062 (1/16) | | .0620 | **.020** | .186 (3x) | 1/4 | 2-1/2 | 813562-C6 | 74.80 |
| .070 | | .0700 | **.005** | .210 (3x) | 1/4 | 2-1/2 | 933270-C6 | 79.00 |

continued on next page

# END MILLS FOR HARDENED STEELS

## Corner Radius – For Steels Up to 55 Rc (cont.)

continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .078 (5/64) | | .0780 | **.005** | .117 (1.5x) | 1/4 | 2-1/2 | 920478-C6 | 78.30 |
| .078 (5/64) | | .0780 | **.005** | .234 (3x) | 1/4 | 2-1/2 | 933278-C6 | 78.30 |
| .078 (5/64) | | .0780 | **.005** | .406 (5x) | 1/4 | 2-1/2 | 851778-C6 | 85.30 |
| .078 (5/64) | | .0780 | **.010** | .117 (1.5x) | 1/4 | 2-1/2 | 872778-C6 | 78.30 |
| .078 (5/64) | | .0780 | **.010** | .234 (3x) | 1/4 | 2-1/2 | 852178-C6 | 78.30 |
| | 2.0 mm | .0787 | **.20 mm** | 6.00 mm (3x) | 6 mm | 63 mm | 894645-C6 | 87.70 |
| .080 | | .0800 | **.005** | .240 (3x) | 1/4 | 2-1/2 | 933280-C6 | 80.10 |
| .090 | | .0900 | **.005** | .270 (3x) | 1/4 | 2-1/2 | 933290-C6 | 81.00 |
| .093 (3/32) | | .0930 | **.005** | .074 (0.8x) | 1/4 | 2-1/2 | 718793-C6 | 83.00 |
| .093 (3/32) | | .0930 | **.005** | .140 (1.5x) | 1/4 | 2-1/2 | 920493-C6 | 79.50 |
| .093 (3/32) | | .0930 | **.005** | .279 (3x) | 1/4 | 2-1/2 | 933293-C6 | 79.50 |
| .093 (3/32) | | .0930 | **.005** | .372 (4x) | 1/4 | 2-1/2 | 750893-C6 | 83.80 |
| .093 (3/32) | | .0930 | **.005** | .500 (5x) | 1/4 | 2-1/2 | 851793-C6 | 86.20 |
| .093 (3/32) | | .0930 | **.010** | .140 (1.5x) | 1/4 | 2-1/2 | 872793-C6 | 79.50 |
| .093 (3/32) | | .0930 | **.010** | .279 (3x) | 1/4 | 2-1/2 | 852193-C6 | 79.50 |
| .093 (3/32) | | .0930 | **.010** | .500 (5x) | 1/4 | 2-1/2 | 750093-C6 | 87.00 |
| .093 (3/32) | | .0930 | **.015** | .279 (3x) | 1/4 | 2-1/2 | 852793-C6 | 79.50 |
| .093 (3/32) | | .0930 | **.020** | .140 (1.5x) | 1/4 | 2-1/2 | 732093-C6 | 79.50 |
| .093 (3/32) | | .0930 | **.020** | .279 (3x) | 1/4 | 2-1/2 | 813593-C6 | 79.50 |
| .093 (3/32) | | .0930 | **.030** | .279 (3x) | 1/4 | 2-1/2 | 853293-C6 | 79.50 |
| .100 | | .1000 | **.005** | .300 (3x) | 1/4 | 2-1/2 | 933300-C6 | 81.00 |
| .109 (7/64) | | .1090 | **.005** | .327 (3x) | 1/4 | 2-1/2 | 933302-C6 | 79.50 |
| .118 | | .1180 | **.005** | .177 (1.5x) | 1/4 | 2-1/2 | 920505-C6 | 80.90 |
| .118 | | .1180 | **.005** | .354 (3x) | 1/4 | 2-1/2 | 933305-C6 | 80.90 |
| .118 | | .1180 | **.010** | .354 (3x) | 1/4 | 2-1/2 | 852205-C6 | 80.90 |
| | 3.0 mm | .1181 | **.20 mm** | 9.00 mm (3x) | 6 mm | 63 mm | 894657-C6 | 88.50 |

| $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.030″ −.000″ +.75mm −.00mm | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | | .1250 | **.005** | .100 (0.8x) | 1/4 | 2-1/2 | 718808-C6 | 83.90 |
| .125 (1/8) | | .1250 | **.005** | .187 (1.5x) | 1/4 | 2-1/2 | 920508-C6 | 80.30 |
| .125 (1/8) | | .1250 | **.005** | .375 (3x) | 1/4 | 2-1/2 | 933308-C6 | 80.30 |
| .125 (1/8) | | .1250 | **.005** | .500 (4x) | 1/4 | 2-1/2 | 750908-C6 | 84.50 |
| .125 (1/8) | | .1250 | **.005** | .625 (5x) | 1/4 | 2-1/2 | 851808-C6 | 87.30 |
| .125 (1/8) | | .1250 | **.010** | .187 (1.5x) | 1/4 | 2-1/2 | 872808-C6 | 81.20 |
| .125 (1/8) | | .1250 | **.010** | .375 (3x) | 1/4 | 2-1/2 | 852208-C6 | 80.30 |
| .125 (1/8) | | .1250 | **.010** | .625 (5x) | 1/4 | 2-1/2 | 781608-C6 | 87.30 |
| .125 (1/8) | | .1250 | **.015** | .187 (1.5x) | 1/4 | 2-1/2 | 798008-C6 | 81.20 |
| .125 (1/8) | | .1250 | **.015** | .375 (3x) | 1/4 | 2-1/2 | 852808-C6 | 80.30 |
| .125 (1/8) | | .1250 | **.015** | .625 (5x) | 1/4 | 2-1/2 | 730808-C6 | 87.30 |
| .125 (1/8) | | .1250 | **.020** | .375 (3x) | 1/4 | 2-1/2 | 813608-C6 | 80.30 |
| .125 (1/8) | | .1250 | **.030** | .187 (1.5x) | 1/4 | 2-1/2 | 761308-C6 | 81.20 |
| .125 (1/8) | | .1250 | **.030** | .375 (3x) | 1/4 | 2-1/2 | 853308-C6 | 80.30 |
| .140 (9/64) | | .1406 | **.005** | .220 (1.5x) | 1/4 | 2-1/2 | 920509-C6 | 81.20 |
| .140 (9/64) | | .1406 | **.005** | .425 (3x) | 1/4 | 2-1/2 | 933309-C6 | 80.30 |

continued on next page

# END MILLS FOR HARDENED STEELS

## Corner Radius – For Steels Up to 55 Rc (cont.)



continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.030″ −.000″ +.75mm −.00mm | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .156 (5/32) | | .1562 | **.005** | .235 (1.5x) | 1/4 | 2-1/2 | 920510-C6 | 80.30 |
| .156 (5/32) | | .1562 | **.005** | .468 (3x) | 1/4 | 2-1/2 | 933310-C6 | 80.30 |
| .156 (5/32) | | .1562 | **.005** | .625 (4x) | 1/4 | 2-1/2 | 750910-C6 | 80.30 |
| .156 (5/32) | | .1562 | **.005** | .750 (5x) | 1/4 | 3 | 851810-C6 | 87.30 |
| .156 (5/32) | | .1562 | **.010** | .468 (3x) | 1/4 | 2-1/2 | 852210-C6 | 81.20 |
| .156 (5/32) | | .1562 | **.015** | .468 (3x) | 1/4 | 2-1/2 | 852810-C6 | 80.30 |
| .156 (5/32) | | .1562 | **.020** | .468 (3x) | 1/4 | 2-1/2 | 813610-C6 | 80.30 |
| .156 (5/32) | | .1562 | **.030** | .468 (3x) | 1/4 | 2-1/2 | 853310-C6 | 80.30 |
| .187 (3/16) | | .1875 | **.005** | .150 (0.8x) | 1/4 | 2-1/2 | 718812-C6 | 87.00 |
| .187 (3/16) | | .1875 | **.005** | .285 (1.5x) | 1/4 | 2-1/2 | 920512-C6 | 83.60 |
| .187 (3/16) | | .1875 | **.005** | .562 (3x) | 1/4 | 2-1/2 | 933312-C6 | 83.60 |
| .187 (3/16) | | .1875 | **.005** | 1.000 (5x) | 1/4 | 3 | 851812-C6 | 92.10 |
| .187 (3/16) | | .1875 | **.010** | .562 (3x) | 1/4 | 2-1/2 | 852212-C6 | 83.60 |
| .187 (3/16) | | .1875 | **.015** | .285 (1.5x) | 1/4 | 2-1/2 | 798012-C6 | 83.60 |
| .187 (3/16) | | .1875 | **.015** | .562 (3x) | 1/4 | 2-1/2 | 852812-C6 | 83.60 |
| .187 (3/16) | | .1875 | **.020** | .562 (3x) | 1/4 | 2-1/2 | 813612-C6 | 83.60 |
| .187 (3/16) | | .1875 | **.030** | .285 (1.5x) | 1/4 | 2-1/2 | 761312-C6 | 83.60 |
| .187 (3/16) | | .1875 | **.030** | .562 (3x) | 1/4 | 2-1/2 | 853312-C6 | 83.60 |
| .187 (3/16) | | .1875 | **.060** | .562 (3x) | 1/4 | 2-1/2 | 800712-C6 | 83.60 |
| | 6.0 mm | .2362 | **.20 mm** | 18.00 mm (3x) | 6 mm | 63 mm | 894666-C6 | 89.40 |
| .250 (1/4) | | .2500 | **.005** | .200 (0.8x) | 1/4 | 2-1/2 | 718816-C6 | 96.60 |
| .250 (1/4) | | .2500 | **.005** | .375 (1.5x) | 1/4 | 2-1/2 | 920516-C6 | 93.10 |
| .250 (1/4) | | .2500 | **.005** | .750 (3x) | 1/4 | 2-1/2 | 933316-C6 | 93.10 |
| .250 (1/4) | | .2500 | **.005** | 1.250 (5x) | 1/4 | 4 | 851816-C6 | 101.20 |
| .250 (1/4) | | .2500 | **.010** | .750 (3x) | 1/4 | 2-1/2 | 852216-C6 | 93.10 |
| .250 (1/4) | | .2500 | **.015** | .375 (1.5x) | 1/4 | 2-1/2 | 798016-C6 | 94.00 |
| .250 (1/4) | | .2500 | **.015** | .750 (3x) | 1/4 | 2-1/2 | 852816-C6 | 93.10 |
| .250 (1/4) | | .2500 | **.020** | .750 (3x) | 1/4 | 2-1/2 | 813616-C6 | 93.10 |
| .250 (1/4) | | .2500 | **.030** | .375 (1.5x) | 1/4 | 2-1/2 | 761316-C6 | 93.10 |
| .250 (1/4) | | .2500 | **.030** | .750 (3x) | 1/4 | 2-1/2 | 853316-C6 | 93.10 |
| .312 (5/16) | | .3125 | **.015** | 1.000 (3x) | 5/16 | 2-1/2 | 852720-C6 | 109.50 |
| .375 (3/8) | | .3750 | **.015** | .570 (1.5x) | 3/8 | 2-1/2 | 798024-C6 | 120.20 |
| .375 (3/8) | | .3750 | **.015** | 1.125 (3x) | 3/8 | 2-1/2 | 852824-C6 | 120.20 |
| .500 (1/2) | | .5000 | **.015** | 1.500 (3x) | 1/2 | 3 | 852832-C6 | 146.70 |
| .500 (1/2) | | .5000 | **.030** | 1.500 (3x) | 1/2 | 3 | 853332-C6 | 146.70 |

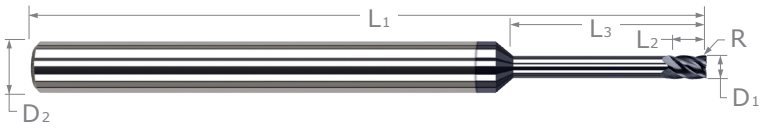
## Speeds & Feeds (End Mills for Hardened Steels – Square & Corner Radius – For Steels Up to 55Rc)

**Important Note:** Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 4x, reduce to 90%; for 5x, reduce to 85%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material | Hardness | SFM | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | Radial | Axial |
| Hardened Steels Titanium Alloys Nickel Alloys | 38-44 Rc | 100 | Slotting | .00003 | .00007 | .00010 | .00013 | .00017 | .00020 | .00027 | .00040 | .00054 | .00067 | .00081 | .00108 | 1 x Dia | .30 x Dia |
| | | | Profiling | .00004 | .00008 | .00012 | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00082 | .00098 | .00131 | .3 x Dia | .5 x Dia |
| | 45-55 Rc | 60 | Slotting | .00002 | .00004 | .00006 | .00009 | .00011 | .00013 | .00017 | .00026 | .00035 | .00043 | .00052 | .00069 | 1 x Dia | .15 x Dia |
| | | | Profiling | .00002 | .00005 | .00007 | .00009 | .00012 | .00014 | .00019 | .00028 | .00038 | .00047 | .00057 | .00076 | .15 x Dia | .5 x Dia |

# END MILLS FOR HARDENED STEELS

## Corner Radius – For Steels Up to 55 Rc – Long Reach, Stub Flute




**5 Flute, Variable Helix Design**

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Stub flute for maximum rigidity
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .031 (1/32) | **.005** | .047 | **.156** (5x) | 1/4 | 2-1/2 | 812731-C6 | 85.30 |
| .031 (1/32) | **.005** | .047 | **.250** (8x) | 1/4 | 2-1/2 | 812531-C6 | 91.10 |
| .047 (3/64) | **.005** | .071 | **.250** (5x) | 1/4 | 2-1/2 | 812747-C6 | 84.40 |
| .047 (3/64) | **.005** | .071 | **.375** (8x) | 1/4 | 2-1/2 | 812547-C6 | 92.10 |
| .062 (1/16) | **.005** | .093 | **.312** (5x) | 1/4 | 2-1/2 | 812762-C6 | 84.40 |
| .062 (1/16) | **.005** | .093 | **.500** (8x) | 1/4 | 2-1/2 | 812562-C6 | 91.10 |
| .062 (1/16) | **.010** | .093 | **.312** (5x) | 1/4 | 2-1/2 | 761562-C6 | 85.30 |
| .062 (1/16) | **.010** | .093 | **.500** (8x) | 1/4 | 2-1/2 | 763762-C6 | 92.10 |
| .078 (5/64) | **.005** | .117 | **.406** (5x) | 1/4 | 2-1/2 | 812778-C6 | 85.30 |
| .078 (5/64) | **.005** | .117 | **.625** (8x) | 1/4 | 2-1/2 | 812578-C6 | 92.10 |
| .093 (3/32) | **.005** | .140 | **.500** (5x) | 1/4 | 2-1/2 | 812793-C6 | 89.10 |
| .093 (3/32) | **.005** | .140 | **.750** (8x) | 1/4 | 2-1/2 | 812593-C6 | 95.70 |
| .093 (3/32) | **.010** | .140 | **.500** (5x) | 1/4 | 2-1/2 | 761593-C6 | 90.00 |
| .093 (3/32) | **.010** | .140 | **.750** (8x) | 1/4 | 2-1/2 | 763793-C6 | 95.70 |
| .109 (7/64) | **.005** | .164 | **.570** (5x) | 1/4 | 2-1/2 | 812702-C6 | 90.00 |
| .109 (7/64) | **.005** | .164 | **.900** (8x) | 1/4 | 2-1/2 | 812502-C6 | 95.70 |
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .125 (1/8) | **.005** | .187 | **.625** (5x) | 1/4 | 2-1/2 | 812808-C6 | 90.00 |
| .125 (1/8) | **.005** | .187 | **1.000** (8x) | 1/4 | 2-1/2 | 812608-C6 | 96.70 |
| .125 (1/8) | **.010** | .187 | **.625** (5x) | 1/4 | 2-1/2 | 761608-C6 | 90.00 |
| .125 (1/8) | **.010** | .187 | **1.000** (8x) | 1/4 | 2-1/2 | 763808-C6 | 97.60 |
| .156 (5/32) | **.005** | .235 | **.750** (5x) | 1/4 | 3 | 812810-C6 | 94.90 |
| .156 (5/32) | **.005** | .235 | **1.250** (8x) | 1/4 | 3 | 812610-C6 | 101.40 |
| .187 (3/16) | **.005** | .285 | **1.000** (5x) | 1/4 | 3 | 812812-C6 | 94.90 |
| .187 (3/16) | **.005** | .285 | **1.500** (8x) | 1/4 | 3 | 812612-C6 | 101.40 |
| .250 (1/4) | **.005** | .375 | **1.250** (5x) | 1/4 | 4 | 812816-C6 | 102.80 |
| .250 (1/4) | **.005** | .375 | **2.000** (8x) | 1/4 | 4 | 812616-C6 | 110.50 |

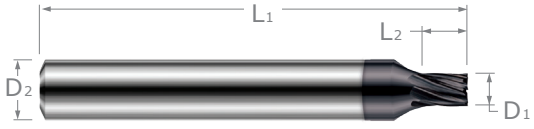
### Speeds & Feeds (End Mills for Hardened Steels – Square & Corner Radius – For Steels Up to 55Rc – Long Reach, Stub Flute)

**Important Note:** Values in tables are in inches and are based on reached (8x Dia) end mills. For shorter reaches, tables values of IPT must be increased (for 5x, increase 125%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material | Hardness | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | Radial | Axial |
| Hardened Steels<br>Titanium Alloys<br>Nickel Alloys | 38-44 Rc | 100 | Slotting | .00003 | .00006 | .00009 | .00012 | .00015 | .00018 | .00024 | .00036 | .00048 | .00060 | .00072 | .00096 | 1 x Dia | .28 x Dia |
| | | | Profiling | .00003 | .00007 | .00011 | .00014 | .00018 | .00022 | .00029 | .00043 | .00058 | .00072 | .00087 | .00116 | 1 x Dia | .28 x Dia |
| | 45-55 Rc | 60 | Slotting | .00002 | .00004 | .00006 | .00008 | .00010 | .00011 | .00015 | .00023 | .00031 | .00038 | .00046 | .00061 | 1 x Dia | .14 x Dia |
| | | | Profiling | .00002 | .00004 | .00006 | .00008 | .00011 | .00013 | .00017 | .00025 | .00034 | .00042 | .00051 | .00068 | 1 x Dia | .14 x Dia |

# END MILLS FOR HARDENED STEELS

## Square – For Steels 45 - 68 Rc




**7 Flute, Variable Helix Design**



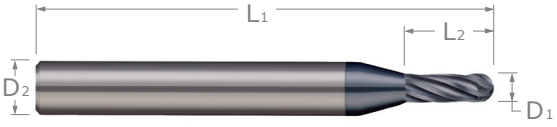
- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 7 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 7 FL | USD$ |
| .031 (1/32) | .047 (1.5x) | 1/4 | 2-1/2 | 835131-C6 | 78.20 |
| .031 (1/32) | .093 (3x) | 1/4 | 2-1/2 | 854831-C6 | 78.20 |
| .039 | .117 (3x) | 1/4 | 2-1/2 | 854839-C6 | 79.00 |
| .040 | .120 (3x) | 1/4 | 2-1/2 | 854840-C6 | 78.20 |
| .047 (3/64) | .071 (1.5x) | 1/4 | 2-1/2 | 835147-C6 | 78.20 |
| .047 (3/64) | .141 (3x) | 1/4 | 2-1/2 | 854847-C6 | 78.20 |
| .060 | .180 (3x) | 1/4 | 2-1/2 | 854860-C6 | 79.00 |
| .062 (1/16) | .093 (1.5x) | 1/4 | 2-1/2 | 835162-C6 | 78.20 |
| .062 (1/16) | .186 (3x) | 1/4 | 2-1/2 | 854862-C6 | 78.20 |
| .062 (1/16) | .312 (5x) | 1/4 | 2-1/2 | 797762-C6 | 78.20 |
| .078 (5/64) | .117 (1.5x) | 1/4 | 2-1/2 | 835178-C6 | 82.50 |
| .078 (5/64) | .234 (3x) | 1/4 | 2-1/2 | 854878-C6 | 82.50 |
| .093 (3/32) | .074 (0.8x) | 1/4 | 2-1/2 | 749893-C6 | 85.40 |
| .093 (3/32) | .140 (1.5x) | 1/4 | 2-1/2 | 835193-C6 | 83.50 |
| .093 (3/32) | .279 (3x) | 1/4 | 2-1/2 | 854893-C6 | 83.50 |
| .093 (3/32) | .500 (5x) | 1/4 | 2-1/2 | 797793-C6 | 85.70 |
| .118 | .177 (1.5x) | 1/4 | 2-1/2 | 835205-C6 | 84.20 |
| .118 | .354 (3x) | 1/4 | 2-1/2 | 854905-C6 | 84.20 |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 7 FL | USD$ |
| .125 (1/8) | .100 (0.8x) | 1/4 | 2-1/2 | 749908-C6 | 86.60 |
| .125 (1/8) | .187 (1.5x) | 1/4 | 2-1/2 | 835208-C6 | 84.40 |
| .125 (1/8) | .375 (3x) | 1/4 | 2-1/2 | 854808-C6 | 84.40 |
| .125 (1/8) | .625 (5x) | 1/4 | 2-1/2 | 797808-C6 | 86.80 |
| .156 (5/32) | .235 (1.5x) | 1/4 | 2-1/2 | 835210-C6 | 91.20 |
| .156 (5/32) | .468 (3x) | 1/4 | 2-1/2 | 854810-C6 | 91.20 |
| .187 (3/16) | .150 (0.8x) | 1/4 | 2-1/2 | 749912-C6 | 90.00 |
| .187 (3/16) | .285 (1.5x) | 1/4 | 2-1/2 | 835212-C6 | 87.90 |
| .187 (3/16) | .562 (3x) | 1/4 | 2-1/2 | 854812-C6 | 87.90 |
| .250 (1/4) | .375 (1.5x) | 1/4 | 2-1/2 | 835216-C6 | 97.80 |
| .250 (1/4) | .750 (3x) | 1/4 | 2-1/2 | 854816-C6 | 97.80 |
| .250 (1/4) | 1.250 (5x) | 1/4 | 4 | 797816-C6 | 102.50 |
| .375 (3/8) | .570 (1.5x) | 3/8 | 2-1/2 | 835224-C6 | 122.20 |
| .375 (3/8) | 1.125 (3x) | 3/8 | 2-1/2 | 854824-C6 | 122.20 |
| .500 (1/2) | .750 (1.5x) | 1/2 | 3 | 835232-C6 | 149.90 |
| .500 (1/2) | 1.500 (3x) | 1/2 | 3 | 854832-C6 | 149.90 |

**Please see Speeds & Feeds on page 126**

# END MILLS FOR HARDENED STEELS

## Ball – For Steels 45 - 68 Rc




**6 Flute, Variable Helix Design**

- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 6 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Center cutting
- Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ |
| .031 (1/32) | .047 (1.5x) | 1/4 | 2-1/2 | 759131-C6 | 56.30 |
| .031 (1/32) | .093 (3x) | 1/4 | 2-1/2 | 763431-C6 | 56.30 |
| .047 (3/64) | .071 (1.5x) | 1/4 | 2-1/2 | 759147-C6 | 56.30 |
| .047 (3/64) | .141 (3x) | 1/4 | 2-1/2 | 763447-C6 | 56.30 |
| .062 (1/16) | .093 (1.5x) | 1/4 | 2-1/2 | 759162-C6 | 53.40 |
| .062 (1/16) | .186 (3x) | 1/4 | 2-1/2 | 763462-C6 | 53.40 |
| .078 (5/64) | .117 (1.5x) | 1/4 | 2-1/2 | 759178-C6 | 53.40 |
| .078 (5/64) | .234 (3x) | 1/4 | 2-1/2 | 763478-C6 | 53.40 |
| .093 (3/32) | .140 (1.5x) | 1/4 | 2-1/2 | 759193-C6 | 53.40 |
| .093 (3/32) | .279 (3x) | 1/4 | 2-1/2 | 763493-C6 | 53.40 |
| .109 (7/64) | .327 (3x) | 1/4 | 2-1/2 | 763502-C6 | 53.40 |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ |
| .125 (1/8) | .188 (1.5x) | 1/4 | 2-1/2 | 759208-C6 | 48.90 |
| .125 (1/8) | .375 (3x) | 1/4 | 2-1/2 | 763508-C6 | 48.90 |
| .156 (5/32) | .469 (3x) | 1/4 | 2-1/2 | 763510-C6 | 50.60 |
| .187 (3/16) | .281 (1.5x) | 1/4 | 2-1/2 | 759212-C6 | 52.00 |
| .187 (3/16) | .563 (3x) | 1/4 | 2-1/2 | 763512-C6 | 52.00 |
| .250 (1/4) | .375 (1.5x) | 1/4 | 2-1/2 | 759216-C6 | 62.90 |
| .250 (1/4) | .750 (3x) | 1/4 | 2-1/2 | 763516-C6 | 62.90 |
| .375 (3/8) | 1.125 (3x) | 3/8 | 2-1/2 | 763524-C6 | 96.40 |
| .500 (1/2) | 1.500 (3x) | 1/2 | 3 | 763532-C6 | 140.30 |

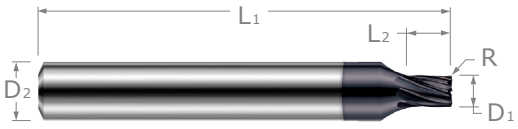
### Speeds & Feeds (End Mills for Hardened Steels – Ball - For Steels 45 - 68Rc)

**Important Note:** Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter length of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material | Hardness | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | Radial | Axial |
| Hardened Steels<br>Titanium Alloys<br>Nickel Alloys | 45 - 55 Rc | 60 | Semi-Roughing | .00004 | .00009 | .00013 | .00017 | .00021 | .00026 | .00034 | .00051 | .00069 | .00086 | .00103 | .00137 | .15 x Dia | .25 x Dia |
| | | | Finishing | .00005 | .00010 | .00016 | .00021 | .00026 | .00031 | .00042 | .00062 | .00083 | .00104 | .00125 | .00166 | .08 x Dia | .5 x Dia |
| | 56 - 68 Rc | 50 | Semi-Roughing | .00003 | .00007 | .00010 | .00014 | .00017 | .00020 | .00027 | .00041 | .00055 | .00069 | .00082 | .00110 | .12 x Dia | .20 x Dia |
| | | | Finishing | .00004 | .00007 | .00011 | .00015 | .00019 | .00022 | .00030 | .00045 | .00060 | .00075 | .00091 | .00121 | .08 x Dia | .5 x Dia |

# END MILLS FOR HARDENED STEELS

## Corner Radius – For Steels 45 - 68 Rc




**7 Flute, Variable Helix Design**



- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 7 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Corner radius for improved strength • h6 shank tolerance for high precision tool holders
- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | ALTiN NANO COATED | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 7 FL | USD$ |
| .030 | **.005** | .045 (1.5x) | 1/4 | 2-1/2 | 903130-C6 | 86.30 |
| .030 | **.005** | .090 (3x) | 1/4 | 2-1/2 | 910830-C6 | 86.30 |
| .031 (1/32) | **.005** | .047 (1.5x) | 1/4 | 2-1/2 | 903131-C6 | 82.90 |
| .031 (1/32) | **.005** | .093 (3x) | 1/4 | 2-1/2 | 910831-C6 | 83.70 |
| .031 (1/32) | **.005** | .156 (5x) | 1/4 | 2-1/2 | 845231-C6 | 89.70 |
| .040 | **.005** | .120 (3x) | 1/4 | 2-1/2 | 910840-C6 | 86.30 |
| .047 (3/64) | **.005** | .071 (1.5x) | 1/4 | 2-1/2 | 903147-C6 | 82.90 |
| .047 (3/64) | **.005** | .141 (3x) | 1/4 | 2-1/2 | 910847-C6 | 82.90 |
| .047 (3/64) | **.010** | .141 (3x) | 1/4 | 2-1/2 | 850547-C6 | 82.90 |
| .050 | **.005** | .150 (3x) | 1/4 | 2-1/2 | 910850-C6 | 86.30 |
| .060 | **.005** | .180 (3x) | 1/4 | 2-1/2 | 910860-C6 | 86.30 |
| .062 (1/16) | **.005** | .050 (0.8x) | 1/4 | 2-1/2 | 705762-C6 | 85.00 |
| .062 (1/16) | **.005** | .093 (1.5x) | 1/4 | 2-1/2 | 903162-C6 | 82.90 |
| .062 (1/16) | **.005** | .186 (3x) | 1/4 | 2-1/2 | 910862-C6 | 82.90 |
| .062 (1/16) | **.005** | .312 (5x) | 1/4 | 2-1/2 | 845262-C6 | 89.70 |
| .062 (1/16) | **.010** | .093 (1.5x) | 1/4 | 2-1/2 | 705562-C6 | 82.90 |
| .062 (1/16) | **.010** | .186 (3x) | 1/4 | 2-1/2 | 850562-C6 | 82.90 |
| .062 (1/16) | **.020** | .093 (1.5x) | 1/4 | 2-1/2 | 705362-C6 | 82.90 |
| .062 (1/16) | **.020** | .186 (3x) | 1/4 | 2-1/2 | 705162-C6 | 82.90 |
| .070 | **.005** | .210 (3x) | 1/4 | 2-1/2 | 910870-C6 | 85.50 |
| .078 (5/64) | **.005** | .117 (1.5x) | 1/4 | 2-1/2 | 903178-C6 | 86.90 |
| .078 (5/64) | **.005** | .234 (3x) | 1/4 | 2-1/2 | 910878-C6 | 86.90 |
| .078 (5/64) | **.010** | .117 (1.5x) | 1/4 | 2-1/2 | 705578-C6 | 86.90 |
| .080 | **.005** | .240 (3x) | 1/4 | 2-1/2 | 910880-C6 | 89.80 |
| .090 | **.005** | .270 (3x) | 1/4 | 2-1/2 | 910890-C6 | 90.60 |
| .093 (3/32) | **.005** | .140 (1.5x) | 1/4 | 2-1/2 | 903193-C6 | 87.70 |
| .093 (3/32) | **.005** | .279 (3x) | 1/4 | 2-1/2 | 910893-C6 | 87.70 |
| .093 (3/32) | **.005** | .500 (5x) | 1/4 | 2-1/2 | 845293-C6 | 94.60 |
| .093 (3/32) | **.010** | .279 (3x) | 1/4 | 2-1/2 | 850593-C6 | 87.70 |
| .093 (3/32) | **.020** | .140 (1.5x) | 1/4 | 2-1/2 | 705393-C6 | 87.70 |
| .093 (3/32) | **.020** | .279 (3x) | 1/4 | 2-1/2 | 705193-C6 | 87.70 |
| .100 | **.005** | .300 (3x) | 1/4 | 2-1/2 | 910900-C6 | 90.60 |
| .109 (7/64) | **.005** | .327 (3x) | 1/4 | 2-1/2 | 910902-C6 | 89.80 |
| .118 | **.005** | .354 (3x) | 1/4 | 2-1/2 | 910905-C6 | 89.80 |

continued on next page

# END MILLS FOR HARDENED STEELS

## Corner Radius – For Steels 45 - 68 Rc (cont.)

continued from previous page

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 7 FL | USD$ |
| .125 (1/8) | **.005** | .100 (0.8x) | 1/4 | 2-1/2 | 705808-C6 | 91.00 |
| .125 (1/8) | **.005** | .187 (1.5x) | 1/4 | 2-1/2 | 903208-C6 | 89.00 |
| .125 (1/8) | **.005** | .375 (3x) | 1/4 | 2-1/2 | 910908-C6 | 89.00 |
| .125 (1/8) | **.005** | .625 (5x) | 1/4 | 2-1/2 | 845308-C6 | 89.00 |
| .125 (1/8) | **.010** | .375 (3x) | 1/4 | 2-1/2 | 850608-C6 | 89.90 |
| .125 (1/8) | **.015** | .187 (1.5x) | 1/4 | 2-1/2 | 879108-C6 | 89.00 |
| .125 (1/8) | **.015** | .375 (3x) | 1/4 | 2-1/2 | 882308-C6 | 89.00 |
| .125 (1/8) | **.020** | .187 (1.5x) | 1/4 | 2-1/2 | 705408-C6 | 89.00 |
| .125 (1/8) | **.020** | .375 (3x) | 1/4 | 2-1/2 | 705208-C6 | 89.00 |
| .125 (1/8) | **.030** | .375 (3x) | 1/4 | 2-1/2 | 883508-C6 | 89.00 |
| .140 (9/64) | **.005** | .425 (3x) | 1/4 | 2-1/2 | 910909-C6 | 91.80 |
| .156 (5/32) | **.005** | .235 (1.5x) | 1/4 | 2-1/2 | 903210-C6 | 89.00 |
| .156 (5/32) | **.005** | .468 (3x) | 1/4 | 2-1/2 | 910910-C6 | 89.00 |
| .187 (3/16) | **.005** | .285 (1.5x) | 1/4 | 2-1/2 | 903212-C6 | 92.70 |
| .187 (3/16) | **.005** | .562 (3x) | 1/4 | 2-1/2 | 910912-C6 | 92.70 |
| .187 (3/16) | **.010** | .562 (3x) | 1/4 | 2-1/2 | 850612-C6 | 92.70 |
| .187 (3/16) | **.015** | .285 (1.5x) | 1/4 | 2-1/2 | 879112-C6 | 92.70 |
| .187 (3/16) | **.015** | .562 (3x) | 1/4 | 2-1/2 | 882312-C6 | 92.70 |
| .187 (3/16) | **.015** | 1.000 (5x) | 1/4 | 3 | 723212-C6 | 95.20 |
| .187 (3/16) | **.020** | .285 (1.5x) | 1/4 | 2-1/2 | 705412-C6 | 92.70 |
| .187 (3/16) | **.020** | .562 (3x) | 1/4 | 2-1/2 | 705212-C6 | 92.70 |
| .187 (3/16) | **.030** | .562 (3x) | 1/4 | 2-1/2 | 883512-C6 | 92.70 |
| .250 (1/4) | **.005** | .200 (0.8x) | 1/4 | 2-1/2 | 705816-C6 | 105.10 |
| .250 (1/4) | **.005** | .375 (1.5x) | 1/4 | 2-1/2 | 903216-C6 | 103.10 |
| .250 (1/4) | **.005** | .750 (3x) | 1/4 | 2-1/2 | 910916-C6 | 104.10 |
| .250 (1/4) | **.010** | .750 (3x) | 1/4 | 2-1/2 | 850616-C6 | 103.10 |
| .250 (1/4) | **.015** | .375 (1.5x) | 1/4 | 2-1/2 | 879116-C6 | 103.10 |
| .250 (1/4) | **.015** | .750 (3x) | 1/4 | 2-1/2 | 882316-C6 | 103.10 |
| .250 (1/4) | **.030** | .750 (3x) | 1/4 | 2-1/2 | 883516-C6 | 103.10 |
| .312 (5/16) | **.015** | 1.000 (3x) | 5/16 | 2-1/2 | 882320-C6 | 107.20 |
| .312 (5/16) | **.030** | 1.000 (3x) | 5/16 | 2-1/2 | 883520-C6 | 108.30 |
| .375 (3/8) | **.015** | .570 (1.5x) | 3/8 | 2-1/2 | 879124-C6 | 115.90 |
| .375 (3/8) | **.015** | 1.125 (3x) | 3/8 | 2-1/2 | 882324-C6 | 115.90 |
| .375 (3/8) | **.030** | .570 (1.5x) | 3/8 | 2-1/2 | 868024-C6 | 115.90 |
| .375 (3/8) | **.030** | 1.125 (3x) | 3/8 | 2-1/2 | 883524-C6 | 117.00 |
| .500 (1/2) | **.015** | .750 (1.5x) | 1/2 | 3 | 879132-C6 | 129.60 |
| .500 (1/2) | **.015** | 1.500 (3x) | 1/2 | 3 | 882332-C6 | 129.60 |
| .500 (1/2) | **.030** | .750 (1.5x) | 1/2 | 3 | 868032-C6 | 129.60 |
| .500 (1/2) | **.030** | 1.500 (3x) | 1/2 | 3 | 883532-C6 | 129.60 |

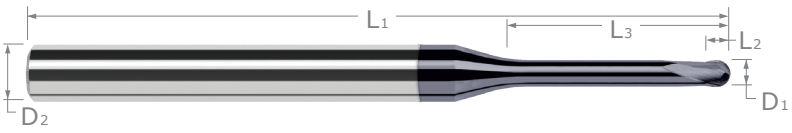
## Speeds & Feeds (End Mills for Hardened Steels – Square & Corner Radius For Steels 45 - 68Rc)

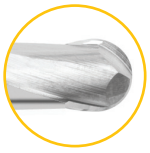
**Important Note:** Values intable are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 114%; for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material | Hardness | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | Radial | Axial |
| Hardened Steels<br>Titanium Alloys<br>Nickel Alloys | 45 - 55 Rc | 60 | Semi-Roughing | .00004 | .00008 | .00012 | .00015 | .00019 | .00023 | .00031 | .00047 | .00062 | .00078 | .00094 | .00125 | .15 x Dia | .25 x Dia |
| | | | Finishing | .00005 | .00009 | .00014 | .00019 | .00024 | .00028 | .00038 | .00056 | .00076 | .00094 | .00113 | .00151 | .08 x Dia | .5 x Dia |
| | 56 - 68 Rc | 50 | Semi-Roughing | .00003 | .00006 | .00009 | .00012 | .00016 | .00019 | .00025 | .00037 | .00050 | .00062 | .00075 | .00100 | .12 x Dia | .20 x Dia |
| | | | Finishing | .00003 | .00007 | .00010 | .00014 | .00017 | .00020 | .00027 | .00041 | .00055 | .00069 | .00082 | .00110 | .08 x Dia | .5 x Dia |

# END MILLS FOR HARDENED STEELS

## Finishers – Ball



Stub Flute and
Large Rigid Core

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders • Center cutting
- Reduced neck diameter to avoid heeling • CNC ground in the USA



| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0000″ −.0006″ | +.000mm −.014mm | decimal equivalent | $L_2$ +.010″ −.000″ +.125mm −.000mm | $L_3$ +.010″ −.000″ +.125mm −.000mm | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 3 FL | USD$ |
| .008 | | .0080 | .006 | **.012** (1.5x) | 1/4 | 2-1/2 | 37808-C6 | 124.00 | | |
| .008 | | .0080 | .006 | **.025** (3x) | 1/4 | 2-1/2 | 31408-C6 | 124.00 | | |
| .008 | | .0080 | .006 | **.040** (5x) | 1/4 | 2-1/2 | 38708-C6 | 130.20 | | |
| .010 | | .0100 | .008 | **.015** (1.5x) | 1/4 | 2-1/2 | 37810-C6 | 112.50 | | |
| .010 | | .0100 | .008 | **.031** (3x) | 1/4 | 2-1/2 | 31410-C6 | 112.50 | | |
| .010 | | .0100 | .008 | **.050** (5x) | 1/4 | 2-1/2 | 38710-C6 | 118.00 | | |
| .015 (1/64) | | .0150 | .012 | **-** | 1/4 | 2-1/2 | 958315-C6 | 94.50 | | |
| .015 (1/64) | | .0150 | .012 | **.023** (1.5x) | 1/4 | 2-1/2 | 37815-C6 | 88.50 | | |
| .015 (1/64) | | .0150 | .012 | **.047** (3x) | 1/4 | 2-1/2 | 31415-C6 | 88.50 | 813115-C6 | 95.20 |
| .015 (1/64) | | .0150 | .012 | **.062** (4x) | 1/4 | 2-1/2 | 881515-C6 | 91.80 | | |
| .015 (1/64) | | .0150 | .012 | **.078** (5x) | 1/4 | 2-1/2 | 38715-C6 | 91.80 | 812915-C6 | 98.50 |
| .015 (1/64) | | .0150 | .012 | **.125** (8x) | 1/4 | 2-1/2 | 32015-C6 | 98.20 | | |
| .015 (1/64) | | .0150 | .012 | **.187** (12x) | 1/4 | 2-1/2 | 33815-C6 | 121.40 | | |
| .020 | | .0200 | .016 | **-** | 1/4 | 2-1/2 | 958320-C6 | 93.40 | | |
| .020 | | .0200 | .016 | **.031** (1.5x) | 1/4 | 2-1/2 | 37820-C6 | 88.50 | | |
| .020 | | .0200 | .016 | **.062** (3x) | 1/4 | 2-1/2 | 31420-C6 | 88.50 | | |
| .020 | | .0200 | .016 | **.080** (4x) | 1/4 | 2-1/2 | 881520-C6 | 91.80 | | |
| .020 | | .0200 | .016 | **.100** (5x) | 1/4 | 2-1/2 | 38720-C6 | 91.80 | | |
| .020 | | .0200 | .016 | **.160** (8x) | 1/4 | 2-1/2 | 32020-C6 | 92.70 | | |
| .020 | | .0200 | .016 | **.200** (10x) | 1/4 | 2-1/2 | 919120-C6 | 108.00 | | |
| .025 | | .0250 | .020 | **.038** (1.5x) | 1/4 | 2-1/2 | 37825-C6 | 88.50 | | |
| .025 | | .0250 | .020 | **.075** (3x) | 1/4 | 2-1/2 | 31425-C6 | 88.50 | | |
| .025 | | .0250 | .020 | **.125** (5x) | 1/4 | 2-1/2 | 38725-C6 | 92.70 | | |
| .031 (1/32) | | .0310 | .025 | **-** | 1/4 | 2-1/2 | 958331-C6 | 80.30 | | |
| .031 (1/32) | | .0310 | .025 | **.047** (1.5x) | 1/4 | 2-1/2 | 37831-C6 | 75.70 | | |
| .031 (1/32) | | .0310 | .025 | **.093** (3x) | 1/4 | 2-1/2 | 31431-C6 | 75.70 | 813131-C6 | 81.50 |
| .031 (1/32) | | .0310 | .025 | **.125** (4x) | 1/4 | 2-1/2 | 881531-C6 | 80.30 | | |
| .031 (1/32) | | .0310 | .025 | **.156** (5x) | 1/4 | 2-1/2 | 38731-C6 | 82.90 | 812931-C6 | 89.40 |
| .031 (1/32) | | .0310 | .025 | **.187** (6x) | 1/4 | 2-1/2 | 858031-C6 | 84.40 | | |
| .031 (1/32) | | .0310 | .025 | **.218** (7x) | 1/4 | 2-1/2 | 863231-C6 | 85.80 | | |
| .031 (1/32) | | .0310 | .025 | **.250** (8x) | 1/4 | 2-1/2 | 32031-C6 | 87.40 | | |
| .031 (1/32) | | .0310 | .025 | **.312** (10x) | 1/4 | 2-1/2 | 919131-C6 | 104.10 | | |
| .031 (1/32) | | .0310 | .025 | **.375** (12x) | 1/4 | 2-1/2 | 33831-C6 | 104.10 | | |
| .031 (1/32) | | .0310 | .025 | **.470** (15x) | 1/4 | 2-1/2 | 973231-C6 | 119.70 | | |

continued on next page

# END MILLS FOR HARDENED STEELS

## Finishers – Ball (cont.)



continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0000″ −.0006″ | +.000mm −.014mm | decimal equivalent | $L_2$ +.010″ −.000″ +.125mm −.000mm | $L_3$ +.010″ −.000″ +.125mm −.000mm | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 3 FL | USD$ |
| .039 | | .0390 | .031 | - | 1/4 | 2-1/2 | 958339-C6 | 81.20 | | |
| .039 | | .0390 | .031 | **.062** (1.5x) | 1/4 | 2-1/2 | 37839-C6 | 75.70 | | |
| .039 | | .0390 | .031 | **.117** (3x) | 1/4 | 2-1/2 | 31439-C6 | 75.70 | | |
| .039 | | .0390 | .031 | **.156** (4x) | 1/4 | 2-1/2 | 881539-C6 | 82.90 | | |
| .039 | | .0390 | .031 | **.203** (5x) | 1/4 | 2-1/2 | 38739-C6 | 82.90 | | |
| .039 | | .0390 | .031 | **.312** (8x) | 1/4 | 2-1/2 | 32039-C6 | 87.40 | | |
| .039 | | .0390 | .031 | **.468** (12x) | 1/4 | 2-1/2 | 33839-C6 | 104.10 | | |
| | 1.0 mm | .0393 | .80 mm | **3.00 mm** (3x) | 6 mm | 63 mm | 882922-C6 | 82.90 | | |
| | 1.0 mm | .0393 | .80 mm | **5.00 mm** (5x) | 6 mm | 63 mm | 881722-C6 | 90.60 | | |
| .040 | | .0400 | .032 | **.062** (1.5x) | 1/4 | 2-1/2 | 37840-C6 | 75.70 | | |
| .040 | | .0400 | .032 | **.125** (3x) | 1/4 | 2-1/2 | 31440-C6 | 76.40 | | |
| .047 (3/64) | | .0470 | .038 | - | 1/4 | 2-1/2 | 958347-C6 | 80.30 | | |
| .047 (3/64) | | .0470 | .038 | **.071** (1.5x) | 1/4 | 2-1/2 | 37847-C6 | 75.70 | | |
| .047 (3/64) | | .0470 | .038 | **.141** (3x) | 1/4 | 2-1/2 | 31447-C6 | 75.70 | 813147-C6 | 82.20 |
| .047 (3/64) | | .0470 | .038 | **.187** (4x) | 1/4 | 2-1/2 | 881547-C6 | 82.90 | | |
| .047 (3/64) | | .0470 | .038 | **.250** (5x) | 1/4 | 2-1/2 | 38747-C6 | 82.90 | 812947-C6 | 89.40 |
| .047 (3/64) | | .0470 | .038 | **.375** (8x) | 1/4 | 2-1/2 | 32047-C6 | 87.40 | | |
| .047 (3/64) | | .0470 | .038 | **.470** (10x) | 1/4 | 2-1/2 | 919147-C6 | 104.10 | | |
| .047 (3/64) | | .0470 | .038 | **.564** (12x) | 1/4 | 2-1/2 | 33847-C6 | 104.10 | | |
| .047 (3/64) | | .0470 | .038 | **.710** (15x) | 1/4 | 2-1/2 | 973247-C6 | 119.70 | | |
| .050 | | .0500 | .040 | **.078** (1.5x) | 1/4 | 2-1/2 | 37850-C6 | 75.70 | | |
| .050 | | .0500 | .040 | **.150** (3x) | 1/4 | 2-1/2 | 31450-C6 | 76.40 | | |
| .060 | | .0600 | .048 | **.093** (1.5x) | 1/4 | 2-1/2 | 37860-C6 | 75.70 | | |
| .060 | | .0600 | .048 | **.180** (3x) | 1/4 | 2-1/2 | 31460-C6 | 76.40 | | |
| .062 (1/16) | | .0620 | .050 | - | 1/4 | 2-1/2 | 958362-C6 | 80.30 | | |
| .062 (1/16) | | .0620 | .050 | **.093** (1.5x) | 1/4 | 2-1/2 | 37862-C6 | 75.70 | | |
| .062 (1/16) | | .0620 | .050 | **.187** (3x) | 1/4 | 2-1/2 | 31462-C6 | 75.70 | 813162-C6 | 81.50 |
| .062 (1/16) | | .0620 | .050 | **.250** (4x) | 1/4 | 2-1/2 | 881562-C6 | 80.30 | | |
| .062 (1/16) | | .0620 | .050 | **.312** (5x) | 1/4 | 2-1/2 | 38762-C6 | 82.90 | 812962-C6 | 88.50 |
| .062 (1/16) | | .0620 | .050 | **.375** (6x) | 1/4 | 2-1/2 | 858062-C6 | 84.40 | | |
| .062 (1/16) | | .0620 | .050 | **.437** (7x) | 1/4 | 2-1/2 | 863262-C6 | 85.80 | | |
| .062 (1/16) | | .0620 | .050 | **.500** (8x) | 1/4 | 2-1/2 | 32062-C6 | 87.40 | | |
| .062 (1/16) | | .0620 | .050 | **.625** (10x) | 1/4 | 2-1/2 | 919162-C6 | 113.50 | | |
| .062 (1/16) | | .0620 | .050 | **.750** (12x) | 1/4 | 4 | 33862-C6 | 113.50 | | |
| .062 (1/16) | | .0620 | .050 | **.950** (15x) | 1/4 | 4 | 973262-C6 | 129.30 | | |
| .078 (5/64) | | .0780 | .062 | - | 1/4 | 2-1/2 | 958378-C6 | 81.20 | | |
| .078 (5/64) | | .0780 | .062 | **.117** (1.5x) | 1/4 | 2-1/2 | 37878-C6 | 75.70 | | |
| .078 (5/64) | | .0780 | .062 | **.234** (3x) | 1/4 | 2-1/2 | 31478-C6 | 75.70 | 813178-C6 | 81.50 |
| .078 (5/64) | | .0780 | .062 | **.312** (4x) | 1/4 | 2-1/2 | 881578-C6 | 83.70 | | |
| .078 (5/64) | | .0780 | .062 | **.406** (5x) | 1/4 | 2-1/2 | 38778-C6 | 82.90 | 812978-C6 | 89.40 |
| .078 (5/64) | | .0780 | .062 | **.625** (8x) | 1/4 | 2-1/2 | 32078-C6 | 87.40 | | |
| .078 (5/64) | | .0780 | .062 | **.781** (10x) | 1/4 | 2-1/2 | 919178-C6 | 113.50 | | |
| .078 (5/64) | | .0780 | .062 | **.937** (12x) | 1/4 | 4 | 33878-C6 | 113.50 | | |
| .078 (5/64) | | .0780 | .062 | **1.187** (15x) | 1/4 | 4 | 973278-C6 | 129.30 | | |

continued on next page

# END MILLS FOR HARDENED STEELS

## Finishers – Ball (cont.)



continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0000″ −.0006″ | +.000mm −.014mm | decimal equivalent | $L_2$ +.010″ −.000″ +.125mm −.000mm | $L_3$ +.010″ −.000″ +.125mm −.000mm | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 3 FL | USD$ |
| | 2.0 mm | .0787 | 1.60 mm | **6.00 mm** (3x) | 6 mm | 63 mm | 882945-C6 | 82.90 | | |
| | 2.0 mm | .0787 | 1.60 mm | **10.00 mm** (5x) | 6 mm | 63 mm | 881745-C6 | 89.80 | | |
| .093 (3/32) | | .0930 | .074 | **-** | 1/4 | 2-1/2 | 958393-C6 | 80.30 | | |
| .093 (3/32) | | .0930 | .074 | **.140** (1.5x) | 1/4 | 2-1/2 | 37893-C6 | 75.70 | | |
| .093 (3/32) | | .0930 | .074 | **.281** (3x) | 1/4 | 2-1/2 | 31493-C6 | 75.70 | 813193-C6 | 81.50 |
| .093 (3/32) | | .0930 | .074 | **.375** (4x) | 1/4 | 2-1/2 | 881593-C6 | 80.30 | | |
| .093 (3/32) | | .0930 | .074 | **.500** (5x) | 1/4 | 2-1/2 | 38793-C6 | 82.90 | 812993-C6 | 89.40 |
| .093 (3/32) | | .0930 | .074 | **.585** (6x) | 1/4 | 2-1/2 | 858093-C6 | 85.30 | | |
| .093 (3/32) | | .0930 | .074 | **.670** (7x) | 1/4 | 2-1/2 | 863293-C6 | 86.70 | | |
| .093 (3/32) | | .0930 | .074 | **.750** (8x) | 1/4 | 2-1/2 | 32093-C6 | 87.40 | | |
| .093 (3/32) | | .0930 | .074 | **.937** (10x) | 1/4 | 4 | 919193-C6 | 113.50 | | |
| .093 (3/32) | | .0930 | .074 | **1.125** (12x) | 1/4 | 4 | 33893-C6 | 113.50 | | |
| .093 (3/32) | | .0930 | .074 | **1.400** (15x) | 1/4 | 4 | 973293-C6 | 129.30 | | |
| .118 | | .1180 | .094 | **.177** (1.5x) | 1/4 | 2-1/2 | 37905-C6 | 85.70 | | |
| .118 | | .1180 | .094 | **.354** (3x) | 1/4 | 2-1/2 | 31505-C6 | 85.70 | | |
| .118 | | .1180 | .094 | **.625** (5x) | 1/4 | 2-1/2 | 38805-C6 | 96.40 | | |
| | 3.0 mm | .1181 | 2.40 mm | **9.00 mm** (3x) | 6 mm | 63 mm | 882957-C6 | 92.70 | | |
| | 3.0 mm | .1181 | 2.40 mm | **15.00 mm** (5x) | 6 mm | 63 mm | 881757-C6 | 104.60 | | |
| .125 (1/8) | | .1250 | .100 | **-** | 1/4 | 2-1/2 | 958408-C6 | 90.60 | | |
| .125 (1/8) | | .1250 | .100 | **.187** (1.5x) | 1/4 | 2-1/2 | 37908-C6 | 85.00 | | |
| .125 (1/8) | | .1250 | .100 | **.375** (3x) | 1/4 | 2-1/2 | 31508-C6 | 85.00 | 813208-C6 | 90.60 |
| .125 (1/8) | | .1250 | .100 | **.500** (4x) | 1/4 | 2-1/2 | 881608-C6 | 94.00 | | |
| .125 (1/8) | | .1250 | .100 | **.625** (5x) | 1/4 | 2-1/2 | 38808-C6 | 96.40 | 813008-C6 | 102.20 |
| .125 (1/8) | | .1250 | .100 | **.750** (6x) | 1/4 | 2-1/2 | 858108-C6 | 98.40 | | |
| .125 (1/8) | | .1250 | .100 | **.875** (7x) | 1/4 | 2-1/2 | 863308-C6 | 101.20 | | |
| .125 (1/8) | | .1250 | .100 | **1.000** (8x) | 1/4 | 2-1/2 | 32108-C6 | 102.20 | | |
| .125 (1/8) | | .1250 | .100 | **1.250** (10x) | 1/4 | 4 | 919208-C6 | 122.60 | | |
| .125 (1/8) | | .1250 | .100 | **1.500** (12x) | 1/4 | 4 | 33908-C6 | 122.60 | | |
| .125 (1/8) | | .1250 | .100 | **1.875** (15x) | 1/4 | 4 | 973308-C6 | 138.40 | | |

| $D_1$ +.000″ −.001″ | +.000mm −.018mm | decimal equivalent | $L_2$ +.020″ −.000″ +.500mm −.000mm | $L_3$ +.020″ −.000″ +.500mm −.000mm | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 3 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|
| .140 (9/64) | | .1406 | .112 | **.220** (1.5x) | 1/4 | 2-1/2 | 37909-C6 | 89.60 | | |
| .140 (9/64) | | .1406 | .112 | **.425** (3x) | 1/4 | 2-1/2 | | | 813209-C6 | 89.60 |
| .156 (5/32) | | .1560 | .125 | **.235** (1.5x) | 1/4 | 2-1/2 | 37910-C6 | 85.00 | | |
| .156 (5/32) | | .1560 | .125 | **.470** (3x) | 1/4 | 2-1/2 | 31510-C6 | 85.00 | | |
| .156 (5/32) | | .1560 | .125 | **.750** (5x) | 1/4 | 2-1/2 | 38810-C6 | 96.40 | | |
| .187 (3/16) | | .1870 | .150 | **-** | 1/4 | 2-1/2 | 958412-C6 | 90.60 | | |
| .187 (3/16) | | .1870 | .150 | **.285** (1.5x) | 1/4 | 2-1/2 | 37912-C6 | 85.00 | | |
| .187 (3/16) | | .1870 | .150 | **.570** (3x) | 1/4 | 2-1/2 | 31512-C6 | 85.00 | 813212-C6 | 91.30 |
| .187 (3/16) | | .1870 | .150 | **.750** (4x) | 1/4 | 2-1/2 | 881612-C6 | 97.30 | | |
| .187 (3/16) | | .1870 | .150 | **1.000** (5x) | 1/4 | 2-1/2 | 38812-C6 | 96.40 | 813012-C6 | 103.20 |
| .187 (3/16) | | .1870 | .150 | **1.500** (8x) | 1/4 | 4 | 32112-C6 | 112.80 | | |
| .187 (3/16) | | .1870 | .150 | **2.250** (12x) | 1/4 | 4 | 33912-C6 | 138.40 | | |
| | 6.0 mm | .2362 | 4.80 mm | **18.00 mm** (3x) | 6 mm | 63 mm | 882966-C6 | 91.80 | | |
| | 6.0 mm | .2362 | 4.80 mm | **30.00 mm** (5x) | 6 mm | 63 mm | 881766-C6 | 104.60 | | |

continued on next page

# END MILLS FOR HARDENED STEELS

## Finishers – Ball (cont.)



continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | +.000mm −.018mm | decimal equivalent | $L_2$ +.020″ −.000″ +.500mm −.000mm | $L_3$ +.020″ −.000″ +.500mm −.000mm | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 3 FL | USD$ |
| .250 (1/4) | | .2500 | .200 | - | 1/4 | 2-1/2 | 958416-C6 | 90.60 | | |
| .250 (1/4) | | .2500 | .200 | **.375** (1.5x) | 1/4 | 2-1/2 | 37916-C6 | 85.00 | | |
| .250 (1/4) | | .2500 | .200 | **.750** (3x) | 1/4 | 2-1/2 | 31516-C6 | 96.40 | 813216-C6 | 103.20 |
| .250 (1/4) | | .2500 | .200 | **1.000** (4x) | 1/4 | 2-1/2 | 881616-C6 | 97.30 | | |
| .250 (1/4) | | .2500 | .200 | **1.250** (5x) | 1/4 | 2-1/2 | 38816-C6 | 96.40 | 813016-C6 | 103.20 |
| .250 (1/4) | | .2500 | .200 | **1.500** (6x) | 1/4 | 3 | 858116-C6 | 104.70 | | |
| .250 (1/4) | | .2500 | .200 | **1.750** (7x) | 1/4 | 3 | 863316-C6 | 105.60 | | |
| .250 (1/4) | | .2500 | .200 | **2.000** (8x) | 1/4 | 4 | 32116-C6 | 114.00 | | |
| .312 (5/16) | | .3120 | .250 | **.470** (1.5x) | 5/16 | 2-1/2 | 37920-C6 | 112.30 | | |
| .312 (5/16) | | .3120 | .250 | **1.000** (3x) | 5/16 | 2-1/2 | 31520-C6 | 118.70 | | |
| .375 (3/8) | | .3750 | .300 | **.570** (1.5x) | 3/8 | 2-1/2 | 37924-C6 | 119.70 | | |
| .375 (3/8) | | .3750 | .300 | **1.125** (3x) | 3/8 | 2-1/2 | 31524-C6 | 126.20 | | |
| .375 (3/8) | | .3750 | .300 | **2.000** (5x) | 3/8 | 4 | 38824-C6 | 142.60 | | |

### Guidelines For Milling Hardened Steels

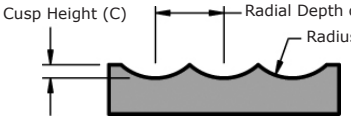
- Rigid machining enhances tool life by centering and balancing tool holders, which minimizes vibration.
- Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
- Climb Milling will extend tool life and improve workpiece finish.

### Speeds & Feeds (End Mills for Hardened Steels – Ball)

**Important Note:** Values in table are in inches and are based on 2 flute end mills. For end mills with more flutes, table values of IPT must be reduced (for 3 Flutes, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material Hardness | SFM | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | Radial* | Axial |
| 45-55 Rc | 700 | Finishing (.8x Reach) | .00028 | .00058 | .00088 | .00116 | .00146 | .00174 | .00234 | .00350 | .00468 | .00584 | .00702 | .00936 | .10 x Dia | .04 x Dia |
| | | Finishing (1.5x Reach) | .00027 | .00056 | .00084 | .00111 | .00140 | .00167 | .00224 | .00335 | .00449 | .00560 | .00673 | .00897 | .10 x Dia | .04 x Dia |
| | | Finishing (3x Reach) | .00026 | .00053 | .00081 | .00106 | .00134 | .00160 | .00215 | .00321 | .00429 | .00535 | .00644 | .00858 | .10 x Dia | .04 x Dia |
| | | Finishing (4x Reach) | .00025 | .00051 | .00077 | .00102 | .00128 | .00152 | .00205 | .00306 | .00410 | .00511 | .00614 | .00819 | .10 x Dia | .04 x Dia |
| | | Finishing (5x Reach) | .00023 | .00048 | .00073 | .00097 | .00122 | .00145 | .00195 | .00292 | .00390 | .00487 | .00585 | .00780 | .10 x Dia | .04 x Dia |
| | | Finishing (6x Reach) | .00022 | .00046 | .00070 | .00093 | .00117 | .00139 | .00187 | .00280 | .00374 | .00467 | .00562 | .00749 | .10 x Dia | .03 x Dia |
| | | Finishing (7x Reach) | .00022 | .00044 | .00067 | .00089 | .00112 | .00133 | .00179 | .00268 | .00359 | .00448 | .00538 | .00718 | .10 x Dia | .03 x Dia |
| | | Finishing (8x Reach) | .00021 | .00043 | .00065 | .00085 | .00107 | .00128 | .00172 | .00257 | .00343 | .00428 | .00515 | .00686 | .10 x Dia | .03 x Dia |
| | | Finishing (10x Reach) | .00019 | .00039 | .00059 | .00077 | .00097 | .00116 | .00156 | .00233 | .00312 | .00389 | .00468 | .00624 | .10 x Dia | .02 x Dia |
| | | Finishing (12x Reach) | .00016 | .00034 | .00051 | .00068 | .00085 | .00102 | .00137 | .00204 | .00273 | .00341 | .00410 | .00546 | .08 x Dia | .02 x Dia |
| | | Finishing (15x Reach) | .00015 | .00031 | .00048 | .00063 | .00079 | .00094 | .00127 | .00190 | .00254 | .00316 | .00380 | .00507 | .08 x Dia | .01 x Dia |
| 56-68 Rc | 600 | Finishing (.8x Reach) | .00022 | .00046 | .00070 | .00093 | .00117 | .00139 | .00187 | .00280 | .00374 | .00467 | .00562 | .00749 | .07 x Dia | .04 x Dia |
| | | Finishing (1.5x Reach) | .00022 | .00044 | .00067 | .00089 | .00112 | .00133 | .00179 | .00268 | .00359 | .00448 | .00538 | .00718 | .07 x Dia | .04 x Dia |
| | | Finishing (3x Reach) | .00021 | .00043 | .00065 | .00085 | .00107 | .00128 | .00172 | .00257 | .00343 | .00428 | .00515 | .00686 | .07 x Dia | .04 x Dia |
| | | Finishing (4x Reach) | .00020 | .00041 | .00062 | .00081 | .00102 | .00122 | .00164 | .00245 | .00328 | .00409 | .00491 | .00655 | .07 x Dia | .04 x Dia |
| | | Finishing (5x Reach) | .00019 | .00039 | .00059 | .00077 | .00097 | .00116 | .00156 | .00233 | .00312 | .00389 | .00468 | .00624 | .07 x Dia | .04 x Dia |
| | | Finishing (6x Reach) | .00018 | .00037 | .00056 | .00074 | .00093 | .00111 | .00150 | .00224 | .00300 | .00374 | .00449 | .00599 | .07 x Dia | .03 x Dia |
| | | Finishing (7x Reach) | .00017 | .00036 | .00054 | .00071 | .00090 | .00107 | .00144 | .00215 | .00287 | .00358 | .00431 | .00574 | .07 x Dia | .03 x Dia |
| | | Finishing (8x Reach) | .00016 | .00034 | .00052 | .00068 | .00086 | .00102 | .00137 | .00205 | .00275 | .00343 | .00412 | .00549 | .07 x Dia | .03 x Dia |
| | | Finishing (10x Reach) | .00015 | .00031 | .00047 | .00062 | .0078 | .00093 | .00125 | .00187 | .00250 | .00312 | .00374 | .00499 | .07 x Dia | .02 x Dia |
| | | Finishing (12x Reach) | .00013 | .00027 | .00041 | .00054 | .00068 | .00081 | .00109 | .00163 | .00218 | .00273 | .00328 | .00437 | .06 x Dia | .02 x Dia |
| | | Finishing (15x Reach) | .00012 | .00025 | .00038 | .00050 | .00063 | .00075 | .00101 | .00152 | .00203 | .00253 | .00304 | .00406 | .06 x Dia | .01 x Dia |

* Operator must consider proper Radial Depth of Cut since it relates directly to cusp height and part finish




$$P = 2\,[R^2-(C-R)^2]^{1/2}$$

$$C = R-[R^2-(P^2/4)]^{1/2}$$

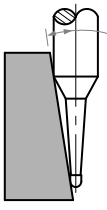
# END MILLS FOR HARDENED STEELS

## Finishers – Ball – Tapered Reach






- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Solid tapered neck for increased rigidity and strength
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- 2 flutes
- Center cutting
- CNC ground in the USA

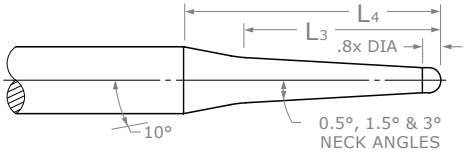



**Effective Wall Angle**
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

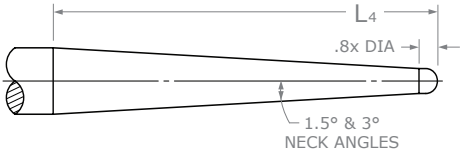
| NECK ANGLE | CUTTER DIAMETER | LENGTH OF CUT | TYPE | TAPERED REACH | OVERALL REACH | EFFECTIVE WALL ANGLE | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0000''}_{-.0006''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $L_3$ | $L_4$ | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| 0.5° | .031 (1/32) | .025 | I | **.093** | **.757** | 8.4° | 1/4 | 2-1/2 | 998703-C6 | 77.50 |
| | .031 (1/32) | .025 | I | **.156** | **.817** | 7.8° | 1/4 | 2-1/2 | 998706-C6 | 85.60 |
| | .031 (1/32) | .025 | I | **.250** | **.906** | 7.0° | 1/4 | 2-1/2 | 998709-C6 | 90.80 |
| | .047 (3/64) | .038 | I | **.156** | **.772** | 7.7° | 1/4 | 2-1/2 | 998712-C6 | 79.00 |
| | .047 (3/64) | .038 | I | **.250** | **.862** | 6.9° | 1/4 | 2-1/2 | 998715-C6 | 85.60 |
| | .047 (3/64) | .038 | I | **.375** | **.981** | 6.1° | 1/4 | 2-1/2 | 998718-C6 | 90.80 |
| | .062 (1/16) | .050 | I | **.312** | **.879** | 6.4° | 1/4 | 2-1/2 | 998721-C6 | 77.50 |
| | .062 (1/16) | .050 | I | **.500** | **1.057** | 5.3° | 1/4 | 2-1/2 | 998724-C6 | 85.60 |
| | .062 (1/16) | .050 | I | **.750** | **1.295** | 4.3° | 1/4 | 2-1/2 | 998727-C6 | 90.00 |
| | .078 (5/64) | .062 | I | **.437** | **.953** | 5.4° | 1/4 | 2-1/2 | 998730-C6 | 79.00 |
| | .078 (5/64) | .062 | I | **.625** | **1.131** | 4.5° | 1/4 | 2-1/2 | 998733-C6 | 85.60 |
| | .078 (5/64) | .062 | I | **1.000** | **1.488** | 3.4° | 1/4 | 3 | 998736-C6 | 99.50 |
| | .093 (3/32) | .074 | I | **.500** | **.971** | 4.9° | 1/4 | 2-1/2 | 998739-C6 | 77.50 |
| | .093 (3/32) | .074 | I | **.750** | **1.208** | 3.9° | 1/4 | 2-1/2 | 998742-C6 | 84.10 |
| | .093 (3/32) | .074 | I | **1.125** | **1.565** | 3.0° | 1/4 | 3 | 998745-C6 | 99.50 |
| | .125 (1/8) | .100 | I | **.625** | **1.000** | 3.9° | 1/4 | 2-1/2 | 998748-C6 | 83.80 |
| | .125 (1/8) | .100 | I | **1.000** | **1.357** | 2.8° | 1/4 | 2-1/2 | 998751-C6 | 84.70 |
| | .125 (1/8) | .100 | I | **1.500** | **1.832** | 2.1° | 1/4 | 3 | 998754-C6 | 101.00 |

continued on next page

**TYPE I**




**TYPE II**



# END MILLS FOR HARDENED STEELS

## Finishers – Ball – Tapered Reach (cont.)



continued from previous page

| NECK ANGLE | CUTTER DIAMETER | LENGTH OF CUT | TYPE | TAPERED REACH | OVERALL REACH | EFFECTIVE WALL ANGLE | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0000''}_{-.0006''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $L_3$ | $L_4$ | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| 1.5° | .031 (1/32) | .025 | I | **.250** | **.875** | 7.3° | 1/4 | 2-1/2 | 997407-C6 | 85.60 |
| | .031 (1/32) | .025 | I | **.500** | **1.088** | 5.9° | 1/4 | 2-1/2 | 997414-C6 | 90.80 |
| | .047 (3/64) | .038 | I | **.375** | **.938** | 6.4° | 1/4 | 2-1/2 | 997421-C6 | 84.10 |
| | .062 (1/16) | .050 | I | **.500** | **1.004** | 5.6° | 1/4 | 2-1/2 | 997428-C6 | 84.10 |
| | .062 (1/16) | .050 | I | **1.000** | **1.429** | 3.9° | 1/4 | 3 | 997435-C6 | 99.50 |
| | .078 (5/64) | .062 | I | **.625** | **1.066** | 4.8° | 1/4 | 2-1/2 | 997442-C6 | 85.60 |
| | .078 (5/64) | .062 | I | **1.250** | **1.599** | 3.2° | 1/4 | 3 | 997449-C6 | 99.50 |
| | .093 (3/32) | .074 | I | **.750** | **1.132** | 4.2° | 1/4 | 2-1/2 | 997456-C6 | 84.10 |
| | .093 (3/32) | .074 | I | **1.500** | **1.771** | 2.7° | 1/4 | 3 | 997463-C6 | 99.50 |
| | .125 (1/8) | .100 | I | **1.000** | **1.258** | 3.0° | 1/4 | 2-1/2 | 997470-C6 | 86.40 |
| | .125 (1/8) | .100 | II | **2.487** | **2.487** | 1.5° | 1/4 | 4 | 997477-C6 | 100.10 |
| 3.0° | .031 (1/32) | .025 | I | **.312** | **.714** | 8.9° | 1/4 | 2-1/2 | 994907-C6 | 90.30 |
| | .031 (1/32) | .025 | I | **.750** | **1.067** | 6.0° | 1/4 | 2-1/2 | 994914-C6 | 92.10 |
| | .047 (3/64) | .038 | I | **.875** | **1.140** | 5.2° | 1/4 | 2-1/2 | 994921-C6 | 90.30 |
| | .047 (3/64) | .038 | I | **1.250** | **1.442** | 4.1° | 1/4 | 3 | 994928-C6 | 100.60 |
| | .062 (1/16) | .050 | I | **.875** | **1.114** | 5.0° | 1/4 | 2-1/2 | 994935-C6 | 89.50 |
| | .062 (1/16) | .050 | II | **1.844** | **1.844** | 3.0° | 1/4 | 3 | 994942-C6 | 100.60 |
| | .078 (5/64) | .062 | I | **1.125** | **1.288** | 4.0° | 1/4 | 2-1/2 | 994949-C6 | 89.50 |
| | .078 (5/64) | .062 | II | **1.703** | **1.703** | 3.0° | 1/4 | 3 | 994956-C6 | 99.50 |
| | .093 (3/32) | .074 | I | **1.000** | **1.162** | 4.1° | 1/4 | 2-1/2 | 994963-C6 | 89.50 |
| | .093 (3/32) | .074 | II | **1.572** | **1.572** | 3.0° | 1/4 | 3 | 994970-C6 | 100.60 |
| | .125 (1/8) | .100 | II | **1.293** | **1.293** | 2.9° | 1/4 | 2-1/2 | 994977-C6 | 99.10 |
| | .125 (1/8) | .100 | II | **2.485** | **2.485** | 3.0° | 3/8 | 4 | 994984-C6 | 144.00 |



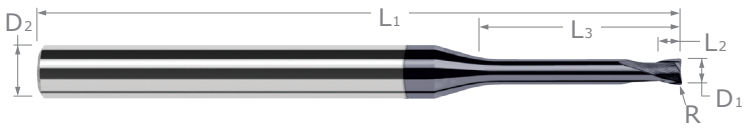
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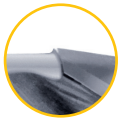
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# END MILLS FOR HARDENED STEELS

## Finishers – Corner Radius





Reduced Neck Diameter to Avoid Heeling

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders • Center cutting
- CNC ground in the USA

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0000''}_{-.0006''}$ | R $^{+.0002''}_{-.0002''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 4 FL | USD$ |
| .010 | **.002** | .008 | **.015** (1.5x) | 1/4 | 2-1/2 | 40210-C6 | 108.40 | | |
| .010 | **.002** | .008 | **.031** (3x) | 1/4 | 2-1/2 | 30610-C6 | 108.40 | | |
| .015 (1/64) | **.002** | .012 | **.023** (1.5x) | 1/4 | 2-1/2 | 40215-C6 | 85.70 | 951415-C6 | 87.00 |
| .015 (1/64) | **.002** | .012 | **.047** (3x) | 1/4 | 2-1/2 | 30615-C6 | 85.70 | | |
| .015 (1/64) | **.002** | .012 | **.078** (5x) | 1/4 | 2-1/2 | 40615-C6 | 95.70 | | |
| .015 (1/64) | **.002** | .012 | **.125** (8x) | 1/4 | 2-1/2 | 31015-C6 | 97.30 | | |
| .015 (1/64) | **.002** | .012 | **.187** (12x) | 1/4 | 2-1/2 | 33015-C6 | 115.30 | | |
| .020 | **.004** | .016 | **.031** (1.5x) | 1/4 | 2-1/2 | 40220-C6 | 85.70 | 951420-C6 | 87.00 |
| .020 | **.004** | .016 | **.062** (3x) | 1/4 | 2-1/2 | 30620-C6 | 85.70 | 938720-C6 | 87.00 |
| .020 | **.004** | .016 | **.100** (5x) | 1/4 | 2-1/2 | 40620-C6 | 92.70 | 996320-C6 | 94.00 |
| .025 | **.004** | .020 | **.038** (1.5x) | 1/4 | 2-1/2 | 40225-C6 | 85.70 | | |
| .025 | **.004** | .020 | **.075** (3x) | 1/4 | 2-1/2 | 30625-C6 | 85.70 | | |
| .025 | **.004** | .020 | **.125** (5x) | 1/4 | 2-1/2 | 40625-C6 | 91.80 | | |
| .031 (1/32) | **.005** | .025 | **.047** (1.5x) | 1/4 | 2-1/2 | 40231-C6 | 75.70 | 951431-C6 | 77.10 |
| .031 (1/32) | **.005** | .025 | **.093** (3x) | 1/4 | 2-1/2 | 30631-C6 | 74.80 | 938731-C6 | 76.40 |
| .031 (1/32) | **.005** | .025 | **.156** (5x) | 1/4 | 2-1/2 | 40631-C6 | 81.90 | 996331-C6 | 82.90 |
| .031 (1/32) | **.005** | .025 | **.250** (8x) | 1/4 | 2-1/2 | 31031-C6 | 86.70 | 999031-C6 | 88.10 |
| .031 (1/32) | **.005** | .025 | **.375** (12x) | 1/4 | 2-1/2 | 33031-C6 | 98.70 | | |
| .031 (1/32) | **.005** | .025 | **.470** (15x) | 1/4 | 2-1/2 | 942431-C6 | 115.60 | | |
| .031 (1/32) | **.010** | .025 | **.093** (3x) | 1/4 | 2-1/2 | 982631-C6 | 78.30 | | |
| .031 (1/32) | **.010** | .025 | **.156** (5x) | 1/4 | 2-1/2 | 957431-C6 | 84.80 | | |
| .039 (1 mm) | **.005** | .031 | **.062** (1.5x) | 1/4 | 2-1/2 | 40239-C6 | 74.80 | 951439-C6 | 77.10 |
| .039 (1 mm) | **.005** | .031 | **.117** (3x) | 1/4 | 2-1/2 | 30639-C6 | 75.70 | 938739-C6 | 77.10 |
| .039 (1 mm) | **.005** | .031 | **.203** (5x) | 1/4 | 2-1/2 | 40639-C6 | 81.20 | 996339-C6 | 82.90 |
| .039 (1 mm) | **.005** | .031 | **.312** (8x) | 1/4 | 2-1/2 | 31039-C6 | 86.70 | | |
| .039 (1 mm) | **.005** | .031 | **.468** (12x) | 1/4 | 2-1/2 | 33039-C6 | 98.70 | | |
| .047 (3/64) | **.008** | .038 | **.071** (1.5x) | 1/4 | 2-1/2 | 40247-C6 | 74.80 | | |
| .047 (3/64) | **.008** | .038 | **.141** (3x) | 1/4 | 2-1/2 | 30647-C6 | 74.80 | 938747-C6 | 77.10 |
| .047 (3/64) | **.008** | .038 | **.250** (5x) | 1/4 | 2-1/2 | 40647-C6 | 81.20 | 996347-C6 | 82.90 |
| .047 (3/64) | **.008** | .038 | **.375** (8x) | 1/4 | 2-1/2 | 31047-C6 | 85.80 | 999047-C6 | 87.40 |
| .047 (3/64) | **.008** | .038 | **.564** (12x) | 1/4 | 2-1/2 | 33047-C6 | 98.70 | | |
| .047 (3/64) | **.008** | .038 | **.710** (15x) | 1/4 | 2-1/2 | 942447-C6 | 115.60 | | |

continued on next page

# END MILLS FOR HARDENED STEELS

## Finishers – Corner Radius (cont.)



continued from previous page

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0000″}_{-.0006″}$ | R $^{+.0002″}_{-.0002″}$ | $L_2$ $^{+.010″}_{-.000″}$ | $L_3$ $^{+.010″}_{-.000″}$ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 4 FL | USD$ |
| .062 (1/16) | **.005** | .050 | **.187** (3x) | 1/4 | 2-1/2 | 893162-C6 | 74.80 | | |
| .062 (1/16) | **.010** | .050 | **-** | 1/4 | 2-1/2 | 870362-C6 | 73.80 | 862262-C6 | 75.20 |
| .062 (1/16) | **.010** | .050 | **.093** (1.5x) | 1/4 | 2-1/2 | 40262-C6 | 74.80 | 951462-C6 | 76.40 |
| .062 (1/16) | **.010** | .050 | **.187** (3x) | 1/4 | 2-1/2 | 30662-C6 | 74.80 | 938762-C6 | 76.40 |
| .062 (1/16) | **.010** | .050 | **.250** (4x) | 1/4 | 2-1/2 | 784162-C6 | 78.30 | 783762-C6 | 79.90 |
| .062 (1/16) | **.010** | .050 | **.312** (5x) | 1/4 | 2-1/2 | 40662-C6 | 81.20 | 996362-C6 | 82.90 |
| .062 (1/16) | **.010** | .050 | **.375** (6x) | 1/4 | 2-1/2 | 783362-C6 | 83.50 | 782562-C6 | 85.20 |
| .062 (1/16) | **.010** | .050 | **.437** (7x) | 1/4 | 2-1/2 | 782962-C6 | 85.00 | 782162-C6 | 86.40 |
| .062 (1/16) | **.010** | .050 | **.500** (8x) | 1/4 | 2-1/2 | 31062-C6 | 85.80 | 999062-C6 | 87.40 |
| .062 (1/16) | **.010** | .050 | **.750** (12x) | 1/4 | 4 | 33062-C6 | 110.90 | 924162-C6 | 112.30 |
| .062 (1/16) | **.010** | .050 | **.950** (15x) | 1/4 | 4 | 942462-C6 | 127.40 | | |
| .062 (1/16) | **.020** | .050 | **.187** (3x) | 1/4 | 2-1/2 | 991562-C6 | 78.30 | | |
| .062 (1/16) | **.020** | .050 | **.312** (5x) | 1/4 | 2-1/2 | 953162-C6 | 84.00 | | |
| .078 (5/64) | **.010** | .062 | **.117** (1.5x) | 1/4 | 2-1/2 | 40278-C6 | 75.70 | | |
| .078 (5/64) | **.010** | .062 | **.234** (3x) | 1/4 | 2-1/2 | 30678-C6 | 74.80 | 938778-C6 | 77.10 |
| .078 (5/64) | **.010** | .062 | **.406** (5x) | 1/4 | 2-1/2 | 40678-C6 | 81.20 | 996378-C6 | 82.90 |
| .078 (5/64) | **.010** | .062 | **.625** (8x) | 1/4 | 2-1/2 | 31078-C6 | 86.70 | 999078-C6 | 87.40 |
| .078 (5/64) | **.010** | .062 | **.937** (12x) | 1/4 | 4 | 33078-C6 | 110.90 | | |
| .093 (3/32) | **.005** | .074 | **.281** (3x) | 1/4 | 2-1/2 | 893193-C6 | 75.70 | | |
| .093 (3/32) | **.010** | .074 | **.281** (3x) | 1/4 | 2-1/2 | 982693-C6 | 75.70 | | |
| .093 (3/32) | **.015** | .074 | **-** | 1/4 | 2-1/2 | 850893-C6 | 73.80 | | |
| .093 (3/32) | **.015** | .074 | **.140** (1.5x) | 1/4 | 2-1/2 | 40293-C6 | 74.80 | 951493-C6 | 77.10 |
| .093 (3/32) | **.015** | .074 | **.281** (3x) | 1/4 | 2-1/2 | 30693-C6 | 74.80 | 938793-C6 | 76.40 |
| .093 (3/32) | **.015** | .074 | **.375** (4x) | 1/4 | 2-1/2 | 783993-C6 | 78.30 | 783593-C6 | 79.90 |
| .093 (3/32) | **.015** | .074 | **.500** (5x) | 1/4 | 2-1/2 | 40693-C6 | 81.20 | 996393-C6 | 82.90 |
| .093 (3/32) | **.015** | .074 | **.585** (6x) | 1/4 | 2-1/2 | 783193-C6 | 83.50 | 782393-C6 | 85.20 |
| .093 (3/32) | **.015** | .074 | **.670** (7x) | 1/4 | 2-1/2 | 782793-C6 | 85.00 | 781993-C6 | 86.40 |
| .093 (3/32) | **.015** | .074 | **.750** (8x) | 1/4 | 2-1/2 | 31093-C6 | 86.70 | 999093-C6 | 87.40 |
| .093 (3/32) | **.015** | .074 | **1.125** (12x) | 1/4 | 4 | 33093-C6 | 110.90 | 924193-C6 | 112.30 |
| .093 (3/32) | **.030** | .074 | **.281** (3x) | 1/4 | 2-1/2 | 963393-C6 | 78.30 | | |
| .093 (3/32) | **.030** | .074 | **.500** (5x) | 1/4 | 2-1/2 | 946393-C6 | 84.00 | | |
| .118 (3 mm) | **.015** | .094 | **.177** (1.5x) | 1/4 | 2-1/2 | 40305-C6 | 81.20 | | |
| .118 (3 mm) | **.015** | .094 | **.354** (3x) | 1/4 | 2-1/2 | 30705-C6 | 81.20 | | |
| .125 (1/8) | **.005** | .100 | **.375** (3x) | 1/4 | 2-1/2 | 893208-C6 | 81.20 | | |
| .125 (1/8) | **.010** | .100 | **.375** (3x) | 1/4 | 2-1/2 | 982708-C6 | 81.20 | | |
| .125 (1/8) | **.015** | .100 | **-** | 1/4 | 2-1/2 | 850908-C6 | 79.20 | | |
| .125 (1/8) | **.015** | .100 | **.187** (1.5x) | 1/4 | 2-1/2 | 40308-C6 | 80.30 | 951508-C6 | 81.70 |
| .125 (1/8) | **.015** | .100 | **.375** (3x) | 1/4 | 2-1/2 | 30708-C6 | 80.30 | 938808-C6 | 81.70 |
| .125 (1/8) | **.015** | .100 | **.500** (4x) | 1/4 | 2-1/2 | 784008-C6 | 85.10 | 783608-C6 | 88.00 |
| .125 (1/8) | **.015** | .100 | **.625** (5x) | 1/4 | 2-1/2 | 40708-C6 | 88.10 | 996408-C6 | 96.40 |
| .125 (1/8) | **.015** | .100 | **.750** (6x) | 1/4 | 2-1/2 | 783208-C6 | 90.90 | 782408-C6 | 99.00 |
| .125 (1/8) | **.015** | .100 | **.875** (7x) | 1/4 | 2-1/2 | 782808-C6 | 92.80 | 782008-C6 | 100.60 |
| .125 (1/8) | **.015** | .100 | **1.000** (8x) | 1/4 | 2-1/2 | 31108-C6 | 93.40 | 999108-C6 | 102.60 |
| .125 (1/8) | **.015** | .100 | **1.500** (12x) | 1/4 | 4 | 33108-C6 | 118.70 | 924208-C6 | 127.90 |
| .125 (1/8) | **.030** | .100 | **.375** (3x) | 1/4 | 2-1/2 | 963408-C6 | 83.10 | | |
| .125 (1/8) | **.030** | .100 | **.625** (5x) | 1/4 | 2-1/2 | 946408-C6 | 91.10 | 781808-C6 | 100.50 |

continued on next page

# END MILLS FOR HARDENED STEELS

## Finishers – Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000″}_{-.001″}$ | R $^{+.0005″}_{-.0005″}$ | $L_2$ $^{+.020″}_{-.000″}$ | $L_3$ $^{+.020″}_{-.000″}$ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 4 FL | USD$ |
| .156 (5/32) | **.015** | .125 | **.235** (1.5x) | 1/4 | 2-1/2 | 40310-C6 | 81.20 | | |
| .156 (5/32) | **.015** | .125 | **.470** (3x) | 1/4 | 2-1/2 | 30710-C6 | 80.30 | | |
| .187 (3/16) | **.015** | .150 | **.285** (1.5x) | 1/4 | 2-1/2 | 40312-C6 | 80.30 | 951512-C6 | 81.70 |
| .187 (3/16) | **.015** | .150 | **.570** (3x) | 1/4 | 2-1/2 | 30712-C6 | 80.30 | 938812-C6 | 81.70 |
| .187 (3/16) | **.015** | .150 | **1.000** (5x) | 1/4 | 2-1/2 | 40712-C6 | 88.10 | 996412-C6 | 96.40 |
| .187 (3/16) | **.015** | .150 | **1.500** (8x) | 1/4 | 4 | 31112-C6 | 106.40 | | |
| .187 (3/16) | **.015** | .150 | **2.250** (12x) | 1/4 | 4 | 33112-C6 | 127.40 | | |
| .187 (3/16) | **.060** | .150 | **.570** (3x) | 1/4 | 2-1/2 | 939212-C6 | 93.10 | 934412-C6 | 100.40 |
| .250 (1/4) | **.015** | .200 | **.375** (1.5x) | 1/4 | 2-1/2 | 40316-C6 | 80.30 | 951516-C6 | 81.70 |
| .250 (1/4) | **.015** | .200 | **.750** (3x) | 1/4 | 2-1/2 | 30716-C6 | 84.20 | 938816-C6 | 92.10 |
| .250 (1/4) | **.015** | .200 | **1.000** (4x) | 1/4 | 2-1/2 | 784016-C6 | 87.00 | 783616-C6 | 94.80 |
| .250 (1/4) | **.015** | .200 | **1.250** (5x) | 1/4 | 2-1/2 | 40716-C6 | 88.10 | 996416-C6 | 96.70 |
| .250 (1/4) | **.015** | .200 | **2.000** (8x) | 1/4 | 4 | 31116-C6 | 106.40 | | |
| .250 (1/4) | **.030** | .200 | **1.000** (3x) | 1/4 | 2-1/2 | | | 750716-C6 | 94.80 |
| .250 (1/4) | **.060** | .200 | **.750** (3x) | 1/4 | 2-1/2 | 939216-C6 | 93.10 | 934416-C6 | 100.40 |
| .312 (5/16) | **.030** | .250 | **1.000** (3x) | 5/16 | 2-1/2 | | | 938820-C6 | 101.40 |
| .375 (3/8) | **.030** | .300 | **.570** (1.5x) | 3/8 | 2-1/2 | | | 951524-C6 | 113.80 |
| .375 (3/8) | **.030** | .300 | **1.125** (3x) | 3/8 | 2-1/2 | | | 938824-C6 | 117.20 |
| .375 (3/8) | **.030** | .300 | **2.000** (5x) | 3/8 | 4 | | | 996424-C6 | 122.90 |
| .500 (1/2) | **.030** | .400 | **1.500** (3x) | 1/2 | 3 | | | 938832-C6 | 148.70 |

### Guidelines For Milling Hardened Steels

- Rigid machining centers and balanced tool holders that minimize vibration and TIR will enhance tool life.
- Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
- Climb Milling will extend tool life and improve workpiece finish.

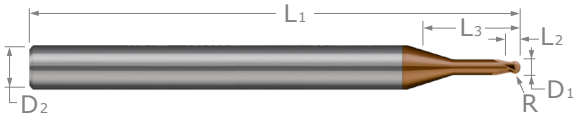
### Speeds & Feeds (End Mills for Hardened Steels – Corner Radius)

**Important Note:** Values in table are in inches and based on 2 flute end mills. For end mills with more flutes, table values of IPT must be reduced (for 4 flutes, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material Hardness | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | Radial | Axial |
| 45-55 Rc | 700 | Finishing (0.8x Reach) | .00014 | .00029 | .00044 | .00058 | .00073 | .00087 | .00117 | .00175 | .00234 | .00292 | .00351 | .00468 | .35 x Dia | .02 x Dia |
| | | Finishing (1.5x Reach) | .00013 | .00028 | .00042 | .00056 | .00070 | .00083 | .00112 | .00168 | .00224 | .00280 | .00336 | .00449 | .35 x Dia | .02 x Dia |
| | | Finishing (3x Reach) | .00013 | .00027 | .00040 | .00053 | .00067 | .00080 | .00107 | .00160 | .00215 | .00268 | .00322 | .00429 | .35 x Dia | .02 x Dia |
| | | Finishing (4x Reach) | .00013 | .00025 | .00039 | .00050 | .00064 | .00077 | .00103 | .00153 | .00205 | .00255 | .00308 | .00410 | .35 x Dia | .02 x Dia |
| | | Finishing (5x Reach) | .00012 | .00024 | .00037 | .00048 | .00061 | .00073 | .00098 | .00146 | .00195 | .00243 | .00293 | .00390 | .35 x Dia | .02 x Dia |
| | | Finishing (6x Reach) | .00012 | .00023 | .00036 | .00046 | .00059 | .00070 | .00094 | .00140 | .00187 | .00233 | .00281 | .00374 | .35 x Dia | .02 x Dia |
| | | Finishing (7x Reach) | .00011 | .00022 | .00034 | .00044 | .00056 | .00067 | .00090 | .00134 | .00179 | .00224 | .00270 | .00359 | .35 x Dia | .02 x Dia |
| | | Finishing (8x Reach) | .00010 | .00021 | .00032 | .00043 | .00054 | .00064 | .00086 | .00128 | .00172 | .00214 | .00257 | .00343 | .35 x Dia | .02 x Dia |
| | | Finishing (12x Reach) | .00008 | .00017 | .00026 | .00034 | .00043 | .00051 | .00068 | .00102 | .00137 | .00170 | .00205 | .00273 | .35 x Dia | .01 x Dia |
| | | Finishing (15x Reach) | .00008 | .00016 | .00024 | .00031 | .00040 | .00047 | .00063 | .00095 | .00127 | .00158 | .00190 | .00254 | .35 x Dia | .01 x Dia |
| 56-68 Rc | 600 | Finishing (0.8x Reach) | .00011 | .00023 | .00035 | .00046 | .00058 | .00070 | .00094 | .00140 | .00187 | .00234 | .00281 | .00374 | .25 x Dia | .02 x Dia |
| | | Finishing (1.5x Reach) | .00011 | .00022 | .00034 | .00044 | .00056 | .00067 | .00090 | .00134 | .00179 | .00224 | .00269 | .00359 | .25 x Dia | .02 x Dia |
| | | Finishing (3x Reach) | .00010 | .00021 | .00032 | .00043 | .00054 | .00064 | .00086 | .00128 | .00172 | .00214 | .00257 | .00343 | .25 x Dia | .02 x Dia |
| | | Finishing (4x Reach) | .00009 | .00020 | .00030 | .00041 | .00051 | .00061 | .00082 | .00123 | .00164 | .00205 | .00246 | .00328 | .25 x Dia | .02 x Dia |
| | | Finishing (5x Reach) | .00009 | .00019 | .00029 | .00039 | .00049 | .00058 | .00078 | .00117 | .00156 | .00195 | .00234 | .00312 | .25 x Dia | .02 x Dia |
| | | Finishing (6x Reach) | .00009 | .00018 | .00028 | .00037 | .00047 | .00056 | .00075 | .00112 | .00150 | .00187 | .00225 | .00300 | .25 x Dia | .02 x Dia |
| | | Finishing (7x Reach) | .00008 | .00017 | .00027 | .00036 | .00045 | .00053 | .00072 | .00108 | .00144 | .00179 | .00215 | .00287 | .25 x Dia | .02 x Dia |
| | | Finishing (8x Reach) | .00008 | .00017 | .00026 | .00034 | .00043 | .00051 | .00069 | .00103 | .00137 | .00171 | .00206 | .00275 | .25 x Dia | .02 x Dia |
| | | Finishing (12x Reach) | .00007 | .00014 | .00021 | .00027 | .00034 | .00041 | .00055 | .00082 | .00109 | .00136 | .00164 | .00218 | .25 x Dia | .01 x Dia |
| | | Finishing (15x Reach) | .00006 | .00013 | .00019 | .00025 | .00032 | .00038 | .00051 | .00076 | .00101 | .00127 | .00152 | .00203 | .25 x Dia | .01 x Dia |

# END MILLS FOR HARDENED STEELS

## Finishers – Tight Tolerance – Ball






- Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc
- Tightly-toleranced radii offer unparalleled precision and consistency, ensuring a perfect fit for high-precision applications
- Ti Hard Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in hardened steels
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h5 shank tolerance for high precision tool holders
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • Solid carbide • CNC ground in Switzerland

| CUTTER DIAMETER | RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | Ti HARD NANO COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{-.002mm}_{-.010mm}$ | R $^{+.002mm}_{-.002mm}$ | $L_2$ $^{+.010mm}_{-.010mm}$ | $L_3$ $^{+.020mm}_{-.000mm}$ | $D_2$ (h5) | $L_1$ | 2 FL | USD$ |
| .30 mm | .15 mm | .25 mm | 1 mm (3x) | 4 mm | 50 mm | 688206-C12 | 56.10 |
| .30 mm | .15 mm | .25 mm | 1 mm (3x) | 6 mm | 55 mm | 687606-C12 | 63.70 |
| .40 mm | .20 mm | .30 mm | 2 mm (5x) | 4 mm | 50 mm | 688009-C12 | 56.10 |
| .40 mm | .20 mm | .30 mm | 2 mm (5x) | 6 mm | 55 mm | 687409-C12 | 63.70 |
| .50 mm | .25 mm | .40 mm | 2 mm (4x) | 4 mm | 50 mm | 688111-C12 | 52.80 |
| .50 mm | .25 mm | .40 mm | 2 mm (4x) | 6 mm | 55 mm | 687511-C12 | 60.40 |
| .60 mm | .30 mm | .50 mm | 2 mm (3x) | 4 mm | 50 mm | 688213-C12 | 52.80 |
| .60 mm | .30 mm | .50 mm | 2 mm (3x) | 6 mm | 55 mm | 687613-C12 | 60.40 |
| .60 mm | .30 mm | .50 mm | 3 mm (5x) | 4 mm | 50 mm | 688013-C12 | 52.80 |
| .60 mm | .30 mm | .50 mm | 3 mm (5x) | 6 mm | 55 mm | 687413-C12 | 60.40 |
| .60 mm | .30 mm | .50 mm | 4 mm (6x) | 6 mm | 55 mm | 687313-C12 | 59.40 |
| .80 mm | .40 mm | .60 mm | 2 mm (2x) | 4 mm | 50 mm | 688318-C12 | 52.80 |
| .80 mm | .40 mm | .60 mm | 2 mm (2x) | 6 mm | 55 mm | 687718-C12 | 60.40 |
| .80 mm | .40 mm | .60 mm | 4 mm (5x) | 4 mm | 50 mm | 688018-C12 | 52.80 |
| .80 mm | .40 mm | .60 mm | 4 mm (5x) | 6 mm | 55 mm | 687418-C12 | 60.40 |
| .80 mm | .40 mm | .60 mm | 8 mm (10x) | 6 mm | 55 mm | 687018-C12 | 59.40 |
| 1.00 mm | .50 mm | .80 mm | 3 mm (3x) | 4 mm | 50 mm | 688222-C12 | 52.80 |
| 1.00 mm | .50 mm | .80 mm | 3 mm (3x) | 6 mm | 55 mm | 687622-C12 | 60.40 |
| 1.00 mm | .50 mm | .80 mm | 4 mm (4x) | 4 mm | 50 mm | 688122-C12 | 52.80 |
| 1.00 mm | .50 mm | .80 mm | 4 mm (4x) | 6 mm | 55 mm | 687522-C12 | 60.40 |
| 1.00 mm | .50 mm | .80 mm | 5 mm (5x) | 4 mm | 50 mm | 688022-C12 | 52.80 |
| 1.00 mm | .50 mm | .80 mm | 5 mm (5x) | 6 mm | 55 mm | 687422-C12 | 60.40 |
| 1.00 mm | .50 mm | .80 mm | 6 mm (6x) | 4 mm | 50 mm | 687922-C12 | 52.80 |
| 1.00 mm | .50 mm | .80 mm | 6 mm (6x) | 6 mm | 55 mm | 687322-C12 | 60.40 |
| 1.00 mm | .50 mm | .80 mm | 8 mm (8x) | 4 mm | 50 mm | 687822-C12 | 52.80 |
| 1.00 mm | .50 mm | .80 mm | 8 mm (8x) | 6 mm | 55 mm | 687122-C12 | 60.40 |
| 1.00 mm | .50 mm | .80 mm | 10 mm (10x) | 6 mm | 65 mm | 687022-C12 | 62.60 |
| 1.00 mm | .50 mm | .80 mm | 12 mm (12x) | 6 mm | 65 mm | 686922-C12 | 61.60 |

continued on next page

# END MILLS FOR HARDENED STEELS

## Finishers – Tight Tolerance – Ball (cont.)

continued from previous page

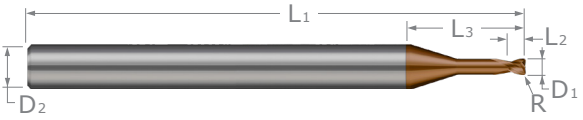
| CUTTER DIAMETER | RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | Ti HARD NANO COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{-.002mm}_{-.010mm}$ | R $^{+.002mm}_{-.002mm}$ | $L_2$ $^{+.010mm}_{-.010mm}$ | $L_3$ $^{+.020mm}_{-.000mm}$ | $D_2$ (h5) | $L_1$ | 2 FL | USD$ |
| 1.50 mm | .75 mm | 1.20 mm | 6 mm (4x) | 4 mm | 50 mm | 688133-C12 | 53.90 |
| 1.50 mm | .75 mm | 1.20 mm | 6 mm (4x) | 6 mm | 55 mm | 687533-C12 | 62.60 |
| 1.50 mm | .75 mm | 1.20 mm | 8 mm (5x) | 4 mm | 50 mm | 688033-C12 | 53.90 |
| 1.50 mm | .75 mm | 1.20 mm | 8 mm (5x) | 6 mm | 55 mm | 687433-C12 | 62.60 |
| 1.50 mm | .75 mm | 1.20 mm | 10 mm (6x) | 6 mm | 65 mm | 687333-C12 | 64.80 |
| 1.50 mm | .75 mm | 1.20 mm | 12 mm (8x) | 6 mm | 65 mm | 687133-C12 | 63.70 |
| 1.50 mm | .75 mm | 1.20 mm | 15 mm (10x) | 6 mm | 65 mm | 687033-C12 | 62.60 |
| 2.00 mm | 1.00 mm | 1.50 mm | 6 mm (3x) | 6 mm | 55 mm | 687645-C12 | 59.40 |
| 2.00 mm | 1.00 mm | 1.50 mm | 8 mm (4x) | 4 mm | 50 mm | 688145-C12 | 53.90 |
| 2.00 mm | 1.00 mm | 1.50 mm | 8 mm (4x) | 6 mm | 55 mm | 687545-C12 | 62.60 |
| 2.00 mm | 1.00 mm | 1.50 mm | 10 mm (5x) | 4 mm | 50 mm | 688045-C12 | 53.90 |
| 2.00 mm | 1.00 mm | 1.50 mm | 10 mm (5x) | 6 mm | 65 mm | 687445-C12 | 64.80 |
| 2.00 mm | 1.00 mm | 1.50 mm | 12 mm (6x) | 6 mm | 65 mm | 687345-C12 | 63.70 |
| 2.00 mm | 1.00 mm | 1.50 mm | 15 mm (7x) | 6 mm | 65 mm | 687245-C12 | 62.60 |
| 2.00 mm | 1.00 mm | 1.50 mm | 20 mm (10x) | 6 mm | 65 mm | 687045-C12 | 61.60 |
| 2.50 mm | 1.25 mm | 2.50 mm | 10 mm (4x) | 6 mm | 65 mm | 687551-C12 | 60.40 |
| 2.50 mm | 1.25 mm | 2.50 mm | 15 mm (6x) | 6 mm | 65 mm | 687351-C12 | 67.00 |
| 3.00 mm | 1.50 mm | 2.50 mm | 10 mm (3x) | 6 mm | 65 mm | 687657-C12 | 65.90 |
| 3.00 mm | 1.50 mm | 2.50 mm | 15 mm (5x) | 6 mm | 65 mm | 687457-C12 | 67.00 |
| 3.00 mm | 1.50 mm | 2.50 mm | 20 mm (6x) | 6 mm | 65 mm | 687357-C12 | 65.90 |
| 3.00 mm | 1.50 mm | 2.50 mm | 25 mm (8x) | 6 mm | 70 mm | 687157-C12 | 69.10 |
| 3.00 mm | 1.50 mm | 2.50 mm | 30 mm (10x) | 6 mm | 75 mm | 687057-C12 | 70.30 |
| 4.00 mm | 2.00 mm | 3.20 mm | 10 mm (2x) | 6 mm | 65 mm | 687761-C12 | 68.10 |
| 4.00 mm | 2.00 mm | 3.20 mm | 15 mm (3x) | 6 mm | 65 mm | 687661-C12 | 67.00 |
| 4.00 mm | 2.00 mm | 3.20 mm | 20 mm (5x) | 6 mm | 65 mm | 687461-C12 | 68.10 |
| 4.00 mm | 2.00 mm | 3.20 mm | 25 mm (6x) | 6 mm | 70 mm | 687361-C12 | 69.10 |
| 5.00 mm | 2.50 mm | 4.00 mm | 20 mm (4x) | 6 mm | 65 mm | 687564-C12 | 67.00 |

| $D_1$ $^{-.004mm}_{-.016mm}$ | R $^{+.000mm}_{-.004mm}$ | $L_2$ $^{+.010mm}_{-.010mm}$ | $L_3$ $^{+.020mm}_{-.000mm}$ | $D_2$ (h5) | $L_1$ | 2 FL | USD$ |
|---|---|---|---|---|---|---|---|
| 6.00 mm | 3.00 mm | 5.00 mm | 20 mm (3x) | 6 mm | 65 mm | 687666-C12 | 67.00 |
| 6.00 mm | 3.00 mm | 5.00 mm | 30 mm (5x) | 6 mm | 75 mm | 687466-C12 | 69.10 |

# END MILLS FOR HARDENED STEELS

## Finishers – Tight Tolerance – Corner Radius






- Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc
- Tightly-toleranced radii offer unparalleled precision and consistency, ensuring a perfect fit for high-precision applications
- Ti Hard Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in hardened steels
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h5 shank tolerance for high precision tool holders
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • Solid carbide • CNC ground in Switzerland

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | Ti HARD NANO COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{-.002mm}_{-.010mm}$ | R $^{+.000mm}_{-.004mm}$ | $L_2$ $^{+.010mm}_{-.010mm}$ | $L_3$ $^{+.020mm}_{-.000mm}$ | $D_2$ (h5) | $L_1$ | 2 FL | USD$ |
| .40 mm | .05 mm | .60 mm | 2 mm (5x) | 6 mm | 55 mm | 682509-C12 | 68.10 |
| .50 mm | .05 mm | .70 mm | 2 mm (4x) | 6 mm | 55 mm | 683111-C12 | 68.10 |
| .50 mm | .05 mm | .70 mm | 3 mm (6x) | 6 mm | 55 mm | 681511-C12 | 68.10 |
| .60 mm | .06 mm | .90 mm | 2 mm (3x) | 6 mm | 55 mm | 683413-C12 | 68.10 |
| .60 mm | .06 mm | .90 mm | 3 mm (5x) | 6 mm | 55 mm | 682413-C12 | 68.10 |
| .60 mm | .06 mm | .90 mm | 4 mm (6x) | 6 mm | 55 mm | 681213-C12 | 68.10 |
| .60 mm | .06 mm | .90 mm | 6 mm (10x) | 6 mm | 55 mm | 680213-C12 | 68.10 |
| .80 mm | .08 mm | 1.20 mm | 2 mm (2x) | 6 mm | 55 mm | 683818-C12 | 68.10 |
| .80 mm | .08 mm | 1.20 mm | 4 mm (5x) | 6 mm | 55 mm | 682318-C12 | 68.10 |
| 1.00 mm | .10 mm | 1.60 mm | 3 mm (3x) | 6 mm | 55 mm | 683622-C12 | 68.10 |
| 1.00 mm | .10 mm | 1.60 mm | 4 mm (4x) | 6 mm | 55 mm | 683022-C12 | 68.10 |
| 1.00 mm | .10 mm | 1.60 mm | 5 mm (5x) | 6 mm | 55 mm | 682222-C12 | 68.10 |
| 1.00 mm | .10 mm | 1.60 mm | 6 mm (6x) | 6 mm | 55 mm | 681422-C12 | 68.10 |
| 1.00 mm | .10 mm | 1.60 mm | 8 mm (8x) | 6 mm | 55 mm | 680522-C12 | 68.10 |
| 1.00 mm | .10 mm | 1.60 mm | 10 mm (10x) | 6 mm | 65 mm | 680122-C12 | 70.80 |
| 1.20 mm | .12 mm | 1.90 mm | 6 mm (5x) | 6 mm | 55 mm | 682127-C12 | 68.10 |
| 1.20 mm | .12 mm | 1.90 mm | 8 mm (6x) | 6 mm | 55 mm | 681127-C12 | 68.10 |
| 1.40 mm | .14 mm | 2.20 mm | 8 mm (5x) | 6 mm | 55 mm | 681631-C12 | 68.10 |
| 1.50 mm | .15 mm | 2.40 mm | 6 mm (4x) | 6 mm | 55 mm | 682933-C12 | 68.10 |
| 1.50 mm | .15 mm | 2.40 mm | 8 mm (5x) | 6 mm | 55 mm | 681833-C12 | 68.10 |
| 1.50 mm | .15 mm | 2.40 mm | 10 mm (6x) | 6 mm | 65 mm | 681033-C12 | 68.10 |
| 1.50 mm | .15 mm | 2.40 mm | 12 mm (8x) | 6 mm | 65 mm | 680433-C12 | 68.10 |
| 1.50 mm | .15 mm | 2.40 mm | 15 mm (10x) | 6 mm | 65 mm | 680033-C12 | 70.80 |
| 1.80 mm | .18 mm | 2.60 mm | 10 mm (5x) | 6 mm | 65 mm | 681740-C12 | 70.30 |
| 2.00 mm | .20 mm | 2.80 mm | 6 mm (3x) | 6 mm | 55 mm | 683545-C12 | 68.10 |
| 2.00 mm | .20 mm | 2.80 mm | 8 mm (4x) | 6 mm | 55 mm | 682845-C12 | 68.10 |
| 2.00 mm | .50 mm | 2.80 mm | 8 mm (4x) | 6 mm | 55 mm | 682745-C12 | 68.10 |
| 2.00 mm | .20 mm | 2.80 mm | 10 mm (5x) | 6 mm | 65 mm | 682045-C12 | 70.30 |
| 2.00 mm | .20 mm | 2.80 mm | 12 mm (6x) | 6 mm | 65 mm | 681345-C12 | 70.30 |
| 2.00 mm | .20 mm | 2.80 mm | 15 mm (7x) | 6 mm | 65 mm | 680745-C12 | 70.30 |
| 2.00 mm | .50 mm | 2.80 mm | 15 mm (7x) | 6 mm | 65 mm | 680645-C12 | 70.30 |
| 2.00 mm | .20 mm | 2.80 mm | 20 mm (10x) | 6 mm | 65 mm | 679945-C12 | 70.80 |

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# END MILLS FOR HARDENED STEELS

## Finishers – Tight Tolerance – Corner Radius (cont.)

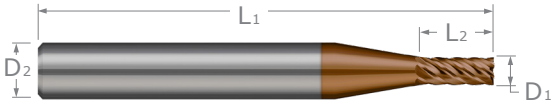
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| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | Ti HARD NANO COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{-.002mm}_{-.010mm}$ | R $^{+.000mm}_{-.004mm}$ | $L_2$ $^{+.010mm}_{-.010mm}$ | $L_3$ $^{+.020mm}_{-.000mm}$ | $D_2$ (h5) | $L_1$ | 2 FL | USD$ |
| 2.50 mm | .25 mm | 2.50 mm | 10 mm (4x) | 6 mm | 65 mm | 682651-C12 | 70.30 |
| 2.50 mm | .25 mm | 2.50 mm | 20 mm (8x) | 6 mm | 65 mm | 680351-C12 | 70.30 |
| 2.50 mm | .25 mm | 2.50 mm | 25 mm (10x) | 6 mm | 70 mm | 679851-C12 | 70.80 |
| 3.00 mm | .30 mm | 3.00 mm | 10 mm (3x) | 6 mm | 65 mm | 683357-C12 | 70.30 |
| 3.00 mm | .50 mm | 3.00 mm | 10 mm (3x) | 6 mm | 65 mm | 683257-C12 | 70.30 |
| 3.00 mm | .50 mm | 3.00 mm | 15 mm (5x) | 6 mm | 65 mm | 681957-C12 | 70.30 |
| 3.00 mm | .30 mm | 3.00 mm | 20 mm (6x) | 6 mm | 65 mm | 680957-C12 | 70.30 |
| 3.00 mm | .50 mm | 3.00 mm | 20 mm (6x) | 6 mm | 65 mm | 680857-C12 | 70.30 |
| 3.00 mm | .30 mm | 3.00 mm | 30 mm (10x) | 6 mm | 75 mm | 679757-C12 | 71.30 |
| 4.00 mm | .50 mm | 4.00 mm | 10 mm (2x) | 6 mm | 65 mm | 683761-C12 | 70.30 |
| 4.00 mm | .50 mm | 4.00 mm | 15 mm (3x) | 6 mm | 65 mm | 683261-C12 | 70.30 |
| 4.00 mm | .50 mm | 4.00 mm | 20 mm (5x) | 6 mm | 65 mm | 681961-C12 | 70.30 |
| 4.00 mm | .50 mm | 4.00 mm | 30 mm (7x) | 6 mm | 75 mm | 680661-C12 | 71.30 |
| 5.00 mm | .50 mm | 5.00 mm | 20 mm (4x) | 6 mm | 65 mm | 682764-C12 | 70.30 |

| $D_1$ $^{-.004mm}_{-.016mm}$ | R $^{+.000mm}_{-.004mm}$ | $L_2$ $^{+.010mm}_{-.010mm}$ | $L_3$ $^{+.020mm}_{-.000mm}$ | $D_2$ (h5) | $L_1$ | 2 FL | USD$ |
|---|---|---|---|---|---|---|---|
| 6.00 mm | .50 mm | 6.00 mm | 10 mm (1x) | 6 mm | 65 mm | 683966-C12 | 70.30 |
| 6.00 mm | .50 mm | 6.00 mm | 20 mm (3x) | 6 mm | 65 mm | 683266-C12 | 70.30 |
| 6.00 mm | .50 mm | 6.00 mm | 30 mm (5x) | 6 mm | 75 mm | 681966-C12 | 71.30 |

# VARIABLE PITCH END MILLS FOR TITANIUM ALLOYS

## Square






- Engineered for outstanding performance in Heavy Radial Efficiency Milling (HREM) of Titanium 6Al4V and other titanium alloys
- Variable pitch design decreases chatter and harmonics
- Not for use in traditional slotting and roughing toolpaths
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- 6 flute • Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | Ti NANO COATED | |
|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ |
| .062 (1/16) | .186 (3x) | 1/4 | 2-1/2 | 711762-C10 | 57.40 |
| .062 (1/16) | .312 (5x) | 1/4 | 2-1/2 | 710362-C10 | 57.40 |
| .078 (5/64) | .234 (3x) | 1/4 | 2-1/2 | 711778-C10 | 57.40 |
| .078 (5/64) | .406 (5x) | 1/4 | 2-1/2 | 710378-C10 | 57.40 |
| .093 (3/32) | .279 (3x) | 1/4 | 2-1/2 | 711793-C10 | 57.40 |
| .093 (3/32) | .500 (5x) | 1/4 | 2-1/2 | 710393-C10 | 57.40 |

| $D_1$ $^{+.002''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ |
|---|---|---|---|---|---|
| .125 (1/8) | .375 (3x) | 1/4 | 2-1/2 | 711808-C10 | 56.40 |
| .125 (1/8) | .625 (5x) | 1/4 | 2-1/2 | 710408-C10 | 56.40 |
| .187 (3/16) | .570 (3x) | 1/4 | 2-1/2 | 711812-C10 | 59.20 |
| .187 (3/16) | 1.000 (5x) | 1/4 | 3 | 710412-C10 | 60.40 |
| .250 (1/4) | .750 (3x) | 1/4 | 2-1/2 | 711816-C10 | 57.20 |
| .250 (1/4) | 1.250 (5x) | 1/4 | 4 | 710416-C10 | 72.90 |

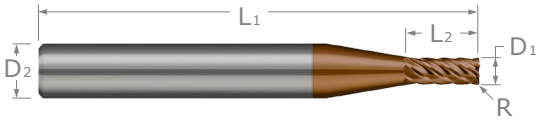
**SCAN THE QR CODE TO LEARN ABOUT HREM MACHINING**

Backed by data, real-world trials, and Helical Solutions tooling, Harvey Performance Company's novel Heavy Radial Efficiency Machining (HREM) strategy for machining titanium offers a compelling alternative for shops looking to optimize machining performance in the most demanding applications.

harveyperformance.com/in-the-loupe/hrem

# VARIABLE PITCH END MILLS FOR TITANIUM ALLOYS

## Corner Radius




- Corner radius for improved strength
- Engineered for outstanding performance in Heavy Radial Efficiency Milling (HREM) of Titanium 6Al4V and other titanium alloys
- Variable pitch design decreases chatter and harmonics
- Not for use in traditional slotting and roughing toolpaths
- Ti Nano coating offers our best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- 6 flute • Center cutting
- Solid carbide
- CNC ground in the USA



| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | Ti NANO COATED | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ |
| .062 (1/16) | .005 | **.186** (3x) | 1/4 | 2-1/2 | 711562-C10 | 59.80 |
| .062 (1/16) | .005 | **.312** (5x) | 1/4 | 2-1/2 | 711162-C10 | 61.80 |
| .062 (1/16) | .010 | **.186** (3x) | 1/4 | 2-1/2 | 711362-C10 | 59.80 |
| .062 (1/16) | .010 | **.312** (5x) | 1/4 | 2-1/2 | 710962-C10 | 61.80 |
| .078 (5/64) | .005 | **.234** (3x) | 1/4 | 2-1/2 | 711578-C10 | 59.80 |
| .078 (5/64) | .005 | **.406** (5x) | 1/4 | 2-1/2 | 711178-C10 | 61.80 |
| .078 (5/64) | .010 | **.234** (3x) | 1/4 | 2-1/2 | 711378-C10 | 59.80 |
| .078 (5/64) | .010 | **.406** (5x) | 1/4 | 2-1/2 | 710978-C10 | 61.80 |
| .093 (3/32) | .005 | **.279** (3x) | 1/4 | 2-1/2 | 711593-C10 | 59.80 |
| .093 (3/32) | .005 | **.500** (5x) | 1/4 | 2-1/2 | 711193-C10 | 61.80 |
| .093 (3/32) | .010 | **.279** (3x) | 1/4 | 2-1/2 | 711393-C10 | 59.80 |
| .093 (3/32) | .010 | **.500** (5x) | 1/4 | 2-1/2 | 710993-C10 | 61.80 |

| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ |
|---|---|---|---|---|---|---|
| .125 (1/8) | .005 | **.375** (3x) | 1/4 | 2-1/2 | 711608-C10 | 60.60 |
| .125 (1/8) | .005 | **.625** (5x) | 1/4 | 2-1/2 | 711208-C10 | 60.60 |
| .125 (1/8) | .010 | **.375** (3x) | 1/4 | 2-1/2 | 711408-C10 | 60.60 |
| .125 (1/8) | .010 | **.625** (5x) | 1/4 | 2-1/2 | 711008-C10 | 60.60 |
| .187 (3/16) | .005 | **.570** (3x) | 1/4 | 2-1/2 | 711612-C10 | 63.80 |
| .187 (3/16) | .005 | **1.000** (5x) | 1/4 | 3 | 711212-C10 | 65.10 |
| .187 (3/16) | .010 | **.570** (3x) | 1/4 | 2-1/2 | 711412-C10 | 63.80 |
| .187 (3/16) | .010 | **1.000** (5x) | 1/4 | 3 | 711012-C10 | 65.10 |
| .250 (1/4) | .005 | **.750** (3x) | 1/4 | 2-1/2 | 711616-C10 | 64.10 |
| .250 (1/4) | .005 | **1.250** (5x) | 1/4 | 4 | 711216-C10 | 79.80 |
| .250 (1/4) | .010 | **.750** (3x) | 1/4 | 2-1/2 | 711416-C10 | 64.10 |
| .250 (1/4) | .010 | **1.250** (5x) | 1/4 | 4 | 711016-C10 | 79.80 |

**SCAN THE QR CODE TO LEARN ABOUT HREM MACHINING**

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harveyperformance.com/in-the-loupe/hrem

NEW

# VARIABLE PITCH END MILLS FOR TITANIUM ALLOYS

## Ball






- Engineered for outstanding performance in Heavy Radial Efficiency Milling (HREM) of Titanium 6Al4V and other titanium alloys
- Variable pitch design decreases chatter and harmonics
- Not for use in traditional slotting and roughing toolpaths
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- 6 flute • Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | Ti NANO COATED | | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ | |
| .062 (1/16) | .186 (3x) | 1/4 | 2-1/2 | 696762-C10 | 54.50 | NEW |
| .062 (1/16) | .312 (5x) | 1/4 | 2-1/2 | 696562-C10 | 57.40 | NEW |
| .078 (5/64) | .234 (3x) | 1/4 | 2-1/2 | 696778-C10 | 54.50 | NEW |
| .078 (5/64) | .406 (5x) | 1/4 | 2-1/2 | 696578-C10 | 57.40 | NEW |
| .093 (3/32) | .279 (3x) | 1/4 | 2-1/2 | 696793-C10 | 54.50 | NEW |
| .093 (3/32) | .500 (5x) | 1/4 | 2-1/2 | 696593-C10 | 57.40 | NEW |

| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 6 FL | USD$ | |
|---|---|---|---|---|---|---|
| .125 (1/8) | .375 (3x) | 1/4 | 2-1/2 | 696808-C10 | 57.10 | NEW |
| .125 (1/8) | .625 (5x) | 1/4 | 2-1/2 | 696608-C10 | 61.20 | NEW |
| .187 (3/16) | .570 (3x) | 1/4 | 2-1/2 | 696812-C10 | 57.10 | NEW |
| .187 (3/16) | 1.000 (5x) | 1/4 | 3 | 696612-C10 | 63.30 | NEW |
| .250 (1/4) | .750 (3x) | 1/4 | 2-1/2 | 696816-C10 | 61.20 | NEW |
| .250 (1/4) | 1.250 (5x) | 1/4 | 4 | 696616-C10 | 70.60 | NEW |

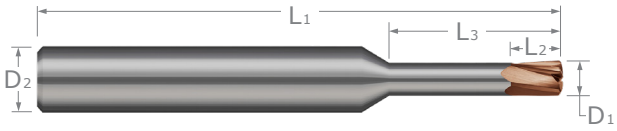
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harveyperformance.com/in-the-loupe/hrem

# HIGH FEED END MILLS FOR HIGH TEMP ALLOYS

## High Feed End Mills




- Engineered to achieve maximum feed rates in steels up to 45 Rc
- Unique end profile geometry developed for ideal tool engagement and lowered cutting forces
- Variable pitch design decreases chatter and harmonics
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- End cutting geometry (non-center cutting)
- Solid carbide
- CNC ground in the USA

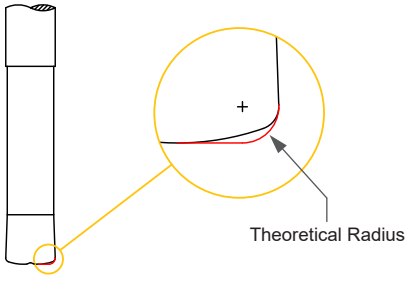


| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | NECK DIA. | FLUTES | THEORETICAL RADIUS* | SHANK DIA. | OVERALL LENGTH | Ti NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | | | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .078 (5/64) | .078 | .234 (3x) | .069 | 4 | .0098 | 1/4 | 2 | 712378-C10 | 56.10 |
| .078 (5/64) | .078 | .391 (5x) | .069 | 4 | .0098 | 1/4 | 2 | 712178-C10 | 56.10 |
| .078 (5/64) | .078 | .625 (8x) | .069 | 4 | .0098 | 1/4 | 2 | 711978-C10 | 58.20 |
| .093 (3/32) | .093 | .279 (3x) | .082 | 4 | .0117 | 1/4 | 2 | 712393-C10 | 59.40 |
| .093 (3/32) | .093 | .465 (5x) | .082 | 4 | .0117 | 1/4 | 2 | 712193-C10 | 59.40 |
| .093 (3/32) | .093 | .744 (8x) | .082 | 4 | .0117 | 1/4 | 2-1/2 | 711993-C10 | 61.60 |
| .125 (1/8) | .125 | .375 (3x) | .113 | 4 | .0157 | 1/4 | 2 | 712408-C10 | 62.60 |
| .125 (1/8) | .125 | .625 (5x) | .113 | 4 | .0157 | 1/4 | 2 | 712208-C10 | 62.60 |
| .125 (1/8) | .125 | 1.000 (8x) | .113 | 4 | .0157 | 1/4 | 2-1/2 | 712008-C10 | 64.80 |
| .187 (3/16) | .187 | .563 (3x) | .165 | 4 | .0236 | 1/4 | 2 | 712412-C10 | 65.90 |
| .187 (3/16) | .187 | .938 (5x) | .165 | 4 | .0236 | 1/4 | 2-1/2 | 712212-C10 | 65.90 |
| .187 (3/16) | .187 | 1.500 (8x) | .165 | 4 | .0236 | 1/4 | 3 | 712012-C10 | 69.10 |
| .250 (1/4) | .250 | .750 (3x) | .245 | 5 | .0314 | 1/4 | 2 | 710216-C10 | 70.30 |
| .250 (1/4) | .250 | 1.250 (5x) | .245 | 5 | .0314 | 1/4 | 2-1/2 | 710016-C10 | 70.30 |
| .250 (1/4) | .250 | 2.000 (8x) | .245 | 5 | .0314 | 1/4 | 3-1/2 | 709816-C10 | 73.50 |

*Theoretical radius for use when programming in CAM software

Visit www.harveytool.com to download precise Simulation Files for all Feed Mills.

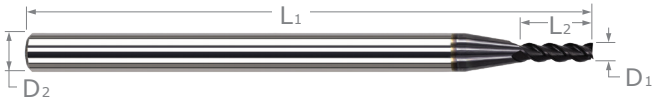
In the absence of a Simulation File, use the Theoretical Radius to approximate Harvey Tool's feed mills as corner radius end mills within your CAM software.



NEW SIZES!

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Square




- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA



| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | ALTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | +.00mm −.02mm | decimal equivalent | $L_2$ +.010" −.000" +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | .2 mm | .0078 | **.60 mm** (3x) | 3 | 4 mm | 50 mm | 942804-C6 | 70.80 |
| .010 | | .0100 | **.015** (1.5x) | 3 | 1/8 | 1-1/2 | 973710-C6 | 65.90 |
| .010 | | .0100 | **.030** (3x) | 3 | 1/8 | 1-1/2 | 967010-C6 | 64.30 |
| .010 | | .0100 | **.050** (5x) | 3 | 1/8 | 2-1/2 | 990710-C6 | 75.70 |
| .015 (1/64) | | .0150 | **.012** (0.8x) | 3 | 1/8 | 1-1/2 | 888015-C6 | 55.40 |
| .015 (1/64) | | .0150 | **.023** (1.5x) | 3 | 1/8 | 1-1/2 | 973715-C6 | 54.00 |
| .015 (1/64) | | .0150 | **.023** (1.5x) | 4 | 1/8 | 1-1/2 | 841615-C6 | 56.20 |
| .015 (1/64) | | .0150 | **.045** (3x) | 3 | 1/8 | 1-1/2 | 967015-C6 | 52.60 |
| .015 (1/64) | | .0150 | **.045** (3x) | 4 | 1/8 | 1-1/2 | 875415-C6 | 54.80 |
| .015 (1/64) | | .0150 | **.062** (4x) | 3 | 1/8 | 2-1/2 | 886215-C6 | 62.30 |
| .015 (1/64) | | .0150 | **.078** (5x) | 3 | 1/8 | 2-1/2 | 990715-C6 | 64.80 |
| | .4 mm | .0157 | **1.20 mm** (3x) | 3 | 4 mm | 50 mm | 942809-C6 | 52.30 |
| | .5 mm | .0196 | **.40 mm** (0.8x) | 3 | 4 mm | 50 mm | 848011-C6 | 54.60 |
| | .5 mm | .0196 | **.75 mm** (1.5x) | 3 | 4 mm | 50 mm | 954511-C6 | 52.30 |
| | .5 mm | .0196 | **1.50 mm** (3x) | 3 | 4 mm | 50 mm | 942811-C6 | 52.30 |
| .020 | | .0200 | **.016** (0.8x) | 3 | 1/8 | 1-1/2 | 888020-C6 | 48.80 |
| .020 | | .0200 | **.030** (1.5x) | 3 | 1/8 | 1-1/2 | 973720-C6 | 47.20 |
| .020 | | .0200 | **.030** (1.5x) | 4 | 1/8 | 1-1/2 | 841620-C6 | 50.60 |
| .020 | | .0200 | **.060** (3x) | 3 | 1/8 | 1-1/2 | 967020-C6 | 46.20 |
| .020 | | .0200 | **.060** (3x) | 4 | 1/8 | 1-1/2 | 875420-C6 | 48.40 |
| .020 | | .0200 | **.080** (4x) | 3 | 1/8 | 2-1/2 | 886220-C6 | 52.30 |
| .020 | | .0200 | **.100** (5x) | 3 | 1/8 | 2-1/2 | 990720-C6 | 54.80 |
| .020 | | .0200 | **.100** (5x) | 4 | 1/8 | 2-1/2 | 852920-C6 | 58.30 |
| | .6 mm | .0236 | **1.80 mm** (3x) | 3 | 4 mm | 50 mm | 942813-C6 | 50.90 |
| .025 | | .0250 | **.038** (1.5x) | 3 | 1/8 | 1-1/2 | 973725-C6 | 45.60 |
| .025 | | .0250 | **.075** (3x) | 3 | 1/8 | 1-1/2 | 967025-C6 | 44.50 |
| .025 | | .0250 | **.075** (3x) | 4 | 1/8 | 1-1/2 | 875425-C6 | 46.60 |
| .025 | | .0250 | **.100** (4x) | 3 | 1/8 | 2-1/2 | 886225-C6 | 54.10 |
| .025 | | .0250 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 990725-C6 | 53.00 |
| .025 | | .0250 | **.125** (5x) | 4 | 1/8 | 2-1/2 | 852925-C6 | 55.00 |
| .030 | | .0300 | **.024** (0.8x) | 3 | 1/8 | 1-1/2 | 888030-C6 | 44.70 |
| .030 | | .0300 | **.045** (1.5x) | 3 | 1/8 | 1-1/2 | 973730-C6 | 45.60 |
| .030 | | .0300 | **.045** (1.5x) | 4 | 1/8 | 1-1/2 | 841630-C6 | 48.00 |
| .030 | | .0300 | **.090** (3x) | 3 | 1/8 | 1-1/2 | 967030-C6 | 44.50 |
| .030 | | .0300 | **.090** (3x) | 4 | 1/8 | 1-1/2 | 875430-C6 | 46.60 |
| .030 | | .0300 | **.125** (4x) | 3 | 1/8 | 2-1/2 | 886230-C6 | 54.10 |
| .030 | | .0300 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 990730-C6 | 53.00 |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Square (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .031 (1/32) | | .0310 | **.025** (0.8x) | 3 | 1/8 | 1-1/2 | 888031-C6 | 41.20 |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 3 | 1/8 | 1-1/2 | 973731-C6 | 38.90 |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 4 | 1/8 | 1-1/2 | 841631-C6 | 40.20 |
| .031 (1/32) | | .0310 | **.093** (3x) | 3 | 1/8 | 1-1/2 | 967031-C6 | 37.90 |
| .031 (1/32) | | .0310 | **.093** (3x) | 4 | 1/8 | 1-1/2 | 875431-C6 | 40.20 |
| .031 (1/32) | | .0310 | **.125** (4x) | 3 | 1/8 | 2-1/2 | 886231-C6 | 45.60 |
| .031 (1/32) | | .0310 | **.125** (4x) | 4 | 1/8 | 2-1/2 | 790731-C6 | 47.70 |
| .031 (1/32) | | .0310 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 990731-C6 | 48.20 |
| .031 (1/32) | | .0310 | **.156** (5x) | 4 | 1/8 | 2-1/2 | 852931-C6 | 50.30 |
| | .8 mm | .0314 | **2.40 mm** (3x) | 3 | 4 mm | 50 mm | 942818-C6 | 44.40 |
| | .8 mm | .0314 | **4.00 mm** (5x) | 3 | 4 mm | 50 mm | 910518-C6 | 46.70 |
| .035 | | .0350 | **.028** (0.8x) | 3 | 1/8 | 1-1/2 | 888035-C6 | 40.10 |
| .035 | | .0350 | **.053** (1.5x) | 3 | 1/8 | 1-1/2 | 973735-C6 | 38.90 |
| .035 | | .0350 | **.053** (1.5x) | 4 | 1/8 | 1-1/2 | 841635-C6 | 41.10 |
| .035 | | .0350 | **.105** (3x) | 3 | 1/8 | 1-1/2 | 967035-C6 | 37.90 |
| .035 | | .0350 | **.105** (3x) | 4 | 1/8 | 1-1/2 | 875435-C6 | 40.20 |
| .035 | | .0350 | **.140** (4x) | 3 | 1/8 | 2-1/2 | 886235-C6 | 46.50 |
| .035 | | .0350 | **.187** (5x) | 3 | 1/8 | 2-1/2 | 990735-C6 | 48.20 |
| | 1.0 mm | .0393 | **.80 mm** (0.8x) | 3 | 4 mm | 50 mm | 848022-C6 | 45.60 |
| | 1.0 mm | .0393 | **1.50 mm** (1.5x) | 3 | 4 mm | 50 mm | 954522-C6 | 45.00 |
| | 1.0 mm | .0393 | **1.50 mm** (1.5x) | 4 | 4 mm | 50 mm | 841622-C6 | 47.40 |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 3 | 4 mm | 50 mm | 942822-C6 | 44.00 |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 4 | 4 mm | 50 mm | 821322-C6 | 46.40 |
| | 1.0 mm | .0393 | **4.00 mm** (4x) | 3 | 4 mm | 50 mm | 820722-C6 | 49.60 |
| | 1.0 mm | .0393 | **5.00 mm** (5x) | 3 | 4 mm | 50 mm | 910522-C6 | 54.50 |
| | 1.0 mm | .0393 | **5.00 mm** (5x) | 4 | 4 mm | 50 mm | 726822-C6 | 57.10 |
| .039 | | .0390 | **.117** (3x) | 3 | 1/8 | 1-1/2 | 967039-C6 | 41.00 |
| .040 | | .0400 | **.032** (0.8x) | 3 | 1/8 | 1-1/2 | 888040-C6 | 39.80 |
| .040 | | .0400 | **.060** (1.5x) | 3 | 1/8 | 1-1/2 | 973740-C6 | 38.90 |
| .040 | | .0400 | **.060** (1.5x) | 4 | 1/8 | 1-1/2 | 841640-C6 | 41.10 |
| .040 | | .0400 | **.120** (3x) | 3 | 1/8 | 1-1/2 | 967040-C6 | 37.90 |
| .040 | | .0400 | **.120** (3x) | 4 | 1/8 | 1-1/2 | 875440-C6 | 40.20 |
| .040 | | .0400 | **.160** (4x) | 3 | 1/8 | 2-1/2 | 886240-C6 | 45.80 |
| .040 | | .0400 | **.203** (5x) | 3 | 1/8 | 2-1/2 | 990740-C6 | 48.20 |
| .040 | | .0400 | **.203** (5x) | 4 | 1/8 | 2-1/2 | 852940-C6 | 51.30 |
| .045 | | .0450 | **.068** (1.5x) | 3 | 1/8 | 1-1/2 | 973745-C6 | 38.90 |
| .045 | | .0450 | **.135** (3x) | 3 | 1/8 | 1-1/2 | 967045-C6 | 37.90 |
| .045 | | .0450 | **.135** (3x) | 4 | 1/8 | 1-1/2 | 875445-C6 | 40.20 |
| .045 | | .0450 | **.225** (5x) | 3 | 1/8 | 2-1/2 | 990745-C6 | 48.20 |
| .047 (3/64) | | .0470 | **.038** (0.8x) | 3 | 1/8 | 1-1/2 | 888047-C6 | 43.10 |
| .047 (3/64) | | .0470 | **.071** (1.5x) | 3 | 1/8 | 1-1/2 | 973747-C6 | 38.90 |
| .047 (3/64) | | .0470 | **.071** (1.5x) | 4 | 1/8 | 1-1/2 | 841647-C6 | 40.40 |
| .047 (3/64) | | .0470 | **.141** (3x) | 3 | 1/8 | 1-1/2 | 967047-C6 | 37.90 |
| .047 (3/64) | | .0470 | **.141** (3x) | 4 | 1/8 | 1-1/2 | 875447-C6 | 40.20 |
| .047 (3/64) | | .0470 | **.187** (4x) | 3 | 1/8 | 2-1/2 | 886247-C6 | 45.60 |
| .047 (3/64) | | .0470 | **.187** (4x) | 4 | 1/8 | 2-1/2 | 790747-C6 | 47.70 |
| .047 (3/64) | | .0470 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 990747-C6 | 48.20 |
| .047 (3/64) | | .0470 | **.250** (5x) | 4 | 1/8 | 2-1/2 | 852947-C6 | 50.30 |
| | 1.2 mm | .0472 | **3.50 mm** (3x) | 3 | 4 mm | 50 mm | 942827-C6 | 44.40 |

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NEW SIZES!

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Square (cont.)

continued from previous page

| CUTTER DIAMETER $D_1$ +.0005″ −.0005″ | $D_1$ +.00mm −.02mm | $D_1$ decimal equivalent | LENGTH OF CUT $L_2$ +.010″ −.000″ +.25mm −.00mm | FLUTES | SHANK DIAMETER $D_2$ (h6) | OVERALL LENGTH $L_1$ | AlTiN NANO COATED TOOL # | USD$ | |
|---|---|---|---|---|---|---|---|---|---|
| .050 | | .0500 | **.040** (0.8x) | 3 | 1/8 | 1-1/2 | 888050-C6 | 38.00 | |
| .050 | | .0500 | **.075** (1.5x) | 3 | 1/8 | 1-1/2 | 973750-C6 | 38.90 | |
| .050 | | .0500 | **.150** (3x) | 3 | 1/8 | 1-1/2 | 967050-C6 | 37.90 | |
| .050 | | .0500 | **.150** (3x) | 4 | 1/8 | 1-1/2 | 875450-C6 | 40.20 | |
| .050 | | .0500 | **.203** (4x) | 3 | 1/8 | 1-1/2 | 886250-C6 | 46.50 | |
| .050 | | .0500 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 990750-C6 | 48.20 | |
| .055 | | .0550 | **.044** (0.8x) | 3 | 1/8 | 1-1/2 | 888055-C6 | 38.00 | |
| .055 | | .0550 | **.083** (1.5x) | 3 | 1/8 | 1-1/2 | 973755-C6 | 38.90 | |
| .055 | | .0550 | **.165** (3x) | 3 | 1/8 | 1-1/2 | 967055-C6 | 37.90 | |
| .055 | | .0550 | **.165** (3x) | 4 | 1/8 | 1-1/2 | 875455-C6 | 40.90 | |
| .055 | | .0550 | **.275** (5x) | 3 | 1/8 | 2-1/2 | 990755-C6 | 48.20 | |
| | 1.4 mm | .0551 | **4.00 mm** (3x) | 3 | 4 mm | 50 mm | 942831-C6 | 41.70 | |
| | 1.5 mm | .0590 | **2.20 mm** (1.5x) | 3 | 4 mm | 50 mm | 954533-C6 | 42.20 | |
| | 1.5 mm | .0590 | **4.50 mm** (3x) | 3 | 4 mm | 50 mm | 942833-C6 | 41.40 | |
| | 1.5 mm | .0590 | **4.50 mm** (3x) | 4 | 4 mm | 50 mm | 821333-C6 | 44.00 | |
| | 1.5 mm | .0590 | **7.50 mm** (5x) | 3 | 4 mm | 50 mm | 910533-C6 | 52.10 | |
| .060 | | .0600 | **.048** (0.8x) | 3 | 1/8 | 1-1/2 | 888060-C6 | 38.70 | |
| .060 | | .0600 | **.090** (1.5x) | 3 | 1/8 | 1-1/2 | 973760-C6 | 38.90 | |
| .060 | | .0600 | **.180** (3x) | 3 | 1/8 | 1-1/2 | 967060-C6 | 37.90 | |
| .060 | | .0600 | **.180** (3x) | 4 | 1/8 | 1-1/2 | 875460-C6 | 40.20 | |
| .060 | | .0600 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 990760-C6 | 48.20 | |
| .062 (1/16) | | .0620 | **.050** (0.8x) | 3 | 1/8 | 1-1/2 | 888062-C6 | 40.60 | |
| .062 (1/16) | | .0620 | **.050** (0.8x) | 4 | 1/8 | 1-1/2 | 790562-C6 | 42.80 | |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 3 | 1/8 | 1-1/2 | 973762-C6 | 36.30 | |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 4 | 1/8 | 1-1/2 | 841662-C6 | 37.80 | |
| .062 (1/16) | | .0620 | **.186** (3x) | 3 | 1/8 | 1-1/2 | 967062-C6 | 35.50 | |
| .062 (1/16) | | .0620 | **.186** (3x) | 4 | 1/8 | 1-1/2 | 875462-C6 | 37.70 | |
| .062 (1/16) | | .0620 | **.250** (4x) | 3 | 1/8 | 2-1/2 | 886262-C6 | 43.70 | |
| .062 (1/16) | | .0620 | **.250** (4x) | 4 | 1/8 | 2-1/2 | 790762-C6 | 45.90 | |
| .062 (1/16) | | .0620 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 990762-C6 | 46.20 | |
| .062 (1/16) | | .0620 | **.312** (5x) | 4 | 1/8 | 2-1/2 | 852962-C6 | 48.40 | |
| | 1.6 mm | .0629 | **5.00 mm** (3x) | 3 | 4 mm | 50 mm | 942836-C6 | 42.60 | |
| .065 | | .0650 | **.195** (3x) | 3 | 1/8 | 1-1/2 | 967065-C6 | 40.80 | |
| .070 | | .0700 | **.105** (1.5x) | 3 | 1/8 | 1-1/2 | 973770-C6 | 36.30 | |
| .070 | | .0700 | **.210** (3x) | 3 | 1/8 | 1-1/2 | 967070-C6 | 35.50 | |
| .070 | | .0700 | **.210** (3x) | 4 | 1/8 | 1-1/2 | 875470-C6 | 37.70 | |
| .070 | | .0700 | **.375** (5x) | 3 | 1/8 | 2-1/2 | 990770-C6 | 46.20 | |
| | 1.8 mm | .0708 | **5.50 mm** (3x) | 3 | 4 mm | 50 mm | 942840-C6 | 42.60 | |
| .075 | | .0750 | **.225** (3x) | 3 | 1/8 | 1-1/2 | 967075-C6 | 40.80 | |
| .078 (5/64) | | .0780 | **.062** (0.8x) | 3 | 1/8 | 1-1/2 | 888078-C6 | 40.60 | |
| .078 (5/64) | | .0780 | **.118** (1.5x) | 3 | 1/8 | 1-1/2 | 973778-C6 | 36.30 | |
| .078 (5/64) | | .0780 | **.118** (1.5x) | 4 | 1/8 | 1-1/2 | 841678-C6 | 37.80 | |
| .078 (5/64) | | .0780 | **.234** (3x) | 3 | 1/8 | 1-1/2 | 967078-C6 | 35.50 | |
| .078 (5/64) | | .0780 | **.234** (3x) | 4 | 1/8 | 1-1/2 | 875478-C6 | 37.70 | |
| .078 (5/64) | | .0780 | **.312** (4x) | 3 | 1/8 | 2-1/2 | 886278-C6 | 43.70 | |
| .078 (5/64) | | .0780 | **.312** (4x) | 4 | 1/8 | 2-1/2 | 790778-C6 | 45.20 | NEW |
| .078 (5/64) | | .0780 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 990778-C6 | 46.20 | |
| .078 (5/64) | | .0780 | **.406** (5x) | 4 | 1/8 | 2-1/2 | 852978-C6 | 48.40 | |

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# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Square (cont.)

continued from previous page

| CUTTER DIAMETER $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | LENGTH OF CUT $L_2$ +.010″ −.000″ +.25mm −.00mm | FLUTES | SHANK DIAMETER $D_2$ (h6) | OVERALL LENGTH $L_1$ | AlTiN NANO COATED TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|
| | 2.0 mm | .0787 | **3.00 mm** (1.5x) | 3 | 4 mm | 50 mm | 954545-C6 | 42.20 |
| | 2.0 mm | .0787 | **6.00 mm** (3x) | 3 | 4 mm | 50 mm | 942845-C6 | 41.40 |
| | 2.0 mm | .0787 | **6.00 mm** (3x) | 4 | 4 mm | 50 mm | 821345-C6 | 44.00 |
| | 2.0 mm | .0787 | **10.00 mm** (5x) | 3 | 4 mm | 50 mm | 910545-C6 | 52.10 |
| .080 | | .0800 | **.120** (1.5x) | 3 | 1/8 | 1-1/2 | 973780-C6 | 36.30 |
| .080 | | .0800 | **.240** (3x) | 3 | 1/8 | 1-1/2 | 967080-C6 | 35.50 |
| .080 | | .0800 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 990780-C6 | 47.00 |
| .085 | | .0850 | **.255** (3x) | 3 | 1/8 | 1-1/2 | 967085-C6 | 40.80 |
| .090 | | .0900 | **.072** (0.8x) | 3 | 1/8 | 1-1/2 | 888090-C6 | 40.60 |
| .090 | | .0900 | **.135** (1.5x) | 3 | 1/8 | 1-1/2 | 973790-C6 | 36.30 |
| .090 | | .0900 | **.135** (1.5x) | 4 | 1/8 | 1-1/2 | 841690-C6 | 38.30 |
| .090 | | .0900 | **.270** (3x) | 3 | 1/8 | 1-1/2 | 967090-C6 | 35.50 |
| .090 | | .0900 | **.450** (5x) | 3 | 1/8 | 2-1/2 | 990790-C6 | 46.20 |
| .093 (3/32) | | .0930 | **.074** (0.8x) | 3 | 1/8 | 1-1/2 | 888093-C6 | 40.60 |
| .093 (3/32) | | .0930 | **.074** (0.8x) | 4 | 1/8 | 1-1/2 | 790593-C6 | 43.30 |
| .093 (3/32) | | .0930 | **.140** (1.5x) | 3 | 1/8 | 1-1/2 | 973793-C6 | 36.30 |
| .093 (3/32) | | .0930 | **.140** (1.5x) | 4 | 1/8 | 1-1/2 | 841693-C6 | 37.80 |
| .093 (3/32) | | .0930 | **.279** (3x) | 3 | 1/8 | 1-1/2 | 967093-C6 | 35.50 |
| .093 (3/32) | | .0930 | **.279** (3x) | 4 | 1/8 | 1-1/2 | 875493-C6 | 37.70 |
| .093 (3/32) | | .0930 | **.375** (4x) | 3 | 1/8 | 2-1/2 | 886293-C6 | 43.70 |
| .093 (3/32) | | .0930 | **.375** (4x) | 4 | 1/8 | 2-1/2 | 790793-C6 | 45.90 |
| .093 (3/32) | | .0930 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 990793-C6 | 46.20 |
| .093 (3/32) | | .0930 | **.500** (5x) | 4 | 1/8 | 2-1/2 | 852993-C6 | 48.40 |
| .095 | | .0950 | **.285** (3x) | 3 | 1/8 | 1-1/2 | 967095-C6 | 40.70 |
| | 2.5 mm | .0984 | **3.70 mm** (1.5x) | 3 | 4 mm | 50 mm | 954551-C6 | 42.20 |
| | 2.5 mm | .0984 | **7.50 mm** (3x) | 3 | 4 mm | 50 mm | 942851-C6 | 41.40 |
| | 2.5 mm | .0984 | **7.50 mm** (3x) | 4 | 4 mm | 50 mm | 821351-C6 | 44.00 |
| | 2.5 mm | .0984 | **12.00 mm** (5x) | 3 | 4 mm | 50 mm | 910551-C6 | 52.10 |
| .100 | | .1000 | **.150** (1.5x) | 3 | 1/8 | 1-1/2 | 973800-C6 | 36.30 |
| .100 | | .1000 | **.300** (3x) | 3 | 1/8 | 1-1/2 | 967100-C6 | 35.50 |
| .100 | | .1000 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 990800-C6 | 46.20 |
| .109 (7/64) | | .1090 | **.164** (1.5x) | 3 | 1/8 | 1-1/2 | 973802-C6 | 36.30 |
| .109 (7/64) | | .1090 | **.164** (1.5x) | 4 | 1/8 | 1-1/2 | 790802-C6 | 38.90 |
| .109 (7/64) | | .1090 | **.327** (3x) | 3 | 1/8 | 1-1/2 | 967102-C6 | 35.50 |
| .109 (7/64) | | .1090 | **.327** (3x) | 4 | 1/8 | 1-1/2 | 875502-C6 | 37.70 |
| .109 (7/64) | | .1090 | **.570** (5x) | 3 | 1/8 | 2-1/2 | 990802-C6 | 46.20 |
| .118 | | .1180 | **.354** (3x) | 3 | 1/8 | 1-1/2 | 967105-C6 | 37.80 |
| | 3.0 mm | .1181 | **2.40 mm** (0.8x) | 3 | 4 mm | 50 mm | 848057-C6 | 41.90 |
| | 3.0 mm | .1181 | **4.50 mm** (1.5x) | 3 | 4 mm | 50 mm | 954557-C6 | 42.20 |
| | 3.0 mm | .1181 | **9.00 mm** (3x) | 3 | 4 mm | 50 mm | 942857-C6 | 41.40 |
| NEW | 3.0 mm | .1181 | **9.00 mm** (3x) | 4 | 4 mm | 50 mm | 821357-C6 | 43.60 |
| | 3.0 mm | .1181 | **15.00 mm** (5x) | 3 | 4 mm | 50 mm | 910557-C6 | 52.10 |

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NEW SIZES!

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Square (cont.)

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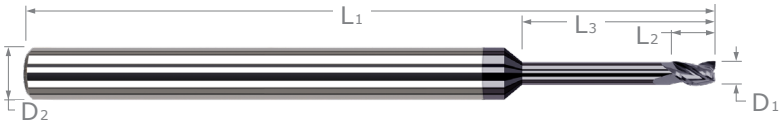


| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equivalent | $L_2$ +.030″ −.000″ +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | |
| .125 (1/8) | | .1250 | **.100** (0.8x) | 4 | 1/8 | 1-1/2 | 888108-C6 | 40.60 | |
| .125 (1/8) | | .1250 | **.187** (1.5x) | 4 | 1/8 | 1-1/2 | 973808-C6 | 32.90 | |
| .125 (1/8) | | .1250 | **.187** (1.5x) | 5 | 1/8 | 1-1/2 | 747108-C6 | 37.40 | |
| .125 (1/8) | | .1250 | **.375** (3x) | 4 | 1/8 | 1-1/2 | 967108-C6 | 32.90 | |
| .125 (1/8) | | .1250 | **.375** (3x) | 5 | 1/8 | 1-1/2 | 747308-C6 | 37.40 | |
| .125 (1/8) | | .1250 | **.500** (4x) | 4 | 1/8 | 2-1/2 | 886308-C6 | 43.70 | |
| .125 (1/8) | | .1250 | **.625** (5x) | 4 | 1/8 | 2-1/2 | 990808-C6 | 46.20 | |
| .140 (9/64) | | .1406 | **.112** (0.8x) | 4 | 3/16 | 2 | 888109-C6 | 37.20 | |
| .140 (9/64) | | .1406 | **.220** (1.5x) | 4 | 3/16 | 2 | 973809-C6 | 38.60 | |
| .140 (9/64) | | .1406 | **.220** (1.5x) | 5 | 3/16 | 2 | 747109-C6 | 41.90 | |
| .140 (9/64) | | .1406 | **.425** (3x) | 4 | 3/16 | 2 | 967109-C6 | 38.60 | |
| .140 (9/64) | | .1406 | **.562** (4x) | 4 | 3/16 | 3 | 886309-C6 | 46.50 | |
| .140 (9/64) | | .1406 | **.750** (5x) | 4 | 3/16 | 3 | 990809-C6 | 48.90 | |
| .156 (5/32) | | .1562 | **.125** (0.8x) | 4 | 3/16 | 2 | 888110-C6 | 37.90 | |
| .156 (5/32) | | .1562 | **.235** (1.5x) | 4 | 3/16 | 2 | 973810-C6 | 38.60 | |
| .156 (5/32) | | .1562 | **.470** (3x) | 4 | 3/16 | 2 | 967110-C6 | 38.60 | |
| .156 (5/32) | | .1562 | **.470** (3x) | 5 | 3/16 | 2 | 747310-C6 | 42.90 | NEW |
| .156 (5/32) | | .1562 | **.625** (4x) | 4 | 3/16 | 3 | 886310-C6 | 40.80 | |
| .156 (5/32) | | .1562 | **.750** (5x) | 4 | 3/16 | 3 | 990810-C6 | 48.90 | |
| | 4.0 mm | .1574 | **12.00 mm** (3x) | 4 | 6 mm | 63 mm | 942861-C6 | 52.30 | |
| .172 (11/64) | | .1718 | **.505** (3x) | 4 | 3/16 | 2 | 967111-C6 | 42.50 | |
| .187 (3/16) | | .1875 | **.150** (0.8x) | 4 | 3/16 | 2 | 888112-C6 | 43.80 | |
| .187 (3/16) | | .1875 | **.285** (1.5x) | 4 | 3/16 | 2 | 973812-C6 | 35.80 | |
| .187 (3/16) | | .1875 | **.285** (1.5x) | 5 | 3/16 | 2 | 747112-C6 | 40.40 | |
| .187 (3/16) | | .1875 | **.562** (3x) | 4 | 3/16 | 2 | 967112-C6 | 36.10 | |
| .187 (3/16) | | .1875 | **.562** (3x) | 5 | 3/16 | 2 | 747312-C6 | 40.40 | |
| .187 (3/16) | | .1875 | **.750** (4x) | 4 | 3/16 | 3 | 886312-C6 | 46.80 | |
| .187 (3/16) | | .1875 | **1.000** (5x) | 4 | 3/16 | 3 | 990812-C6 | 48.90 | |
| | 5.0 mm | .1968 | **15.00 mm** (3x) | 4 | 6 mm | 63 mm | 821364-C6 | 52.70 | |
| .218 (7/32) | | .2187 | **.330** (1.5x) | 4 | 1/4 | 2-1/2 | 973814-C6 | 50.60 | |
| .218 (7/32) | | .2187 | **.660** (3x) | 4 | 1/4 | 2-1/2 | 967114-C6 | 50.60 | |
| | 6.0 mm | .2362 | **18.00 mm** (3x) | 4 | 6 mm | 63 mm | 942866-C6 | 52.30 | |
| .250 (1/4) | | .2500 | **.200** (0.8x) | 4 | 1/4 | 2-1/2 | 888116-C6 | 54.20 | |
| .250 (1/4) | | .2500 | **.375** (1.5x) | 4 | 1/4 | 2-1/2 | 973816-C6 | 44.80 | |
| .250 (1/4) | | .2500 | **.375** (1.5x) | 5 | 1/4 | 2-1/2 | 747116-C6 | 50.10 | |
| .250 (1/4) | | .2500 | **.750** (3x) | 4 | 1/4 | 2-1/2 | 967116-C6 | 45.30 | |
| .250 (1/4) | | .2500 | **.750** (3x) | 5 | 1/4 | 2-1/2 | 747316-C6 | 50.10 | |
| .250 (1/4) | | .2500 | **1.000** (4x) | 4 | 1/4 | 4 | 886316-C6 | 56.50 | |
| .250 (1/4) | | .2500 | **1.250** (5x) | 4 | 1/4 | 4 | 990816-C6 | 58.60 | |
| .312 (5/16) | | .3125 | **1.000** (3x) | 4 | 5/16 | 2-1/2 | 967120-C6 | 63.10 | |
| .375 (3/8) | | .3750 | **.570** (1.5x) | 4 | 3/8 | 2-1/2 | 973824-C6 | 72.50 | |
| .375 (3/8) | | .3750 | **1.125** (3x) | 4 | 3/8 | 2-1/2 | 967124-C6 | 73.20 | |
| | 10.0 mm | .3937 | **30.0 mm** (3x) | 4 | 10 mm | 75 mm | 942873-C6 | 84.00 | |
| .500 (1/2) | | .5000 | **.750** (1.5x) | 4 | 1/2 | 3 | 973832-C6 | 94.60 | |
| .500 (1/2) | | .5000 | **1.500** (3x) | 4 | 1/2 | 3 | 967132-C6 | 94.60 | |

**Please see Speeds & Feeds on page 167**

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Square – Long Reach, Stub Flute




- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities • Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA



| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .010 | | .0100 | .015 | **.050** (5x) | 3 | 1/8 | 2-1/2 | 985310-C6 | 82.20 |
| .010 | | .0100 | .015 | **.080** (8x) | 3 | 1/8 | 2-1/2 | 978210-C6 | 83.10 |
| .015 (1/64) | | .0150 | .023 | **.078** (5x) | 3 | 1/8 | 2-1/2 | 985315-C6 | 70.40 |
| .015 (1/64) | | .0150 | .023 | **.125** (8x) | 3 | 1/8 | 2-1/2 | 978215-C6 | 71.60 |
| .020 | | .0200 | .030 | **.060** (3x) | 3 | 1/8 | 1-1/2 | 940520-C6 | 65.90 |
| .020 | | .0200 | .030 | **.100** (5x) | 3 | 1/8 | 2-1/2 | 985320-C6 | 67.20 |
| .020 | | .0200 | .030 | **.100** (5x) | 4 | 1/8 | 2-1/2 | 791320-C6 | 69.80 |
| .020 | | .0200 | .030 | **.120** (6x) | 3 | 1/8 | 2-1/2 | 895520-C6 | 67.20 |
| .020 | | .0200 | .030 | **.140** (7x) | 3 | 1/8 | 2-1/2 | 880720-C6 | 69.30 |
| .020 | | .0200 | .030 | **.160** (8x) | 3 | 1/8 | 2-1/2 | 978220-C6 | 68.60 |
| .020 | | .0200 | .030 | **.200** (10x) | 3 | 1/8 | 2-1/2 | 935720-C6 | 75.50 |
| .025 | | .0250 | .038 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 985325-C6 | 67.20 |
| .025 | | .0250 | .038 | **.203** (8x) | 3 | 1/8 | 2-1/2 | 978225-C6 | 68.60 |
| .030 | | .0300 | .045 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 985330-C6 | 67.20 |
| .030 | | .0300 | .045 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 978230-C6 | 68.60 |
| .031 (1/32) | | .0310 | .047 | **.093** (3x) | 3 | 1/8 | 1-1/2 | 940531-C6 | 61.00 |
| .031 (1/32) | | .0310 | .047 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 985331-C6 | 62.30 |
| .031 (1/32) | | .0310 | .047 | **.156** (5x) | 4 | 1/8 | 2-1/2 | 791331-C6 | 64.80 |
| .031 (1/32) | | .0310 | .047 | **.187** (6x) | 3 | 1/8 | 2-1/2 | 895531-C6 | 62.30 |
| .031 (1/32) | | .0310 | .047 | **.218** (7x) | 3 | 1/8 | 2-1/2 | 880731-C6 | 63.80 |
| .031 (1/32) | | .0310 | .047 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 978231-C6 | 63.80 |
| .031 (1/32) | | .0310 | .047 | **.250** (8x) | 4 | 1/8 | 2-1/2 | 812331-C6 | 66.20 |
| .031 (1/32) | | .0310 | .047 | **.312** (10x) | 3 | 1/8 | 2-1/2 | 935731-C6 | 70.30 |
| .031 (1/32) | | .0310 | .047 | **.375** (12x) | 3 | 1/8 | 2-1/2 | 901331-C6 | 72.50 |
| .031 (1/32) | | .0310 | .047 | **.470** (15x) | 3 | 1/8 | 2-1/2 | 851531-C6 | 73.90 |
| .035 | | .0350 | .053 | **.187** (5x) | 3 | 1/8 | 2-1/2 | 985335-C6 | 61.00 |
| | 1.0 mm | .0393 | 1.50 mm | **5.0 mm** (5x) | 3 | 4 mm | 50 mm | 905022-C6 | 69.90 |
| | 1.0 mm | .0393 | 1.50 mm | **8.0 mm** (8x) | 3 | 4 mm | 50 mm | 911422-C6 | 70.20 |
| .040 | | .0400 | .060 | **.203** (5x) | 3 | 1/8 | 2-1/2 | 985340-C6 | 61.00 |
| .040 | | .0400 | .060 | **.203** (5x) | 4 | 1/8 | 2-1/2 | 791340-C6 | 63.50 |
| .040 | | .0400 | .060 | **.240** (6x) | 3 | 1/8 | 2-1/2 | 895540-C6 | 61.70 |
| .040 | | .0400 | .060 | **.325** (8x) | 3 | 1/8 | 2-1/2 | 978240-C6 | 62.30 |
| .045 | | .0450 | .068 | **.225** (5x) | 3 | 1/8 | 2-1/2 | 985345-C6 | 61.00 |

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# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Square – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .047 (3/64) | | .0470 | .071 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 985347-C6 | 61.00 |
| .047 (3/64) | | .0470 | .071 | **.250** (5x) | 4 | 1/8 | 2-1/2 | 791347-C6 | 64.00 |
| .047 (3/64) | | .0470 | .071 | **.281** (6x) | 3 | 1/8 | 2-1/2 | 895547-C6 | 61.70 |
| .047 (3/64) | | .0470 | .071 | **.328** (7x) | 3 | 1/8 | 2-1/2 | 880747-C6 | 62.80 |
| .047 (3/64) | | .0470 | .071 | **.375** (8x) | 3 | 1/8 | 2-1/2 | 978247-C6 | 62.30 |
| .047 (3/64) | | .0470 | .071 | **.375** (8x) | 4 | 1/8 | 2-1/2 | 812347-C6 | 64.70 |
| .047 (3/64) | | .0470 | .071 | **.480** (10x) | 3 | 1/8 | 2-1/2 | 935747-C6 | 68.40 |
| .050 | | .0500 | .075 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 985350-C6 | 61.00 |
| .055 | | .0550 | .083 | **.275** (5x) | 3 | 1/8 | 2-1/2 | 985355-C6 | 61.00 |
| .060 | | .0600 | .090 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 985360-C6 | 61.00 |
| .060 | | .0600 | .090 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 978260-C6 | 62.30 |
| .062 (1/16) | | .0620 | .093 | **.186** (3x) | 3 | 1/8 | 1-1/2 | 940562-C6 | 61.00 |
| .062 (1/16) | | .0620 | .093 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 985362-C6 | 62.30 |
| .062 (1/16) | | .0620 | .093 | **.312** (5x) | 4 | 1/8 | 2-1/2 | 791362-C6 | 64.70 |
| .062 (1/16) | | .0620 | .093 | **.375** (6x) | 3 | 1/8 | 2-1/2 | 895562-C6 | 62.30 |
| .062 (1/16) | | .0620 | .093 | **.375** (6x) | 4 | 1/8 | 2-1/2 | 720962-C6 | 65.40 |
| .062 (1/16) | | .0620 | .093 | **.437** (7x) | 3 | 1/8 | 2-1/2 | 880762-C6 | 63.80 |
| .062 (1/16) | | .0620 | .093 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 978262-C6 | 63.80 |
| .062 (1/16) | | .0620 | .093 | **.500** (8x) | 4 | 1/8 | 2-1/2 | 812362-C6 | 66.20 |
| .062 (1/16) | | .0620 | .093 | **.625** (10x) | 3 | 1/8 | 2-1/2 | 935762-C6 | 70.30 |
| .062 (1/16) | | .0620 | .093 | **.750** (12x) | 3 | 1/8 | 2-1/2 | 901362-C6 | 72.50 |
| .062 (1/16) | | .0620 | .093 | **.950** (15x) | 3 | 1/8 | 2-1/2 | 851562-C6 | 73.90 |
| .070 | | .0700 | .105 | **.375** (5x) | 3 | 1/8 | 2-1/2 | 985370-C6 | 66.40 |
| .078 (5/64) | | .0780 | .118 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 985378-C6 | 61.00 |
| .078 (5/64) | | .0780 | .118 | **.625** (8x) | 3 | 1/8 | 2-1/2 | 978278-C6 | 62.30 |
| .078 (5/64) | | .0780 | .118 | **.625** (8x) | 4 | 1/8 | 2-1/2 | 812378-C6 | 64.70 |
| .078 (5/64) | | .0780 | .118 | **.800** (10x) | 3 | 1/8 | 2-1/2 | 935778-C6 | 68.40 |
| | 2.0 mm | .0787 | 3.00 mm | **10.0 mm** (5x) | 3 | 4 mm | 50 mm | 905045-C6 | 70.70 |
| | 2.0 mm | .0787 | 3.00 mm | **16.0 mm** (8x) | 3 | 4 mm | 50 mm | 911445-C6 | 71.40 |
| | 2.0 mm | .0787 | 3.00 mm | **20.0 mm** (10x) | 3 | 4 mm | 50 mm | 935745-C6 | 75.20 |
| .080 | | .0800 | .120 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 985380-C6 | 67.00 |
| .090 | | .0900 | .135 | **.450** (5x) | 3 | 1/8 | 2-1/2 | 985390-C6 | 66.40 |
| .093 (3/32) | | .0930 | .140 | **.279** (3x) | 3 | 1/8 | 1-1/2 | 940593-C6 | 61.00 |
| .093 (3/32) | | .0930 | .140 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 985393-C6 | 62.30 |
| .093 (3/32) | | .0930 | .140 | **.500** (5x) | 4 | 1/8 | 2-1/2 | 791393-C6 | 65.50 |
| .093 (3/32) | | .0930 | .140 | **.585** (6x) | 3 | 1/8 | 2-1/2 | 895593-C6 | 62.30 |
| .093 (3/32) | | .0930 | .140 | **.670** (7x) | 3 | 1/8 | 2-1/2 | 880793-C6 | 63.80 |
| .093 (3/32) | | .0930 | .140 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 978293-C6 | 63.80 |
| .093 (3/32) | | .0930 | .140 | **.750** (8x) | 4 | 1/8 | 2-1/2 | 812393-C6 | 66.20 |
| .093 (3/32) | | .0930 | .140 | **.950** (10x) | 3 | 1/8 | 2-1/2 | 935793-C6 | 70.30 |
| .093 (3/32) | | .0930 | .140 | **1.125** (12x) | 3 | 1/8 | 2-1/2 | 901393-C6 | 72.50 |
| .093 (3/32) | | .0930 | .140 | **1.400** (15x) | 3 | 1/8 | 3 | 851593-C6 | 73.90 |
| .100 | | .1000 | .150 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 985400-C6 | 61.00 |
| .100 | | .1000 | .150 | **.800** (8x) | 3 | 1/8 | 2-1/2 | 978300-C6 | 62.80 |
| .109 (7/64) | | .1090 | .164 | **.570** (5x) | 3 | 1/8 | 2-1/2 | 985402-C6 | 61.00 |
| .109 (7/64) | | .1090 | .164 | **.900** (8x) | 3 | 1/8 | 2-1/2 | 978302-C6 | 62.30 |

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# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Square – Long Reach, Stub Flute (cont.)

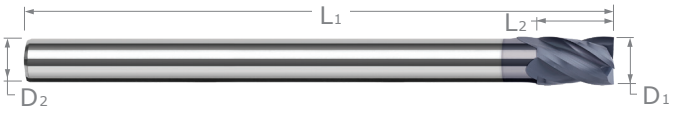
continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equivalent | $L_2$ +.030″ −.000″ +.75mm −.00mm | $L_3$ +.030″ −.000″ +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | 3.0 mm | .1181 | 4.50 mm | **15.0 mm** (5x) | 3 | 4 mm | 50 mm | 905057-C6 | 63.60 |
| | 3.0 mm | .1181 | 4.50 mm | **24.0 mm** (8x) | 3 | 4 mm | 50 mm | 911457-C6 | 63.80 |
| .125 (1/8) | | .1250 | .187 | **.375** (3x) | 4 | 1/8 | 1-1/2 | 940608-C6 | 61.00 |
| .125 (1/8) | | .1250 | .187 | **.625** (5x) | 4 | 1/8 | 2-1/2 | 985408-C6 | 62.30 |
| .125 (1/8) | | .1250 | .187 | **.750** (6x) | 4 | 1/8 | 2-1/2 | 895608-C6 | 62.30 |
| .125 (1/8) | | .1250 | .187 | **.875** (7x) | 4 | 1/8 | 2-1/2 | 880808-C6 | 63.80 |
| .125 (1/8) | | .1250 | .187 | **1.000** (8x) | 4 | 1/8 | 2-1/2 | 978308-C6 | 63.80 |
| .125 (1/8) | | .1250 | .187 | **1.250** (10x) | 4 | 1/8 | 2-1/2 | 935808-C6 | 70.30 |
| .125 (1/8) | | .1250 | .187 | **1.500** (12x) | 4 | 1/8 | 3 | 901408-C6 | 74.80 |
| .140 (9/64) | | .1406 | .220 | **.750** (5x) | 4 | 3/16 | 3 | 985409-C6 | 71.60 |
| .140 (9/64) | | .1406 | .220 | **1.125** (8x) | 4 | 3/16 | 3 | 978309-C6 | 74.10 |
| .156 (5/32) | | .1562 | .235 | **.750** (5x) | 4 | 3/16 | 3 | 985410-C6 | 67.20 |
| .156 (5/32) | | .1562 | .235 | **1.250** (8x) | 4 | 3/16 | 3 | 978310-C6 | 68.60 |
| .156 (5/32) | | .1562 | .235 | **1.570** (10x) | 4 | 3/16 | 3 | 935810-C6 | 74.80 |
| .187 (3/16) | | .1875 | .285 | **1.000** (5x) | 4 | 3/16 | 3 | 985412-C6 | 67.20 |
| .187 (3/16) | | .1875 | .285 | **1.500** (8x) | 4 | 3/16 | 3 | 978312-C6 | 68.60 |
| .187 (3/16) | | .1875 | .285 | **1.875** (10x) | 4 | 3/16 | 4 | 935812-C6 | 74.80 |
| | 6.0 mm | .2362 | 9.00mm | **30.0mm** (5x) | 4 | 6 mm | 63 mm | 905066-C6 | 80.90 |
| .250 (1/4) | | .2500 | .375 | **1.250** (5x) | 4 | 1/4 | 4 | 985416-C6 | 75.20 |
| .250 (1/4) | | .2500 | .375 | **2.000** (8x) | 4 | 1/4 | 4 | 978316-C6 | 76.70 |
| .375 (3/8) | | .3750 | .570 | **2.000** (5x) | 4 | 3/8 | 4 | 985424-C6 | 85.50 |

**Please see Speeds & Feeds on page 159**

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Square – Reduced Shank




- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Reduced straight shank allows any chucking depth
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA



| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ |
| .125 (1/8) | **.187** (1.5x) | 4 | 3 mm | 2-1/2 | 740108-C6 | 126.10 |
| .156 (5/32) | **.235** (1.5x) | 4 | 1/8 | 2-1/2 | 740110-C6 | 126.10 |
| .187 (3/16) | **.285** (1.5x) | 4 | 5/32 | 2-1/2 | 740112-C6 | 129.00 |
| .250 (1/4) | **.375** (1.5x) | 4 | 3/16 | 3 | 740116-C6 | 140.10 |
| .312 (5/16) | **.470** (1.5x) | 4 | 1/4 | 4 | 740120-C6 | 168.70 |
| .375 (3/8) | **.570** (1.5x) | 4 | 5/16 | 4 | 740124-C6 | 189.20 |
| .500 (1/2) | **.750** (1.5x) | 4 | 7/16 | 6 | 740132-C6 | 204.70 |

In The Loupe TV

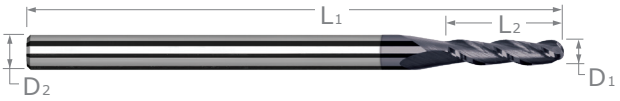
**Check Out Our New CNC Show!**

Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

youtube.com/intheloupetv

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Ball




- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | +.00mm −.02mm | decimal equivalent | $L_2$ +.010" −.000" +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | .2 mm | .0078 | **.60 mm** (3x) | 3 | 4 mm | 50 mm | 975304-C6 | 81.20 |
| .010 | | .0100 | **.015** (1.5x) | 3 | 1/8 | 1-1/2 | 944210-C6 | 75.20 |
| .010 | | .0100 | **.030** (3x) | 3 | 1/8 | 1-1/2 | 970510-C6 | 75.20 |
| .010 | | .0100 | **.050** (5x) | 3 | 1/8 | 2-1/2 | 930610-C6 | 86.90 |
| .015 (1/64) | | .0150 | **.023** (1.5x) | 3 | 1/8 | 1-1/2 | 944215-C6 | 63.80 |
| .015 (1/64) | | .0150 | **.045** (3x) | 3 | 1/8 | 1-1/2 | 970515-C6 | 63.80 |
| .015 (1/64) | | .0150 | **.078** (5x) | 3 | 1/8 | 2-1/2 | 930615-C6 | 76.00 |
| | .4 mm | .0157 | **1.20 mm** (3x) | 3 | 4 mm | 50 mm | 975309-C6 | 67.00 |
| | .5 mm | .0196 | **.750 mm** (1.5x) | 3 | 4 mm | 50 mm | 968011-C6 | 60.20 |
| | .5 mm | .0196 | **1.50 mm** (3x) | 3 | 4 mm | 50 mm | 975311-C6 | 60.20 |
| .020 | | .0200 | **.016** (0.8x) | 3 | 1/8 | 1-1/2 | 848120-C6 | 58.40 |
| .020 | | .0200 | **.030** (1.5x) | 3 | 1/8 | 1-1/2 | 944220-C6 | 57.00 |
| .020 | | .0200 | **.060** (3x) | 3 | 1/8 | 1-1/2 | 970520-C6 | 57.00 |
| .020 | | .0200 | **.060** (3x) | 4 | 1/8 | 1-1/2 | 893020-C6 | 59.80 |
| .020 | | .0200 | **.080** (4x) | 3 | 1/8 | 2-1/2 | 811220-C6 | 62.60 |
| .020 | | .0200 | **.100** (5x) | 3 | 1/8 | 2-1/2 | 930620-C6 | 62.60 |
| | .6 mm | .0236 | **1.80 mm** (3x) | 3 | 4 mm | 50 mm | 975313-C6 | 58.40 |
| .025 | | .0250 | **.038** (1.5x) | 3 | 1/8 | 1-1/2 | 944225-C6 | 55.10 |
| .025 | | .0250 | **.075** (3x) | 3 | 1/8 | 1-1/2 | 970525-C6 | 55.10 |
| .025 | | .0250 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 930625-C6 | 61.00 |
| .030 | | .0300 | **.045** (1.5x) | 3 | 1/8 | 1-1/2 | 944230-C6 | 48.80 |
| .030 | | .0300 | **.090** (3x) | 3 | 1/8 | 1-1/2 | 970530-C6 | 48.80 |
| .030 | | .0300 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 930630-C6 | 55.00 |
| .031 (1/32) | | .0310 | **.025** (0.8x) | 3 | 1/8 | 1-1/2 | 848131-C6 | 50.10 |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 3 | 1/8 | 1-1/2 | 944231-C6 | 48.60 |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 4 | 1/8 | 1-1/2 | 814531-C6 | 51.30 |
| .031 (1/32) | | .0310 | **.093** (3x) | 3 | 1/8 | 1-1/2 | 970531-C6 | 48.60 |
| .031 (1/32) | | .0310 | **.093** (3x) | 4 | 1/8 | 1-1/2 | 893031-C6 | 51.30 |
| .031 (1/32) | | .0310 | **.125** (4x) | 3 | 1/8 | 2-1/2 | 811231-C6 | 58.60 |
| .031 (1/32) | | .0310 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 930631-C6 | 58.60 |
| .031 (1/32) | | .0310 | **.156** (5x) | 4 | 1/8 | 2-1/2 | 778831-C6 | 61.40 |
| | .8 mm | .0314 | **1.20 mm** (1.5x) | 3 | 4 mm | 50 mm | 968018-C6 | 51.80 |
| | .8 mm | .0314 | **2.40 mm** (3x) | 3 | 4 mm | 50 mm | 975318-C6 | 51.30 |
| .035 | | .0350 | **.105** (3x) | 3 | 1/8 | 1-1/2 | 970535-C6 | 48.80 |

continued on next page

NEW SIZES!

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Ball (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | |
| | 1.0 mm | .0393 | **.80 mm** (0.8x) | 3 | 4 mm | 50 mm | 872422-C6 | 52.00 | |
| | 1.0 mm | .0393 | **1.50 mm** (1.5x) | 3 | 4 mm | 50 mm | 968022-C6 | 51.30 | |
| | 1.0 mm | .0393 | **1.50 mm** (1.5x) | 4 | 4 mm | 50 mm | 726622-C6 | 54.70 | |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 3 | 4 mm | 50 mm | 975322-C6 | 51.30 | |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 4 | 4 mm | 50 mm | 793822-C6 | 54.70 | |
| | 1.0 mm | .0393 | **4.00 mm** (4x) | 3 | 4 mm | 50 mm | 790122-C6 | 62.10 | |
| | 1.0 mm | .0393 | **5.00 mm** (5x) | 3 | 4 mm | 50 mm | 911322-C6 | 61.60 | |
| .040 | | .0400 | **.032** (0.8x) | 3 | 1/8 | 1-1/2 | 848140-C6 | 48.90 | |
| .040 | | .0400 | **.060** (1.5x) | 3 | 1/8 | 1-1/2 | 944240-C6 | 48.60 | |
| .040 | | .0400 | **.060** (1.5x) | 4 | 1/8 | 1-1/2 | 814540-C6 | 51.70 | |
| .040 | | .0400 | **.120** (3x) | 3 | 1/8 | 1-1/2 | 970540-C6 | 48.60 | |
| .040 | | .0400 | **.120** (3x) | 4 | 1/8 | 1-1/2 | 893040-C6 | 51.30 | |
| .040 | | .0400 | **.160** (4x) | 3 | 1/8 | 2-1/2 | 811240-C6 | 59.50 | |
| .040 | | .0400 | **.203** (5x) | 3 | 1/8 | 2-1/2 | 930640-C6 | 59.00 | |
| .045 | | .0450 | **.135** (3x) | 3 | 1/8 | 1-1/2 | 970545-C6 | 49.20 | |
| .047 (3/64) | | .0470 | **.038** (0.8x) | 3 | 1/8 | 1-1/2 | 848147-C6 | 48.90 | |
| .047 (3/64) | | .0470 | **.071** (1.5x) | 3 | 1/8 | 1-1/2 | 944247-C6 | 48.60 | |
| .047 (3/64) | | .0470 | **.141** (3x) | 3 | 1/8 | 1-1/2 | 970547-C6 | 48.60 | |
| .047 (3/64) | | .0470 | **.141** (3x) | 4 | 1/8 | 1-1/2 | 893047-C6 | 51.30 | |
| .047 (3/64) | | .0470 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 930647-C6 | 59.00 | |
| | 1.2 mm | .0472 | **1.80 mm** (1.5x) | 3 | 4 mm | 50 mm | 968027-C6 | 51.80 | |
| | 1.2 mm | .0472 | **3.50 mm** (3x) | 3 | 4 mm | 50 mm | 975327-C6 | 51.80 | |
| .050 | | .0500 | **.040** (0.8x) | 3 | 1/8 | 1-1/2 | 848150-C6 | 48.90 | NEW |
| .050 | | .0500 | **.075** (1.5x) | 3 | 1/8 | 1-1/2 | 944250-C6 | 48.60 | |
| .050 | | .0500 | **.150** (3x) | 3 | 1/8 | 1-1/2 | 970550-C6 | 48.60 | |
| .050 | | .0500 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 930650-C6 | 59.00 | |
| .055 | | .0550 | **.165** (3x) | 3 | 1/8 | 1-1/2 | 970555-C6 | 48.80 | |
| | 1.4 mm | .0551 | **2.10 mm** (1.5x) | 3 | 4 mm | 50 mm | 968031-C6 | 51.80 | |
| | 1.4 mm | .0551 | **4.00 mm** (3x) | 3 | 4 mm | 50 mm | 975331-C6 | 51.30 | |
| | 1.4 mm | .0551 | **7.00 mm** (5x) | 3 | 4 mm | 50 mm | 911331-C6 | 61.60 | NEW |
| | 1.5 mm | .0590 | **2.20 mm** (1.5x) | 3 | 4 mm | 50 mm | 968033-C6 | 51.80 | |
| | 1.5 mm | .0590 | **4.50 mm** (3x) | 3 | 4 mm | 50 mm | 975333-C6 | 51.30 | |
| | 1.5 mm | .0590 | **7.50 mm** (5x) | 3 | 4 mm | 50 mm | 911333-C6 | 61.60 | |
| .060 | | .0600 | **.048** (0.8x) | 3 | 1/8 | 1-1/2 | 848160-C6 | 48.90 | |
| .060 | | .0600 | **.090** (1.5x) | 3 | 1/8 | 1-1/2 | 944260-C6 | 48.60 | |
| .060 | | .0600 | **.090** (1.5x) | 4 | 1/8 | 1-1/2 | 814560-C6 | 51.30 | |
| .060 | | .0600 | **.180** (3x) | 3 | 1/8 | 1-1/2 | 970560-C6 | 48.60 | |
| .060 | | .0600 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 930660-C6 | 59.00 | |
| .062 (1/16) | | .0620 | **.050** (0.8x) | 3 | 1/8 | 1-1/2 | 848162-C6 | 47.20 | |
| .062 (1/16) | | .0620 | **.050** (0.8x) | 4 | 1/8 | 1-1/2 | 787162-C6 | 50.10 | |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 3 | 1/8 | 1-1/2 | 944262-C6 | 45.60 | |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 4 | 1/8 | 1-1/2 | 814562-C6 | 48.60 | |
| .062 (1/16) | | .0620 | **.186** (3x) | 3 | 1/8 | 1-1/2 | 970562-C6 | 45.60 | |
| .062 (1/16) | | .0620 | **.186** (3x) | 4 | 1/8 | 1-1/2 | 893062-C6 | 48.60 | |
| .062 (1/16) | | .0620 | **.250** (4x) | 3 | 1/8 | 2-1/2 | 811262-C6 | 56.30 | |
| .062 (1/16) | | .0620 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 930662-C6 | 56.30 | |
| .062 (1/16) | | .0620 | **.312** (5x) | 4 | 1/8 | 2-1/2 | 778862-C6 | 59.10 | |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Ball (cont.)

continued from previous page

| | CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ | | | $L_2$ $^{+.010''}_{-.000''}$ $^{+.25mm}_{-.00mm}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | | | | | | |
| | | 1.6 mm | .0629 | **2.40 mm** (1.5x) | 3 | 4 mm | 50 mm | 968036-C6 | 48.30 |
| | | 1.6 mm | .0629 | **5.00 mm** (3x) | 3 | 4 mm | 50 mm | 975336-C6 | 48.70 |
| | .070 | | .0700 | **.105** (1.5x) | 3 | 1/8 | 1-1/2 | 944270-C6 | 46.40 |
| | .070 | | .0700 | **.210** (3x) | 3 | 1/8 | 1-1/2 | 970570-C6 | 46.40 |
| | .070 | | .0700 | **.210** (3x) | 4 | 1/8 | 1-1/2 | 893070-C6 | 49.50 |
| | .070 | | .0700 | **.375** (5x) | 3 | 1/8 | 2-1/2 | 930670-C6 | 55.50 |
| | | 1.8 mm | .0708 | **2.70 mm** (1.5x) | 3 | 4 mm | 50 mm | 968040-C6 | 48.70 |
| | | 1.8 mm | .0708 | **5.50 mm** (3x) | 3 | 4 mm | 50 mm | 975340-C6 | 48.30 |
| | .078 (5/64) | | .0780 | **.062** (0.8x) | 3 | 1/8 | 1-1/2 | 848178-C6 | 47.20 |
| | .078 (5/64) | | .0780 | **.118** (1.5x) | 3 | 1/8 | 1-1/2 | 944278-C6 | 45.60 |
| | .078 (5/64) | | .0780 | **.118** (1.5x) | 4 | 1/8 | 1-1/2 | 814578-C6 | 48.60 |
| | .078 (5/64) | | .0780 | **.234** (3x) | 3 | 1/8 | 1-1/2 | 970578-C6 | 45.60 |
| | .078 (5/64) | | .0780 | **.234** (3x) | 4 | 1/8 | 1-1/2 | 893078-C6 | 48.60 |
| | .078 (5/64) | | .0780 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 930678-C6 | 55.60 |
| | | 2.0 mm | .0787 | **3.00 mm** (1.5x) | 3 | 4 mm | 50 mm | 968045-C6 | 48.70 |
| | | 2.0 mm | .0787 | **6.00 mm** (3x) | 3 | 4 mm | 50 mm | 975345-C6 | 48.30 |
| | | 2.0 mm | .0787 | **10.00 mm** (5x) | 3 | 4 mm | 50 mm | 911345-C6 | 58.40 |
| | .080 | | .0800 | **.120** (1.5x) | 3 | 1/8 | 1-1/2 | 944280-C6 | 46.70 |
| | .080 | | .0800 | **.240** (3x) | 3 | 1/8 | 1-1/2 | 970580-C6 | 46.40 |
| | .090 | | .0900 | **.135** (1.5x) | 3 | 1/8 | 1-1/2 | 944290-C6 | 46.70 |
| | .090 | | .0900 | **.270** (3x) | 3 | 1/8 | 1-1/2 | 970590-C6 | 46.70 |
| | .093 (3/32) | | .0930 | **.074** (0.8x) | 3 | 1/8 | 1-1/2 | 848193-C6 | 47.20 |
| | .093 (3/32) | | .0930 | **.140** (1.5x) | 3 | 1/8 | 1-1/2 | 944293-C6 | 45.60 |
| | .093 (3/32) | | .0930 | **.140** (1.5x) | 4 | 1/8 | 1-1/2 | 814593-C6 | 48.60 |
| | .093 (3/32) | | .0930 | **.279** (3x) | 3 | 1/8 | 1-1/2 | 970593-C6 | 45.60 |
| | .093 (3/32) | | .0930 | **.279** (3x) | 4 | 1/8 | 1-1/2 | 893093-C6 | 48.60 |
| | .093 (3/32) | | .0930 | **.375** (4x) | 3 | 1/8 | 2-1/2 | 811293-C6 | 56.30 |
| NEW | .093 (3/32) | | .0930 | **.375** (4x) | 4 | 1/8 | 2-1/2 | 696396-C6 | 59.30 |
| | .093 (3/32) | | .0930 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 930693-C6 | 56.30 |
| | | 2.5 mm | .0984 | **3.70 mm** (1.5x) | 3 | 4 mm | 50 mm | 968051-C6 | 51.30 |
| | | 2.5 mm | .0984 | **7.50 mm** (3x) | 3 | 4 mm | 50 mm | 975351-C6 | 50.80 |
| | .100 | | .1000 | **.150** (1.5x) | 3 | 1/8 | 1-1/2 | 944300-C6 | 46.00 |
| | .100 | | .1000 | **.300** (3x) | 3 | 1/8 | 1-1/2 | 970600-C6 | 46.00 |
| | .100 | | .1000 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 930700-C6 | 56.90 |
| | .109 (7/64) | | .1090 | **.164** (1.5x) | 3 | 1/8 | 1-1/2 | 944302-C6 | 48.80 |
| | .109 (7/64) | | .1090 | **.327** (3x) | 3 | 1/8 | 1-1/2 | 970602-C6 | 48.80 |
| | | 3.0 mm | .1181 | **4.50 mm** (1.5x) | 3 | 4 mm | 50 mm | 968057-C6 | 48.70 |
| | | 3.0 mm | .1181 | **9.00 mm** (3x) | 3 | 4 mm | 50 mm | 975357-C6 | 48.30 |
| | | 3.0 mm | .1181 | **9.00 mm** (3x) | 4 | 4 mm | 50 mm | 793857-C6 | 51.50 |
| | | 3.0 mm | .1181 | **15.00 mm** (5x) | 3 | 4 mm | 50 mm | 911357-C6 | 58.40 |

continued on next page

NEW SIZES!

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Ball (cont.)

continued from previous page

| CUTTER DIAMETER $D_1$ +.000″ −.002″ | CUTTER DIAMETER $D_1$ +.00mm −.04mm | CUTTER DIAMETER $D_1$ decimal equivalent | LENGTH OF CUT $L_2$ +.030″ −.000″ / +.75mm −.00mm | FLUTES | SHANK DIAMETER $D_2$ (h6) | OVERALL LENGTH $L_1$ | AlTiN NANO COATED TOOL # | AlTiN NANO COATED USD$ |
|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | | .1250 | **.100** (0.8x) | 4 | 1/8 | 1-1/2 | 848208-C6 | 47.20 |
| .125 (1/8) | | .1250 | **.187** (1.5x) | 4 | 1/8 | 1-1/2 | 944308-C6 | 40.90 |
| .125 (1/8) | | .1250 | **.375** (3x) | 4 | 1/8 | 1-1/2 | 970608-C6 | 40.90 |
| .125 (1/8) | | .1250 | **.500** (4x) | 4 | 1/8 | 2-1/2 | 811308-C6 | 56.30 |
| .125 (1/8) | | .1250 | **.625** (5x) | 4 | 1/8 | 2-1/2 | 930708-C6 | 56.30 |
| .140 (9/64) | | .1406 | **.220** (1.5x) | 4 | 3/16 | 2 | 944309-C6 | 59.00 |
| .140 (9/64) | | .1406 | **.425** (3x) | 4 | 3/16 | 2 | 970609-C6 | 59.00 |
| .140 (9/64) | | .1406 | **.750** (5x) | 4 | 3/16 | 3 | 930709-C6 | 66.50 |
| .156 (5/32) | | .1562 | **.235** (1.5x) | 4 | 3/16 | 2 | 944310-C6 | 48.80 |
| .156 (5/32) | | .1562 | **.470** (3x) | 4 | 3/16 | 2 | 970610-C6 | 49.20 |
| .156 (5/32) | | .1562 | **.750** (5x) | 4 | 3/16 | 3 | 930710-C6 | 59.40 |
| .187 (3/16) | | .1875 | **.150** (0.8x) | 4 | 3/16 | 2 | 848212-C6 | 50.30 |
| .187 (3/16) | | .1875 | **.285** (1.5x) | 4 | 3/16 | 2 | 944312-C6 | 43.50 |
| .187 (3/16) | | .1875 | **.562** (3x) | 4 | 3/16 | 2 | 970612-C6 | 43.90 |
| .187 (3/16) | | .1875 | **.750** (4x) | 4 | 3/16 | 3 | 811312-C6 | 50.10 |
| .187 (3/16) | | .1875 | **1.000** (5x) | 4 | 3/16 | 3 | 930712-C6 | 59.40 |
| | 5.0 mm | .1968 | **15.00 mm** (3x) | 4 | 6 mm | 63 mm | 975364-C6 | 62.00 |
| | 6.0 mm | .2362 | **18.00 mm** (3x) | 4 | 6 mm | 63 mm | 975372-C6 | 64.60 |
| .250 (1/4) | | .2500 | **.200** (0.8x) | 4 | 1/4 | 2-1/2 | 848216-C6 | 60.80 |
| .250 (1/4) | | .2500 | **.375** (1.5x) | 4 | 1/4 | 2-1/2 | 944316-C6 | 52.60 |
| .250 (1/4) | | .2500 | **.750** (3x) | 4 | 1/4 | 2-1/2 | 970616-C6 | 53.10 |
| .250 (1/4) | | .2500 | **1.000** (4x) | 4 | 1/4 | 4 | 811316-C6 | 66.70 |
| .250 (1/4) | | .2500 | **1.250** (5x) | 4 | 1/4 | 4 | 930716-C6 | 70.30 |
| .375 (3/8) | | .3750 | **.570** (1.5x) | 4 | 3/8 | 2-1/2 | 944324-C6 | 87.50 |
| .375 (3/8) | | .3750 | **1.125** (3x) | 4 | 3/8 | 2-1/2 | 970624-C6 | 86.70 |
| .500 (1/2) | | .5000 | **.750** (1.5x) | 4 | 1/2 | 3 | 944332-C6 | 105.50 |
| .500 (1/2) | | .5000 | **1.500** (3x) | 4 | 1/2 | 3 | 970632-C6 | 105.50 |

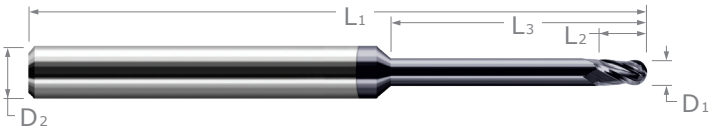
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# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Ball – Long Reach, Stub Flute




- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Suitable for steels up to 45Rc
- h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

**Improves Performance**

Contour Profiling



Tipped Multi-Axis Machining





| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .015 (1/64) | | .0150 | .022 | **.078** (5x) | 4 | 1/8 | 2-1/2 | 63615-C6 | 80.30 |
| .015 (1/64) | | .0150 | .022 | **.125** (8x) | 4 | 1/8 | 2-1/2 | 56115-C6 | 81.90 |
| .015 (1/64) | | .0150 | .022 | **.187** (12x) | 4 | 1/8 | 2-1/2 | 64815-C6 | 87.30 |
| | .4 mm | .0157 | .60 mm | **2.0 mm** (5x) | 4 | 4 mm | 50 mm | 988709-C6 | 87.20 |
| | .4 mm | .0157 | .60 mm | **3.2 mm** (8x) | 4 | 4 mm | 50 mm | 974009-C6 | 89.50 |
| | .4 mm | .0157 | .60 mm | **4.8 mm** (12x) | 4 | 4 mm | 50 mm | 981309-C6 | 95.90 |
| | .5 mm | .0196 | .75 mm | **2.5 mm** (5x) | 4 | 4 mm | 50 mm | 988711-C6 | 85.20 |
| | .5 mm | .0196 | .75 mm | **4.0 mm** (8x) | 4 | 4 mm | 50 mm | 974011-C6 | 85.70 |
| | .5 mm | .0196 | .75 mm | **6.0 mm** (12x) | 4 | 4 mm | 50 mm | 981311-C6 | 92.60 |
| | .5 mm | .0196 | .75 mm | **8.0 mm** (16x) | 4 | 4 mm | 50 mm | 976511-C6 | 96.80 |
| .020 | | .0200 | .030 | **.100** (5x) | 4 | 1/8 | 2-1/2 | 63620-C6 | 76.00 |
| .020 | | .0200 | .030 | **.160** (8x) | 4 | 1/8 | 2-1/2 | 56120-C6 | 77.60 |
| .020 | | .0200 | .030 | **.250** (12x) | 4 | 1/8 | 2-1/2 | 64820-C6 | 84.00 |
| | .6 mm | .0236 | .90 mm | **3.0 mm** (5x) | 4 | 4 mm | 50 mm | 988713-C6 | 82.20 |
| | .6 mm | .0236 | .90 mm | **4.8 mm** (8x) | 4 | 4 mm | 50 mm | 974013-C6 | 84.10 |
| | .6 mm | .0236 | .90 mm | **7.2 mm** (12x) | 4 | 4 mm | 50 mm | 981313-C6 | 90.50 |
| .025 | | .0250 | .037 | **.125** (5x) | 4 | 1/8 | 2-1/2 | 63625-C6 | 74.10 |
| .025 | | .0250 | .037 | **.203** (8x) | 4 | 1/8 | 2-1/2 | 56125-C6 | 75.70 |
| .025 | | .0250 | .037 | **.312** (12x) | 4 | 1/8 | 2-1/2 | 64825-C6 | 82.20 |
| .031 (1/32) | | .0310 | .047 | **.093** (3x) | 4 | 1/8 | 1-1/2 | 929031-C6 | 67.90 |
| .031 (1/32) | | .0310 | .047 | **.156** (5x) | 4 | 1/8 | 2-1/2 | 63631-C6 | 69.50 |
| .031 (1/32) | | .0310 | .047 | **.187** (6x) | 4 | 1/8 | 2-1/2 | 797531-C6 | 70.30 |
| .031 (1/32) | | .0310 | .047 | **.250** (8x) | 4 | 1/8 | 2-1/2 | 56131-C6 | 71.30 |
| .031 (1/32) | | .0310 | .047 | **.312** (10x) | 4 | 1/8 | 2-1/2 | 887231-C6 | 73.40 |
| .031 (1/32) | | .0310 | .047 | **.375** (12x) | 4 | 1/8 | 2-1/2 | 64831-C6 | 74.20 |
| .031 (1/32) | | .0310 | .047 | **.470** (15x) | 4 | 1/8 | 2-1/2 | 953331-C6 | 77.10 |
| | .8 mm | .0314 | 1.20 mm | **4.0 mm** (5x) | 4 | 4 mm | 50 mm | 988718-C6 | 77.40 |
| | .8 mm | .0314 | 1.20 mm | **6.5 mm** (8x) | 4 | 4 mm | 50 mm | 974018-C6 | 78.60 |
| | .8 mm | .0314 | 1.20 mm | **9.5 mm** (12x) | 4 | 4 mm | 50 mm | 981318-C6 | 81.20 |
| .035 | | .0350 | .052 | **.187** (5x) | 4 | 1/8 | 2-1/2 | 63635-C6 | 69.50 |

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# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Ball – Long Reach, Stub Flute (cont.)

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| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| | 1.0 mm | .0393 | 1.50 mm | **5.0 mm** (5x) | 4 | 4 mm | 50 mm | 988722-C6 | 76.80 |
| | 1.0 mm | .0393 | 1.50 mm | **8.0 mm** (8x) | 4 | 4 mm | 50 mm | 974022-C6 | 78.60 |
| | 1.0 mm | .0393 | 1.50 mm | **12.0 mm** (12x) | 4 | 4 mm | 50 mm | 981322-C6 | 80.40 |
| | 1.0 mm | .0393 | 1.50 mm | **16.0 mm** (16x) | 4 | 4 mm | 50 mm | 976522-C6 | 84.40 |
| .040 | | .0400 | .060 | **.203** (5x) | 4 | 1/8 | 2-1/2 | 63640-C6 | 69.50 |
| .040 | | .0400 | .060 | **.325** (8x) | 4 | 1/8 | 2-1/2 | 56140-C6 | 71.30 |
| .045 | | .0450 | .067 | **.225** (5x) | 4 | 1/8 | 2-1/2 | 63645-C6 | 69.50 |
| .047 (3/64) | | .0470 | .070 | **.250** (5x) | 4 | 1/8 | 2-1/2 | 63647-C6 | 69.50 |
| .047 (3/64) | | .0470 | .070 | **.281** (6x) | 4 | 1/8 | 2-1/2 | 797547-C6 | 69.50 |
| .047 (3/64) | | .0470 | .070 | **.375** (8x) | 4 | 1/8 | 2-1/2 | 56147-C6 | 71.30 |
| .047 (3/64) | | .0470 | .070 | **.480** (10x) | 4 | 1/8 | 2-1/2 | 887247-C6 | 72.70 |
| .047 (3/64) | | .0470 | .070 | **.570** (12x) | 4 | 1/8 | 2-1/2 | 64847-C6 | 73.50 |
| .050 | | .0500 | .075 | **.250** (5x) | 4 | 1/8 | 2-1/2 | 63650-C6 | 69.50 |
| .050 | | .0500 | .075 | **.400** (8x) | 4 | 1/8 | 2-1/2 | 56150-C6 | 71.30 |
| .055 | | .0550 | .082 | **.275** (5x) | 4 | 1/8 | 2-1/2 | 63655-C6 | 70.30 |
| | 1.5 mm | .0590 | 2.20 mm | **7.5 mm** (5x) | 4 | 4 mm | 50 mm | 988733-C6 | 76.80 |
| | 1.5 mm | .0590 | 2.20 mm | **12.0 mm** (8x) | 4 | 4 mm | 50 mm | 974033-C6 | 78.60 |
| | 1.5 mm | .0590 | 2.20 mm | **18.0 mm** (12x) | 4 | 4 mm | 50 mm | 981333-C6 | 80.40 |
| | 1.5 mm | .0590 | 2.20 mm | **24.0 mm** (16x) | 4 | 4 mm | 63 mm | 976533-C6 | 85.20 |
| .060 | | .0600 | .090 | **.312** (5x) | 4 | 1/8 | 2-1/2 | 63660-C6 | 69.50 |
| .060 | | .0600 | .090 | **.500** (8x) | 4 | 1/8 | 2-1/2 | 56160-C6 | 71.30 |
| .062 (1/16) | | .0620 | .093 | **.186** (3x) | 4 | 1/8 | 1-1/2 | 929062-C6 | 67.90 |
| .062 (1/16) | | .0620 | .093 | **.312** (5x) | 4 | 1/8 | 2-1/2 | 63662-C6 | 69.50 |
| .062 (1/16) | | .0620 | .093 | **.375** (6x) | 4 | 1/8 | 2-1/2 | 797562-C6 | 69.50 |
| .062 (1/16) | | .0620 | .093 | **.500** (8x) | 4 | 1/8 | 2-1/2 | 56162-C6 | 71.30 |
| .062 (1/16) | | .0620 | .093 | **.625** (10x) | 4 | 1/8 | 2-1/2 | 887262-C6 | 72.70 |
| .062 (1/16) | | .0620 | .093 | **.750** (12x) | 4 | 1/8 | 2-1/2 | 64862-C6 | 73.50 |
| .062 (1/16) | | .0620 | .093 | **.950** (15x) | 4 | 1/8 | 2-1/2 | 953362-C6 | 77.10 |
| .070 | | .0700 | .105 | **.375** (5x) | 4 | 1/8 | 2-1/2 | 63670-C6 | 70.30 |
| .070 | | .0700 | .105 | **.570** (8x) | 4 | 1/8 | 2-1/2 | 56170-C6 | 72.00 |
| .078 (5/64) | | .0780 | .117 | **.406** (5x) | 4 | 1/8 | 2-1/2 | 63678-C6 | 69.50 |
| .078 (5/64) | | .0780 | .117 | **.475** (6x) | 4 | 1/8 | 2-1/2 | 797578-C6 | 69.50 |
| .078 (5/64) | | .0780 | .117 | **.625** (8x) | 4 | 1/8 | 2-1/2 | 56178-C6 | 71.30 |
| .078 (5/64) | | .0780 | .117 | **.940** (12x) | 4 | 1/8 | 2-1/2 | 64878-C6 | 73.50 |
| | 2.0 mm | .0787 | 3.00 mm | **10.0 mm** (5x) | 4 | 4 mm | 50 mm | 988745-C6 | 76.50 |
| | 2.0 mm | .0787 | 3.00 mm | **12.0 mm** (6x) | 4 | 4 mm | 50 mm | 749245-C6 | 78.10 |
| | 2.0 mm | .0787 | 3.00 mm | **16.0 mm** (8x) | 4 | 4 mm | 50 mm | 974045-C6 | 78.20 |
| | 2.0 mm | .0787 | 3.00 mm | **24.0 mm** (12x) | 4 | 4 mm | 63 mm | 981345-C6 | 80.40 |
| | 2.0 mm | .0787 | 3.00 mm | **32.0 mm** (16x) | 4 | 4 mm | 63 mm | 976545-C6 | 85.20 |
| .093 (3/32) | | .0930 | .139 | **.279** (3x) | 4 | 1/8 | 1-1/2 | 929093-C6 | 67.90 |
| .093 (3/32) | | .0930 | .139 | **.500** (5x) | 4 | 1/8 | 2-1/2 | 63693-C6 | 69.50 |
| .093 (3/32) | | .0930 | .139 | **.585** (6x) | 4 | 1/8 | 2-1/2 | 797593-C6 | 69.50 |
| .093 (3/32) | | .0930 | .139 | **.750** (8x) | 4 | 1/8 | 2-1/2 | 56193-C6 | 71.30 |
| .093 (3/32) | | .0930 | .139 | **.950** (10x) | 4 | 1/8 | 2-1/2 | 887293-C6 | 72.70 |
| .093 (3/32) | | .0930 | .139 | **1.125** (12x) | 4 | 1/8 | 2-1/2 | 64893-C6 | 74.20 |
| .093 (3/32) | | .0930 | .139 | **1.400** (15x) | 4 | 1/8 | 3 | 953393-C6 | 77.10 |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Ball – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .100 | | .1000 | .150 | **.500** (5x) | 4 | 1/8 | 2-1/2 | 63700-C6 | 68.80 |
| .100 | | .1000 | .150 | **.800** (8x) | 4 | 1/8 | 2-1/2 | 56200-C6 | 70.90 |
| | 3.0 mm | .1181 | 4.50 mm | **15.0 mm** (5x) | 4 | 4 mm | 50 mm | 988757-C6 | 72.60 |
| | 3.0 mm | .1181 | 4.50 mm | **24.0 mm** (8x) | 4 | 4 mm | 50 mm | 974057-C6 | 74.30 |

| $D_1$ +.000″ −.002″ | decimal equivalent | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | FLUTES | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | .187 | **.375** (3x) | 4 | 1/8 | 1-1/2 | 929108-C6 | 67.90 |
| .125 (1/8) | .1250 | .187 | **.625** (5x) | 4 | 1/8 | 2-1/2 | 63708-C6 | 69.00 |
| .125 (1/8) | .1250 | .187 | **.750** (6x) | 4 | 1/8 | 2-1/2 | 797608-C6 | 69.00 |
| .125 (1/8) | .1250 | .187 | **1.000** (8x) | 4 | 1/8 | 2-1/2 | 56208-C6 | 70.60 |
| .125 (1/8) | .1250 | .187 | **1.250** (10x) | 4 | 1/8 | 3 | 887308-C6 | 72.70 |
| .125 (1/8) | .1250 | .187 | **1.500** (12x) | 4 | 1/8 | 3 | 64908-C6 | 73.50 |
| .140 (9/64) | .1406 | .220 | **.750** (5x) | 4 | 3/16 | 3 | 63709-C6 | 75.70 |
| .156 (5/32) | .1562 | .234 | **.750** (5x) | 4 | 3/16 | 3 | 63710-C6 | 74.80 |
| .156 (5/32) | .1562 | .234 | **1.250** (8x) | 4 | 3/16 | 3 | 56210-C6 | 76.40 |
| .156 (5/32) | .1562 | .234 | **1.570** (10x) | 4 | 3/16 | 4 | 887310-C6 | 79.90 |
| .187 (3/16) | .1875 | .281 | **1.000** (5x) | 4 | 3/16 | 3 | 63712-C6 | 76.00 |
| .187 (3/16) | .1875 | .281 | **1.500** (8x) | 4 | 3/16 | 3 | 56212-C6 | 77.70 |
| .187 (3/16) | .1875 | .281 | **1.875** (10x) | 4 | 3/16 | 4 | 887312-C6 | 81.40 |
| .250 (1/4) | .2500 | .375 | **1.250** (5x) | 4 | 1/4 | 4 | 63716-C6 | 84.20 |
| .250 (1/4) | .2500 | .375 | **2.000** (8x) | 4 | 1/4 | 4 | 56216-C6 | 85.80 |
| .250 (1/4) | .2500 | .375 | **2.500** (10x) | 4 | 1/4 | 6 | 887316-C6 | 100.90 |
| .375 (3/8) | .3750 | .570 | **2.000** (5x) | 4 | 3/8 | 4 | 63724-C6 | 105.00 |



## Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For High Temp Alloys)

**Important Note:** Values in table are in inches and are based on 4 flute, reached (8x Dia) end mills. For 3 flutes, table values of IPT must be increased to 105% before adjustments for different reaches. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%; for 6x, increase to 120%; for 7x, increase to 110%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%; for 15x, reduce to 75%). For complete speeds and feeds charts, please see www.harveytool.com

| Material | Hardness (HBn) | SFM |
|---|---|---|
| **Stainless Steels**: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7<br>**Tool Steels**: D, H, M, T, S series | 275 - 300 | 160 |
| | 300 - 350 | 140 |
| | 350 - 400 | 100 |
| | 400 - 425 | 80 |
| **Titanium**: All alloys | 275 - 300 | 200 |
| | 300 - 350 | 125 |
| | 350 - 400 | 75 |
| | 400 - 425 | 75 |
| **Nickel Alloys**: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy | 275 - 300 | 80 |
| | 300 - 350 | 60 |
| | 350 - 400 | 50 |
| | 400 - 425 | 40 |

| Chip Load Per Tooth (IPT) By Cutter Diameter | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Slotting | .00004 | .00008 | .00012 | .00016 | .00021 | .00025 | .00033 | .00049 | .00066 | .00086 | .00104 | .00139 |
| Roughing | .00005 | .00010 | .00016 | .00021 | .00026 | .00031 | .00042 | .00063 | .00084 | .00110 | .00132 | .00176 |
| Finishing | .00007 | .00014 | .00021 | .00027 | .00034 | .00041 | .00055 | .00082 | .00110 | .00144 | .00173 | .00231 |
| Max | .00008 | .00016 | .00025 | .00033 | .00041 | .00049 | .00066 | .00099 | .00132 | .00173 | .00208 | .00277 |

**Radial Depth of Cut*:**
Slotting: 1x Dia
Roughing: .28x Dia
Finishing: .1x Dia

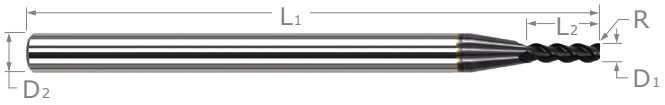
**Axial Depth of Cut*:**
Slotting: .28x Dia
Roughing: .5x - .7x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

NEW SIZES!

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius




- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA



| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ | | | R | $L_2$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | +.001″ −.001″ +.025mm −.025mm | +.010″ −.000″ +.25mm −.00mm | | | | | |
| | .2 mm | .0078 | **.05 mm** | .30 mm (1.5x) | 3 | 4 mm | 50 mm | 984104-C6 | 71.60 |
| | .2 mm | .0078 | **.05 mm** | .60 mm (3x) | 3 | 4 mm | 50 mm | 979304-C6 | 71.60 |
| .010 | | .0100 | **.003** | .015 (1.5x) | 3 | 1/8 | 1-1/2 | 52210-C6 | 67.20 |
| .010 | | .0100 | **.003** | .030 (3x) | 3 | 1/8 | 1-1/2 | 46810-C6 | 67.70 |
| | .3 mm | .0118 | **.08 mm** | .45 mm (1.5x) | 3 | 4 mm | 50 mm | 984106-C6 | 69.90 |
| | .3 mm | .0118 | **.08 mm** | .90 mm (3x) | 3 | 4 mm | 50 mm | 979306-C6 | 69.90 |
| .015 (1/64) | | .0150 | **.003** | .012 (0.8x) | 3 | 1/8 | 1-1/2 | 954215-C6 | 59.30 |
| .015 (1/64) | | .0150 | **.003** | .022 (1.5x) | 3 | 1/8 | 1-1/2 | 52215-C6 | 54.70 |
| .015 (1/64) | | .0150 | **.003** | .045 (3x) | 3 | 1/8 | 1-1/2 | 46815-C6 | 54.70 |
| .015 (1/64) | | .0150 | **.003** | .078 (5x) | 3 | 1/8 | 2-1/2 | 53615-C6 | 67.10 |
| .015 (1/64) | | .0150 | **.005** | .045 (3x) | 3 | 1/8 | 1-1/2 | 936415-C6 | 63.40 |
| | .4 mm | .0157 | **.08 mm** | .60 mm (1.5x) | 3 | 4 mm | 50 mm | 984109-C6 | 60.00 |
| | .4 mm | .0157 | **.08 mm** | 1.20 mm (3x) | 3 | 4 mm | 50 mm | 979309-C6 | 60.00 |
| | .5 mm | .0196 | **.10 mm** | .75 mm (1.5x) | 3 | 4 mm | 50 mm | 984111-C6 | 53.60 |
| | .5 mm | .0196 | **.10 mm** | 1.50 mm (3x) | 3 | 4 mm | 50 mm | 979311-C6 | 53.00 |
| | .5 mm | .0196 | **.10 mm** | 2.50 mm (5x) | 3 | 4 mm | 50 mm | 965811-C6 | 67.70 |
| .020 | | .0200 | **.004** | .016 (0.8x) | 3 | 1/8 | 1-1/2 | 954220-C6 | 51.70 |
| .020 | | .0200 | **.004** | .030 (1.5x) | 3 | 1/8 | 1-1/2 | 52220-C6 | 48.20 |
| .020 | | .0200 | **.004** | .060 (3x) | 3 | 1/8 | 1-1/2 | 46820-C6 | 48.20 |
| .020 | | .0200 | **.004** | .060 (3x) | 4 | 1/8 | 1-1/2 | 786620-C6 | 51.70 |
| .020 | | .0200 | **.004** | .100 (5x) | 3 | 1/8 | 2-1/2 | 53620-C6 | 59.70 |
| | .6 mm | .0236 | **.10 mm** | .90 mm (1.5x) | 3 | 4 mm | 50 mm | 984113-C6 | 51.90 |
| | .6 mm | .0236 | **.10 mm** | 1.80 mm (3x) | 3 | 4 mm | 50 mm | 979313-C6 | 51.90 |
| .025 | | .0250 | **.004** | .020 (0.8x) | 3 | 1/8 | 1-1/2 | 954225-C6 | 51.00 |
| .025 | | .0250 | **.004** | .038 (1.5x) | 3 | 1/8 | 1-1/2 | 52225-C6 | 46.60 |
| .025 | | .0250 | **.004** | .075 (3x) | 3 | 1/8 | 1-1/2 | 46825-C6 | 46.60 |
| .025 | | .0250 | **.004** | .075 (3x) | 4 | 1/8 | 1-1/2 | 786625-C6 | 49.30 |
| .025 | | .0250 | **.004** | .125 (5x) | 3 | 1/8 | 2-1/2 | 53625-C6 | 57.70 |
| | .7 mm | .0275 | **.10 mm** | 2.10 mm (3x) | 3 | 4 mm | 50 mm | 979315-C6 | 51.40 |
| .030 | | .0300 | **.004** | .045 (1.5x) | 3 | 1/8 | 1-1/2 | 52230-C6 | 47.40 |
| .030 | | .0300 | **.004** | .090 (3x) | 3 | 1/8 | 1-1/2 | 46830-C6 | 46.60 |
| .030 | | .0300 | **.004** | .156 (5x) | 3 | 1/8 | 2-1/2 | 53630-C6 | 58.20 |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .031 (1/32) | | .0310 | **.003** | .047 (1.5x) | 3 | 1/8 | 1-1/2 | 853631-C6 | 42.80 |
| .031 (1/32) | | .0310 | **.003** | .093 (3x) | 3 | 1/8 | 1-1/2 | 923631-C6 | 40.10 |
| .031 (1/32) | | .0310 | **.005** | .025 (0.8x) | 3 | 1/8 | 1-1/2 | 954231-C6 | 41.50 |
| .031 (1/32) | | .0310 | **.005** | .047 (1.5x) | 3 | 1/8 | 1-1/2 | 52231-C6 | 39.80 |
| .031 (1/32) | | .0310 | **.005** | .047 (1.5x) | 4 | 1/8 | 1-1/2 | 795531-C6 | 43.00 |
| .031 (1/32) | | .0310 | **.005** | .093 (3x) | 3 | 1/8 | 1-1/2 | 46831-C6 | 39.80 |
| .031 (1/32) | | .0310 | **.005** | .093 (3x) | 4 | 1/8 | 1-1/2 | 850731-C6 | 42.60 |
| .031 (1/32) | | .0310 | **.005** | .125 (4x) | 3 | 1/8 | 2-1/2 | 796731-C6 | 44.80 |
| .031 (1/32) | | .0310 | **.005** | .156 (5x) | 3 | 1/8 | 2-1/2 | 53631-C6 | 50.10 |
| .031 (1/32) | | .0310 | **.005** | .156 (5x) | 4 | 1/8 | 2-1/2 | 796931-C6 | 53.60 |
| .031 (1/32) | | .0310 | **.008** | .047 (1.5x) | 3 | 1/8 | 1-1/2 | 847831-C6 | 43.00 |
| .031 (1/32) | | .0310 | **.008** | .093 (3x) | 3 | 1/8 | 1-1/2 | 848431-C6 | 43.90 |
| .031 (1/32) | | .0310 | **.010** | .047 (1.5x) | 3 | 1/8 | 1-1/2 | 912931-C6 | 42.80 |
| .031 (1/32) | | .0310 | **.010** | .093 (3x) | 3 | 1/8 | 1-1/2 | 950731-C6 | 43.00 |
| .031 (1/32) | | .0310 | **.010** | .093 (3x) | 4 | 1/8 | 1-1/2 | 856431-C6 | 43.00 |
| .031 (1/32) | | .0310 | **.010** | .156 (5x) | 3 | 1/8 | 2-1/2 | 869831-C6 | 53.60 |
| | .8 mm | .0314 | **.10 mm** | 1.20 mm (1.5x) | 3 | 4 mm | 50 mm | 984118-C6 | 45.00 |
| | .8 mm | .0314 | **.10 mm** | 2.40 mm (3x) | 3 | 4 mm | 50 mm | 979318-C6 | 45.00 |
| .035 | | .0350 | **.005** | .053 (1.5x) | 3 | 1/8 | 1-1/2 | 52235-C6 | 39.80 |
| .035 | | .0350 | **.005** | .105 (3x) | 3 | 1/8 | 1-1/2 | 46835-C6 | 39.80 |
| .035 | | .0350 | **.005** | .187 (5x) | 3 | 1/8 | 2-1/2 | 53635-C6 | 50.10 |
| .035 | | .0350 | **.010** | .105 (3x) | 3 | 1/8 | 1-1/2 | 950735-C6 | 43.00 |
| | .9 mm | .0354 | **.10 mm** | 2.70 mm (3x) | 3 | 4 mm | 50 mm | 979320-C6 | 45.00 |
| | 1.0 mm | .0393 | **.10 mm** | 1.50 mm (1.5x) | 3 | 4 mm | 50 mm | 984122-C6 | 44.60 |
| | 1.0 mm | .0393 | **.10 mm** | 3.00 mm (3x) | 3 | 4 mm | 50 mm | 979322-C6 | 44.60 |
| | 1.0 mm | .0393 | **.10 mm** | 5.00 mm (5x) | 3 | 4 mm | 50 mm | 965822-C6 | 55.40 |
| | 1.0 mm | .0393 | **.30 mm** | 3.00 mm (3x) | 3 | 4 mm | 50 mm | 843322-C6 | 45.00 |
| .040 | | .0400 | **.003** | .120 (3x) | 3 | 1/8 | 1-1/2 | 923640-C6 | 39.80 |
| .040 | | .0400 | **.005** | .032 (0.8x) | 3 | 1/8 | 1-1/2 | 954240-C6 | 43.80 |
| .040 | | .0400 | **.005** | .060 (1.5x) | 3 | 1/8 | 1-1/2 | 52240-C6 | 39.80 |
| .040 | | .0400 | **.005** | .120 (3x) | 3 | 1/8 | 1-1/2 | 46840-C6 | 39.80 |
| .040 | | .0400 | **.005** | .203 (5x) | 3 | 1/8 | 2-1/2 | 53640-C6 | 50.10 |
| .040 | | .0400 | **.005** | .203 (5x) | 4 | 1/8 | 2-1/2 | 796940-C6 | 53.60 |
| .040 | | .0400 | **.010** | .120 (3x) | 3 | 1/8 | 1-1/2 | 950740-C6 | 43.00 |
| | 1.1 mm | .0433 | **.10 mm** | 3.00 mm (3x) | 3 | 4 mm | 50 mm | 979324-C6 | 44.80 |
| .045 | | .0450 | **.005** | .068 (1.5x) | 3 | 1/8 | 1-1/2 | 52245-C6 | 39.80 |
| .045 | | .0450 | **.005** | .135 (3x) | 3 | 1/8 | 1-1/2 | 46845-C6 | 39.80 |
| .045 | | .0450 | **.005** | .225 (5x) | 3 | 1/8 | 2-1/2 | 53645-C6 | 50.10 |
| .047 (3/64) | | .0470 | **.003** | .141 (3x) | 3 | 1/8 | 1-1/2 | 923647-C6 | 39.30 |
| .047 (3/64) | | .0470 | **.005** | .038 (0.8x) | 3 | 1/8 | 1-1/2 | 954247-C6 | 41.50 |
| .047 (3/64) | | .0470 | **.005** | .071 (1.5x) | 3 | 1/8 | 1-1/2 | 52247-C6 | 39.80 |
| .047 (3/64) | | .0470 | **.005** | .071 (1.5x) | 4 | 1/8 | 1-1/2 | 795547-C6 | 42.60 |
| .047 (3/64) | | .0470 | **.005** | .141 (3x) | 3 | 1/8 | 1-1/2 | 46847-C6 | 39.80 |
| .047 (3/64) | | .0470 | **.005** | .141 (3x) | 4 | 1/8 | 1-1/2 | 850747-C6 | 42.60 |
| .047 (3/64) | | .0470 | **.005** | .187 (4x) | 3 | 1/8 | 2-1/2 | 796747-C6 | 45.30 |
| .047 (3/64) | | .0470 | **.005** | .250 (5x) | 3 | 1/8 | 2-1/2 | 53647-C6 | 50.10 |
| .047 (3/64) | | .0470 | **.005** | .250 (5x) | 4 | 1/8 | 2-1/2 | 796947-C6 | 53.60 |
| .047 (3/64) | | .0470 | **.010** | .071 (1.5x) | 3 | 1/8 | 1-1/2 | 912947-C6 | 42.80 |
| .047 (3/64) | | .0470 | **.010** | .141 (3x) | 3 | 1/8 | 1-1/2 | 950747-C6 | 43.00 |
| .047 (3/64) | | .0470 | **.015** | .071 (1.5x) | 3 | 1/8 | 1-1/2 | 975647-C6 | 40.40 |
| .047 (3/64) | | .0470 | **.015** | .141 (3x) | 3 | 1/8 | 1-1/2 | 964147-C6 | 43.00 |

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NEW SIZES!

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | |
| | 1.2 mm | .0472 | **.10 mm** | 1.80 mm (1.5x) | 3 | 4 mm | 50 mm | 984127-C6 | 45.00 | |
| | 1.2 mm | .0472 | **.10 mm** | 3.50 mm (3x) | 3 | 4 mm | 50 mm | 979327-C6 | 45.00 | |
| .050 | | .0500 | **.005** | .040 (0.8x) | 3 | 1/8 | 1-1/2 | 954250-C6 | 43.30 | |
| .050 | | .0500 | **.005** | .075 (1.5x) | 3 | 1/8 | 1-1/2 | 52250-C6 | 39.30 | |
| .050 | | .0500 | **.005** | .150 (3x) | 3 | 1/8 | 1-1/2 | 46850-C6 | 39.30 | |
| .050 | | .0500 | **.005** | .150 (3x) | 4 | 1/8 | 1-1/2 | 850750-C6 | 42.10 | |
| .050 | | .0500 | **.005** | .250 (5x) | 3 | 1/8 | 2-1/2 | 53650-C6 | 50.10 | |
| .050 | | .0500 | **.010** | .075 (1.5x) | 3 | 1/8 | 1-1/2 | 912950-C6 | 42.80 | |
| .050 | | .0500 | **.010** | .150 (3x) | 3 | 1/8 | 1-1/2 | 950750-C6 | 43.90 | |
| .050 | | .0500 | **.015** | .075 (1.5x) | 3 | 1/8 | 1-1/2 | 975650-C6 | 43.00 | |
| .050 | | .0500 | **.015** | .150 (3x) | 3 | 1/8 | 1-1/2 | 964150-C6 | 41.60 | |
| | 1.3 mm | .0511 | **.10 mm** | 4.00 mm (3x) | 3 | 4 mm | 50 mm | 979329-C6 | 45.00 | |
| .055 | | .0550 | **.005** | .083 (1.5x) | 3 | 1/8 | 1-1/2 | 52255-C6 | 39.30 | |
| .055 | | .0550 | **.005** | .165 (3x) | 3 | 1/8 | 1-1/2 | 46855-C6 | 39.30 | |
| .055 | | .0550 | **.005** | .165 (3x) | 4 | 1/8 | 1-1/2 | 850755-C6 | 42.10 | NEW |
| .055 | | .0550 | **.005** | .275 (5x) | 3 | 1/8 | 2-1/2 | 53655-C6 | 50.10 | |
| .055 | | .0550 | **.010** | .083 (1.5x) | 3 | 1/8 | 1-1/2 | 912955-C6 | 43.60 | |
| .055 | | .0550 | **.010** | .165 (3x) | 3 | 1/8 | 1-1/2 | 950755-C6 | 43.90 | |
| .055 | | .0550 | **.015** | .083 (1.5x) | 3 | 1/8 | 1-1/2 | 975655-C6 | 43.90 | |
| .055 | | .0550 | **.015** | .165 (3x) | 3 | 1/8 | 1-1/2 | 964155-C6 | 43.90 | |
| | 1.4 mm | .0551 | **.10 mm** | 2.10 mm (1.5x) | 3 | 4 mm | 50 mm | 984131-C6 | 45.00 | |
| | 1.4 mm | .0551 | **.10 mm** | 4.00 mm (3x) | 3 | 4 mm | 50 mm | 979331-C6 | 45.00 | |
| | 1.5 mm | .0590 | **.20 mm** | 2.20 mm (1.5x) | 3 | 4 mm | 50 mm | 984133-C6 | 41.80 | |
| | 1.5 mm | .0590 | **.20 mm** | 4.50 mm (3x) | 3 | 4 mm | 50 mm | 979333-C6 | 41.80 | |
| | 1.5 mm | .0590 | **.20 mm** | 7.50 mm (5x) | 3 | 4 mm | 50 mm | 965833-C6 | 51.60 | |
| .060 | | .0600 | **.005** | .090 (1.5x) | 3 | 1/8 | 1-1/2 | 908860-C6 | 39.30 | |
| .060 | | .0600 | **.005** | .180 (3x) | 3 | 1/8 | 1-1/2 | 936460-C6 | 39.30 | |
| .060 | | .0600 | **.005** | .312 (5x) | 3 | 1/8 | 2-1/2 | 869060-C6 | 50.10 | |
| .060 | | .0600 | **.010** | .048 (0.8x) | 3 | 1/8 | 1-1/2 | 954260-C6 | 43.80 | |
| .060 | | .0600 | **.010** | .090 (1.5x) | 3 | 1/8 | 1-1/2 | 52260-C6 | 39.30 | |
| .060 | | .0600 | **.010** | .180 (3x) | 3 | 1/8 | 1-1/2 | 46860-C6 | 39.30 | |
| .060 | | .0600 | **.010** | .312 (5x) | 3 | 1/8 | 2-1/2 | 53660-C6 | 50.10 | |
| .060 | | .0600 | **.015** | .090 (1.5x) | 3 | 1/8 | 1-1/2 | 975660-C6 | 39.80 | |
| .060 | | .0600 | **.015** | .180 (3x) | 3 | 1/8 | 1-1/2 | 964160-C6 | 40.40 | |
| .060 | | .0600 | **.020** | .090 (1.5x) | 3 | 1/8 | 1-1/2 | 931760-C6 | 40.90 | |
| .060 | | .0600 | **.020** | .180 (3x) | 3 | 1/8 | 1-1/2 | 959260-C6 | 41.20 | |
| .062 (1/16) | | .0620 | **.003** | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 853662-C6 | 37.70 | |
| .062 (1/16) | | .0620 | **.003** | .186 (3x) | 3 | 1/8 | 1-1/2 | 923662-C6 | 36.80 | |
| .062 (1/16) | | .0620 | **.005** | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 908862-C6 | 36.80 | |
| .062 (1/16) | | .0620 | **.005** | .093 (1.5x) | 4 | 1/8 | 1-1/2 | 795562-C6 | 40.40 | |
| .062 (1/16) | | .0620 | **.005** | .186 (3x) | 3 | 1/8 | 1-1/2 | 936462-C6 | 36.80 | |
| .062 (1/16) | | .0620 | **.005** | .186 (3x) | 4 | 1/8 | 1-1/2 | 850762-C6 | 39.80 | |
| .062 (1/16) | | .0620 | **.005** | .312 (5x) | 3 | 1/8 | 2-1/2 | 869062-C6 | 47.60 | |
| .062 (1/16) | | .0620 | **.008** | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 847862-C6 | 36.80 | |
| .062 (1/16) | | .0620 | **.008** | .186 (3x) | 3 | 1/8 | 1-1/2 | 848462-C6 | 37.70 | |
| .062 (1/16) | | .0620 | **.010** | .050 (0.8x) | 3 | 1/8 | 1-1/2 | 954262-C6 | 37.50 | |
| .062 (1/16) | | .0620 | **.010** | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 52262-C6 | 36.80 | |
| .062 (1/16) | | .0620 | **.010** | .093 (1.5x) | 4 | 1/8 | 1-1/2 | 797162-C6 | 42.60 | |
| .062 (1/16) | | .0620 | **.010** | .186 (3x) | 3 | 1/8 | 1-1/2 | 46862-C6 | 36.80 | |
| .062 (1/16) | | .0620 | **.010** | .186 (3x) | 4 | 1/8 | 1-1/2 | 856462-C6 | 42.60 | |
| .062 (1/16) | | .0620 | **.010** | .250 (4x) | 3 | 1/8 | 2-1/2 | 796562-C6 | 44.10 | |

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# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius (cont.)

continued from previous page

| | CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | .062 (1/16) | | .0620 | **.010** | .312 (5x) | 3 | 1/8 | 2-1/2 | 53662-C6 | 48.00 |
| | .062 (1/16) | | .0620 | **.010** | .312 (5x) | 4 | 1/8 | 2-1/2 | 797362-C6 | 52.70 |
| | .062 (1/16) | | .0620 | **.015** | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 975662-C6 | 36.80 |
| | .062 (1/16) | | .0620 | **.015** | .186 (3x) | 3 | 1/8 | 1-1/2 | 964162-C6 | 36.80 |
| NEW | .062 (1/16) | | .0620 | **.015** | .186 (3x) | 4 | 1/8 | 1-1/2 | 696262-C6 | 42.60 |
| NEW | .062 (1/16) | | .0620 | **.015** | .250 (4x) | 3 | 1/8 | 2-1/2 | 696162-C6 | 44.10 |
| | .062 (1/16) | | .0620 | **.015** | .312 (5x) | 3 | 1/8 | 2-1/2 | 860262-C6 | 48.50 |
| | .062 (1/16) | | .0620 | **.020** | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 931762-C6 | 40.60 |
| | .062 (1/16) | | .0620 | **.020** | .093 (1.5x) | 4 | 1/8 | 1-1/2 | 702862-C6 | 46.30 |
| | .062 (1/16) | | .0620 | **.020** | .186 (3x) | 3 | 1/8 | 1-1/2 | 959262-C6 | 44.50 |
| | .062 (1/16) | | .0620 | **.020** | .186 (3x) | 4 | 1/8 | 1-1/2 | 786462-C6 | 46.40 |
| | .062 (1/16) | | .0620 | **.020** | .312 (5x) | 3 | 1/8 | 2-1/2 | 870662-C6 | 48.00 |
| | | 1.6 mm | .0629 | **.20 mm** | 2.40 mm (1.5x) | 3 | 4 mm | 50 mm | 984136-C6 | 41.80 |
| | | 1.6 mm | .0629 | **.20 mm** | 5.00 mm (3x) | 3 | 4 mm | 50 mm | 979336-C6 | 41.80 |
| | | 1.7 mm | .0669 | **.20 mm** | 5.00 mm (3x) | 3 | 4 mm | 50 mm | 979338-C6 | 41.80 |
| | .070 | | .0700 | **.005** | .210 (3x) | 3 | 1/8 | 1-1/2 | 936470-C6 | 37.70 |
| | .070 | | .0700 | **.010** | .105 (1.5x) | 3 | 1/8 | 1-1/2 | 52270-C6 | 36.80 |
| | .070 | | .0700 | **.010** | .210 (3x) | 3 | 1/8 | 1-1/2 | 46870-C6 | 36.80 |
| | .070 | | .0700 | **.010** | .375 (5x) | 3 | 1/8 | 2-1/2 | 53670-C6 | 48.50 |
| | | 1.8 mm | .0708 | **.20 mm** | 2.70 mm (1.5x) | 3 | 4 mm | 50 mm | 984140-C6 | 42.10 |
| | | 1.8 mm | .0708 | **.20 mm** | 5.50 mm (3x) | 3 | 4 mm | 50 mm | 979340-C6 | 42.10 |
| | | 1.9 mm | .0748 | **.20 mm** | 5.50 mm (3x) | 3 | 4 mm | 50 mm | 979342-C6 | 42.10 |
| | .078 (5/64) | | .0780 | **.003** | .234 (3x) | 3 | 1/8 | 1-1/2 | 923678-C6 | 38.30 |
| | .078 (5/64) | | .0780 | **.005** | .117 (1.5x) | 3 | 1/8 | 1-1/2 | 908878-C6 | 36.80 |
| | .078 (5/64) | | .0780 | **.005** | .117 (1.5x) | 4 | 1/8 | 1-1/2 | 795578-C6 | 39.80 |
| | .078 (5/64) | | .0780 | **.005** | .234 (3x) | 3 | 1/8 | 1-1/2 | 936478-C6 | 36.80 |
| | .078 (5/64) | | .0780 | **.005** | .406 (5x) | 3 | 1/8 | 2-1/2 | 869078-C6 | 47.60 |
| | .078 (5/64) | | .0780 | **.010** | .062 (0.8x) | 3 | 1/8 | 1-1/2 | 954278-C6 | 37.50 |
| | .078 (5/64) | | .0780 | **.010** | .117 (1.5x) | 3 | 1/8 | 1-1/2 | 52278-C6 | 36.80 |
| | .078 (5/64) | | .0780 | **.010** | .117 (1.5x) | 4 | 1/8 | 1-1/2 | 797178-C6 | 43.00 |
| | .078 (5/64) | | .0780 | **.010** | .234 (3x) | 3 | 1/8 | 1-1/2 | 46878-C6 | 36.80 |
| | .078 (5/64) | | .0780 | **.010** | .234 (3x) | 4 | 1/8 | 1-1/2 | 856478-C6 | 42.60 |
| | .078 (5/64) | | .0780 | **.010** | .312 (4x) | 3 | 1/8 | 2-1/2 | 796578-C6 | 44.80 |
| | .078 (5/64) | | .0780 | **.010** | .406 (5x) | 3 | 1/8 | 2-1/2 | 53678-C6 | 47.60 |
| | .078 (5/64) | | .0780 | **.010** | .406 (5x) | 4 | 1/8 | 2-1/2 | 797378-C6 | 54.00 |
| | .078 (5/64) | | .0780 | **.015** | .117 (1.5x) | 3 | 1/8 | 1-1/2 | 975678-C6 | 40.90 |
| | .078 (5/64) | | .0780 | **.015** | .234 (3x) | 3 | 1/8 | 1-1/2 | 964178-C6 | 40.90 |
| NEW | .078 (5/64) | | .0780 | **.015** | .406 (5x) | 3 | 1/8 | 2-1/2 | 860278-C6 | 53.00 |
| | .078 (5/64) | | .0780 | **.020** | .117 (1.5x) | 3 | 1/8 | 1-1/2 | 931778-C6 | 44.50 |
| | .078 (5/64) | | .0780 | **.020** | .234 (3x) | 3 | 1/8 | 1-1/2 | 959278-C6 | 44.50 |
| | .078 (5/64) | | .0780 | **.020** | .406 (5x) | 3 | 1/8 | 2-1/2 | 870678-C6 | 56.70 |
| | .078 (5/64) | | .0780 | **.025** | .234 (3x) | 3 | 1/8 | 1-1/2 | 848878-C6 | 44.50 |
| | | 2.0 mm | .0787 | **.20 mm** | 3.00 mm (1.5x) | 3 | 4 mm | 50 mm | 984145-C6 | 41.80 |
| | | 2.0 mm | .0787 | **.20 mm** | 6.00 mm (3x) | 3 | 4 mm | 50 mm | 979345-C6 | 41.80 |
| | | 2.0 mm | .0787 | **.20 mm** | 10.00 mm (5x) | 3 | 4 mm | 50 mm | 965845-C6 | 51.20 |
| | | 2.0 mm | .0787 | **.50 mm** | 6.00 mm (3x) | 3 | 4 mm | 50 mm | 842545-C6 | 42.10 |
| | .080 | | .0800 | **.010** | .120 (1.5x) | 3 | 1/8 | 1-1/2 | 52280-C6 | 37.70 |
| | .080 | | .0800 | **.010** | .240 (3x) | 3 | 1/8 | 1-1/2 | 46880-C6 | 36.80 |
| | .090 | | .0900 | **.010** | .135 (1.5x) | 3 | 1/8 | 1-1/2 | 52290-C6 | 36.80 |
| | .090 | | .0900 | **.010** | .270 (3x) | 3 | 1/8 | 1-1/2 | 46890-C6 | 37.70 |

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NEW SIZES!

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | CORNER RADIUS R +.001″ −.001″ +.025mm −.025mm | LENGTH OF CUT $L_2$ +.010″ −.000″ +.25mm −.00mm | FLUTES | SHANK DIAMETER $D_2$ (h6) | OVERALL LENGTH $L_1$ | AlTiN NANO COATED TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|---|
| .093 (3/32) | | .0930 | **.003** | .279 (3x) | 3 | 1/8 | 1-1/2 | 923693-C6 | 37.10 |
| .093 (3/32) | | .0930 | **.005** | .074 (0.8x) | 3 | 1/8 | 1-1/2 | 840593-C6 | 37.80 |
| .093 (3/32) | | .0930 | **.005** | .140 (1.5x) | 3 | 1/8 | 1-1/2 | 908893-C6 | 36.80 |
| .093 (3/32) | | .0930 | **.005** | .140 (1.5x) | 4 | 1/8 | 1-1/2 | 795593-C6 | 42.60 |
| .093 (3/32) | | .0930 | **.005** | .279 (3x) | 3 | 1/8 | 1-1/2 | 936493-C6 | 36.80 |
| .093 (3/32) | | .0930 | **.005** | .279 (3x) | 4 | 1/8 | 1-1/2 | 850793-C6 | 43.00 |
| .093 (3/32) | | .0930 | **.005** | .500 (5x) | 3 | 1/8 | 2-1/2 | 869093-C6 | 47.50 |
| .093 (3/32) | | .0930 | **.008** | .140 (1.5x) | 3 | 1/8 | 1-1/2 | 847893-C6 | 36.80 |
| .093 (3/32) | | .0930 | **.008** | .279 (3x) | 3 | 1/8 | 1-1/2 | 848493-C6 | 36.80 |
| .093 (3/32) | | .0930 | **.010** | .074 (0.8x) | 3 | 1/8 | 1-1/2 | 954293-C6 | 37.80 |
| .093 (3/32) | | .0930 | **.010** | .140 (1.5x) | 3 | 1/8 | 1-1/2 | 52293-C6 | 36.80 |
| .093 (3/32) | | .0930 | **.010** | .140 (1.5x) | 4 | 1/8 | 1-1/2 | 797193-C6 | 42.60 |
| .093 (3/32) | | .0930 | **.010** | .279 (3x) | 3 | 1/8 | 1-1/2 | 46893-C6 | 36.80 |
| .093 (3/32) | | .0930 | **.010** | .279 (3x) | 4 | 1/8 | 1-1/2 | 856493-C6 | 42.60 |
| .093 (3/32) | | .0930 | **.010** | .375 (4x) | 3 | 1/8 | 2-1/2 | 796593-C6 | 44.80 |
| .093 (3/32) | | .0930 | **.010** | .500 (5x) | 3 | 1/8 | 2-1/2 | 53693-C6 | 47.60 |
| .093 (3/32) | | .0930 | **.010** | .500 (5x) | 4 | 1/8 | 2-1/2 | 797393-C6 | 53.50 |
| .093 (3/32) | | .0930 | **.015** | .140 (1.5x) | 3 | 1/8 | 1-1/2 | 975693-C6 | 37.70 |
| .093 (3/32) | | .0930 | **.015** | .279 (3x) | 3 | 1/8 | 1-1/2 | 964193-C6 | 36.80 |
| .093 (3/32) | | .0930 | **.020** | .140 (1.5x) | 3 | 1/8 | 1-1/2 | 931793-C6 | 36.80 |
| .093 (3/32) | | .0930 | **.020** | .279 (3x) | 3 | 1/8 | 1-1/2 | 959293-C6 | 36.80 |
| .093 (3/32) | | .0930 | **.020** | .279 (3x) | 4 | 1/8 | 1-1/2 | 786493-C6 | 42.60 |
| .093 (3/32) | | .0930 | **.020** | .500 (5x) | 3 | 1/8 | 2-1/2 | 870693-C6 | 48.30 |
| .093 (3/32) | | .0930 | **.025** | .279 (3x) | 3 | 1/8 | 1-1/2 | 848893-C6 | 44.70 |
| .093 (3/32) | | .0930 | **.030** | .140 (1.5x) | 3 | 1/8 | 1-1/2 | 929393-C6 | 44.70 |
| .093 (3/32) | | .0930 | **.030** | .279 (3x) | 3 | 1/8 | 1-1/2 | 943893-C6 | 44.70 |
| .093 (3/32) | | .0930 | **.030** | .279 (3x) | 4 | 1/8 | 1-1/2 | 702693-C6 | 50.40 |
| .093 (3/32) | | .0930 | **.030** | .500 (5x) | 3 | 1/8 | 2-1/2 | 871493-C6 | 55.30 |
| | 2.5 mm | .0984 | **.20 mm** | 3.70 mm (1.5x) | 3 | 4 mm | 50 mm | 984151-C6 | 38.70 |
| | 2.5 mm | .0984 | **.20 mm** | 7.50 mm (3x) | 3 | 4 mm | 50 mm | 979351-C6 | 41.80 |
| | 2.5 mm | .0984 | **.20 mm** | 7.50 mm (3x) | 4 | 4 mm | 50 mm | 722951-C6 | 47.20 |
| | 2.5 mm | .0984 | **.20 mm** | 12.00 mm (5x) | 3 | 4 mm | 50 mm | 965851-C6 | 51.20 |
| .100 | | .1000 | **.005** | .150 (1.5x) | 3 | 1/8 | 1-1/2 | 908800-C6 | 36.80 |
| .100 | | .1000 | **.005** | .300 (3x) | 3 | 1/8 | 1-1/2 | 936500-C6 | 36.80 |
| .100 | | .1000 | **.010** | .150 (1.5x) | 3 | 1/8 | 1-1/2 | 52300-C6 | 36.80 |
| .100 | | .1000 | **.010** | .300 (3x) | 3 | 1/8 | 1-1/2 | 46900-C6 | 36.80 |
| .100 | | .1000 | **.010** | .500 (5x) | 3 | 1/8 | 2-1/2 | 53700-C6 | 48.50 |
| .100 | | .1000 | **.015** | .150 (1.5x) | 3 | 1/8 | 1-1/2 | 907700-C6 | 41.80 |
| .100 | | .1000 | **.015** | .300 (3x) | 3 | 1/8 | 1-1/2 | 964200-C6 | 41.80 |
| .100 | | .1000 | **.020** | .150 (1.5x) | 3 | 1/8 | 1-1/2 | 931800-C6 | 44.50 |
| .100 | | .1000 | **.020** | .300 (3x) | 3 | 1/8 | 1-1/2 | 959300-C6 | 45.40 |
| .100 | | .1000 | **.030** | .150 (1.5x) | 3 | 1/8 | 1-1/2 | 929400-C6 | 45.50 |
| .100 | | .1000 | **.030** | .300 (3x) | 3 | 1/8 | 1-1/2 | 943900-C6 | 44.70 |
| .109 (7/64) | | .1090 | **.005** | .327 (3x) | 3 | 1/8 | 1-1/2 | 936502-C6 | 36.80 |
| .109 (7/64) | | .1090 | **.010** | .327 (3x) | 3 | 1/8 | 1-1/2 | 46902-C6 | 36.80 |
| .109 (7/64) | | .1090 | **.015** | .327 (3x) | 3 | 1/8 | 1-1/2 | 964202-C6 | 40.90 |
| .118 | | .1180 | **.010** | .177 (1.5x) | 3 | 1/8 | 1-1/2 | 52305-C6 | 36.80 |
| .118 | | .1180 | **.010** | .354 (3x) | 3 | 1/8 | 1-1/2 | 46905-C6 | 36.80 |

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# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | 3.0 mm | .1181 | **.20 mm** | 4.50 mm (1.5x) | 3 | 4 mm | 50 mm | 984157-C6 | 41.80 |
| | 3.0 mm | .1181 | **.20 mm** | 9.00 mm (3x) | 3 | 4 mm | 50 mm | 979357-C6 | 41.80 |
| | 3.0 mm | .1181 | **.20 mm** | 9.00 mm (3x) | 4 | 4 mm | 50 mm | 723057-C6 | 47.20 |
| | 3.0 mm | .1181 | **.20 mm** | 15.00 mm (5x) | 3 | 4 mm | 50 mm | 965857-C6 | 51.20 |
| | 3.0 mm | .1181 | **.50 mm** | 9.00 mm (3x) | 3 | 4 mm | 50 mm | 842557-C6 | 42.10 |
| | 3.0 mm | .1181 | **.50 mm** | 15.00 mm (5x) | 3 | 4 mm | 50 mm | 760957-C6 | 51.60 |
| | 3.0 mm | .1181 | **1.00 mm** | 9.00 mm (3x) | 3 | 4 mm | 50 mm | 842157-C6 | 49.10 |
| $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.030″ −.000″ +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .125 (1/8) | | .1250 | **.003** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 853708-C6 | 36.10 |
| .125 (1/8) | | .1250 | **.003** | .375 (3x) | 4 | 1/8 | 1-1/2 | 923708-C6 | 36.10 |
| .125 (1/8) | | .1250 | **.005** | .100 (0.8x) | 4 | 1/8 | 1-1/2 | 840608-C6 | 36.10 |
| .125 (1/8) | | .1250 | **.005** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 908908-C6 | 36.10 |
| .125 (1/8) | | .1250 | **.005** | .375 (3x) | 4 | 1/8 | 1-1/2 | 936508-C6 | 36.10 |
| .125 (1/8) | | .1250 | **.005** | .625 (5x) | 4 | 1/8 | 2-1/2 | 869108-C6 | 48.30 |
| .125 (1/8) | | .1250 | **.008** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 847908-C6 | 36.10 |
| .125 (1/8) | | .1250 | **.008** | .375 (3x) | 4 | 1/8 | 1-1/2 | 848508-C6 | 36.10 |
| .125 (1/8) | | .1250 | **.010** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 913008-C6 | 33.40 |
| .125 (1/8) | | .1250 | **.010** | .375 (3x) | 4 | 1/8 | 1-1/2 | 950808-C6 | 33.40 |
| .125 (1/8) | | .1250 | **.010** | .625 (5x) | 4 | 1/8 | 2-1/2 | 869908-C6 | 48.30 |
| .125 (1/8) | | .1250 | **.015** | .100 (0.8x) | 4 | 1/8 | 1-1/2 | 954308-C6 | 37.50 |
| .125 (1/8) | | .1250 | **.015** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 52308-C6 | 33.40 |
| .125 (1/8) | | .1250 | **.015** | .375 (3x) | 4 | 1/8 | 1-1/2 | 46908-C6 | 33.40 |
| .125 (1/8) | | .1250 | **.015** | .500 (4x) | 4 | 1/8 | 2-1/2 | 796408-C6 | 41.40 |
| .125 (1/8) | | .1250 | **.015** | .625 (5x) | 4 | 1/8 | 2-1/2 | 53708-C6 | 47.20 |
| .125 (1/8) | | .1250 | **.020** | .100 (0.8x) | 4 | 1/8 | 1-1/2 | 816408-C6 | 37.80 |
| .125 (1/8) | | .1250 | **.020** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 931808-C6 | 40.50 |
| .125 (1/8) | | .1250 | **.020** | .375 (3x) | 4 | 1/8 | 1-1/2 | 959308-C6 | 40.50 |
| .125 (1/8) | | .1250 | **.020** | .625 (5x) | 4 | 1/8 | 2-1/2 | 870708-C6 | 54.90 |
| .125 (1/8) | | .1250 | **.025** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 749408-C6 | 41.50 |
| .125 (1/8) | | .1250 | **.025** | .375 (3x) | 4 | 1/8 | 1-1/2 | 848908-C6 | 40.70 |
| .125 (1/8) | | .1250 | **.030** | .100 (0.8x) | 4 | 1/8 | 1-1/2 | 718630-C6 | 42.70 |
| .125 (1/8) | | .1250 | **.030** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 929408-C6 | 40.70 |
| .125 (1/8) | | .1250 | **.030** | .375 (3x) | 4 | 1/8 | 1-1/2 | 943908-C6 | 40.70 |
| .125 (1/8) | | .1250 | **.030** | .625 (5x) | 4 | 1/8 | 2-1/2 | 871508-C6 | 55.10 |
| .125 (1/8) | | .1250 | **.040** | .375 (3x) | 4 | 1/8 | 1-1/2 | 844008-C6 | 44.50 |
| NEW .140 (9/64) | | .1406 | **.005** | .425 (3x) | 4 | 3/16 | 2 | 936505-C6 | 43.70 |
| .140 (9/64) | | .1406 | **.010** | .425 (3x) | 4 | 3/16 | 2 | 950809-C6 | 43.70 |
| .140 (9/64) | | .1406 | **.015** | .112 (0.8x) | 4 | 3/16 | 2 | 954309-C6 | 44.80 |
| .140 (9/64) | | .1406 | **.015** | .220 (1.5x) | 4 | 3/16 | 2 | 52309-C6 | 43.10 |
| .140 (9/64) | | .1406 | **.015** | .425 (3x) | 4 | 3/16 | 2 | 46909-C6 | 44.00 |
| .140 (9/64) | | .1406 | **.015** | .750 (5x) | 4 | 3/16 | 3 | 53709-C6 | 55.80 |
| .140 (9/64) | | .1406 | **.020** | .425 (3x) | 4 | 3/16 | 2 | 959309-C6 | 44.80 |
| .140 (9/64) | | .1406 | **.030** | .425 (3x) | 4 | 3/16 | 2 | 943909-C6 | 44.80 |

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NEW SIZES!

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.030″ −.000″ +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .156 (5/32) | | .1562 | **.005** | .235 (1.5x) | 4 | 3/16 | 2 | 908956-C6 | 39.10 |
| .156 (5/32) | | .1562 | **.005** | .470 (3x) | 4 | 3/16 | 2 | 936510-C6 | 39.10 |
| .156 (5/32) | | .1562 | **.010** | .235 (1.5x) | 4 | 3/16 | 2 | 913010-C6 | 36.50 |
| .156 (5/32) | | .1562 | **.010** | .470 (3x) | 4 | 3/16 | 2 | 950810-C6 | 36.50 |
| .156 (5/32) | | .1562 | **.010** | .750 (5x) | 4 | 3/16 | 3 | 869910-C6 | 51.30 |
| .156 (5/32) | | .1562 | **.015** | .125 (0.8x) | 4 | 3/16 | 2 | 954310-C6 | 40.60 |
| .156 (5/32) | | .1562 | **.015** | .235 (1.5x) | 4 | 3/16 | 2 | 52310-C6 | 39.10 |
| .156 (5/32) | | .1562 | **.015** | .470 (3x) | 4 | 3/16 | 2 | 46910-C6 | 39.10 |
| .156 (5/32) | | .1562 | **.015** | .750 (5x) | 4 | 3/16 | 3 | 53710-C6 | 52.40 |
| .156 (5/32) | | .1562 | **.020** | .470 (3x) | 4 | 3/16 | 2 | 959310-C6 | 39.10 |
| .156 (5/32) | | .1562 | **.025** | .470 (3x) | 4 | 3/16 | 2 | 848910-C6 | 39.10 |
| .156 (5/32) | | .1562 | **.030** | .235 (1.5x) | 4 | 3/16 | 2 | 929410-C6 | 36.50 |
| .156 (5/32) | | .1562 | **.030** | .470 (3x) | 4 | 3/16 | 2 | 943910-C6 | 36.50 |
| .156 (5/32) | | .1562 | **.030** | .750 (5x) | 4 | 3/16 | 3 | 871510-C6 | 51.30 |
| | 4.0 mm | .1574 | **.40 mm** | 6.00 mm (1.5x) | 4 | 6 mm | 63 mm | 984161-C6 | 44.80 |
| | 4.0 mm | .1574 | **.40 mm** | 12.00 mm (3x) | 4 | 6 mm | 63 mm | 979361-C6 | 44.80 |
| .187 (3/16) | | .1875 | **.005** | .285 (1.5x) | 4 | 3/16 | 2 | 908910-C6 | 39.10 |
| .187 (3/16) | | .1875 | **.005** | .562 (3x) | 4 | 3/16 | 2 | 936512-C6 | 39.10 |
| .187 (3/16) | | .1875 | **.005** | 1.000 (5x) | 4 | 3/16 | 3 | 869112-C6 | 51.80 |
| .187 (3/16) | | .1875 | **.008** | .562 (3x) | 4 | 3/16 | 2 | 848512-C6 | 39.10 |
| .187 (3/16) | | .1875 | **.010** | .150 (0.8x) | 4 | 3/16 | 2 | 763212-C6 | 42.60 |
| .187 (3/16) | | .1875 | **.010** | .285 (1.5x) | 4 | 3/16 | 2 | 913012-C6 | 36.20 |
| .187 (3/16) | | .1875 | **.010** | .562 (3x) | 4 | 3/16 | 2 | 950812-C6 | 36.50 |
| .187 (3/16) | | .1875 | **.010** | 1.000 (5x) | 4 | 3/16 | 3 | 869912-C6 | 52.40 |
| .187 (3/16) | | .1875 | **.015** | .150 (0.8x) | 4 | 3/16 | 2 | 954312-C6 | 40.60 |
| .187 (3/16) | | .1875 | **.015** | .285 (1.5x) | 4 | 3/16 | 2 | 52312-C6 | 36.20 |
| .187 (3/16) | | .1875 | **.015** | .562 (3x) | 4 | 3/16 | 2 | 46912-C6 | 36.50 |
| .187 (3/16) | | .1875 | **.015** | .750 (4x) | 4 | 3/16 | 3 | 796412-C6 | 44.30 |
| .187 (3/16) | | .1875 | **.015** | 1.000 (5x) | 4 | 3/16 | 3 | 53712-C6 | 52.40 |
| .187 (3/16) | | .1875 | **.020** | .150 (0.8x) | 4 | 3/16 | 2 | 816412-C6 | 49.30 |
| .187 (3/16) | | .1875 | **.020** | .285 (1.5x) | 4 | 3/16 | 2 | 931812-C6 | 43.00 |
| .187 (3/16) | | .1875 | **.020** | .562 (3x) | 4 | 3/16 | 2 | 959312-C6 | 43.00 |
| .187 (3/16) | | .1875 | **.020** | 1.000 (5x) | 4 | 3/16 | 3 | 870712-C6 | 49.10 |
| .187 (3/16) | | .1875 | **.025** | .285 (1.5x) | 4 | 3/16 | 2 | 749412-C6 | 43.30 |
| .187 (3/16) | | .1875 | **.025** | .562 (3x) | 4 | 3/16 | 2 | 848912-C6 | 51.80 |
| .187 (3/16) | | .1875 | **.030** | .285 (1.5x) | 4 | 3/16 | 2 | 929412-C6 | 43.30 |
| .187 (3/16) | | .1875 | **.030** | .562 (3x) | 4 | 3/16 | 2 | 943912-C6 | 44.70 |
| .187 (3/16) | | .1875 | **.030** | 1.000 (5x) | 4 | 3/16 | 3 | 871512-C6 | 51.80 |
| .187 (3/16) | | .1875 | **.040** | .562 (3x) | 4 | 3/16 | 2 | 844012-C6 | 48.30 |
| .187 (3/16) | | .1875 | **.045** | .285 (1.5x) | 4 | 3/16 | 2 | 857612-C6 | 47.20 |
| .187 (3/16) | | .1875 | **.045** | .562 (3x) | 4 | 3/16 | 2 | 864512-C6 | 47.20 |
| .187 (3/16) | | .1875 | **.060** | .285 (1.5x) | 4 | 3/16 | 2 | 845412-C6 | 43.00 |
| .187 (3/16) | | .1875 | **.060** | .562 (3x) | 4 | 3/16 | 2 | 885612-C6 | 43.00 |
| .187 (3/16) | | .1875 | **.060** | 1.000 (5x) | 4 | 3/16 | 3 | 804412-C6 | 48.00 |
| | 5.0 mm | .1968 | **.40 mm** | 7.50 mm (1.5x) | 4 | 6 mm | 63 mm | 984164-C6 | 44.80 |
| | 5.0 mm | .1968 | **.40 mm** | 15.00 mm (3x) | 4 | 6 mm | 63 mm | 979364-C6 | 44.80 |
| | 5.0 mm | .1968 | **1.00 mm** | 7.50 mm (1.5x) | 4 | 6 mm | 63 mm | 752464-C6 | 45.30 |
| | 5.0 mm | .1968 | **1.00 mm** | 15.00 mm (3x) | 4 | 6 mm | 63 mm | 752964-C6 | 45.30 |
| | 6.0 mm | .2362 | **.40 mm** | 9.00 mm (1.5x) | 4 | 6 mm | 63 mm | 984166-C6 | 45.30 |
| | 6.0 mm | .2362 | **.40 mm** | 18.00 mm (3x) | 4 | 6 mm | 63 mm | 979366-C6 | 45.30 |

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# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | +.00mm −.04mm decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.030″ −.000″ +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .250 (1/4) | .2500 | **.005** | .375 (1.5x) | 4 | 1/4 | 2-1/2 | 908916-C6 | 48.90 |
| .250 (1/4) | .2500 | **.005** | .750 (3x) | 4 | 1/4 | 2-1/2 | 936516-C6 | 48.90 |
| .250 (1/4) | .2500 | **.008** | .750 (3x) | 4 | 1/4 | 2-1/2 | 848516-C6 | 48.90 |
| .250 (1/4) | .2500 | **.010** | .375 (1.5x) | 4 | 1/4 | 2-1/2 | 913016-C6 | 45.80 |
| .250 (1/4) | .2500 | **.010** | .750 (3x) | 4 | 1/4 | 2-1/2 | 950816-C6 | 45.80 |
| .250 (1/4) | .2500 | **.015** | .200 (0.8x) | 4 | 1/4 | 2-1/2 | 954316-C6 | 51.20 |
| .250 (1/4) | .2500 | **.015** | .375 (1.5x) | 4 | 1/4 | 2-1/2 | 52316-C6 | 46.10 |
| .250 (1/4) | .2500 | **.015** | .750 (3x) | 4 | 1/4 | 2-1/2 | 46916-C6 | 46.10 |
| .250 (1/4) | .2500 | **.015** | 1.250 (5x) | 4 | 1/4 | 4 | 53716-C6 | 64.80 |
| .250 (1/4) | .2500 | **.020** | .200 (0.8x) | 4 | 1/4 | 2-1/2 | 816416-C6 | 57.70 |
| .250 (1/4) | .2500 | **.020** | .375 (1.5x) | 4 | 1/4 | 2-1/2 | 931816-C6 | 52.10 |
| .250 (1/4) | .2500 | **.020** | .750 (3x) | 4 | 1/4 | 2-1/2 | 959316-C6 | 52.60 |
| .250 (1/4) | .2500 | **.025** | .750 (3x) | 4 | 1/4 | 2-1/2 | 848916-C6 | 52.60 |
| .250 (1/4) | .2500 | **.030** | .375 (1.5x) | 4 | 1/4 | 2-1/2 | 929416-C6 | 52.60 |
| .250 (1/4) | .2500 | **.030** | .750 (3x) | 4 | 1/4 | 2-1/2 | 943916-C6 | 52.10 |
| .250 (1/4) | .2500 | **.030** | 1.250 (5x) | 4 | 1/4 | 4 | 871516-C6 | 61.10 |
| .250 (1/4) | .2500 | **.040** | .750 (3x) | 4 | 1/4 | 2-1/2 | 844016-C6 | 57.40 |
| .250 (1/4) | .2500 | **.045** | .750 (3x) | 4 | 1/4 | 2-1/2 | 864516-C6 | 58.30 |
| .250 (1/4) | .2500 | **.060** | .375 (1.5x) | 4 | 1/4 | 2-1/2 | 845416-C6 | 52.60 |
| .250 (1/4) | .2500 | **.060** | .750 (3x) | 4 | 1/4 | 2-1/2 | 885616-C6 | 52.60 |
| .312 (5/16) | .3125 | **.015** | .470 (1.5x) | 4 | 5/16 | 2-1/2 | 52320-C6 | 66.10 |
| .312 (5/16) | .3125 | **.015** | 1.000 (3x) | 4 | 5/16 | 2-1/2 | 46920-C6 | 66.70 |
| .375 (3/8) | .3750 | **.015** | .570 (1.5x) | 4 | 3/8 | 2-1/2 | 52324-C6 | 76.20 |
| .375 (3/8) | .3750 | **.015** | 1.125 (3x) | 4 | 3/8 | 2-1/2 | 46924-C6 | 77.00 |
| .375 (3/8) | .3750 | **.020** | .570 (1.5x) | 4 | 3/8 | 2-1/2 | 931824-C6 | 82.60 |
| .375 (3/8) | .3750 | **.030** | .570 (1.5x) | 4 | 3/8 | 2-1/2 | 929424-C6 | 82.60 |
| .375 (3/8) | .3750 | **.030** | 1.125 (3x) | 4 | 3/8 | 2-1/2 | 943924-C6 | 85.00 |
| .375 (3/8) | .3750 | **.040** | 1.125 (3x) | 4 | 3/8 | 2-1/2 | 844024-C6 | 85.00 |
| .500 (1/2) | .5000 | **.015** | .750 (1.5x) | 4 | 1/2 | 3 | 816232-C6 | 98.50 |
| .500 (1/2) | .5000 | **.030** | .750 (1.5x) | 4 | 1/2 | 3 | 52332-C6 | 99.50 |
| .500 (1/2) | .5000 | **.030** | 1.500 (3x) | 4 | 1/2 | 3 | 843932-C6 | 98.50 |
| .500 (1/2) | .5000 | **.060** | .750 (1.5x) | 4 | 1/2 | 3 | 845532-C6 | 98.50 |



## Speeds & Feeds (Variable Helix For High Temp Alloys)

**Important Note**:Values in table are in inches and are based on 4 flute, standard (3x Dia) length of cut end mills. For 3 flutes, table values of IPT must be increased to 105% before adjustments for different lengths of cut. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase to 115%; for 1.5x, increase to 108%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material | Hardness (HBn) | SFM |
|---|---|---|
| **Stainless Steels**: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7<br>**Tool Steels**: D, H, M, T, S series | 275 - 300 | 160 |
| | 300 - 350 | 140 |
| | 350 - 400 | 100 |
| | 400 - 425 | 80 |
| **Titanium**: All alloys | 275 - 300 | 200 |
| | 300 - 350 | 125 |
| | 350 - 400 | 75 |
| | 400 - 425 | 75 |
| **Nickel Alloys**: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy | 275 - 300 | 80 |
| | 300 - 350 | 60 |
| | 350 - 400 | 50 |
| | 400 - 425 | 40 |

| Chip Load Per Tooth (IPT) By Cutter Diameter | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Slotting | .00005 | .00010 | .00016 | .00020 | .00026 | .00031 | .00041 | .00062 | .00083 | .00108 | .00130 | .00173 |
| Roughing | .00006 | .00013 | .00020 | .00026 | .00033 | .00039 | .00053 | .00079 | .00105 | .00138 | .00165 | .00221 |
| Finishing | .00008 | .00017 | .00026 | .00034 | .00043 | .00051 | .00069 | .00103 | .00138 | .00180 | .00217 | .00289 |
| Max | .00010 | .00020 | .00031 | .00041 | .00051 | .00061 | .00083 | .00123 | .00165 | .00216 | .00260 | .00347 |

**Radial Depth of Cut*:**
Slotting: 1x Dia
Roughing: .4x Dia
Finishing: .1x Dia

**Axial Depth of Cut*:**
Slotting: .4x Dia
Roughing: .5x - .7x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius – Chipbreaker



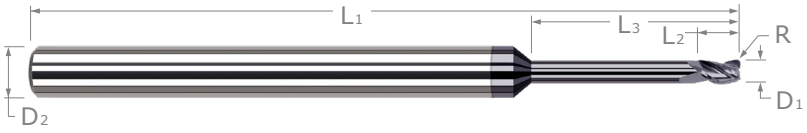

- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Chipbreaker geometry for efficient chip evacuation, reduced heat buildup, and prolonged tool life in high-temperature alloys
- Ti Nano coating offers extreme hardness for improved tool life and superior edge strength in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

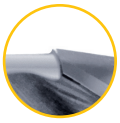


| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | Ti NANO COATED | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .125 (1/8) | .010 | .187 (1.5x) | 1/8 | 1-1/2 | 701708-C10 | 39.50 |
| .125 (1/8) | .010 | .375 (3x) | 1/8 | 1-1/2 | 701108-C10 | 39.50 |
| .187 (3/16) | .010 | .285 (1.5x) | 3/16 | 2 | 701712-C10 | 42.80 |
| .187 (3/16) | .010 | .562 (3x) | 3/16 | 2 | 701112-C10 | 42.80 |
| .250 (1/4) | .020 | .375 (1.5x) | 1/4 | 2-1/2 | 701516-C10 | 55.00 |
| .250 (1/4) | .020 | .750 (3x) | 1/4 | 2-1/2 | 700916-C10 | 55.00 |
| .312 (5/16) | .020 | .470 (1.5x) | 5/16 | 2-1/2 | 701520-C10 | 76.80 |
| .312 (5/16) | .020 | 1.000 (3x) | 5/16 | 2-1/2 | 700920-C10 | 76.80 |
| .375 (3/8) | .020 | .570 (1.5x) | 3/8 | 2-1/2 | 701524-C10 | 87.40 |
| .375 (3/8) | .020 | 1.125 (3x) | 3/8 | 2-1/2 | 700924-C10 | 87.40 |
| .500 (1/2) | .030 | .750 (1.5x) | 1/2 | 3 | 701332-C10 | 108.60 |
| .500 (1/2) | .030 | 1.500 (3x) | 1/2 | 3 | 700732-C10 | 108.60 |

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius – Long Reach, Stub Flute



Reduced Neck Diameter to Avoid Heeling

- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities • Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .015 (1/64) | | .0150 | **.003** | .022 | .045 (3x) | 3 | 1/8 | 1-1/2 | 947615-C6 | 71.60 |
| .015 (1/64) | | .0150 | **.003** | .022 | .078 (5x) | 3 | 1/8 | 2-1/2 | 64415-C6 | 72.00 |
| .015 (1/64) | | .0150 | **.003** | .022 | .125 (8x) | 3 | 1/8 | 2-1/2 | 54815-C6 | 72.80 |
| .015 (1/64) | | .0150 | **.003** | .022 | .187 (12x) | 3 | 1/8 | 2-1/2 | 63015-C6 | 80.30 |
| .015 (1/64) | | .0150 | **.003** | .022 | .225 (15x) | 3 | 1/8 | 2-1/2 | 968915-C6 | 88.10 |
| | .4 mm | .0157 | **.08 mm** | .60 mm | 2.0 mm (5x) | 3 | 4 mm | 50 mm | 980709-C6 | 79.90 |
| | .4 mm | .0157 | **.08 mm** | .60 mm | 3.2 mm (8x) | 3 | 4 mm | 50 mm | 975009-C6 | 82.50 |
| | .4 mm | .0157 | **.08 mm** | .60 mm | 4.8 mm (12x) | 3 | 4 mm | 50 mm | 987309-C6 | 88.10 |
| | .5 mm | .0196 | **.10 mm** | .75 mm | 2.5 mm (5x) | 3 | 4 mm | 50 mm | 980711-C6 | 76.80 |
| | .5 mm | .0196 | **.10 mm** | .75 mm | 4.0 mm (8x) | 3 | 4 mm | 50 mm | 975011-C6 | 79.20 |
| | .5 mm | .0196 | **.10 mm** | .75 mm | 6.0 mm (12x) | 3 | 4 mm | 50 mm | 987311-C6 | 85.50 |
| | .5 mm | .0196 | **.10 mm** | .75 mm | 8.0 mm (16x) | 3 | 4 mm | 50 mm | 971511-C6 | 89.50 |
| .020 | | .0200 | **.004** | .030 | .060 (3x) | 3 | 1/8 | 1-1/2 | 947620-C6 | 68.10 |
| .020 | | .0200 | **.004** | .030 | .100 (5x) | 3 | 1/8 | 2-1/2 | 64420-C6 | 68.10 |
| .020 | | .0200 | **.004** | .030 | .160 (8x) | 3 | 1/8 | 2-1/2 | 54820-C6 | 69.50 |
| .020 | | .0200 | **.004** | .030 | .200 (10x) | 3 | 1/8 | 2-1/2 | 932520-C6 | 73.80 |
| .020 | | .0200 | **.004** | .030 | .250 (12x) | 3 | 1/8 | 2-1/2 | 63020-C6 | 76.70 |
| | .6 mm | .0236 | **.10 mm** | .90 mm | 3.0 mm (5x) | 3 | 4 mm | 50 mm | 980713-C6 | 76.10 |
| | .6 mm | .0236 | **.10 mm** | .90 mm | 4.8 mm (8x) | 3 | 4 mm | 50 mm | 975013-C6 | 77.40 |
| | .6 mm | .0236 | **.10 mm** | .90 mm | 7.2 mm (12x) | 3 | 4 mm | 50 mm | 987313-C6 | 82.80 |
| .025 | | .0250 | **.004** | .038 | .075 (3x) | 3 | 1/8 | 1-1/2 | 947625-C6 | 66.00 |
| .025 | | .0250 | **.004** | .038 | .125 (5x) | 3 | 1/8 | 2-1/2 | 64425-C6 | 66.50 |
| .025 | | .0250 | **.004** | .038 | .203 (8x) | 3 | 1/8 | 2-1/2 | 54825-C6 | 67.90 |
| .025 | | .0250 | **.004** | .038 | .312 (12x) | 3 | 1/8 | 2-1/2 | 63025-C6 | 74.80 |
| .031 (1/32) | | .0310 | **.005** | .047 | .093 (3x) | 3 | 1/8 | 1-1/2 | 947631-C6 | 61.80 |
| .031 (1/32) | | .0310 | **.005** | .047 | .156 (5x) | 3 | 1/8 | 2-1/2 | 64431-C6 | 63.00 |
| .031 (1/32) | | .0310 | **.005** | .047 | .156 (5x) | 4 | 1/8 | 2-1/2 | 812131-C6 | 66.10 |
| .031 (1/32) | | .0310 | **.005** | .047 | .187 (6x) | 3 | 1/8 | 2-1/2 | 796131-C6 | 66.10 |
| .031 (1/32) | | .0310 | **.005** | .047 | .250 (8x) | 3 | 1/8 | 2-1/2 | 54831-C6 | 64.50 |
| .031 (1/32) | | .0310 | **.005** | .047 | .312 (10x) | 3 | 1/8 | 2-1/2 | 932531-C6 | 66.10 |
| .031 (1/32) | | .0310 | **.005** | .047 | .375 (12x) | 3 | 1/8 | 2-1/2 | 63031-C6 | 67.20 |
| .031 (1/32) | | .0310 | **.005** | .047 | .470 (15x) | 3 | 1/8 | 2-1/2 | 968931-C6 | 74.70 |
| .031 (1/32) | | .0310 | **.010** | .047 | .156 (5x) | 3 | 1/8 | 2-1/2 | 917331-C6 | 60.50 |
| .031 (1/32) | | .0310 | **.010** | .047 | .250 (8x) | 3 | 1/8 | 2-1/2 | 908631-C6 | 63.60 |
| | .8 mm | .0314 | **.10 mm** | 1.20 mm | 4.0 mm (5x) | 3 | 4 mm | 50 mm | 980718-C6 | 69.20 |
| | .8 mm | .0314 | **.10 mm** | 1.20 mm | 6.5 mm (8x) | 3 | 4 mm | 50 mm | 975018-C6 | 71.90 |
| | .8 mm | .0314 | **.10 mm** | 1.20 mm | 9.5 mm (12x) | 3 | 4 mm | 50 mm | 987318-C6 | 73.80 |

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# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $D_1$ +.00mm −.02mm | $D_1$ decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .035 | | .0350 | **.005** | .053 | .105 (3x) | 3 | 1/8 | 1-1/2 | 947635-C6 | 61.80 |
| .035 | | .0350 | **.005** | .053 | .187 (5x) | 3 | 1/8 | 2-1/2 | 64435-C6 | 63.70 |
| .035 | | .0350 | **.005** | .053 | .281 (8x) | 3 | 1/8 | 2-1/2 | 54835-C6 | 64.50 |
| .035 | | .0350 | **.005** | .053 | .350 (10x) | 3 | 1/8 | 2-1/2 | 932535-C6 | 67.20 |
| | 1.0 mm | .0393 | **.10 mm** | 1.50 mm | 5.0 mm (5x) | 3 | 4 mm | 50 mm | 980722-C6 | 69.20 |
| | 1.0 mm | .0393 | **.10 mm** | 1.50 mm | 8.0 mm (8x) | 3 | 4 mm | 50 mm | 975022-C6 | 71.10 |
| | 1.0 mm | .0393 | **.10 mm** | 1.50 mm | 12.0 mm (12x) | 3 | 4 mm | 50 mm | 987322-C6 | 73.20 |
| | 1.0 mm | .0393 | **.10 mm** | 1.50 mm | 16.0 mm (16x) | 3 | 4 mm | 50 mm | 971522-C6 | 77.90 |
| .040 | | .0400 | **.005** | .060 | .120 (3x) | 3 | 1/8 | 1-1/2 | 947640-C6 | 61.80 |
| .040 | | .0400 | **.005** | .060 | .203 (5x) | 3 | 1/8 | 2-1/2 | 64440-C6 | 63.00 |
| .040 | | .0400 | **.005** | .060 | .325 (8x) | 3 | 1/8 | 2-1/2 | 54840-C6 | 64.50 |
| .045 | | .0450 | **.005** | .068 | .135 (3x) | 3 | 1/8 | 1-1/2 | 947645-C6 | 63.00 |
| .045 | | .0450 | **.005** | .068 | .225 (5x) | 3 | 1/8 | 2-1/2 | 64445-C6 | 63.00 |
| .045 | | .0450 | **.005** | .068 | .375 (8x) | 3 | 1/8 | 2-1/2 | 54845-C6 | 64.50 |
| .047 (3/64) | | .0470 | **.005** | .070 | .141 (3x) | 3 | 1/8 | 1-1/2 | 947647-C6 | 61.80 |
| .047 (3/64) | | .0470 | **.005** | .070 | .250 (5x) | 3 | 1/8 | 2-1/2 | 64447-C6 | 63.00 |
| .047 (3/64) | | .0470 | **.005** | .070 | .281 (6x) | 3 | 1/8 | 2-1/2 | 796147-C6 | 63.00 |
| .047 (3/64) | | .0470 | **.005** | .070 | .375 (8x) | 3 | 1/8 | 2-1/2 | 54847-C6 | 64.50 |
| .047 (3/64) | | .0470 | **.005** | .070 | .570 (12x) | 3 | 1/8 | 2-1/2 | 63047-C6 | 67.20 |
| .047 (3/64) | | .0470 | **.005** | .070 | .710 (15x) | 3 | 1/8 | 2-1/2 | 968947-C6 | 74.10 |
| .047 (3/64) | | .0470 | **.010** | .070 | .250 (5x) | 3 | 1/8 | 2-1/2 | 917347-C6 | 63.00 |
| .047 (3/64) | | .0470 | **.010** | .070 | .375 (8x) | 3 | 1/8 | 2-1/2 | 908647-C6 | 65.00 |
| .050 | | .0500 | **.005** | .075 | .150 (3x) | 3 | 1/8 | 1-1/2 | 947650-C6 | 63.00 |
| .050 | | .0500 | **.005** | .075 | .250 (5x) | 3 | 1/8 | 2-1/2 | 64450-C6 | 62.10 |
| .050 | | .0500 | **.005** | .075 | .400 (8x) | 3 | 1/8 | 2-1/2 | 54850-C6 | 63.60 |
| .055 | | .0550 | **.005** | .083 | .275 (5x) | 3 | 1/8 | 2-1/2 | 64455-C6 | 63.40 |
| .055 | | .0550 | **.005** | .083 | .450 (8x) | 3 | 1/8 | 2-1/2 | 54855-C6 | 63.60 |
| | 1.5 mm | .0590 | **.20 mm** | 2.20 mm | 7.5 mm (5x) | 3 | 4 mm | 50 mm | 980733-C6 | 69.20 |
| | 1.5 mm | .0590 | **.20 mm** | 2.20 mm | 12.0 mm (8x) | 3 | 4 mm | 50 mm | 975033-C6 | 71.90 |
| | 1.5 mm | .0590 | **.20 mm** | 2.20 mm | 18.0 mm (12x) | 3 | 4 mm | 50 mm | 987333-C6 | 73.80 |
| | 1.5 mm | .0590 | **.20 mm** | 2.20 mm | 24.0 mm (16x) | 3 | 4 mm | 63 mm | 971533-C6 | 77.90 |
| .060 | | .0600 | **.005** | .090 | .312 (5x) | 3 | 1/8 | 2-1/2 | 919860-C6 | 63.40 |
| .060 | | .0600 | **.005** | .090 | .500 (8x) | 3 | 1/8 | 2-1/2 | 915360-C6 | 64.80 |
| .060 | | .0600 | **.010** | .090 | .312 (5x) | 3 | 1/8 | 2-1/2 | 64460-C6 | 62.10 |
| .060 | | .0600 | **.010** | .090 | .500 (8x) | 3 | 1/8 | 2-1/2 | 54860-C6 | 63.60 |
| .060 | | .0600 | **.010** | .090 | .625 (10x) | 3 | 1/8 | 2-1/2 | 932560-C6 | 67.20 |
| .062 (1/16) | | .0620 | **.005** | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 919862-C6 | 60.50 |
| .062 (1/16) | | .0620 | **.005** | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 915362-C6 | 63.60 |
| .062 (1/16) | | .0620 | **.005** | .093 | .625 (10x) | 3 | 1/8 | 2-1/2 | 884462-C6 | 64.30 |
| .062 (1/16) | | .0620 | **.010** | .093 | .186 (3x) | 3 | 1/8 | 1-1/2 | 947662-C6 | 60.50 |
| .062 (1/16) | | .0620 | **.010** | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 64462-C6 | 62.10 |
| .062 (1/16) | | .0620 | **.010** | .093 | .312 (5x) | 4 | 1/8 | 2-1/2 | 811862-C6 | 64.50 |
| .062 (1/16) | | .0620 | **.010** | .093 | .375 (6x) | 3 | 1/8 | 2-1/2 | 795962-C6 | 64.50 |
| .062 (1/16) | | .0620 | **.010** | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 54862-C6 | 63.60 |
| .062 (1/16) | | .0620 | **.010** | .093 | .625 (10x) | 3 | 1/8 | 2-1/2 | 932562-C6 | 66.10 |
| .062 (1/16) | | .0620 | **.010** | .093 | .750 (12x) | 3 | 1/8 | 2-1/2 | 63062-C6 | 67.20 |
| .062 (1/16) | | .0620 | **.010** | .093 | .950 (15x) | 3 | 1/8 | 2-1/2 | 968962-C6 | 74.70 |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .062 (1/16) | | .0620 | **.015** | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 902662-C6 | 61.70 |
| .062 (1/16) | | .0620 | **.015** | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 912062-C6 | 63.60 |
| .062 (1/16) | | .0620 | **.020** | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 866862-C6 | 62.50 |
| .062 (1/16) | | .0620 | **.020** | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 847562-C6 | 64.80 |
| .078 (5/64) | | .0780 | **.005** | .117 | .406 (5x) | 3 | 1/8 | 2-1/2 | 919878-C6 | 62.10 |
| .078 (5/64) | | .0780 | **.005** | .117 | .625 (8x) | 3 | 1/8 | 2-1/2 | 915378-C6 | 63.60 |
| .078 (5/64) | | .0780 | **.010** | .117 | .234 (3x) | 3 | 1/8 | 1-1/2 | 947678-C6 | 61.70 |
| .078 (5/64) | | .0780 | **.010** | .117 | .406 (5x) | 3 | 1/8 | 2-1/2 | 64478-C6 | 62.10 |
| .078 (5/64) | | .0780 | **.010** | .117 | .406 (5x) | 4 | 1/8 | 2-1/2 | 811878-C6 | 64.50 |
| .078 (5/64) | | .0780 | **.010** | .117 | .475 (6x) | 3 | 1/8 | 2-1/2 | 795978-C6 | 62.10 |
| .078 (5/64) | | .0780 | **.010** | .117 | .625 (8x) | 3 | 1/8 | 2-1/2 | 54878-C6 | 63.60 |
| .078 (5/64) | | .0780 | **.010** | .117 | .940 (12x) | 3 | 1/8 | 2-1/2 | 63078-C6 | 67.20 |
| .078 (5/64) | | .0780 | **.010** | .117 | 1.187 (15x) | 3 | 1/8 | 2-1/2 | 968978-C6 | 74.70 |
| | 2.0 mm | .0787 | **.20 mm** | 3.00 mm | 10.0 mm (5x) | 3 | 4 mm | 50 mm | 980745-C6 | 70.10 |
| | 2.0 mm | .0787 | **.20 mm** | 3.00 mm | 16.0 mm (8x) | 3 | 4 mm | 50 mm | 975045-C6 | 71.10 |
| | 2.0 mm | .0787 | **.20 mm** | 3.00 mm | 24.0 mm (12x) | 3 | 4 mm | 63 mm | 987345-C6 | 73.80 |
| | 2.0 mm | .0787 | **.20 mm** | 3.00 mm | 32.0 mm (16x) | 3 | 4 mm | 63 mm | 971545-C6 | 77.90 |
| .093 (3/32) | | .0930 | **.005** | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 919893-C6 | 60.50 |
| .093 (3/32) | | .0930 | **.005** | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 915393-C6 | 64.80 |
| .093 (3/32) | | .0930 | **.010** | .139 | .279 (3x) | 3 | 1/8 | 1-1/2 | 947693-C6 | 60.50 |
| .093 (3/32) | | .0930 | **.010** | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 64493-C6 | 62.10 |
| .093 (3/32) | | .0930 | **.010** | .139 | .500 (5x) | 4 | 1/8 | 2-1/2 | 811893-C6 | 64.50 |
| .093 (3/32) | | .0930 | **.010** | .139 | .585 (6x) | 3 | 1/8 | 2-1/2 | 795993-C6 | 62.10 |
| .093 (3/32) | | .0930 | **.010** | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 54893-C6 | 63.60 |
| .093 (3/32) | | .0930 | **.010** | .139 | .950 (10x) | 3 | 1/8 | 2-1/2 | 932593-C6 | 66.10 |
| .093 (3/32) | | .0930 | **.010** | .139 | 1.125 (12x) | 3 | 1/8 | 2-1/2 | 63093-C6 | 67.20 |
| .093 (3/32) | | .0930 | **.010** | .139 | 1.400 (15x) | 3 | 1/8 | 3 | 968993-C6 | 74.10 |
| .093 (3/32) | | .0930 | **.015** | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 902693-C6 | 60.50 |
| .093 (3/32) | | .0930 | **.015** | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 912093-C6 | 64.80 |
| .093 (3/32) | | .0930 | **.020** | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 866893-C6 | 62.50 |
| .093 (3/32) | | .0930 | **.020** | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 847593-C6 | 64.80 |
| .093 (3/32) | | .0930 | **.030** | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 910193-C6 | 61.70 |
| .093 (3/32) | | .0930 | **.030** | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 906493-C6 | 63.60 |
| .100 | | .1000 | **.010** | .150 | .500 (5x) | 3 | 1/8 | 2-1/2 | 64500-C6 | 61.40 |
| .100 | | .1000 | **.010** | .150 | .800 (8x) | 3 | 1/8 | 2-1/2 | 54900-C6 | 63.20 |
| | 3.0 mm | .1181 | **.20 mm** | 4.50 mm | 15.0 mm (5x) | 3 | 4 mm | 50 mm | 980757-C6 | 65.80 |
| | 3.0 mm | .1181 | **.20 mm** | 4.50 mm | 24.0 mm (8x) | 3 | 4 mm | 50 mm | 975057-C6 | 65.90 |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Corner Radius – Long Reach, Stub Flute (cont.)

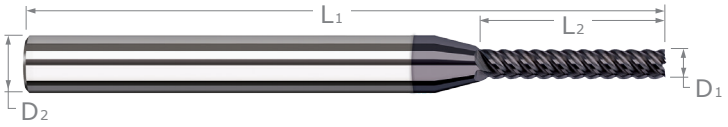
continued from previous page

| CUTTER DIAMETER | | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | decimal equivalent | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .125 (1/8) | .1250 | **.005** | .187 | .625 (5x) | 4 | 1/8 | 2-1/2 | 919908-C6 | 57.00 |
| .125 (1/8) | .1250 | **.005** | .187 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 915408-C6 | 59.90 |
| .125 (1/8) | .1250 | **.010** | .187 | .625 (5x) | 4 | 1/8 | 2-1/2 | 917408-C6 | 60.10 |
| .125 (1/8) | .1250 | **.010** | .187 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 908708-C6 | 63.20 |
| .125 (1/8) | .1250 | **.015** | .187 | .375 (3x) | 4 | 1/8 | 1-1/2 | 947708-C6 | 57.80 |
| .125 (1/8) | .1250 | **.015** | .187 | .625 (5x) | 4 | 1/8 | 2-1/2 | 64508-C6 | 61.40 |
| .125 (1/8) | .1250 | **.015** | .187 | .750 (6x) | 4 | 1/8 | 2-1/2 | 795808-C6 | 62.50 |
| .125 (1/8) | .1250 | **.015** | .187 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 54908-C6 | 63.20 |
| .125 (1/8) | .1250 | **.015** | .187 | 1.250 (10x) | 4 | 1/8 | 2-1/2 | 932608-C6 | 66.10 |
| .125 (1/8) | .1250 | **.015** | .187 | 1.500 (12x) | 4 | 1/8 | 3 | 63108-C6 | 67.20 |
| .125 (1/8) | .1250 | **.020** | .187 | .625 (5x) | 4 | 1/8 | 2-1/2 | 866908-C6 | 61.10 |
| .125 (1/8) | .1250 | **.020** | .187 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 847608-C6 | 63.20 |
| .125 (1/8) | .1250 | **.030** | .187 | .625 (5x) | 4 | 1/8 | 2-1/2 | 910208-C6 | 60.10 |
| .125 (1/8) | .1250 | **.030** | .187 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 906508-C6 | 63.20 |
| .140 (9/64) | .1406 | **.015** | .220 | .750 (5x) | 4 | 3/16 | 3 | 64509-C6 | 69.20 |
| .140 (9/64) | .1406 | **.015** | .220 | 1.125 (8x) | 4 | 3/16 | 3 | 54909-C6 | 70.60 |
| .156 (5/32) | .1562 | **.010** | .235 | .750 (5x) | 4 | 3/16 | 3 | 917410-C6 | 67.90 |
| .156 (5/32) | .1562 | **.015** | .235 | .750 (5x) | 4 | 3/16 | 3 | 64510-C6 | 67.90 |
| .156 (5/32) | .1562 | **.015** | .235 | 1.250 (8x) | 4 | 3/16 | 3 | 54910-C6 | 69.30 |
| .156 (5/32) | .1562 | **.015** | .235 | 1.875 (12x) | 4 | 3/16 | 4 | 63110-C6 | 85.30 |
| .156 (5/32) | .1562 | **.030** | .235 | .750 (5x) | 4 | 3/16 | 3 | 910210-C6 | 67.90 |
| .187 (3/16) | .1875 | **.005** | .281 | 1.000 (5x) | 4 | 3/16 | 3 | 919912-C6 | 66.50 |
| .187 (3/16) | .1875 | **.005** | .281 | 1.500 (8x) | 4 | 3/16 | 3 | 915412-C6 | 68.20 |
| .187 (3/16) | .1875 | **.010** | .281 | 1.000 (5x) | 4 | 3/16 | 3 | 917412-C6 | 70.00 |
| .187 (3/16) | .1875 | **.010** | .281 | 1.500 (8x) | 4 | 3/16 | 3 | 908712-C6 | 70.30 |
| .187 (3/16) | .1875 | **.015** | .281 | 1.000 (5x) | 4 | 3/16 | 3 | 64512-C6 | 68.60 |
| .187 (3/16) | .1875 | **.015** | .281 | 1.156 (6x) | 4 | 3/16 | 3 | 795812-C6 | 70.00 |
| .187 (3/16) | .1875 | **.015** | .281 | 1.500 (8x) | 4 | 3/16 | 3 | 54912-C6 | 70.30 |
| .187 (3/16) | .1875 | **.015** | .281 | 1.875 (10x) | 4 | 3/16 | 4 | 932612-C6 | 83.10 |
| .187 (3/16) | .1875 | **.015** | .281 | 2.250 (12x) | 4 | 3/16 | 4 | 63112-C6 | 84.40 |
| .187 (3/16) | .1875 | **.020** | .281 | 1.000 (5x) | 4 | 3/16 | 3 | 866912-C6 | 69.40 |
| .187 (3/16) | .1875 | **.020** | .281 | 1.500 (8x) | 4 | 3/16 | 3 | 847612-C6 | 71.20 |
| .187 (3/16) | .1875 | **.030** | .281 | 1.000 (5x) | 4 | 3/16 | 3 | 910212-C6 | 68.10 |
| .187 (3/16) | .1875 | **.030** | .281 | 1.500 (8x) | 4 | 3/16 | 3 | 906512-C6 | 69.90 |
| .187 (3/16) | .1875 | **.040** | .281 | 1.000 (5x) | 4 | 3/16 | 3 | 785612-C6 | 68.10 |
| .187 (3/16) | .1875 | **.040** | .281 | 1.500 (8x) | 4 | 3/16 | 3 | 785412-C6 | 71.20 |
| .250 (1/4) | .2500 | **.015** | .375 | 1.250 (5x) | 4 | 1/4 | 4 | 64516-C6 | 77.70 |
| .250 (1/4) | .2500 | **.015** | .375 | 2.000 (8x) | 4 | 1/4 | 4 | 54916-C6 | 77.40 |
| .250 (1/4) | .2500 | **.015** | .375 | 3.000 (12x) | 4 | 1/4 | 6 | 63116-C6 | 95.40 |
| .250 (1/4) | .2500 | **.030** | .375 | 1.250 (5x) | 4 | 1/4 | 4 | 910216-C6 | 77.30 |
| .250 (1/4) | .2500 | **.030** | .375 | 2.000 (8x) | 4 | 1/4 | 4 | 906516-C6 | 78.50 |
| .375 (3/8) | .3750 | **.015** | .570 | 2.000 (5x) | 4 | 3/8 | 4 | 64524-C6 | 87.40 |

**Please see Speeds & Feeds on page 159**

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Square




**Up to 7 Flutes!**

- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Large core and eccentric relief for improved tool life
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | .2 mm | .0078 | **.60 mm** (3x) | 4 | 4 mm | 50 mm | 967604-C6 | 70.10 |
| | .2 mm | .0078 | **1.00 mm** (5x) | 4 | 4 mm | 50 mm | 974504-C6 | 80.40 |
| | .2 mm | .0078 | **1.60 mm** (8x) | 4 | 4 mm | 50 mm | 976104-C6 | 82.50 |
| .010 | | .0100 | **.030** (3x) | 4 | 1/8 | 1-1/2 | 57810-C6 | 68.60 |
| .010 | | .0100 | **.050** (5x) | 4 | 1/8 | 2-1/2 | 62610-C6 | 78.80 |
| | .3 mm | .0118 | **.90 mm** (3x) | 4 | 4 mm | 50 mm | 967606-C6 | 64.60 |
| .015 (1/64) | | .0150 | **.023** (1.5x) | 4 | 1/8 | 1-1/2 | 946115-C6 | 53.40 |
| .015 (1/64) | | .0150 | **.045** (3x) | 4 | 1/8 | 1-1/2 | 57815-C6 | 53.40 |
| .015 (1/64) | | .0150 | **.062** (4x) | 4 | 1/8 | 2-1/2 | 890115-C6 | 66.30 |
| .015 (1/64) | | .0150 | **.078** (5x) | 4 | 1/8 | 2-1/2 | 62615-C6 | 66.30 |
| .015 (1/64) | | .0150 | **.125** (8x) | 4 | 1/8 | 2-1/2 | 59015-C6 | 69.00 |
| .015 (1/64) | | .0150 | **.156** (10x) | 4 | 1/8 | 2-1/2 | 941815-C6 | 81.20 |
| | .4 mm | .0157 | **1.20 mm** (3x) | 4 | 4 mm | 50 mm | 967609-C6 | 61.40 |
| | .4 mm | .0157 | **2.00 mm** (5x) | 4 | 4 mm | 50 mm | 974509-C6 | 72.00 |
| | .4 mm | .0157 | **3.20 mm** (8x) | 4 | 4 mm | 50 mm | 976109-C6 | 74.20 |
| | .5 mm | .0196 | **1.50 mm** (3x) | 4 | 4 mm | 50 mm | 967611-C6 | 61.40 |
| | .5 mm | .0196 | **2.50 mm** (5x) | 4 | 4 mm | 50 mm | 974511-C6 | 70.30 |
| | .5 mm | .0196 | **4.00 mm** (8x) | 4 | 4 mm | 50 mm | 976111-C6 | 72.80 |
| .020 | | .0200 | **.030** (1.5x) | 4 | 1/8 | 1-1/2 | 946120-C6 | 52.40 |
| .020 | | .0200 | **.060** (3x) | 4 | 1/8 | 1-1/2 | 57820-C6 | 52.40 |
| .020 | | .0200 | **.080** (4x) | 4 | 1/8 | 2-1/2 | 890120-C6 | 66.00 |
| .020 | | .0200 | **.100** (5x) | 4 | 1/8 | 2-1/2 | 62620-C6 | 66.00 |
| .020 | | .0200 | **.160** (8x) | 4 | 1/8 | 2-1/2 | 59020-C6 | 68.80 |
| .020 | | .0200 | **.200** (10x) | 4 | 1/8 | 2-1/2 | 941820-C6 | 81.20 |
| | .6 mm | .0236 | **1.80 mm** (3x) | 4 | 4 mm | 50 mm | 967613-C6 | 61.40 |
| | .6 mm | .0236 | **3.00 mm** (5x) | 4 | 4 mm | 50 mm | 974513-C6 | 70.30 |
| | .6 mm | .0236 | **4.80 mm** (8x) | 4 | 4 mm | 50 mm | 976113-C6 | 72.80 |
| .025 | | .0250 | **.075** (3x) | 4 | 1/8 | 1-1/2 | 57825-C6 | 49.10 |
| .025 | | .0250 | **.125** (5x) | 4 | 1/8 | 2-1/2 | 62625-C6 | 63.60 |
| .025 | | .0250 | **.150** (6x) | 4 | 1/8 | 2-1/2 | 718425-C6 | 65.10 |
| .025 | | .0250 | **.203** (8x) | 4 | 1/8 | 2-1/2 | 59025-C6 | 66.50 |
| .025 | | .0250 | **.250** (10x) | 4 | 1/8 | 2-1/2 | 941825-C6 | 78.20 |
| | .7 mm | .0275 | **2.10 mm** (3x) | 4 | 4 mm | 50 mm | 967615-C6 | 61.10 |
| .030 | | .0300 | **.090** (3x) | 6 | 1/8 | 1-1/2 | 57830-C6 | 49.10 |
| .030 | | .0300 | **.156** (5x) | 6 | 1/8 | 2-1/2 | 62630-C6 | 64.80 |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Square (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 6 | 1/8 | 1-1/2 | 946131-C6 | 44.00 |
| .031 (1/32) | | .0310 | **.093** (3x) | 6 | 1/8 | 1-1/2 | 57831-C6 | 44.00 |
| .031 (1/32) | | .0310 | **.125** (4x) | 6 | 1/8 | 2-1/2 | 890131-C6 | 60.80 |
| .031 (1/32) | | .0310 | **.156** (5x) | 6 | 1/8 | 2-1/2 | 62631-C6 | 60.80 |
| .031 (1/32) | | .0310 | **.187** (6x) | 6 | 1/8 | 2-1/2 | 868531-C6 | 62.40 |
| .031 (1/32) | | .0310 | **.218** (7x) | 6 | 1/8 | 2-1/2 | 881331-C6 | 62.40 |
| .031 (1/32) | | .0310 | **.250** (8x) | 6 | 1/8 | 2-1/2 | 59031-C6 | 63.60 |
| .031 (1/32) | | .0310 | **.312** (10x) | 6 | 1/8 | 2-1/2 | 941831-C6 | 74.80 |
| .031 (1/31) | | .0310 | **.375** (12x) | 6 | 1/8 | 2-1/2 | 69131-C6 | 80.40 |
| | .8 mm | .0314 | **2.40 mm** (3x) | 6 | 4 mm | 50 mm | 967618-C6 | 54.60 |
| | .8 mm | .0314 | **4.00 mm** (5x) | 6 | 4 mm | 50 mm | 974518-C6 | 63.90 |
| | .8 mm | .0314 | **6.50 mm** (8x) | 6 | 4 mm | 50 mm | 976118-C6 | 65.90 |
| .035 | | .0350 | **.105** (3x) | 6 | 1/8 | 1-1/2 | 57835-C6 | 48.30 |
| .035 | | .0350 | **.187** (5x) | 6 | 1/8 | 2-1/2 | 62635-C6 | 50.60 |
| | .9 mm | .0354 | **2.70 mm** (3x) | 6 | 4 mm | 50 mm | 967620-C6 | 53.00 |
| | 1.0 mm | .0393 | **1.50 mm** (1.5x) | 6 | 4 mm | 50 mm | 846722-C6 | 53.00 |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 6 | 4 mm | 50 mm | 967622-C6 | 53.00 |
| | 1.0 mm | .0393 | **4.00 mm** (4x) | 6 | 4 mm | 50 mm | 726422-C6 | 59.50 |
| | 1.0 mm | .0393 | **5.00 mm** (5x) | 6 | 4 mm | 50 mm | 974522-C6 | 65.80 |
| | 1.0 mm | .0393 | **8.00 mm** (8x) | 6 | 4 mm | 50 mm | 976122-C6 | 69.90 |
| | 1.0 mm | .0393 | **10.00 mm** (10x) | 6 | 4 mm | 50 mm | 938322-C6 | 78.70 |
| .040 | | .0400 | **.060** (1.5x) | 6 | 1/8 | 1-1/2 | 946140-C6 | 44.00 |
| .040 | | .0400 | **.120** (3x) | 6 | 1/8 | 1-1/2 | 57840-C6 | 44.00 |
| .040 | | .0400 | **.160** (4x) | 6 | 1/8 | 2-1/2 | 890140-C6 | 62.00 |
| .040 | | .0400 | **.203** (5x) | 6 | 1/8 | 2-1/2 | 62640-C6 | 60.80 |
| .040 | | .0400 | **.240** (6x) | 6 | 1/8 | 2-1/2 | 868540-C6 | 62.90 |
| .040 | | .0400 | **.325** (8x) | 6 | 1/8 | 2-1/2 | 59040-C6 | 63.60 |
| | 1.1 mm | .0433 | **3.00 mm** (3x) | 6 | 4 mm | 50 mm | 967624-C6 | 51.40 |
| .045 | | .0450 | **.135** (3x) | 6 | 1/8 | 1-1/2 | 57845-C6 | 48.30 |
| .045 | | .0450 | **.225** (5x) | 6 | 1/8 | 2-1/2 | 62645-C6 | 51.00 |
| .047 (3/64) | | .0470 | **.071** (1.5x) | 6 | 1/8 | 1-1/2 | 946147-C6 | 45.00 |
| .047 (3/64) | | .0470 | **.141** (3x) | 6 | 1/8 | 1-1/2 | 57847-C6 | 44.00 |
| .047 (3/64) | | .0470 | **.187** (4x) | 6 | 1/8 | 2-1/2 | 890147-C6 | 60.80 |
| .047 (3/64) | | .0470 | **.250** (5x) | 6 | 1/8 | 2-1/2 | 62647-C6 | 60.80 |
| .047 (3/64) | | .0470 | **.281** (6x) | 6 | 1/8 | 2-1/2 | 868547-C6 | 62.40 |
| .047 (3/64) | | .0470 | **.328** (7x) | 6 | 1/8 | 2-1/2 | 881347-C6 | 62.40 |
| .047 (3/64) | | .0470 | **.375** (8x) | 6 | 1/8 | 2-1/2 | 59047-C6 | 63.60 |
| .047 (3/64) | | .0470 | **.480** (10x) | 6 | 1/8 | 2-1/2 | 941847-C6 | 74.80 |
| .047 (3/64) | | .0470 | **.570** (12x) | 6 | 1/8 | 2-1/2 | 69147-C6 | 81.20 |
| | 1.2 mm | .0472 | **3.50 mm** (3x) | 6 | 4 mm | 50 mm | 967627-C6 | 53.70 |
| | 1.2 mm | .0472 | **6.00 mm** (5x) | 6 | 4 mm | 50 mm | 974527-C6 | 66.40 |
| | 1.2 mm | .0472 | **9.50 mm** (8x) | 6 | 4 mm | 50 mm | 976127-C6 | 69.90 |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Square (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .050 | | .0500 | **.075** (1.5x) | 7 | 1/8 | 1-1/2 | 946150-C6 | 45.00 |
| .050 | | .0500 | **.150** (3x) | 7 | 1/8 | 1-1/2 | 57850-C6 | 44.00 |
| .050 | | .0500 | **.250** (5x) | 7 | 1/8 | 2-1/2 | 62650-C6 | 60.80 |
| .050 | | .0500 | **.400** (8x) | 7 | 1/8 | 2-1/2 | 59050-C6 | 63.60 |
| | 1.3 mm | .0511 | **4.00 mm** (3x) | 7 | 4 mm | 50 mm | 967629-C6 | 53.70 |
| .055 | | .0550 | **.165** (3x) | 7 | 1/8 | 1-1/2 | 57855-C6 | 47.40 |
| .055 | | .0550 | **.275** (5x) | 7 | 1/8 | 2-1/2 | 62655-C6 | 49.20 |
| | 1.4 mm | .0551 | **4.00 mm** (3x) | 7 | 4 mm | 50 mm | 967631-C6 | 53.00 |
| | 1.4 mm | .0551 | **7.00 mm** (5x) | 7 | 4 mm | 50 mm | 974531-C6 | 65.80 |
| | 1.4 mm | .0551 | **11.00 mm** (8x) | 7 | 4 mm | 50 mm | 976131-C6 | 69.90 |
| | 1.5 mm | .0590 | **2.20 mm** (1.5x) | 7 | 4 mm | 50 mm | 846733-C6 | 51.80 |
| | 1.5 mm | .0590 | **4.50 mm** (3x) | 7 | 4 mm | 50 mm | 967633-C6 | 51.80 |
| | 1.5 mm | .0590 | **7.50 mm** (5x) | 7 | 4 mm | 50 mm | 974533-C6 | 63.90 |
| | 1.5 mm | .0590 | **12.00 mm** (8x) | 7 | 4 mm | 50 mm | 976133-C6 | 67.90 |
| | 1.5 mm | .0590 | **15.00 mm** (10x) | 7 | 4 mm | 50 mm | 938333-C6 | 80.20 |
| .060 | | .0600 | **.090** (1.5x) | 7 | 1/8 | 1-1/2 | 946160-C6 | 43.30 |
| .060 | | .0600 | **.180** (3x) | 7 | 1/8 | 1-1/2 | 57860-C6 | 43.30 |
| .060 | | .0600 | **.312** (5x) | 7 | 1/8 | 2-1/2 | 62660-C6 | 56.10 |
| .060 | | .0600 | **.500** (8x) | 7 | 1/8 | 2-1/2 | 59060-C6 | 59.00 |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 7 | 1/8 | 1-1/2 | 946162-C6 | 43.30 |
| .062 (1/16) | | .0620 | **.186** (3x) | 7 | 1/8 | 1-1/2 | 57862-C6 | 43.30 |
| .062 (1/16) | | .0620 | **.250** (4x) | 7 | 1/8 | 2-1/2 | 890162-C6 | 57.40 |
| .062 (1/16) | | .0620 | **.312** (5x) | 7 | 1/8 | 2-1/2 | 62662-C6 | 57.40 |
| .062 (1/16) | | .0620 | **.375** (6x) | 7 | 1/8 | 2-1/2 | 868562-C6 | 59.10 |
| .062 (1/16) | | .0620 | **.437** (7x) | 7 | 1/8 | 2-1/2 | 881362-C6 | 59.10 |
| .062 (1/16) | | .0620 | **.500** (8x) | 7 | 1/8 | 2-1/2 | 59062-C6 | 60.00 |
| .062 (1/16) | | .0620 | **.625** (10x) | 7 | 1/8 | 2-1/2 | 941862-C6 | 76.30 |
| .062 (1/16) | | .0620 | **.750** (12x) | 7 | 1/8 | 2-1/2 | 69162-C6 | 86.50 |
| .062 (1/16) | | .0620 | **.950** (15x) | 7 | 1/8 | 2-1/2 | 68762-C6 | 109.00 |
| | 1.6 mm | .0629 | **5.00 mm** (3x) | 7 | 4 mm | 50 mm | 967636-C6 | 51.80 |
| | 1.6 mm | .0629 | **8.00 mm** (5x) | 7 | 4 mm | 50 mm | 974536-C6 | 63.90 |
| | 1.6 mm | .0629 | **13.00 mm** (8x) | 7 | 4 mm | 50 mm | 976136-C6 | 67.90 |
| | 1.7 mm | .0669 | **5.00 mm** (3x) | 7 | 4 mm | 50 mm | 967638-C6 | 51.30 |
| | 1.7 mm | .0669 | **8.50 mm** (5x) | 7 | 4 mm | 50 mm | 974538-C6 | 63.90 |
| .070 | | .0700 | **.210** (3x) | 7 | 1/8 | 1-1/2 | 57870-C6 | 40.90 |
| .070 | | .0700 | **.375** (5x) | 7 | 1/8 | 2-1/2 | 62670-C6 | 57.40 |
| .070 | | .0700 | **.570** (8x) | 7 | 1/8 | 2-1/2 | 59070-C6 | 60.00 |
| | 1.8 mm | .0708 | **5.50 mm** (3x) | 7 | 4 mm | 50 mm | 967640-C6 | 51.80 |
| | 1.8 mm | .0708 | **9.00 mm** (5x) | 7 | 4 mm | 50 mm | 974540-C6 | 63.90 |
| | 1.8 mm | .0708 | **14.00 mm** (8x) | 7 | 4 mm | 50 mm | 976140-C6 | 67.90 |
| | 1.9 mm | .0748 | **5.50 mm** (3x) | 7 | 4 mm | 50 mm | 967642-C6 | 51.80 |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Square (cont.)



continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .078 (5/64) | | .0780 | **.117** (1.5x) | 7 | 1/8 | 1-1/2 | 946178-C6 | 40.90 |
| .078 (5/64) | | .0780 | **.234** (3x) | 7 | 1/8 | 1-1/2 | 57878-C6 | 40.90 |
| .078 (5/64) | | .0780 | **.312** (4x) | 7 | 1/8 | 2-1/2 | 890178-C6 | 57.40 |
| .078 (5/64) | | .0780 | **.406** (5x) | 7 | 1/8 | 2-1/2 | 62678-C6 | 57.40 |
| .078 (5/64) | | .0780 | **.475** (6x) | 7 | 1/8 | 2-1/2 | 868578-C6 | 59.10 |
| .078 (5/64) | | .0780 | **.550** (7x) | 7 | 1/8 | 2-1/2 | 881378-C6 | 59.10 |
| .078 (5/64) | | .0780 | **.625** (8x) | 7 | 1/8 | 2-1/2 | 59078-C6 | 60.00 |
| .078 (5/64) | | .0780 | **.800** (10x) | 7 | 1/8 | 2-1/2 | 941878-C6 | 76.30 |
| .078 (5/64) | | .0780 | **.940** (12x) | 7 | 1/8 | 2-1/2 | 69178-C6 | 86.50 |
| .078 (5/64) | | .0780 | **1.187** (15x) | 7 | 1/8 | 2-1/2 | 68778-C6 | 109.00 |
| | 2.0 mm | .0787 | **3.00 mm** (1.5x) | 7 | 4 mm | 50 mm | 846745-C6 | 51.30 |
| | 2.0 mm | .0787 | **6.00 mm** (3x) | 7 | 4 mm | 50 mm | 967645-C6 | 51.30 |
| | 2.0 mm | .0787 | **10.00 mm** (5x) | 7 | 4 mm | 50 mm | 974545-C6 | 63.60 |
| | 2.0 mm | .0787 | **16.00 mm** (8x) | 7 | 4 mm | 50 mm | 976145-C6 | 67.30 |
| .080 | | .0800 | **.120** (1.5x) | 7 | 1/8 | 1-1/2 | 946180-C6 | 44.20 |
| .080 | | .0800 | **.240** (3x) | 7 | 1/8 | 1-1/2 | 57880-C6 | 40.90 |
| .080 | | .0800 | **.406** (5x) | 7 | 1/8 | 2-1/2 | 62680-C6 | 58.30 |
| .080 | | .0800 | **.650** (8x) | 7 | 1/8 | 2-1/2 | 59080-C6 | 60.50 |
| .090 | | .0900 | **.270** (3x) | 7 | 1/8 | 1-1/2 | 57890-C6 | 41.80 |
| .090 | | .0900 | **.450** (5x) | 7 | 1/8 | 2-1/2 | 62690-C6 | 57.40 |
| .090 | | .0900 | **.750** (8x) | 7 | 1/8 | 2-1/2 | 59090-C6 | 60.50 |
| .093 (3/32) | | .0930 | **.074** (0.8x) | 7 | 1/8 | 1-1/2 | 836593-C6 | 45.20 |
| .093 (3/32) | | .0930 | **.140** (1.5x) | 7 | 1/8 | 1-1/2 | 946193-C6 | 40.90 |
| .093 (3/32) | | .0930 | **.279** (3x) | 7 | 1/8 | 1-1/2 | 57893-C6 | 40.90 |
| .093 (3/32) | | .0930 | **.375** (4x) | 7 | 1/8 | 2-1/2 | 890193-C6 | 57.40 |
| .093 (3/32) | | .0930 | **.500** (5x) | 7 | 1/8 | 2-1/2 | 62693-C6 | 57.40 |
| .093 (3/32) | | .0930 | **.585** (6x) | 7 | 1/8 | 2-1/2 | 868593-C6 | 59.10 |
| .093 (3/32) | | .0930 | **.670** (7x) | 7 | 1/8 | 2-1/2 | 881393-C6 | 59.10 |
| .093 (3/32) | | .0930 | **.750** (8x) | 7 | 1/8 | 2-1/2 | 59093-C6 | 60.00 |
| .093 (3/32) | | .0930 | **.950** (10x) | 7 | 1/8 | 2-1/2 | 941893-C6 | 77.00 |
| .093 (3/32) | | .0930 | **1.125** (12x) | 7 | 1/8 | 2-1/2 | 69193-C6 | 85.70 |
| .093 (3/32) | | .0930 | **1.400** (15x) | 7 | 1/8 | 3 | 68793-C6 | 108.30 |
| | 2.5 mm | .0984 | **7.50 mm** (3x) | 7 | 4 mm | 50 mm | 967651-C6 | 51.30 |
| .100 | | .1000 | **.150** (1.5x) | 7 | 1/8 | 1-1/2 | 960100-C6 | 42.00 |
| .100 | | .1000 | **.300** (3x) | 7 | 1/8 | 1-1/2 | 57900-C6 | 40.90 |
| .100 | | .1000 | **.500** (5x) | 7 | 1/8 | 2-1/2 | 62700-C6 | 57.40 |
| .100 | | .1000 | **.800** (8x) | 7 | 1/8 | 2-1/2 | 59100-C6 | 60.00 |
| .109 (7/64) | | .1090 | **.164** (1.5x) | 7 | 1/8 | 1-1/2 | 960102-C6 | 42.00 |
| .109 (7/64) | | .1090 | **.327** (3x) | 7 | 1/8 | 1-1/2 | 57902-C6 | 40.90 |
| .109 (7/64) | | .1090 | **.570** (5x) | 7 | 1/8 | 2-1/2 | 62702-C6 | 57.40 |
| .109 (7/64) | | .1090 | **.900** (8x) | 7 | 1/8 | 2-1/2 | 59102-C6 | 63.30 |
| | 3.0 mm | .1181 | **4.50 mm** (1.5x) | 7 | 4 mm | 50 mm | 846757-C6 | 51.80 |
| | 3.0 mm | .1181 | **9.00 mm** (3x) | 7 | 4 mm | 50 mm | 967657-C6 | 51.30 |
| | 3.0 mm | .1181 | **12.00 mm** (4x) | 7 | 4 mm | 50 mm | 773057-C6 | 51.80 |
| | 3.0 mm | .1181 | **15.00 mm** (5x) | 7 | 4 mm | 50 mm | 974557-C6 | 52.90 |
| | 3.0 mm | .1181 | **24.00 mm** (8x) | 7 | 4 mm | 50 mm | 976157-C6 | 58.10 |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Square (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equivalent | $L_2$ +.030″ −.000″ +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .125 (1/8) | | .1250 | **.100** (0.8x) | 7 | 1/8 | 1-1/2 | 836608-C6 | 43.70 |
| .125 (1/8) | | .1250 | **.187** (1.5x) | 7 | 1/8 | 1-1/2 | 960108-C6 | 39.30 |
| .125 (1/8) | | .1250 | **.375** (3x) | 7 | 1/8 | 1-1/2 | 57908-C6 | 38.50 |
| .125 (1/8) | | .1250 | **.500** (4x) | 7 | 1/8 | 2-1/2 | 890208-C6 | 56.40 |
| .125 (1/8) | | .1250 | **.625** (5x) | 7 | 1/8 | 2-1/2 | 62708-C6 | 56.40 |
| .125 (1/8) | | .1250 | **.750** (6x) | 7 | 1/8 | 2-1/2 | 868608-C6 | 58.10 |
| .125 (1/8) | | .1250 | **.875** (7x) | 7 | 1/8 | 2-1/2 | 881408-C6 | 58.10 |
| .125 (1/8) | | .1250 | **1.000** (8x) | 7 | 1/8 | 2-1/2 | 59108-C6 | 59.10 |
| .125 (1/8) | | .1250 | **1.250** (10x) | 7 | 1/8 | 2-1/2 | 941908-C6 | 75.50 |
| .125 (1/8) | | .1250 | **1.500** (12x) | 7 | 1/8 | 3 | 69208-C6 | 85.80 |
| .125 (1/8) | | .1250 | **1.875** (15x) | 7 | 1/8 | 3 | 68808-C6 | 111.30 |
| .140 (9/64) | | .1406 | **.220** (1.5x) | 7 | 3/16 | 2 | 960109-C6 | 54.70 |
| .140 (9/64) | | .1406 | **.425** (3x) | 7 | 3/16 | 2 | 57909-C6 | 54.00 |
| .140 (9/64) | | .1406 | **.750** (5x) | 7 | 3/16 | 3 | 62709-C6 | 56.40 |
| .140 (9/64) | | .1406 | **1.125** (8x) | 7 | 3/16 | 3 | 59109-C6 | 61.90 |
| .156 (5/32) | | .1562 | **.235** (1.5x) | 7 | 3/16 | 2 | 960110-C6 | 44.50 |
| .156 (5/32) | | .1562 | **.470** (3x) | 7 | 3/16 | 2 | 57910-C6 | 44.00 |
| .156 (5/32) | | .1562 | **.625** (4x) | 7 | 3/16 | 3 | 890210-C6 | 44.80 |
| .156 (5/32) | | .1562 | **.750** (5x) | 7 | 3/16 | 3 | 62710-C6 | 59.40 |
| .156 (5/32) | | .1562 | **1.250** (8x) | 7 | 3/16 | 3 | 59110-C6 | 65.60 |
| .187 (3/16) | | .1875 | **.150** (0.8x) | 7 | 3/16 | 2 | 836612-C6 | 49.00 |
| .187 (3/16) | | .1875 | **.285** (1.5x) | 7 | 3/16 | 2 | 960112-C6 | 44.50 |
| .187 (3/16) | | .1875 | **.570** (3x) | 7 | 3/16 | 2 | 57912-C6 | 44.00 |
| .187 (3/16) | | .1875 | **.750** (4x) | 7 | 3/16 | 3 | 890212-C6 | 60.40 |
| .187 (3/16) | | .1875 | **1.000** (5x) | 7 | 3/16 | 3 | 62712-C6 | 59.40 |
| .187 (3/16) | | .1875 | **1.156** (6x) | 7 | 3/16 | 3 | 868612-C6 | 64.00 |
| .187 (3/16) | | .1875 | **1.312** (7x) | 7 | 3/16 | 3 | 881412-C6 | 64.70 |
| .187 (3/16) | | .1875 | **1.500** (8x) | 7 | 3/16 | 3 | 59112-C6 | 65.10 |
| | 5.0 mm | .1968 | **25.00 mm** (5x) | 7 | 6 mm | 63 mm | 974564-C6 | 61.90 |
| .218 (7/32) | | .2187 | **.660** (3x) | 7 | 1/4 | 2-1/2 | 57814-C6 | 59.60 |
| .218 (7/32) | | .2187 | **1.125** (5x) | 7 | 1/4 | 4 | 62714-C6 | 75.60 |
| | 6.0 mm | .2362 | **18.00 mm** (3x) | 7 | 6 mm | 63 mm | 967666-C6 | 58.20 |
| | 6.0 mm | .2362 | **30.00 mm** (5x) | 7 | 6 mm | 63 mm | 974566-C6 | 61.90 |
| .250 (1/4) | | .2500 | **.200** (0.8x) | 7 | 1/4 | 2-1/2 | 836616-C6 | 62.60 |
| .250 (1/4) | | .2500 | **.375** (1.5x) | 7 | 1/4 | 2-1/2 | 960116-C6 | 58.00 |
| .250 (1/4) | | .2500 | **.750** (3x) | 7 | 1/4 | 2-1/2 | 57916-C6 | 57.20 |
| .250 (1/4) | | .2500 | **1.000** (4x) | 7 | 1/4 | 4 | 890216-C6 | 74.30 |
| .250 (1/4) | | .2500 | **1.250** (5x) | 7 | 1/4 | 4 | 62716-C6 | 72.90 |
| .250 (1/4) | | .2500 | **1.500** (6x) | 7 | 1/4 | 4 | 868616-C6 | 79.20 |
| .250 (1/4) | | .2500 | **1.750** (7x) | 7 | 1/4 | 4 | 881416-C6 | 79.20 |
| .250 (1/4) | | .2500 | **2.000** (8x) | 7 | 1/4 | 4 | 59116-C6 | 79.30 |
| .312 (5/16) | | .3125 | **.470** (1.5x) | 7 | 5/16 | 2-1/2 | 960120-C6 | 80.00 |
| .312 (5/16) | | .3125 | **1.000** (3x) | 7 | 5/16 | 2-1/2 | 57920-C6 | 77.40 |
| .375 (3/8) | | .3750 | **.570** (1.5x) | 7 | 3/8 | 2-1/2 | 960124-C6 | 89.10 |
| .375 (3/8) | | .3750 | **1.125** (3x) | 7 | 3/8 | 2-1/2 | 57924-C6 | 88.40 |
| .375 (3/8) | | .3750 | **2.000** (5x) | 7 | 3/8 | 4 | 62724-C6 | 114.40 |
| .500 (1/2) | | .5000 | **.750** (1.5x) | 7 | 1/2 | 3 | 960132-C6 | 116.80 |
| .500 (1/2) | | .5000 | **1.500** (3x) | 7 | 1/2 | 3 | 57932-C6 | 116.80 |

**Please see Speeds & Feeds on page 178-179**

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Square (cont.)



**SPEEDS & FEEDS (Finishers for High Temp Alloys)**

| Material | Hardness (HBn) | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | Radial | Axial |
| **Stainless Steels**: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7 | 275 - 300 | 400 | Finishing (0.8x LOC) | .00013 | .00026 | .00040 | .00053 | .00066 | .00079 | .00106 | .00158 | .00212 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (1.5x LOC) | .00012 | .00024 | .00036 | .00048 | .00060 | .00072 | .00096 | .00144 | .00193 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00011 | .00022 | .00033 | .00043 | .00055 | .00065 | .00088 | .00131 | .00175 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00010 | .00021 | .00031 | .00042 | .00052 | .00062 | .00084 | .00125 | .00167 | < .10x Dia | .5x - 4x Dia |
| | | | Finishing (5x LOC) | .00008 | .00016 | .00025 | .00033 | .00041 | .00049 | .00066 | .00098 | .00131 | < .07x Dia | .5x - 5x Dia |
| | 300 - 350 | 350 | Finishing (6x LOC) | .00007 | .00015 | .00022 | .00030 | .00037 | .00044 | .00060 | .00089 | .00119 | < .07x Dia | .5x - 6x Dia |
| | | | Finishing (7x LOC) | .00006 | .00013 | .00020 | .00026 | .00032 | .00039 | .00052 | .00078 | .00104 | < .05x Dia | .5x - 7x Dia |
| | | | Finishing (8x LOC) | .00006 | .00012 | .00018 | .00024 | .00030 | .00036 | .00048 | .00072 | .00096 | < .05x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00011 | .00017 | .00023 | .00028 | .00034 | .00046 | .00068 | .00091 | < .04x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00011 | .00016 | .00022 | .00027 | .00033 | .00044 | .00065 | .00088 | < .04x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00020 | .00025 | .00029 | .00039 | .00059 | .00079 | < .02x Dia | .5x - 15x Dia |
| **Tool Steels**: D, H, M, T, S series | 300 - 350 | 500 | Finishing (0.8x LOC) | .00013 | .00026 | .00040 | .00053 | .00066 | .00079 | .00106 | .00158 | .00212 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (1.5x LOC) | .00012 | .00024 | .00036 | .00048 | .00060 | .00072 | .00096 | .00144 | .00193 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00011 | .00022 | .00033 | .00043 | .00055 | .00065 | .00088 | .00131 | .00175 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00010 | .00021 | .00031 | .00042 | .00052 | .00062 | .00084 | .00125 | .00167 | < .10x Dia | .5x - 4x Dia |
| | | | Finishing (5x LOC) | .00008 | .00016 | .00025 | .00033 | .00041 | .00049 | .00066 | .00098 | .00131 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (6x LOC) | .00007 | .00015 | .00022 | .00030 | .00037 | .00044 | .00060 | .00089 | .00119 | < .07x Dia | .5x - 6x Dia |
| | | | Finishing (7x LOC) | .00006 | .00013 | .00020 | .00026 | .00032 | .00039 | .00052 | .00078 | .00104 | < .05x Dia | .5x - 7x Dia |
| | | | Finishing (8x LOC) | .00006 | .00012 | .00018 | .00024 | .00030 | .00036 | .00048 | .00072 | .00096 | < .05x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00011 | .00017 | .00023 | .00028 | .00034 | .00046 | .00068 | .00091 | < .04x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00011 | .00016 | .00022 | .00027 | .00033 | .00044 | .00065 | .00088 | < .04x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00020 | .00025 | .00029 | .00039 | .00059 | .00079 | < .02x Dia | .5x - 15x Dia |
| | 350 - 400 | 250 | Finishing (0.8x LOC) | .00010 | .00021 | .00032 | .00042 | .00053 | .00063 | .00085 | .00127 | .00169 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (1.5x LOC) | .00009 | .00019 | .00029 | .00038 | .00048 | .00057 | .00077 | .00115 | .00154 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00008 | .00017 | .00026 | .00035 | .00044 | .00052 | .00070 | .00105 | .00140 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00008 | .00017 | .00025 | .00033 | .00042 | .00050 | .00067 | .00100 | .00134 | < .10x Dia | .5x - 4x Dia |
| | | | Finishing (5x LOC) | .00006 | .00013 | .00020 | .00026 | .00033 | .00039 | .00053 | .00079 | .00105 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (6x LOC) | .00006 | .00012 | .00018 | .00024 | .00030 | .00035 | .00048 | .00071 | .00095 | < .07x Dia | .5x - 6x Dia |
| | | | Finishing (7x LOC) | .00005 | .00010 | .00016 | .00021 | .00026 | .00031 | .00042 | .00062 | .00083 | < .05x Dia | .5x - 7x Dia |
| | | | Finishing (8x LOC) | .00005 | .00010 | .00014 | .00019 | .00024 | .00029 | .00039 | .00058 | .00077 | < .05x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00009 | .00014 | .00018 | .00023 | .00027 | .00036 | .00054 | .00073 | < .04x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00009 | .00013 | .00017 | .00022 | .00026 | .00035 | .00052 | .00070 | < .04x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00016 | .00020 | .00023 | .00032 | .00047 | .00063 | < .02x Dia | .5x - 15x Dia |
| | 400 - 540 | 200 | Finishing (0.8x LOC) | .00008 | .00017 | .00026 | .00034 | .00043 | .00051 | .00069 | .00103 | .00138 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (1.5x LOC) | .00008 | .00016 | .00024 | .00031 | .00039 | .00047 | .00063 | .00094 | .00125 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00007 | .00014 | .00021 | .00028 | .00035 | .00042 | .00057 | .00085 | .00114 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00007 | .00013 | .00020 | .00027 | .00034 | .00040 | .00054 | .00081 | .00109 | < .10x Dia | .5x - 5x Dia |
| | | | Finishing (5x LOC) | .00005 | .00011 | .00016 | .00021 | .00027 | .00032 | .00043 | .00064 | .00085 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (6x LOC) | .00005 | .00010 | .00015 | .00019 | .00024 | .00029 | .00039 | .00058 | .00077 | < .07x Dia | .5x - 6x Dia |
| | | | Finishing (7x LOC) | .00004 | .00008 | .00013 | .00017 | .00021 | .00025 | .00034 | .00050 | .00067 | < .05x Dia | .5x - 7x Dia |
| | | | Finishing (8x LOC) | .00004 | .00008 | .00012 | .00016 | .00020 | .00023 | .00031 | .00047 | .00063 | < .05x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00007 | .00011 | .00015 | .00018 | .00022 | .00030 | .00044 | .00059 | < .04x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00007 | .00011 | .00014 | .00018 | .00021 | .00028 | .00043 | .00057 | < .04x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00013 | .00016 | .00019 | .00026 | .00038 | .00051 | < .02x Dia | .5x - 15x Dia |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Square (cont.)

continued from previous page

**SPEEDS & FEEDS (Finishers for High Temp Alloys)**

| Material | Hardness (HBn) | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | Radial | Axial |
| **Titanium**: All alloys | 275 - 300<br>300 - 350 | 300<br>200 | Finishing (0.8x LOC) | .00006 | .00012 | .00018 | .00023 | .00029 | .00035 | .00047 | .00070 | .00094 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (1.5x LOC) | .00005 | .00011 | .00016 | .00021 | .00027 | .00032 | .00043 | .00064 | .00085 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00005 | .00010 | .00015 | .00019 | .00024 | .00029 | .00039 | .00058 | .00078 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00004 | .00009 | .00014 | .00018 | .00023 | .00028 | .00037 | .00055 | .00074 | < .10x Dia | .5x - 4x Dia |
| | | | Finishing (5x LOC) | .00003 | .00007 | .00011 | .00014 | .00018 | .00022 | .00029 | .00043 | .00058 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (6x LOC) | .00003 | .00007 | .00010 | .00013 | .00016 | .00020 | .00026 | .00039 | .00053 | < .07x Dia | .5x - 6x Dia |
| | | | Finishing (7x LOC) | .00003 | .00006 | .00009 | .00011 | .00014 | .00017 | .00023 | .00034 | .00046 | < .05x Dia | .5x - 7x Dia |
| | | | Finishing (8x LOC) | .00003 | .00005 | .00008 | .00011 | .00013 | .00016 | .00021 | .00032 | .00043 | < .05x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00005 | .00008 | .00010 | .00013 | .00015 | .00020 | .00030 | .00040 | < .04x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00005 | .00007 | .00010 | .00012 | .00014 | .00019 | .00029 | .00039 | < .04x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00009 | .00011 | .00013 | .00017 | .00026 | .00035 | < .02x Dia | .5x - 15x Dia |
| | 350 - 400<br>400 - 425 | 150<br>100 | Finishing (0.8x LOC) | .00005 | .00009 | .00014 | .00019 | .00023 | .00028 | .00038 | .00056 | .00075 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (1.5x LOC) | .00004 | .00008 | .00013 | .00017 | .00021 | .00025 | .00034 | .00051 | .00068 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00004 | .00008 | .00012 | .00015 | .00019 | .00023 | .00031 | .00046 | .00062 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00004 | .00007 | .00011 | .00015 | .00019 | .00022 | .00030 | .00044 | .00059 | < .10x Dia | .5x - 4x Dia |
| | | | Finishing (5x LOC) | .00003 | .00006 | .00009 | .00012 | .00015 | .00017 | .00023 | .00035 | .00047 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (6x LOC) | .00003 | .00005 | .00008 | .00010 | .00013 | .00016 | .00021 | .00032 | .00042 | < .07x Dia | .5x - 6x Dia |
| | | | Finishing (7x LOC) | .00002 | .00005 | .00007 | .00009 | .00011 | .00014 | .00018 | .00028 | .00037 | < .05x Dia | .5x - 7x Dia |
| | | | Finishing (8x LOC) | .00002 | .00004 | .00006 | .00008 | .00011 | .00013 | .00017 | .00026 | .00034 | < .05x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00004 | .00006 | .00008 | .00010 | .00012 | .00016 | .00024 | .00032 | < .04x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00004 | .00006 | .00008 | .00010 | .00012 | .00016 | .00023 | .00031 | < .04x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00007 | .00009 | .00010 | .00014 | .00021 | .00028 | < .02x Dia | .5x - 15x Dia |
| **Nickel Alloys**: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy | 275 - 300<br>300 - 350 | 150<br>100 | Finishing (0.8x LOC) | .00002 | .00005 | .00007 | .00010 | .00012 | .00015 | .00020 | .00029 | .00039 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (1.5x LOC) | .00002 | .00004 | .00007 | .00009 | .00011 | .00013 | .00018 | .00027 | .00036 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00002 | .00004 | .00006 | .00008 | .00010 | .00012 | .00016 | .00024 | .00033 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00002 | .00004 | .00005 | .00007 | .00009 | .00011 | .00014 | .00021 | .00029 | < .10x Dia | .5x - 4x Dia |
| | | | Finishing (5x LOC) | .00001 | .00002 | .00004 | .00005 | .00006 | .00007 | .00010 | .00015 | .00020 | < .05x Dia | .5x - 5x Dia |
| | | | Finishing (6x LOC) | .00001 | .00002 | .00003 | .00005 | .00006 | .00007 | .00009 | .00014 | .00018 | < .05x Dia | .5x - 6x Dia |
| | | | Finishing (7x LOC) | .00001 | .00002 | .00003 | .00004 | .00005 | .00006 | .00007 | .00011 | .00015 | < .03x Dia | .5x - 7x Dia |
| | | | Finishing (8x LOC) | .00001 | .00002 | .00003 | .00004 | .00005 | .00006 | .00008 | .00011 | .00015 | < .03x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00002 | .00003 | .00003 | .00004 | .00005 | .00007 | .00010 | .00014 | < .02x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00002 | .00002 | .00003 | .00004 | .00005 | .00007 | .00010 | .00013 | < .02x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00003 | .00004 | .00004 | .00006 | .00009 | .00011 | < .01x Dia | .5x - 15x Dia |
| | 350 - 400<br>400 - 425 | 80<br>60 | Finishing (0.8x LOC) | .00002 | .00004 | .00006 | .00008 | .00010 | .00012 | .00016 | .00024 | .00031 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (1.5x LOC) | .00002 | .00004 | .00005 | .00007 | .00009 | .00011 | .00014 | .00021 | .00029 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00002 | .00003 | .00005 | .00006 | .00008 | .00010 | .00013 | .00019 | .00026 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00001 | .00003 | .00004 | .00006 | .00007 | .00009 | .00011 | .00017 | .00023 | < .10x Dia | .5x - 4x Dia |
| | | | Finishing (5x LOC) | .00001 | .00002 | .00003 | .00004 | .00005 | .00006 | .00008 | .00012 | .00016 | < .05x Dia | .5x - 5x Dia |
| | | | Finishing (6x LOC) | .00001 | .00002 | .00003 | .00004 | .00005 | .00005 | .00007 | .00011 | .00015 | < .05x Dia | .5x - 6x Dia |
| | | | Finishing (7x LOC) | .00001 | .00001 | .00002 | .00003 | .00004 | .00004 | .00006 | .00009 | .00012 | < .03x Dia | .5x - 7x Dia |
| | | | Finishing (8x LOC) | .00001 | .00002 | .00002 | .00003 | .00004 | .00005 | .00006 | .00009 | .00012 | < .03x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00001 | .00002 | .00003 | .00003 | .00004 | .00006 | .00008 | .00011 | < .02x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00001 | .00002 | .00003 | .00003 | .00004 | .00005 | .00008 | .00010 | < .02x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00002 | .00003 | .00003 | .00005 | .00007 | .00009 | < .01x Dia | .5x - 15x Dia |

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Square – Long Reach




- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities and increased rigidity • Reduced neck diameter to avoid heeling
  - Length of cut = 3x diameter • Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Large core and eccentric relief for improved tool life
  - Latest generation AlTiN Nano coating offers superior hardness and heat resistance
  - h6 shank tolerance for high precision tool holders • End cutting (not center cutting)
- Solid carbide • CNC ground in the USA



| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .015 (1/64) | | .0150 | .045 | **.078** (5x) | 4 | 1/8 | 2-1/2 | 940715-C6 | 71.60 |
| .015 (1/64) | | .0150 | .045 | **.125** (8x) | 4 | 1/8 | 2-1/2 | 962115-C6 | 74.10 |
| .015 (1/64) | | .0150 | .045 | **.187** (12x) | 4 | 1/8 | 2-1/2 | 951815-C6 | 78.80 |
| .020 | | .0200 | .060 | **.160** (8x) | 4 | 1/8 | 2-1/2 | 962120-C6 | 65.50 |
| .025 | | .0250 | .075 | **.203** (8x) | 4 | 1/8 | 2-1/2 | 962125-C6 | 64.70 |
| .031 (1/32) | | .0310 | .093 | **.156** (5x) | 6 | 1/8 | 2-1/2 | 940731-C6 | 63.00 |
| .031 (1/32) | | .0310 | .093 | **.187** (6x) | 6 | 1/8 | 2-1/2 | 792531-C6 | 63.00 |
| .031 (1/32) | | .0310 | .093 | **.250** (8x) | 6 | 1/8 | 2-1/2 | 962131-C6 | 64.70 |
| .031 (1/32) | | .0310 | .093 | **.312** (10x) | 6 | 1/8 | 2-1/2 | 862831-C6 | 67.70 |
| .031 (1/32) | | .0310 | .093 | **.375** (12x) | 6 | 1/8 | 2-1/2 | 951831-C6 | 68.80 |
| | 1.0 mm | .0393 | 3.00 mm | **8.0 mm** (8x) | 6 | 4 mm | 50 mm | 924722-C6 | 66.00 |
| .040 | | .0400 | .120 | **.325** (8x) | 6 | 1/8 | 2-1/2 | 962140-C6 | 65.50 |
| .047 (3/64) | | .0470 | .141 | **.250** (5x) | 6 | 1/8 | 2-1/2 | 940747-C6 | 63.00 |
| .047 (3/64) | | .0470 | .141 | **.375** (8x) | 6 | 1/8 | 2-1/2 | 962147-C6 | 64.70 |
| .047 (3/64) | | .0470 | .141 | **.570** (12x) | 6 | 1/8 | 2-1/2 | 951847-C6 | 68.80 |
| .050 | | .0500 | .150 | **.250** (5x) | 7 | 1/8 | 2-1/2 | 940750-C6 | 63.00 |
| .050 | | .0500 | .150 | **.400** (8x) | 7 | 1/8 | 2-1/2 | 962150-C6 | 64.70 |
| | 1.5 mm | .0590 | 4.50 mm | **12.0 mm** (8x) | 7 | 4 mm | 50 mm | 924733-C6 | 66.00 |
| .060 | | .0600 | .180 | **.500** (8x) | 7 | 1/8 | 2-1/2 | 962160-C6 | 64.70 |
| .062 (1/16) | | .0620 | .186 | **.312** (5x) | 7 | 1/8 | 2-1/2 | 940762-C6 | 60.20 |
| .062 (1/16) | | .0620 | .186 | **.375** (6x) | 7 | 1/8 | 2-1/2 | 792562-C6 | 60.20 |
| .062 (1/16) | | .0620 | .186 | **.500** (8x) | 7 | 1/8 | 2-1/2 | 962162-C6 | 62.10 |
| .062 (1/16) | | .0620 | .186 | **.625** (10x) | 7 | 1/8 | 2-1/2 | 862862-C6 | 64.30 |
| .062 (1/16) | | .0620 | .186 | **.750** (12x) | 7 | 1/8 | 2-1/2 | 951862-C6 | 66.30 |
| .070 | | .0700 | .210 | **.570** (8x) | 7 | 1/8 | 2-1/2 | 962170-C6 | 62.60 |
| .078 (5/64) | | .0780 | .234 | **.406** (5x) | 7 | 1/8 | 2-1/2 | 940778-C6 | 60.20 |
| .078 (5/64) | | .0780 | .234 | **.625** (8x) | 7 | 1/8 | 2-1/2 | 962178-C6 | 62.10 |
| .078 (5/64) | | .0780 | .234 | **.940** (12x) | 7 | 1/8 | 2-1/2 | 951878-C6 | 66.30 |
| | 2.0 mm | .0787 | 6.00 mm | **16.0 mm** (8x) | 7 | 4 mm | 50 mm | 924745-C6 | 63.30 |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Square – Long Reach (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .080 | | .0800 | .240 | **.650** (8x) | 7 | 1/8 | 2-1/2 | 962180-C6 | 62.60 |
| .090 | | .0900 | .270 | **.750** (8x) | 7 | 1/8 | 2-1/2 | 962190-C6 | 62.60 |
| .093 (3/32) | | .0930 | .279 | **.500** (5x) | 7 | 1/8 | 2-1/2 | 940793-C6 | 60.20 |
| .093 (3/32) | | .0930 | .279 | **.585** (6x) | 7 | 1/8 | 2-1/2 | 792593-C6 | 60.70 |
| .093 (3/32) | | .0930 | .279 | **.750** (8x) | 7 | 1/8 | 2-1/2 | 962193-C6 | 62.10 |
| .093 (3/32) | | .0930 | .279 | **.950** (10x) | 7 | 1/8 | 2-1/2 | 862893-C6 | 64.80 |
| .093 (3/32) | | .0930 | .279 | **1.125** (12x) | 7 | 1/8 | 2-1/2 | 951893-C6 | 66.30 |
| .100 | | .1000 | .300 | **.800** (8x) | 7 | 1/8 | 2-1/2 | 962200-C6 | 62.10 |
| .109 (7/64) | | .1094 | .327 | **.570** (5x) | 7 | 1/8 | 2-1/2 | 940802-C6 | 60.20 |
| .109 (7/64) | | .1094 | .327 | **.900** (8x) | 7 | 1/8 | 2-1/2 | 962202-C6 | 62.10 |
| | 3.0 mm | .1181 | 9.00 mm | **24.0 mm** (8x) | 7 | 4 mm | 50 mm | 924757-C6 | 62.60 |

| $D_1$ +.000″ −.002″ | decimal equivalent | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | FLUTES | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | .375 | **.625** (5x) | 7 | 1/8 | 2-1/2 | 940808-C6 | 58.20 |
| .125 (1/8) | .1250 | .375 | **.750** (6x) | 7 | 1/8 | 2-1/2 | 792608-C6 | 58.60 |
| .125 (1/8) | .1250 | .375 | **1.000** (8x) | 7 | 1/8 | 2-1/2 | 962208-C6 | 59.90 |
| .125 (1/8) | .1250 | .375 | **1.250** (10x) | 7 | 1/8 | 3 | 862908-C6 | 62.40 |
| .125 (1/8) | .1250 | .375 | **1.500** (12x) | 7 | 1/8 | 3 | 951908-C6 | 63.80 |
| .140 (9/64) | .1406 | .425 | **.703** (5x) | 7 | 3/16 | 3 | 940809-C6 | 62.60 |
| .140 (9/64) | .1406 | .425 | **1.125** (8x) | 7 | 3/16 | 3 | 962209-C6 | 64.40 |
| .156 (5/32) | .1562 | .470 | **.750** (5x) | 7 | 3/16 | 3 | 940810-C6 | 58.20 |
| .156 (5/32) | .1562 | .470 | **1.250** (8x) | 7 | 3/16 | 3 | 962210-C6 | 59.90 |
| .187 (3/16) | .1875 | .570 | **1.000** (5x) | 7 | 3/16 | 3 | 940812-C6 | 61.80 |
| .187 (3/16) | .1875 | .570 | **1.500** (8x) | 7 | 3/16 | 3 | 962212-C6 | 63.90 |
| .250 (1/4) | .2500 | .750 | **1.250** (5x) | 7 | 1/4 | 4 | 940816-C6 | 74.50 |
| .250 (1/4) | .2500 | .750 | **2.000** (8x) | 7 | 1/4 | 4 | 962216-C6 | 77.70 |

**Please see Speeds & Feeds on page 182**

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Square – Long Reach (cont.)

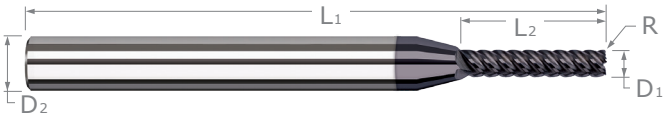


**SPEEDS & FEEDS (Finishers – Long Reach for High Temp Alloys)**

| Material | Hardness (HBn) | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | Radial | Axial |
| **Stainless Steels**: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7 | 275 - 300 | 400 | Finishing (5x Reach) | .00009 | .00020 | .00030 | .00039 | .00049 | .00059 | .00079 | .00118 | .00158 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (6x Reach) | .00009 | .00018 | .00028 | .00037 | .00046 | .00055 | .00074 | .00111 | .00148 | < .07x Dia | .5x - 3x Dia |
| | | | Finishing (8x Reach) | .00008 | .00016 | .00025 | .00032 | .00041 | .00049 | .00065 | .00098 | .00131 | < .07x Dia | .5x - 3x Dia |
| | 300 - 350 | 350 | Finishing (10x Reach) | .00007 | .00015 | .00023 | .00031 | .00039 | .00046 | .00062 | .00093 | .00124 | < .05x Dia | .5x - 3x Dia |
| | | | Finishing (12x Reach) | .00007 | .00015 | .00022 | .00029 | .00037 | .00044 | .00059 | .00088 | .00118 | < .05x Dia | .5x - 3x Dia |
| **Tool Steels**: D, H, M, T, S series | 300 - 350 | 500 | Finishing (5x Reach) | .00009 | .00020 | .00030 | .00039 | .00049 | .00059 | .00079 | .00118 | .00158 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (6x Reach) | .00009 | .00018 | .00028 | .00037 | .00046 | .00055 | .00074 | .00111 | .00148 | < .07x Dia | .5x - 3x Dia |
| | | | Finishing (8x Reach) | .00008 | .00016 | .00025 | .00032 | .00041 | .00049 | .00065 | .00098 | .00131 | < .07x Dia | .5x - 3x Dia |
| | | | Finishing (10x Reach) | .00007 | .00015 | .00023 | .00031 | .00039 | .00046 | .00062 | .00093 | .00124 | < .05x Dia | .5x - 3x Dia |
| | | | Finishing (12x Reach) | .00007 | .00015 | .00022 | .00029 | .00037 | .00044 | .00059 | .00088 | .00118 | < .05x Dia | .5x - 3x Dia |
| | 350 - 400 | 250 | Finishing (5x Reach) | .00008 | .00016 | .00024 | .00031 | .00039 | .00047 | .00063 | .00094 | .00126 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (6x Reach) | .00007 | .00015 | .00022 | .00029 | .00037 | .00044 | .00059 | .00089 | .00118 | < .07x Dia | .5x - 3x Dia |
| | | | Finishing (8x Reach) | .00006 | .00013 | .00020 | .00026 | .00033 | .00039 | .00052 | .00078 | .00105 | < .07x Dia | .5x - 3x Dia |
| | | | Finishing (10x Reach) | .00006 | .00012 | .00019 | .00025 | .00031 | .00037 | .00050 | .00074 | .00100 | < .05x Dia | .5x - 3x Dia |
| | | | Finishing (12x Reach) | .00006 | .00012 | .00018 | .00023 | .00029 | .00035 | .00047 | .00071 | .00095 | < .05x Dia | .5x - 3x Dia |
| | 400 - 540 | 200 | Finishing (5x Reach) | .00006 | .00013 | .00019 | .00025 | .00032 | .00038 | .00051 | .00077 | .00102 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (6x Reach) | .00006 | .00012 | .00018 | .00024 | .00030 | .00036 | .00048 | .00072 | .00096 | < .07x Dia | .5x - 3x Dia |
| | | | Finishing (8x Reach) | .00005 | .00011 | .00016 | .00021 | .00027 | .00032 | .00042 | .00064 | .00085 | < .07x Dia | .5x - 3x Dia |
| | | | Finishing (10x Reach) | .00005 | .00010 | .00015 | .00020 | .00025 | .00030 | .00040 | .00060 | .00081 | < .05x Dia | .5x - 3x Dia |
| | | | Finishing (12x Reach) | .00005 | .00010 | .00014 | .00019 | .00024 | .00029 | .00038 | .00057 | .00077 | < .05x Dia | .5x - 3x Dia |
| **Titanium**: All alloys | 275 - 300 | 300 | Finishing (5x Reach) | .00004 | .00009 | .00013 | .00017 | .00022 | .00026 | .00035 | .00052 | .00070 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (6x Reach) | .00004 | .00008 | .00012 | .00016 | .00020 | .00024 | .00033 | .00049 | .00066 | < .07x Dia | .5x - 3x Dia |
| | | | Finishing (8x Reach) | .00003 | .00007 | .00011 | .00014 | .00018 | .00022 | .00029 | .00043 | .00058 | < .07x Dia | .5x - 3x Dia |
| | 300 - 350 | 200 | Finishing (10x Reach) | .00003 | .00007 | .00010 | .00014 | .00017 | .00020 | .00028 | .00041 | .00055 | < .05x Dia | .5x - 3x Dia |
| | | | Finishing (12x Reach) | .00003 | .00006 | .00010 | .00013 | .00016 | .00019 | .00026 | .00039 | .00052 | < .05x Dia | .5x - 3x Dia |
| | 350 - 400 | 150 | Finishing (5x Reach) | .00003 | .00007 | .00010 | .00014 | .00017 | .00021 | .00028 | .00042 | .00056 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (6x Reach) | .00003 | .00007 | .00010 | .00013 | .00016 | .00020 | .00026 | .00039 | .00052 | < .07x Dia | .5x - 3x Dia |
| | | | Finishing (8x Reach) | .00003 | .00006 | .00009 | .00011 | .00014 | .00017 | .00023 | .00035 | .00046 | < .07x Dia | .5x - 3x Dia |
| | 400 - 425 | 100 | Finishing (10x Reach) | .00003 | .00005 | .00008 | .00011 | .00014 | .00016 | .00022 | .00033 | .00044 | < .05x Dia | .5x - 3x Dia |
| | | | Finishing (12x Reach) | .00003 | .00005 | .00008 | .00010 | .00013 | .00016 | .00021 | .00031 | .00042 | < .05x Dia | .5x - 3x Dia |
| **Nickel Alloys**: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy | 275 - 300 | 150 | Finishing (5x Reach) | .00002 | .00004 | .00005 | .00007 | .00009 | .00011 | .00015 | .00022 | .00029 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (6x Reach) | .00001 | .00002 | .00004 | .00005 | .00006 | .00007 | .00010 | .00014 | .00019 | < .05x Dia | .5x - 3x Dia |
| | | | Finishing (8x Reach) | .00001 | .00002 | .00003 | .00004 | .00005 | .00007 | .00009 | .00013 | .00018 | < .05x Dia | .5x - 3x Dia |
| | 300 - 350 | 100 | Finishing (10x Reach) | .00001 | .00002 | .00003 | .00004 | .00005 | .00006 | .00008 | .00012 | .00016 | < .03x Dia | .5x - 3x Dia |
| | | | Finishing (12x Reach) | .00001 | .00002 | .00003 | .00003 | .00004 | .00005 | .00007 | .00010 | .00014 | < .03x Dia | .5x - 3x Dia |
| | 350 - 400 | 80 | Finishing (5x Reach) | .00001 | .00003 | .00004 | .00006 | .00007 | .00009 | .00012 | .00018 | .00023 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (6x Reach) | .00001 | .00002 | .00003 | .00004 | .00005 | .00006 | .00008 | .00012 | .00015 | < .05x Dia | .5x - 3x Dia |
| | | | Finishing (8x Reach) | .00001 | .00002 | .00003 | .00003 | .00004 | .00005 | .00007 | .00011 | .00014 | < .05x Dia | .5x - 3x Dia |
| | 400 - 425 | 60 | Finishing (10x Reach) | .00001 | .00002 | .00002 | .00003 | .00004 | .00005 | .00006 | .00010 | .00013 | < .03x Dia | .5x - 3x Dia |
| | | | Finishing (12x Reach) | .00001 | .00001 | .00002 | .00003 | .00003 | .00004 | .00005 | .00008 | .00011 | < .03x Dia | .5x - 3x Dia |

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Corner Radius




- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.25mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .015 (1/64) | | .0150 | **.003** | .045 (3x) | 4 | 1/8 | 1-1/2 | 775615-C6 | 50.20 |
| .015 (1/64) | | .0150 | **.003** | .078 (5x) | 4 | 1/8 | 2-1/2 | 774715-C6 | 67.70 |
| .020 | | .0200 | **.003** | .060 (3x) | 4 | 1/8 | 1-1/2 | 775620-C6 | 50.20 |
| .020 | | .0200 | **.003** | .100 (5x) | 4 | 1/8 | 2-1/2 | 774720-C6 | 67.70 |
| .020 | | .0200 | **.005** | .060 (3x) | 4 | 1/8 | 1-1/2 | 873020-C6 | 50.20 |
| .020 | | .0200 | **.005** | .100 (5x) | 4 | 1/8 | 1-1/2 | 874620-C6 | 66.80 |
| .031 (1/32) | | .0310 | **.005** | .093 (3x) | 6 | 1/8 | 1-1/2 | 873031-C6 | 47.20 |
| .031 (1/32) | | .0310 | **.005** | .156 (5x) | 6 | 1/8 | 2-1/2 | 874631-C6 | 64.50 |
| .031 (1/32) | | .0310 | **.010** | .093 (3x) | 6 | 1/8 | 1-1/2 | 882631-C6 | 47.60 |
| .031 (1/32) | | .0310 | **.010** | .156 (5x) | 6 | 1/8 | 2-1/2 | 885431-C6 | 65.00 |
| | 1.0 mm | .0393 | **.10 mm** | 3.00 mm (3x) | 6 | 4 mm | 50 mm | 749122-C6 | 49.80 |
| | 1.0 mm | .0393 | **.10 mm** | 5.00 mm (5x) | 6 | 4 mm | 50 mm | 748522-C6 | 67.40 |
| .040 | | .0400 | **.005** | .120 (3x) | 6 | 1/8 | 1-1/2 | 873040-C6 | 47.60 |
| .040 | | .0400 | **.010** | .120 (3x) | 6 | 1/8 | 1-1/2 | 882640-C6 | 65.00 |
| .047 (3/64) | | .0470 | **.005** | .141 (3x) | 6 | 1/8 | 1-1/2 | 873047-C6 | 47.20 |
| .047 (3/64) | | .0470 | **.005** | .250 (5x) | 6 | 1/8 | 2-1/2 | 874647-C6 | 65.00 |
| .047 (3/64) | | .0470 | **.010** | .141 (3x) | 6 | 1/8 | 1-1/2 | 882647-C6 | 47.20 |
| .047 (3/64) | | .0470 | **.010** | .250 (5x) | 6 | 1/8 | 2-1/2 | 885447-C6 | 65.00 |
| .062 (1/16) | | .0620 | **.005** | .093 (1.5x) | 7 | 1/8 | 1-1/2 | 872262-C6 | 47.00 |
| .062 (1/16) | | .0620 | **.005** | .186 (3x) | 7 | 1/8 | 1-1/2 | 873062-C6 | 47.00 |
| .062 (1/16) | | .0620 | **.005** | .312 (5x) | 7 | 1/8 | 2-1/2 | 874662-C6 | 61.80 |
| .062 (1/16) | | .0620 | **.010** | .186 (3x) | 7 | 1/8 | 1-1/2 | 882662-C6 | 47.00 |
| .062 (1/16) | | .0620 | **.010** | .312 (5x) | 7 | 1/8 | 2-1/2 | 885462-C6 | 61.80 |
| .078 (5/64) | | .0780 | **.005** | .234 (3x) | 7 | 1/8 | 1-1/2 | 873078-C6 | 44.80 |
| .078 (5/64) | | .0780 | **.005** | .406 (5x) | 7 | 1/8 | 2-1/2 | 874678-C6 | 61.80 |
| .078 (5/64) | | .0780 | **.010** | .234 (3x) | 7 | 1/8 | 1-1/2 | 882678-C6 | 45.30 |
| .078 (5/64) | | .0780 | **.010** | .406 (5x) | 7 | 1/8 | 2-1/2 | 885478-C6 | 61.80 |
| | 2.0 mm | .0787 | **.20 mm** | 6.00 mm (3x) | 7 | 4 mm | 50 mm | 748745-C6 | 49.80 |
| | 2.0 mm | .0787 | **.20 mm** | 10.00 mm (5x) | 7 | 4 mm | 50 mm | 747945-C6 | 67.40 |
| .093 (3/32) | | .0930 | **.005** | .140 (1.5x) | 7 | 1/8 | 1-1/2 | 872293-C6 | 44.80 |
| .093 (3/32) | | .0930 | **.005** | .279 (3x) | 7 | 1/8 | 1-1/2 | 873093-C6 | 44.80 |
| .093 (3/32) | | .0930 | **.005** | .500 (5x) | 7 | 1/8 | 2-1/2 | 874693-C6 | 61.80 |
| .093 (3/32) | | .0930 | **.010** | .279 (3x) | 7 | 1/8 | 1-1/2 | 882693-C6 | 44.80 |
| .093 (3/32) | | .0930 | **.010** | .500 (5x) | 7 | 1/8 | 2-1/2 | 885493-C6 | 61.80 |
| .093 (3/32) | | .0930 | **.020** | .279 (3x) | 7 | 1/8 | 1-1/2 | 774093-C6 | 45.30 |
| | 3.0 mm | .1181 | **.20 mm** | 9.00 mm (3x) | 7 | 4 mm | 50 mm | 748757-C6 | 49.80 |
| | 3.0 mm | .1181 | **.20 mm** | 15.00 mm (5x) | 7 | 4 mm | 50 mm | 747957-C6 | 67.40 |

continued on next page

# VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

## Finishers – Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | decimal equivalent | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .125 (1/8) | .1250 | **.005** | .187 (1.5x) | 7 | 1/8 | 1-1/2 | 872308-C6 | 38.40 |
| .125 (1/8) | .1250 | **.005** | .375 (3x) | 7 | 1/8 | 1-1/2 | 873108-C6 | 38.40 |
| .125 (1/8) | .1250 | **.005** | .625 (5x) | 7 | 1/8 | 2-1/2 | 874708-C6 | 41.50 |
| .125 (1/8) | .1250 | **.010** | .187 (1.5x) | 7 | 1/8 | 1-1/2 | 880108-C6 | 38.40 |
| .125 (1/8) | .1250 | **.010** | .375 (3x) | 7 | 1/8 | 1-1/2 | 882708-C6 | 38.40 |
| .125 (1/8) | .1250 | **.010** | .625 (5x) | 7 | 1/8 | 2-1/2 | 885508-C6 | 41.50 |
| .125 (1/8) | .1250 | **.015** | .375 (3x) | 7 | 1/8 | 1-1/2 | 813808-C6 | 38.40 |
| .125 (1/8) | .1250 | **.020** | .375 (3x) | 7 | 1/8 | 1-1/2 | 774108-C6 | 38.40 |
| .125 (1/8) | .1250 | **.030** | .187 (1.5x) | 7 | 1/8 | 1-1/2 | 890508-C6 | 39.50 |
| .125 (1/8) | .1250 | **.030** | .375 (3x) | 7 | 1/8 | 1-1/2 | 892708-C6 | 38.40 |
| .156 (5/32) | .1560 | **.005** | .470 (3x) | 7 | 3/16 | 2 | 873110-C6 | 43.10 |
| .156 (5/32) | .1560 | **.010** | .470 (3x) | 7 | 3/16 | 2 | 882710-C6 | 43.10 |
| .187 (3/16) | .1870 | **.005** | .285 (1.5x) | 7 | 3/16 | 2 | 872312-C6 | 43.30 |
| .187 (3/16) | .1870 | **.005** | .570 (3x) | 7 | 3/16 | 2 | 873112-C6 | 43.10 |
| .187 (3/16) | .1870 | **.010** | .285 (1.5x) | 7 | 3/16 | 2 | 880112-C6 | 44.40 |
| .187 (3/16) | .1870 | **.010** | .570 (3x) | 7 | 3/16 | 2 | 882712-C6 | 43.10 |
| .187 (3/16) | .1870 | **.015** | .570 (3x) | 7 | 3/16 | 2 | 813812-C6 | 43.10 |
| .187 (3/16) | .1870 | **.020** | .570 (3x) | 7 | 3/16 | 2 | 774112-C6 | 43.10 |
| .187 (3/16) | .1870 | **.030** | .285 (1.5x) | 7 | 3/16 | 2 | 890512-C6 | 43.70 |
| .187 (3/16) | .1870 | **.030** | .570 (3x) | 7 | 3/16 | 2 | 892712-C6 | 43.10 |
| .250 (1/4) | .2500 | **.005** | .375 (1.5x) | 7 | 1/4 | 2-1/2 | 872316-C6 | 55.70 |
| .250 (1/4) | .2500 | **.005** | .750 (3x) | 7 | 1/4 | 2-1/2 | 873116-C6 | 55.40 |
| .250 (1/4) | .2500 | **.010** | .375 (1.5x) | 7 | 1/4 | 2-1/2 | 880116-C6 | 56.30 |
| .250 (1/4) | .2500 | **.010** | .750 (3x) | 7 | 1/4 | 2-1/2 | 882716-C6 | 55.40 |
| .250 (1/4) | .2500 | **.010** | 1.250 (5x) | 7 | 1/4 | 4 | 885516-C6 | 62.50 |
| .250 (1/4) | .2500 | **.015** | .750 (3x) | 7 | 1/4 | 2-1/2 | 813816-C6 | 55.40 |
| .250 (1/4) | .2500 | **.020** | .750 (3x) | 7 | 1/4 | 2-1/2 | 774116-C6 | 55.40 |
| .250 (1/4) | .2500 | **.030** | .375 (1.5x) | 7 | 1/4 | 2-1/2 | 890516-C6 | 56.30 |
| .250 (1/4) | .2500 | **.030** | .750 (3x) | 7 | 1/4 | 2-1/2 | 892716-C6 | 55.40 |
| .375 (3/8) | .3750 | **.005** | 1.125 (3x) | 7 | 3/8 | 2-1/2 | 873124-C6 | 68.80 |

**Please see Speeds & Feeds on page 178**

# MULTI-AXIS FINISHERS

## Technical Information

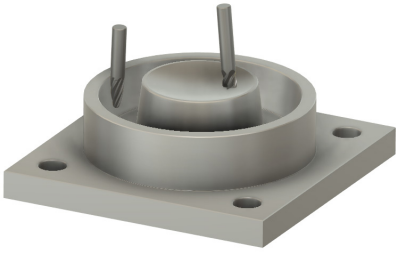
Multi-Axis Finishers are for operations with extremely high surface finish requirements. When switching from a traditional ball end mill, finish requirements can be dramatically improved, and cycle times can be cut down to a fraction of the time.

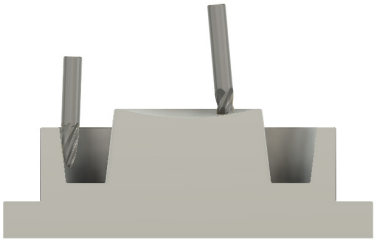




### Benefits of Multi-Axis Finishing Techniques

The basic principle of a Multi-Axis Finisher comes down to the large radius included in the profile of the tool. With a larger radius, a far greater stepover can be used pass-to-pass while keeping the same cusp height as a ball end mill. This decreases the cycle time by a known value called the Benefit Multiple. If a Multi-Axis Finisher is used with the same pass-to-pass stepover as a ball end mill, the finish will be drastically improved due to exponentially smaller cusp heights. Most situations allow both reduced cycle time and improved surface finish to be achieved.





The images above show the comparison of a ball end mill to an oval shape Multi-Axis Finisher with a benefit multiple of 4.

Due to their large radii, Multi-Axis Finishers are best suited for wide open, flowing, and somewhat flat surfaces. Smaller spaces, especially tight corners, will generally not see as much benefit from these tools due to limited use of the major radius.

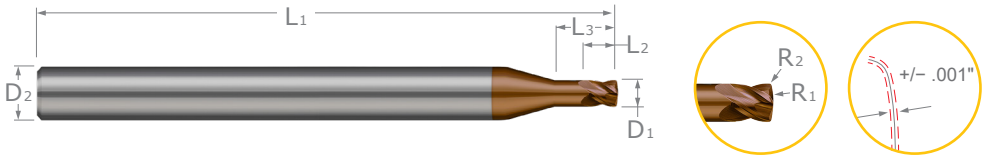
| | Lens | Oval |
|---|---|---|
| **Geometry** | 2 tangential radii on the end of the tool | 2 tangential radii |
| **Main Use** | Primarily on the face of a part | In smaller spaces where a slightly varied approach angle is required |
| **Tip** | Tilt angles of approximately 5 degrees are recommended for these tools to avoid working on-center | This form offers the most versatility and is a common choice for machinists machining impellers or fan blades |

### CAM Resources

Programming Multi-Axis Finishers requires some additional consideration compared to a typical end mill. Luckily, many modern CAM packages offer support for these unique profiles, including many of Harvey Tools CAM partners. Each software has their own name for these toolpaths, so reach out to your CAM or Harvey sales rep to find how you can program yours!

# MULTI-AXIS FINISHERS FOR HIGH TEMP ALLOYS

## Lens Form




- Designed for massive reduction in cycle time with top quality results for finishing operations
- Lens form with two tangential radii for finishing floors
- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 tolerance for high precision tool holders • 4 flutes
- Center cutting • Solid carbide • CNC ground in the USA



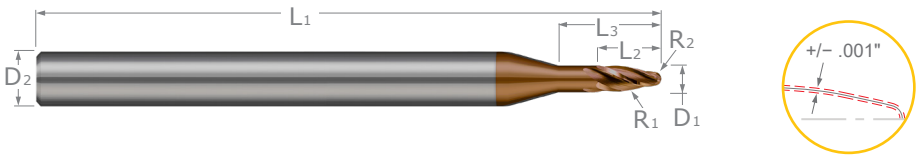
| CUTTER DIAMETER | SKANK DIAMETER | MAJOR RADIUS | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | OVERALL LENGTH | BENEFIT MULTIPLE | Ti NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $D_2$ (h6) | $R_1$ | $R_2$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | $L_1$ | | 4 FL | USD$ |
| .062 (1/16) | 1/8 | .125 (1/8) | .004 | .062 (1/16) | .163 | 1-1/2 | 2x | 698262-C10 | 38.90 |
| .078 (5/64) | 1/8 | .156 (5/32) | .005 | .078 (5/64) | .178 | 1-1/2 | 2x | 698278-C10 | 38.90 |
| .093 (3/32) | 1/8 | .187 (3/16) | .006 | .093 (3/32) | .194 | 1-1/2 | 2x | 698293-C10 | 38.90 |

| $D_1$ $^{+.000''}_{-.002''}$ | $D_2$ (h6) | $R_1$ | $R_2$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | $L_1$ | | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | 1/8 | .250 (1/4) | .008 | .125 (1/8) | | 1-1/2 | 2x | 698308-C10 | 41.50 |
| .156 (5/32) | 3/16 | .312 (5/16) | .010 | .156 (5/32) | .356 | 2 | 2x | 698310-C10 | 50.10 |
| .187 (3/16) | 3/16 | .375 (3/8) | .012 | .187 (3/16) | | 2 | 2x | 698312-C10 | 59.10 |
| .250 (1/4) | 1/4 | .500 (1/2) | .015 | .250 (1/4) | | 2 | 2x | 698316-C10 | 75.30 |
| .312 (5/16) | 5/16 | .625 (5/8) | .018 | .312 (5/16) | | 2-1/2 | 2x | 698320-C10 | 83.50 |
| .375 (3/8) | 3/8 | .750 (3/4) | .020 | .375 (3/8) | | 2-1/2 | 2x | 698324-C10 | 91.00 |
| .500 (1/2) | 1/2 | 1.000 | .030 | .500 (1/2) | | 3 | 2x | 698332-C10 | 108.70 |

**Technical information found on page 185.**

# MULTI-AXIS FINISHERS FOR HIGH TEMP ALLOYS

## Oval Form




- Designed for massive reduction in cycle time with top quality results for finishing operations
- Oval form with two tangential radii for versatility in angle of approach and clearance in tight spaces
- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

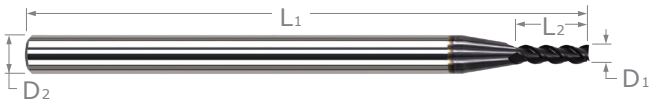
| CUTTER DIAMETER | SKANK DIAMETER | MAJOR RADIUS | TIP RADIUS | LENGTH OF CUT | OVERALL REACH | OVERALL LENGTH | BENEFIT MULTIPLE | Ti NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $D_2$ (h6) | $R_1$ | $R_2$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | $L_1$ | | 4 FL | USD$ |
| .062 (1/16) | 1/8 | .500 (1/2) | .016 | .138 | .168 | 1-1/2 | 4x | 698462-C10 | 39.80 |
| .078 (5/64) | 1/8 | .625 (5/8) | .020 | .172 | .202 | 1-1/2 | 4x | 698478-C10 | 39.80 |
| .093 (3/32) | 1/8 | .750 (3/4) | .023 | .206 | .236 | 1-1/2 | 4x | 698493-C10 | 39.80 |

| $D_1$ $^{+.000''}_{-.002''}$ | $D_2$ (h6) | $R_1$ | $R_2$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | $L_1$ | | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | 1/8 | 1.000 | .031 | .275 | | 2 | 4x | 698508-C10 | 42.40 |
| .156 (5/32) | 3/16 | 1.250 | .039 | .344 | .374 | 2 | 4x | 698510-C10 | 51.10 |
| .187 (3/16) | 3/16 | 1.500 | .047 | .413 | | 2 | 4x | 698512-C10 | 60.20 |
| .250 (1/4) | 1/4 | 2.000 | .063 | .551 | | 2-1/2 | 4x | 698516-C10 | 76.80 |
| .312 (5/16) | 5/16 | 2.500 | .078 | .688 | | 2-1/2 | 4x | 698520-C10 | 85.10 |
| .375 (3/8) | 3/8 | 3.000 | .094 | .826 | | 2-1/2 | 4x | 698524-C10 | 92.90 |
| .500 (1/2) | 1/2 | 4.000 | .125 | 1.101 | | 3 | 4x | 698532-C10 | 110.90 |

**Technical information found on page 185.**

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Square




- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | +.00mm −.02mm | decimal equivalent | $L_2$ +.010" −.000" +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .010 | | .0100 | **.015** (1.5x) | 3 | 1/8 | 1-1/2 | 964910-C3 | 64.50 |
| .010 | | .0100 | **.030** (3x) | 3 | 1/8 | 1-1/2 | 958510-C3 | 64.50 |
| .015 (1/64) | | .0150 | **.023** (1.5x) | 3 | 1/8 | 1-1/2 | 964915-C3 | 51.30 |
| .015 (1/64) | | .0150 | **.045** (3x) | 3 | 1/8 | 1-1/2 | 958515-C3 | 51.30 |
| .015 (1/64) | | .0150 | **.078** (5x) | 3 | 1/8 | 2-1/2 | 952615-C3 | 65.70 |
| | .5 mm | .0196 | **1.50 mm** (3x) | 3 | 4 mm | 50 mm | 945911-C3 | 51.40 |
| .020 | | .0200 | **.030** (1.5x) | 3 | 1/8 | 1-1/2 | 964920-C3 | 45.00 |
| .020 | | .0200 | **.060** (3x) | 3 | 1/8 | 1-1/2 | 958520-C3 | 45.00 |
| .020 | | .0200 | **.100** (5x) | 3 | 1/8 | 2-1/2 | 952620-C3 | 57.20 |
| .025 | | .0250 | **.038** (1.5x) | 3 | 1/8 | 1-1/2 | 964925-C3 | 43.40 |
| .025 | | .0250 | **.075** (3x) | 3 | 1/8 | 1-1/2 | 958525-C3 | 43.40 |
| .025 | | .0250 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 952625-C3 | 55.90 |
| .030 | | .0300 | **.090** (3x) | 3 | 1/8 | 1-1/2 | 958530-C3 | 43.10 |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 3 | 1/8 | 1-1/2 | 964931-C3 | 36.40 |
| .031 (1/32) | | .0310 | **.093** (3x) | 3 | 1/8 | 1-1/2 | 958531-C3 | 36.40 |
| .031 (1/32) | | .0310 | **.125** (4x) | 3 | 1/8 | 2-1/2 | 814831-C3 | 48.60 |
| .031 (1/32) | | .0310 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 952631-C3 | 48.60 |
| .035 | | .0350 | **.053** (1.5x) | 3 | 1/8 | 1-1/2 | 964935-C3 | 37.30 |
| .035 | | .0350 | **.105** (3x) | 3 | 1/8 | 1-1/2 | 958535-C3 | 36.40 |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 3 | 4 mm | 50 mm | 945922-C3 | 42.60 |
| .040 | | .0400 | **.060** (1.5x) | 3 | 1/8 | 1-1/2 | 964940-C3 | 36.60 |
| .040 | | .0400 | **.120** (3x) | 3 | 1/8 | 1-1/2 | 958540-C3 | 36.60 |
| .040 | | .0400 | **.203** (5x) | 3 | 1/8 | 2-1/2 | 952640-C3 | 48.80 |
| .045 | | .0450 | **.068** (1.5x) | 3 | 1/8 | 1-1/2 | 964945-C3 | 36.60 |
| .045 | | .0450 | **.135** (3x) | 3 | 1/8 | 1-1/2 | 958545-C3 | 36.60 |
| .045 | | .0450 | **.225** (5x) | 3 | 1/8 | 2-1/2 | 952645-C3 | 49.20 |
| .047 (3/64) | | .0470 | **.071** (1.5x) | 3 | 1/8 | 1-1/2 | 964947-C3 | 36.40 |
| .047 (3/64) | | .0470 | **.141** (3x) | 3 | 1/8 | 1-1/2 | 958547-C3 | 36.40 |
| .047 (3/64) | | .0470 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 952647-C3 | 49.00 |
| .050 | | .0500 | **.075** (1.5x) | 3 | 1/8 | 1-1/2 | 964950-C3 | 36.60 |
| .050 | | .0500 | **.150** (3x) | 3 | 1/8 | 1-1/2 | 958550-C3 | 36.60 |
| .050 | | .0500 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 952650-C3 | 49.20 |
| .055 | | .0550 | **.083** (1.5x) | 3 | 1/8 | 1-1/2 | 964955-C3 | 37.30 |
| .055 | | .0550 | **.165** (3x) | 3 | 1/8 | 1-1/2 | 958555-C3 | 36.40 |
| .055 | | .0550 | **.275** (5x) | 3 | 1/8 | 2-1/2 | 952655-C3 | 49.00 |
| | 1.5 mm | .0590 | **4.50 mm** (3x) | 3 | 4 mm | 50 mm | 945933-C3 | 39.90 |
| .060 | | .0600 | **.180** (3x) | 3 | 1/8 | 1-1/2 | 958560-C3 | 37.90 |
| .062 (1/16) | | .0620 | **.050** (0.8x) | 3 | 1/8 | 1-1/2 | 835762-C3 | 37.80 |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 3 | 1/8 | 1-1/2 | 964962-C3 | 34.20 |
| .062 (1/16) | | .0620 | **.186** (3x) | 3 | 1/8 | 1-1/2 | 958562-C3 | 34.20 |
| .062 (1/16) | | .0620 | **.250** (4x) | 3 | 1/8 | 2-1/2 | 814862-C3 | 39.50 |

continued on next page

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Square (cont.)

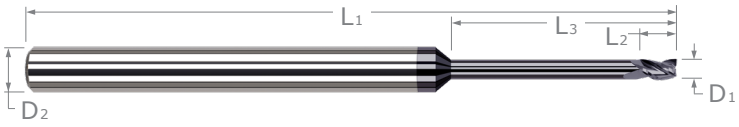
continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .062 (1/16) | | .0620 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 952662-C3 | 46.40 |
| .062 (1/16) | | .0620 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 714262-C3 | 48.60 |
| .070 | | .0700 | **.105** (1.5x) | 3 | 1/8 | 1-1/2 | 964970-C3 | 34.80 |
| .070 | | .0700 | **.210** (3x) | 3 | 1/8 | 1-1/2 | 958570-C3 | 34.80 |
| .078 (5/64) | | .0780 | **.118** (1.5x) | 3 | 1/8 | 1-1/2 | 964978-C3 | 34.20 |
| .078 (5/64) | | .0780 | **.234** (3x) | 3 | 1/8 | 1-1/2 | 958578-C3 | 34.20 |
| .078 (5/64) | | .0780 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 952678-C3 | 46.40 |
| .078 (5/64) | | .0780 | **.625** (8x) | 3 | 1/8 | 2-1/2 | 714278-C3 | 48.60 |
| | 2.0 mm | .0787 | **6.00 mm** (3x) | 3 | 4 mm | 50 mm | 945945-C3 | 39.90 |
| .080 | | .0800 | **.240** (3x) | 3 | 1/8 | 1-1/2 | 958580-C3 | 34.20 |
| .090 | | .0900 | **.270** (3x) | 3 | 1/8 | 1-1/2 | 958590-C3 | 34.20 |
| .093 (3/32) | | .0930 | **.074** (0.8x) | 3 | 1/8 | 1-1/2 | 835793-C3 | 37.80 |
| .093 (3/32) | | .0930 | **.140** (1.5x) | 3 | 1/8 | 1-1/2 | 964993-C3 | 34.20 |
| .093 (3/32) | | .0930 | **.279** (3x) | 3 | 1/8 | 1-1/2 | 958593-C3 | 34.20 |
| .093 (3/32) | | .0930 | **.375** (4x) | 3 | 1/8 | 2-1/2 | 814893-C3 | 39.50 |
| .093 (3/32) | | .0930 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 952693-C3 | 46.40 |
| .093 (3/32) | | .0930 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 714293-C3 | 48.60 |
| .100 | | .1000 | **.150** (1.5x) | 3 | 1/8 | 1-1/2 | 965000-C3 | 34.20 |
| .100 | | .1000 | **.300** (3x) | 3 | 1/8 | 1-1/2 | 958600-C3 | 34.20 |
| .109 (7/64) | | .1090 | **.164** (1.5x) | 3 | 1/8 | 1-1/2 | 965002-C3 | 34.20 |
| .109 (7/64) | | .1090 | **.327** (3x) | 3 | 1/8 | 1-1/2 | 958602-C3 | 34.20 |
| | 3.0 mm | .1181 | **9.00 mm** (3x) | 3 | 4 mm | 50 mm | 945957-C3 | 39.90 |
| $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equivalent | $L_2$ +.030″ −.000″ +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .125 (1/8) | | .1250 | **.100** (0.8x) | 4 | 1/8 | 1-1/2 | 835808-C3 | 35.40 |
| .125 (1/8) | | .1250 | **.187** (1.5x) | 4 | 1/8 | 1-1/2 | 965008-C3 | 31.60 |
| .125 (1/8) | | .1250 | **.375** (3x) | 4 | 1/8 | 1-1/2 | 958608-C3 | 31.60 |
| .125 (1/8) | | .1250 | **.500** (4x) | 4 | 1/8 | 2-1/2 | 814908-C3 | 41.30 |
| .125 (1/8) | | .1250 | **.625** (5x) | 4 | 1/8 | 2-1/2 | 952708-C3 | 44.70 |
| .125 (1/8) | | .1250 | **1.000** (8x) | 4 | 1/8 | 2-1/2 | 714308-C3 | 49.70 |
| .140 (9/64) | | .1406 | **.220** (1.5x) | 4 | 3/16 | 2 | 965009-C3 | 47.20 |
| .140 (9/64) | | .1406 | **.425** (3x) | 4 | 3/16 | 2 | 958609-C3 | 47.20 |
| .156 (5/32) | | .1562 | **.235** (1.5x) | 4 | 3/16 | 2 | 965010-C3 | 34.00 |
| .156 (5/32) | | .1562 | **.470** (3x) | 4 | 3/16 | 2 | 958610-C3 | 34.40 |
| .156 (5/32) | | .1562 | **.750** (5x) | 4 | 3/16 | 3 | 952710-C3 | 47.90 |
| .187 (3/16) | | .1875 | **.150** (0.8x) | 4 | 3/16 | 2 | 835812-C3 | 37.90 |
| .187 (3/16) | | .1875 | **.285** (1.5x) | 4 | 3/16 | 2 | 965012-C3 | 34.00 |
| .187 (3/16) | | .1875 | **.562** (3x) | 4 | 3/16 | 2 | 958612-C3 | 34.40 |
| .187 (3/16) | | .1875 | **1.000** (5x) | 4 | 3/16 | 3 | 952712-C3 | 47.90 |
| | 6.0 mm | .2362 | **18.00 mm** (3x) | 4 | 6 mm | 63 mm | 945972-C3 | 40.20 |
| .250 (1/4) | | .2500 | **.375** (1.5x) | 4 | 1/4 | 2-1/2 | 965016-C3 | 43.30 |
| .250 (1/4) | | .2500 | **.750** (3x) | 4 | 1/4 | 2-1/2 | 958616-C3 | 43.70 |
| .250 (1/4) | | .2500 | **1.250** (5x) | 4 | 1/4 | 4 | 952716-C3 | 53.60 |
| .312 (5/16) | | .3125 | **1.000** (3x) | 4 | 5/16 | 2-1/2 | 958620-C3 | 48.90 |
| .375 (3/8) | | .3750 | **.570** (1.5x) | 4 | 3/8 | 2-1/2 | 965024-C3 | 54.10 |
| .375 (3/8) | | .3750 | **1.125** (3x) | 4 | 3/8 | 2-1/2 | 958624-C3 | 54.10 |
| .500 (1/2) | | .5000 | **1.500** (3x) | 4 | 1/2 | 3 | 958632-C3 | 78.10 |

**Please see Speeds & Feeds on page 193**

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Square – Long Reach, Stub Flute




- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA



| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .015 (1/64) | | .0150 | .023 | **.078** (5x) | 3 | 1/8 | 2-1/2 | 936115-C3 | 69.40 |
| .015 (1/64) | | .0150 | .023 | **.125** (8x) | 3 | 1/8 | 2-1/2 | 933815-C3 | 69.90 |
| .020 | | .0200 | .030 | **.100** (5x) | 3 | 1/8 | 2-1/2 | 936120-C3 | 65.70 |
| .020 | | .0200 | .030 | **.160** (8x) | 3 | 1/8 | 2-1/2 | 933820-C3 | 68.30 |
| .025 | | .0250 | .038 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 936125-C3 | 65.10 |
| .025 | | .0250 | .038 | **.203** (8x) | 3 | 1/8 | 2-1/2 | 933825-C3 | 65.70 |
| .030 | | .0300 | .045 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 936130-C3 | 60.10 |
| .030 | | .0300 | .045 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 933830-C3 | 62.50 |
| .031 (1/32) | | .0310 | .047 | **.093** (3x) | 3 | 1/8 | 1-1/2 | 945331-C3 | 58.50 |
| .031 (1/32) | | .0310 | .047 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 936131-C3 | 61.30 |
| .031 (1/32) | | .0310 | .047 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 933831-C3 | 61.40 |
| .031 (1/32) | | .0310 | .047 | **.312** (10x) | 3 | 1/8 | 2-1/2 | 931131-C3 | 66.00 |
| | 1.0 mm | .0393 | 1.50 mm | **5.0 mm** (5x) | 3 | 4 mm | 50 mm | 886422-C3 | 65.00 |
| | 1.0 mm | .0393 | 1.50 mm | **8.0 mm** (8x) | 3 | 4 mm | 50 mm | 887122-C3 | 66.30 |
| .040 | | .0400 | .060 | **.203** (5x) | 3 | 1/8 | 2-1/2 | 936140-C3 | 63.60 |
| .040 | | .0400 | .060 | **.325** (8x) | 3 | 1/8 | 2-1/2 | 933840-C3 | 65.40 |
| .047 (3/64) | | .0470 | .071 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 936147-C3 | 60.10 |
| .047 (3/64) | | .0470 | .071 | **.375** (8x) | 3 | 1/8 | 2-1/2 | 933847-C3 | 61.40 |
| .062 (1/16) | | .0620 | .093 | **.186** (3x) | 3 | 1/8 | 1-1/2 | 945362-C3 | 59.70 |
| .062 (1/16) | | .0620 | .093 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 936162-C3 | 59.80 |
| .062 (1/16) | | .0620 | .093 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 933862-C3 | 61.40 |
| .062 (1/16) | | .0620 | .093 | **.625** (10x) | 3 | 1/8 | 2-1/2 | 931162-C3 | 65.50 |
| .078 (5/64) | | .0780 | .118 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 936178-C3 | 59.80 |
| .078 (5/64) | | .0780 | .118 | **.625** (8x) | 3 | 1/8 | 2-1/2 | 933878-C3 | 62.50 |
| | 2.0 mm | .0787 | 3.00 mm | **10.0 mm** (5x) | 3 | 4 mm | 50 mm | 886445-C3 | 65.00 |
| | 2.0 mm | .0787 | 3.00 mm | **16.0 mm** (8x) | 3 | 4 mm | 50 mm | 887145-C3 | 66.30 |
| .093 (3/32) | | .0930 | .140 | **.279** (3x) | 3 | 1/8 | 1-1/2 | 945393-C3 | 58.50 |
| .093 (3/32) | | .0930 | .140 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 936193-C3 | 59.80 |
| .093 (3/32) | | .0930 | .140 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 933893-C3 | 61.40 |
| .093 (3/32) | | .0930 | .140 | **.950** (10x) | 3 | 1/8 | 2-1/2 | 931193-C3 | 66.00 |

continued on next page

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Square – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .100 | | .1000 | .150 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 936200-C3 | 64.80 |
| .100 | | .1000 | .150 | **.800** (8x) | 3 | 1/8 | 2-1/2 | 933900-C3 | 66.50 |
| .109 (7/64) | | .1090 | .164 | **.570** (5x) | 3 | 1/8 | 2-1/2 | 936202-C3 | 64.80 |
| .109 (7/64) | | .1090 | .164 | **.900** (8x) | 3 | 1/8 | 2-1/2 | 933902-C3 | 66.50 |
| | 3.0 mm | .1181 | 4.50 mm | **15.0 mm** (5x) | 3 | 4 mm | 50 mm | 886457-C3 | 66.60 |
| | 3.0 mm | .1181 | 4.50 mm | **24.0 mm** (8x) | 3 | 4 mm | 50 mm | 887157-C3 | 68.20 |

| $D_1$ +.000″ −.002″ | decimal equivalent | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | .187 | **.375** (3x) | 4 | 1/8 | 1-1/2 | 945408-C3 | 59.70 |
| .125 (1/8) | .1250 | .187 | **.625** (5x) | 4 | 1/8 | 2-1/2 | 936208-C3 | 59.10 |
| .125 (1/8) | .1250 | .187 | **1.000** (8x) | 4 | 1/8 | 2-1/2 | 933908-C3 | 60.80 |
| .125 (1/8) | .1250 | .187 | **1.250** (10x) | 4 | 1/8 | 2-1/2 | 931208-C3 | 61.80 |
| .156 (5/32) | .1562 | .235 | **.750** (5x) | 4 | 3/16 | 3 | 936210-C3 | 65.70 |
| .187 (3/16) | .1875 | .285 | **1.000** (5x) | 4 | 3/16 | 3 | 936212-C3 | 65.70 |
| .250 (1/4) | .2500 | .375 | **1.250** (5x) | 4 | 1/4 | 4 | 936216-C3 | 73.30 |

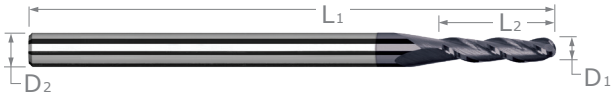
**Please See Speeds & Feeds On Page 195**

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harveytool.com/resources/speeds-feeds

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Ball




- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA



| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | .2 mm | .0078 | **.60 mm** (3x) | 3 | 4 mm | 50 mm | 974804-C3 | 76.00 |
| .010 | | .0100 | **.030** (3x) | 3 | 1/8 | 1-1/2 | 971810-C3 | 74.20 |
| .015 (1/64) | | .0150 | **.023** (1.5x) | 3 | 1/8 | 1-1/2 | 963015-C3 | 62.30 |
| .015 (1/64) | | .0150 | **.045** (3x) | 3 | 1/8 | 1-1/2 | 971815-C3 | 61.20 |
| | .4 mm | .0157 | **1.20 mm** (3x) | 3 | 4 mm | 50 mm | 974809-C3 | 65.90 |
| | .5 mm | .0196 | **1.50 mm** (3x) | 3 | 4 mm | 50 mm | 974811-C3 | 56.80 |
| .020 | | .0200 | **.030** (1.5x) | 3 | 1/8 | 1-1/2 | 963020-C3 | 56.30 |
| .020 | | .0200 | **.060** (3x) | 3 | 1/8 | 1-1/2 | 971820-C3 | 55.60 |
| | .6 mm | .0236 | **1.80 mm** (3x) | 3 | 4 mm | 50 mm | 974813-C3 | 55.00 |
| .025 | | .0250 | **.075** (3x) | 3 | 1/8 | 1-1/2 | 971825-C3 | 54.50 |
| .031 (1/32) | | .0310 | **.025** (0.8x) | 3 | 1/8 | 1-1/2 | 883931-C3 | 49.30 |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 3 | 1/8 | 1-1/2 | 963031-C3 | 46.10 |
| .031 (1/32) | | .0310 | **.093** (3x) | 3 | 1/8 | 1-1/2 | 971831-C3 | 46.10 |
| .031 (1/32) | | .0310 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 888631-C3 | 57.70 |
| | .8 mm | .0314 | **2.40 mm** (3x) | 3 | 4 mm | 50 mm | 974818-C3 | 47.60 |
| | 1.0 mm | .0393 | **1.50 mm** (1.5x) | 3 | 4 mm | 50 mm | 929222-C3 | 47.60 |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 3 | 4 mm | 50 mm | 974822-C3 | 47.60 |
| .040 | | .0400 | **.120** (3x) | 3 | 1/8 | 1-1/2 | 971840-C3 | 47.10 |
| .047 (3/64) | | .0470 | **.038** (0.8x) | 3 | 1/8 | 1-1/2 | 883947-C3 | 51.40 |
| .047 (3/64) | | .0470 | **.071** (1.5x) | 3 | 1/8 | 1-1/2 | 963047-C3 | 46.10 |
| .047 (3/64) | | .0470 | **.141** (3x) | 3 | 1/8 | 1-1/2 | 971847-C3 | 46.90 |
| | 1.2 mm | .0472 | **3.50 mm** (3x) | 3 | 4 mm | 50 mm | 974827-C3 | 47.60 |
| .050 | | .0500 | **.150** (3x) | 3 | 1/8 | 1-1/2 | 971850-C3 | 46.70 |
| | 1.4 mm | .0551 | **4.00 mm** (3x) | 3 | 4 mm | 50 mm | 974831-C3 | 47.60 |
| | 1.5 mm | .0590 | **4.50 mm** (3x) | 3 | 4 mm | 50 mm | 974833-C3 | 45.00 |
| .060 | | .0600 | **.180** (3x) | 3 | 1/8 | 1-1/2 | 971860-C3 | 47.10 |
| .062 (1/16) | | .0620 | **.050** (0.8x) | 3 | 1/8 | 1-1/2 | 883962-C3 | 46.60 |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 3 | 1/8 | 1-1/2 | 963062-C3 | 43.40 |
| .062 (1/16) | | .0620 | **.186** (3x) | 3 | 1/8 | 1-1/2 | 971862-C3 | 43.40 |
| .062 (1/16) | | .0620 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 888662-C3 | 54.90 |
| | 1.6 mm | .0629 | **5.00 mm** (3x) | 3 | 4 mm | 50 mm | 974836-C3 | 45.00 |
| .070 | | .0700 | **.210** (3x) | 3 | 1/8 | 1-1/2 | 971870-C3 | 44.50 |
| | 1.8 mm | .0708 | **5.50 mm** (3x) | 3 | 4 mm | 50 mm | 974840-C3 | 45.00 |
| .078 (5/64) | | .0780 | **.062** (0.8x) | 3 | 1/8 | 1-1/2 | 883978-C3 | 49.90 |
| .078 (5/64) | | .0780 | **.118** (1.5x) | 3 | 1/8 | 1-1/2 | 963078-C3 | 44.30 |
| .078 (5/64) | | .0780 | **.234** (3x) | 3 | 1/8 | 1-1/2 | 971878-C3 | 44.30 |

continued on next page

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Ball (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | 2.0 mm | .0787 | **6.00 mm** (3x) | 3 | 4 mm | 50 mm | 974845-C3 | 45.00 |
| .080 | | .0800 | **.240** (3x) | 3 | 1/8 | 1-1/2 | 971880-C3 | 44.50 |
| .090 | | .0900 | **.270** (3x) | 3 | 1/8 | 1-1/2 | 971890-C3 | 44.50 |
| .093 (3/32) | | .0930 | **.074** (0.8x) | 3 | 1/8 | 1-1/2 | 883993-C3 | 47.40 |
| .093 (3/32) | | .0930 | **.140** (1.5x) | 3 | 1/8 | 1-1/2 | 963093-C3 | 43.40 |
| .093 (3/32) | | .0930 | **.279** (3x) | 3 | 1/8 | 1-1/2 | 971893-C3 | 43.40 |
| .093 (3/32) | | .0930 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 888693-C3 | 54.90 |
| .100 | | .1000 | **.300** (3x) | 3 | 1/8 | 1-1/2 | 971900-C3 | 44.10 |
| .109 (7/64) | | .1090 | **.327** (3x) | 3 | 1/8 | 1-1/2 | 971902-C3 | 44.30 |
| | 3.0 mm | .1181 | **4.50 mm** (1.5x) | 3 | 4 mm | 50 mm | 929257-C3 | 45.30 |
| | 3.0 mm | .1181 | **9.00 mm** (3x) | 3 | 4 mm | 50 mm | 974857-C3 | 45.30 |

| $D_1$ +.000″ −.002″ | decimal equivalent | $L_2$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | **.100** (0.8x) | 4 | 1/8 | 1-1/2 | 884008-C3 | 47.40 |
| .125 (1/8) | .1250 | **.187** (1.5x) | 4 | 1/8 | 1-1/2 | 963108-C3 | 39.40 |
| .125 (1/8) | .1250 | **.375** (3x) | 4 | 1/8 | 1-1/2 | 971908-C3 | 39.90 |
| .125 (1/8) | .1250 | **.625** (5x) | 4 | 1/8 | 2-1/2 | 888708-C3 | 54.90 |
| .140 (9/64) | .1406 | **.425** (3x) | 4 | 3/16 | 2 | 971909-C3 | 59.00 |
| .156 (5/32) | .1562 | **.235** (1.5x) | 4 | 3/16 | 2 | 963110-C3 | 47.20 |
| .156 (5/32) | .1562 | **.470** (3x) | 4 | 3/16 | 2 | 971910-C3 | 47.20 |
| .187 (3/16) | .1875 | **.150** (0.8x) | 4 | 3/16 | 2 | 884012-C3 | 50.80 |
| .187 (3/16) | .1875 | **.285** (1.5x) | 4 | 3/16 | 2 | 963112-C3 | 43.40 |
| .187 (3/16) | .1875 | **.562** (3x) | 4 | 3/16 | 2 | 971912-C3 | 42.50 |
| .250 (1/4) | .2500 | **.375** (1.5x) | 4 | 1/4 | 2-1/2 | 963116-C3 | 51.50 |
| .250 (1/4) | .2500 | **.750** (3x) | 4 | 1/4 | 2-1/2 | 971916-C3 | 51.90 |



## Speeds & Feeds (Variable Helix For Medium Alloy Steels)

**Important Note**: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material | Hardness (HBn) | SFM |
|---|---|---|
| **Carbon Steels**: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx 52Lxxx, 6xxx, 8xxx, 9xxx | 225 - 250 | 250 |
| **Stainless Steels**: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502 | 250 - 275 | 220 |
| **Tool Steels**: A, L, O, P, W series | 275 - 300 | 180 |

| Chip Load Per Tooth (IPT) By Cutter Diameter | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Slotting | .00008 | .00017 | .00026 | .00035 | .00043 | .00052 | .00066 | .00099 | .00133 | .00174 | .00209 | .00278 |
| Roughing | .00010 | .00021 | .00032 | .00042 | .00052 | .00062 | .00080 | .00120 | .00160 | .00210 | .00252 | .00336 |
| Finishing | .00012 | .00025 | .00038 | .00050 | .00063 | .00075 | .00096 | .00144 | .00193 | .00252 | .00303 | .00404 |
| Max | .00016 | .00032 | .00049 | .00064 | .00081 | .00097 | .00124 | .00185 | .00248 | .00324 | .00390 | .00520 |

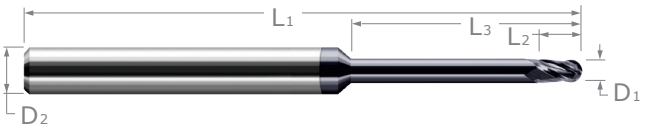
**Radial Depth of Cut*:**
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

**Axial Depth of Cut*:**
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

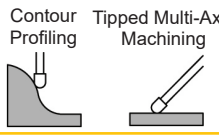
# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Ball – Long Reach, Stub Flute




- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

**IMPROVES PERFORMANCE**






| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .015 (1/64) | | .0150 | .022 | **.078** (5x) | 4 | 1/8 | 2-1/2 | 64215-C3 | 78.80 |
| .015 (1/64) | | .0150 | .022 | **.125** (8x) | 4 | 1/8 | 2-1/2 | 56615-C3 | 80.30 |
| .015 (1/64) | | .0150 | .022 | **.187** (12x) | 4 | 1/8 | 2-1/2 | 65415-C3 | 85.30 |
| | .4 mm | .0157 | .60 mm | **2.0 mm** (5x) | 4 | 4 mm | 50 mm | 984709-C3 | 86.50 |
| | .4 mm | .0157 | .60 mm | **3.2 mm** (8x) | 4 | 4 mm | 50 mm | 971009-C3 | 88.10 |
| | .4 mm | .0157 | .60 mm | **4.8 mm** (12x) | 4 | 4 mm | 50 mm | 988309-C3 | 95.10 |
| | .5 mm | .0196 | .75 mm | **2.5 mm** (5x) | 4 | 4 mm | 50 mm | 984711-C3 | 83.20 |
| | .5 mm | .0196 | .75 mm | **4.0 mm** (8x) | 4 | 4 mm | 50 mm | 971011-C3 | 84.40 |
| | .5 mm | .0196 | .75 mm | **6.0 mm** (12x) | 4 | 4 mm | 50 mm | 988311-C3 | 92.00 |
| | .5 mm | .0196 | .75 mm | **8.0 mm** (16x) | 4 | 4 mm | 50 mm | 979511-C3 | 95.90 |
| .020 | | .0200 | .030 | **.100** (5x) | 4 | 1/8 | 2-1/2 | 64220-C3 | 74.50 |
| .020 | | .0200 | .030 | **.160** (8x) | 4 | 1/8 | 2-1/2 | 56620-C3 | 76.00 |
| .020 | | .0200 | .030 | **.250** (12x) | 4 | 1/8 | 2-1/2 | 65420-C3 | 81.70 |
| | .6 mm | .0236 | .90 mm | **3.0 mm** (5x) | 4 | 4 mm | 50 mm | 984713-C3 | 81.40 |
| | .6 mm | .0236 | .90 mm | **4.8 mm** (8x) | 4 | 4 mm | 50 mm | 971013-C3 | 83.00 |
| | .6 mm | .0236 | .90 mm | **7.2 mm** (12x) | 4 | 4 mm | 50 mm | 988313-C3 | 88.40 |
| .025 | | .0250 | .037 | **.125** (5x) | 4 | 1/8 | 2-1/2 | 64225-C3 | 73.50 |
| .025 | | .0250 | .037 | **.203** (8x) | 4 | 1/8 | 2-1/2 | 56625-C3 | 74.10 |
| .025 | | .0250 | .037 | **.312** (12x) | 4 | 1/8 | 2-1/2 | 65425-C3 | 81.00 |
| .031 (1/32) | | .0310 | .046 | **.156** (5x) | 4 | 1/8 | 2-1/2 | 64231-C3 | 68.10 |
| .031 (1/32) | | .0310 | .046 | **.250** (8x) | 4 | 1/8 | 2-1/2 | 56631-C3 | 69.50 |
| .031 (1/32) | | .0310 | .046 | **.375** (12x) | 4 | 1/8 | 2-1/2 | 65431-C3 | 72.80 |
| | .8 mm | .0314 | 1.20 mm | **4.0 mm** (5x) | 4 | 4 mm | 50 mm | 984718-C3 | 76.10 |
| | .8 mm | .0314 | 1.20 mm | **6.5 mm** (8x) | 4 | 4 mm | 50 mm | 971018-C3 | 77.40 |
| | .8 mm | .0314 | 1.20 mm | **9.5 mm** (12x) | 4 | 4 mm | 50 mm | 988318-C3 | 80.00 |
| | 1.0 mm | .0393 | 1.50 mm | **5.0 mm** (5x) | 4 | 4 mm | 50 mm | 984722-C3 | 75.50 |
| | 1.0 mm | .0393 | 1.50 mm | **8.0 mm** (8x) | 4 | 4 mm | 50 mm | 971022-C3 | 76.80 |
| | 1.0 mm | .0393 | 1.50 mm | **12.0 mm** (12x) | 4 | 4 mm | 50 mm | 988322-C3 | 80.00 |
| | 1.0 mm | .0393 | 1.50 mm | **16.0 mm** (16x) | 4 | 4 mm | 50 mm | 979522-C3 | 83.70 |
| .040 | | .0400 | .060 | **.203** (5x) | 4 | 1/8 | 2-1/2 | 64240-C3 | 68.10 |
| .040 | | .0400 | .060 | **.325** (8x) | 4 | 1/8 | 2-1/2 | 56640-C3 | 69.50 |
| .047 (3/64) | | .0470 | .070 | **.250** (5x) | 4 | 1/8 | 2-1/2 | 64247-C3 | 68.10 |
| .047 (3/64) | | .0470 | .070 | **.375** (8x) | 4 | 1/8 | 2-1/2 | 56647-C3 | 69.50 |
| .047 (3/64) | | .0470 | .070 | **.570** (12x) | 4 | 1/8 | 2-1/2 | 65447-C3 | 72.10 |
| | 1.5 mm | .0590 | 2.20 mm | **7.5 mm** (5x) | 4 | 4 mm | 50 mm | 984733-C3 | 75.50 |
| | 1.5 mm | .0590 | 2.20 mm | **12.0 mm** (8x) | 4 | 4 mm | 50 mm | 971033-C3 | 77.40 |
| | 1.5 mm | .0590 | 2.20 mm | **18.0 mm** (12x) | 4 | 4 mm | 50 mm | 988333-C3 | 80.00 |
| | 1.5 mm | .0590 | 2.20 mm | **24.0 mm** (16x) | 4 | 4 mm | 63 mm | 979533-C3 | 83.70 |

continued on next page

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Ball – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .062 (1/16) | | .0620 | .093 | **.186** (3x) | 4 | 1/8 | 1-1/2 | 755462-C3 | 66.40 |
| .062 (1/16) | | .0620 | .093 | **.312** (5x) | 4 | 1/8 | 2-1/2 | 64262-C3 | 68.10 |
| .062 (1/16) | | .0620 | .093 | **.500** (8x) | 4 | 1/8 | 2-1/2 | 56662-C3 | 69.50 |
| .062 (1/16) | | .0620 | .093 | **.750** (12x) | 4 | 1/8 | 2-1/2 | 65462-C3 | 72.10 |
| .078 (5/64) | | .0780 | .117 | **.234** (3x) | 4 | 1/8 | 1-1/2 | 755478-C3 | 66.40 |
| .078 (5/64) | | .0780 | .117 | **.406** (5x) | 4 | 1/8 | 2-1/2 | 64278-C3 | 68.10 |
| .078 (5/64) | | .0780 | .117 | **.625** (8x) | 4 | 1/8 | 2-1/2 | 56678-C3 | 69.50 |
| .078 (5/64) | | .0780 | .117 | **.940** (12x) | 4 | 1/8 | 2-1/2 | 65478-C3 | 72.10 |
| | 2.0 mm | .0787 | 3.00 mm | **10.0 mm** (5x) | 4 | 4 mm | 50 mm | 984745-C3 | 76.10 |
| | 2.0 mm | .0787 | 3.00 mm | **16.0 mm** (8x) | 4 | 4 mm | 50 mm | 971045-C3 | 77.40 |
| | 2.0 mm | .0787 | 3.00 mm | **24.0 mm** (12x) | 4 | 4 mm | 63 mm | 988345-C3 | 80.00 |
| | 2.0 mm | .0787 | 3.00 mm | **32.0 mm** (16x) | 4 | 4 mm | 63 mm | 979545-C3 | 83.70 |
| .093 (3/32) | | .0930 | .139 | **.279** (3x) | 4 | 1/8 | 1-1/2 | 755493-C3 | 66.40 |
| .093 (3/32) | | .0930 | .139 | **.500** (5x) | 4 | 1/8 | 2-1/2 | 64293-C3 | 68.10 |
| .093 (3/32) | | .0930 | .139 | **.750** (8x) | 4 | 1/8 | 2-1/2 | 56693-C3 | 69.50 |
| .093 (3/32) | | .0930 | .139 | **1.125** (12x) | 4 | 1/8 | 2-1/2 | 65493-C3 | 72.80 |
| | 3.0 mm | .1181 | 4.50 mm | **15.0 mm** (5x) | 4 | 4 mm | 50 mm | 984757-C3 | 71.90 |

| $D_1$ +.000″ −.002″ | decimal equivalent | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | .187 | **.375** (3x) | 4 | 1/8 | 2-1/2 | 755508-C3 | 68.00 |
| .125 (1/8) | .1250 | .187 | **.625** (5x) | 4 | 1/8 | 2-1/2 | 64308-C3 | 67.20 |
| .125 (1/8) | .1250 | .187 | **1.000** (8x) | 4 | 1/8 | 2-1/2 | 56708-C3 | 68.80 |
| .125 (1/8) | .1250 | .187 | **1.250** (10x) | 4 | 1/8 | 2-1/2 | 733108-C3 | 70.50 |
| .125 (1/8) | .1250 | .187 | **1.500** (12x) | 4 | 1/8 | 3 | 65508-C3 | 72.10 |
| .156 (5/32) | .1562 | .234 | **.750** (5x) | 4 | 3/16 | 3 | 64310-C3 | 74.10 |
| .156 (5/32) | .1562 | .234 | **1.250** (8x) | 4 | 3/16 | 3 | 56710-C3 | 75.70 |
| .187 (3/16) | .1875 | .281 | **1.000** (5x) | 4 | 3/16 | 3 | 64312-C3 | 75.70 |
| .187 (3/16) | .1875 | .281 | **1.500** (8x) | 4 | 3/16 | 3 | 56712-C3 | 76.40 |
| .250 (1/4) | .2500 | .375 | **.750** (3x) | 4 | 1/4 | 4 | 755516-C3 | 83.40 |
| .250 (1/4) | .2500 | .375 | **1.250** (5x) | 4 | 1/4 | 4 | 64316-C3 | 82.50 |
| .250 (1/4) | .2500 | .375 | **2.000** (8x) | 4 | 1/4 | 4 | 56716-C3 | 84.20 |

## Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For Medium Alloy Steels)

**Important Note**: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%; for 16x, reduce to 75%) For complete speeds and feeds charts, please see www.harveytool.com.

| Material | Hardness (HBn) | SFM |
|---|---|---|
| **Carbon Steels**: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx 52Lxxx, 6xxx, 8xxx, 9xxx | 225 - 250 | 250 |
| **Stainless Steels**: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502 | 250 - 275 | 220 |
| **Tool Steels**: A, L, O, P, W series | 275 - 300 | 180 |

| | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 |
| Slotting | .00007 | .00014 | .00021 | .00028 | .00035 | .00041 | .00053 | .00079 | .00106 |
| Roughing | .00008 | .00017 | .00025 | .00033 | .00042 | .00050 | .00064 | .00096 | .00128 |
| Finishing | .00010 | .00020 | .00030 | .00040 | .00050 | .00060 | .00077 | .00115 | .00154 |
| Max | .00012 | .00026 | .00039 | .00052 | .00065 | .00077 | .00099 | .00148 | .00198 |

| Radial Depth of Cut*: | Axial Depth of Cut*: |
|---|---|
| Slotting: 1x Dia | Slotting: .35x Dia |
| Roughing: .35x Dia | Roughing: .5x - 1x Dia |
| Finishing: .1x Dia | Finishing: .5x - 1x Dia |

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

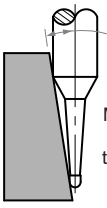
# HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Ball – Tapered Reach (Mold Cutters)




**Excellent in Readily Machinable Mold Steels, Stainless Steels, & Tool Steels**

- Very short length of cut and solid tapered neck for maximum rigidity
- Ideal for contour machining of mold and die cavities
- 35° helix for increased cutting performance
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- 2 flutes to center • Solid carbide • CNC ground in the USA

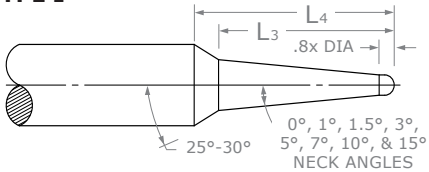



**Effective Wall Angle**
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

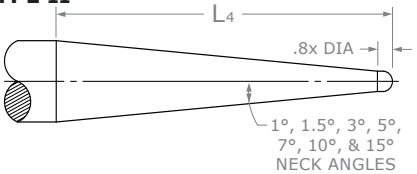
| NECK ANGLE | CUTTER DIAMETER | LENGTH OF CUT | TYPE | TAPERED REACH | OVERALL REACH | EFFECTIVE WALL ANGLE | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ +0°00′ −0°30′ | $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | | $L_3$ | $L_4$ | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| 0° (straight neck) | .062 (1/16) | .050 | I | .500 | **.610** | 6.2° | 3/16 | 2 | 882843-C6 | 70.30 |
| | .062 (1/16) | .050 | I | 1.000 | **1.110** | 3.3° | 3/16 | 2-1/2 | 882850-C6 | 76.70 |
| | .093 (3/32) | .074 | I | .750 | **.833** | 3.4° | 3/16 | 2 | 882864-C6 | 70.30 |
| | .093 (3/32) | .074 | I | 1.125 | **1.208** | 2.3° | 3/16 | 2-1/2 | 882871-C6 | 76.70 |
| | .125 (1/8) | .100 | I | 1.000 | **1.058** | 1.8° | 3/16 | 2-1/2 | 882877-C6 | 76.70 |
| | .125 (1/8) | .100 | I | 1.750 | **1.808** | 1.0° | 3/16 | 3 | 882885-C6 | 79.10 |
| 1° | .062 (1/16) | .050 | I | .500 | **.595** | 6.4° | 3/16 | 2 | 927543-C6 | 69.00 |
| | .062 (1/16) | .050 | I | 1.000 | **1.080** | 3.5° | 3/16 | 2-1/2 | 927550-C6 | 75.50 |
| | .093 (3/32) | .074 | I | .750 | **.811** | 3.6° | 3/16 | 2 | 927564-C6 | 69.90 |
| | .093 (3/32) | .074 | I | 1.125 | **1.175** | 2.4° | 3/16 | 2-1/2 | 927571-C6 | 75.50 |
| | .125 (1/8) | .100 | I | 1.000 | **1.027** | 1.9° | 3/16 | 2 | 927577-C6 | 71.90 |
| | .125 (1/8) | .100 | II | 1.890 | **1.890** | 1.0° | 3/16 | 3 | 927585-C6 | 78.00 |
| | .187 (3/16) | .150 | II | 1.940 | **1.940** | 1.0° | 1/4 | 4 | 927587-C6 | 91.70 |
| | .250 (1/4) | .200 | II | 1.990 | **1.990** | 1.0° | 5/16 | 4 | 927592-C6 | 97.80 |
| 1.5° | .015 (1/64) | .012 | I | .125 | **.269** | 18.2° | 3/16 | 2 | 19001-C6 | 78.50 |
| | .015 (1/64) | .012 | I | .250 | **.389** | 12.8° | 3/16 | 2 | 19008-C6 | 78.50 |
| | .031 (1/32) | .025 | I | .250 | **.375** | 12.3° | 3/16 | 2 | 19015-C6 | 76.70 |
| | .031 (1/32) | .025 | I | .500 | **.614** | 7.5° | 3/16 | 2 | 19022-C6 | 76.70 |
| | .039 (1 mm) | .031 | I | .375 | **.488** | 9.0° | 3/16 | 2 | 19025-C6 | 73.40 |
| | .047 (3/64) | .038 | I | .375 | **.481** | 8.7° | 3/16 | 2 | 19029-C6 | 73.40 |
| | .047 (3/64) | .038 | I | .750 | **.839** | 5.0° | 3/16 | 2 | 19036-C6 | 73.40 |
| | .062 (1/16) | .050 | I | .500 | **.588** | 6.4° | 3/16 | 2 | 19043-C6 | 69.00 |
| | .062 (1/16) | .050 | I | 1.000 | **1.066** | 3.5° | 3/16 | 2-1/2 | 19050-C6 | 76.10 |
| | .062 (1/16) | .050 | I | 1.500 | **1.543** | 2.4° | 3/16 | 3 | 19053-C6 | 78.30 |
| | .078 (5/64) | .062 | I | .625 | **.694** | 4.8° | 3/16 | 2 | 19057-C6 | 69.90 |
| | .093 (3/32) | .074 | I | .750 | **.801** | 3.6° | 3/16 | 2 | 19064-C6 | 69.00 |
| | .093 (3/32) | .074 | I | 1.500 | **1.517** | 1.9° | 3/16 | 2-1/2 | 19066-C6 | 75.50 |
| | .093 (3/32) | .074 | II | 1.878 | **1.878** | 1.5° | 3/16 | 3 | 19068-C6 | 79.10 |
| | .125 (1/8) | .100 | II | 1.293 | **1.293** | 1.5° | 3/16 | 2-1/2 | 19071-C6 | 71.90 |
| | .125 (1/8) | .100 | II | 2.487 | **2.487** | 1.5° | 1/4 | 4 | 19078-C6 | 84.40 |
| | .187 (3/16) | .150 | II | 1.343 | **1.343** | 1.5° | 1/4 | 2-1/2 | 19085-C6 | 78.10 |
| | .250 (1/4) | .200 | II | 1.393 | **1.393** | 1.5° | 5/16 | 2-1/2 | 19092-C6 | 99.60 |

continued on next page

**TYPE I**




**TYPE II**



# HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Ball – Tapered Reach (Mold Cutters) (cont.)

continued from previous page

| NECK ANGLE | CUTTER DIAMETER | LENGTH OF CUT | TYPE | TAPERED REACH | OVERALL REACH | EFFECTIVE WALL ANGLE | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°00'}_{-0°30'}$ | $D_1$ $^{+.000"}_{-.001"}$ | $L_2$ $^{+.010"}_{-.000"}$ | | $L_3$ | $L_4$ | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| | .015 (1/64) | .012 | I | .156 | **.292** | 16.8° | 3/16 | 2-1/2 | 36901-C6 | 84.30 |
| | .015 (1/64) | .012 | I | .375 | **.491** | 10.1° | 3/16 | 2-1/2 | 66643-C6 | 79.10 |
| | .015 (1/64) | .012 | I | .875 | **.946** | 5.3° | 3/16 | 2-1/2 | 66648-C6 | 78.30 |
| | .020 | .016 | I | .250 | **.374** | 13.0° | 3/16 | 2-1/2 | 36904-C6 | 83.60 |
| | .020 | .016 | I | .500 | **.601** | 8.1° | 3/16 | 2-1/2 | 36907-C6 | 83.60 |
| | .025 | .020 | I | .250 | **.370** | 12.8° | 3/16 | 2-1/2 | 36910-C6 | 84.00 |
| | .025 | .020 | I | .500 | **.597** | 7.9° | 3/16 | 2-1/2 | 36913-C6 | 83.20 |
| | .031 (1/32) | .025 | I | .312 | **.421** | 10.9° | 3/16 | 2-1/2 | 36916-C6 | 84.00 |
| | .031 (1/32) | .025 | I | .750 | **.820** | 5.6° | 3/16 | 2-1/2 | 67046-C6 | 68.80 |
| | .031 (1/32) | .025 | II | 1.518 | **1.518** | 3.0° | 3/16 | 2-1/2 | 36931-C6 | 68.80 |
| | .039 (1 mm) | .031 | I | .375 | **.472** | 9.3° | 3/16 | 2-1/2 | 36917-C6 | 84.00 |
| | .039 (1 mm) | .031 | I | .750 | **.813** | 5.4° | 3/16 | 2-1/2 | 36919-C6 | 83.20 |
| | .039 (1 mm) | .031 | II | 1.448 | **1.448** | 3.0° | 3/16 | 2-1/2 | 36921-C6 | 84.00 |
| | .047 (3/64) | .038 | I | .375 | **.466** | 9.0° | 3/16 | 2-1/2 | 36922-C6 | 80.30 |
| | .047 (3/64) | .038 | I | .875 | **.921** | 4.5° | 3/16 | 2-1/2 | 67348-C6 | 64.90 |
| | .047 (3/64) | .038 | II | 1.378 | **1.378** | 3.0° | 3/16 | 2-1/2 | 36947-C6 | 64.90 |
| | .050 | .040 | I | .500 | **.577** | 7.1° | 3/16 | 2-1/2 | 36925-C6 | 80.30 |
| | .060 | .048 | I | .625 | **.683** | 5.6° | 3/16 | 2-1/2 | 36928-C6 | 80.30 |
| | .062 (1/16) | .050 | I | .375 | **.454** | 8.4° | 3/16 | 2-1/2 | 36934-C6 | 75.80 |
| 3° | .062 (1/16) | .050 | I | .625 | **.681** | 5.5° | 3/16 | 2-1/2 | 66946-C6 | 64.90 |
| | .062 (1/16) | .050 | I | .875 | **.909** | 4.1° | 3/16 | 2-1/2 | 36937-C6 | 75.20 |
| | .062 (1/16) | .050 | II | 1.247 | **1.247** | 3.0° | 3/16 | 2-1/2 | 36962-C6 | 64.90 |
| | .062 (1/16) | .050 | II | 1.843 | **1.843** | 3.0° | 1/4 | 3 | 37362-C6 | 85.80 |
| | .078 (5/64) | .062 | I | .500 | **.555** | 6.1° | 3/16 | 2-1/2 | 36940-C6 | 75.20 |
| | .078 (5/64) | .062 | II | 1.107 | **1.107** | 3.0° | 3/16 | 2-1/2 | 36978-C6 | 63.20 |
| | .093 (3/32) | .074 | I | .625 | **.657** | 4.5° | 3/16 | 2 | 36943-C6 | 69.00 |
| | .093 (3/32) | .074 | II | .976 | **.976** | 3.0° | 3/16 | 2 | 36993-C6 | 57.50 |
| | .093 (3/32) | .074 | II | 1.572 | **1.572** | 3.0° | 1/4 | 3 | 37393-C6 | 84.30 |
| | .100 | .080 | II | 1.511 | **1.511** | 3.0° | 1/4 | 3 | 37400-C6 | 87.30 |
| | .109 (7/64) | .087 | II | 1.432 | **1.432** | 3.0° | 1/4 | 3 | 37402-C6 | 87.30 |
| | .118 (3 mm) | .094 | II | 1.354 | **1.354** | 2.9° | 1/4 | 2-1/2 | 37405-C6 | 86.40 |
| | .125 (1/8) | .100 | I | .875 | **.913** | 4.2° | 1/4 | 2-1/2 | 36946-C6 | 82.50 |
| | .125 (1/8) | .100 | II | 1.293 | **1.293** | 2.9° | 1/4 | 2-1/2 | 37408-C6 | 78.60 |
| | .125 (1/8) | .100 | II | 2.485 | **2.485** | 3.0° | 3/8 | 4 | 37708-C6 | 123.20 |
| | .156 (5/32) | .125 | II | 1.020 | **1.020** | 2.8° | 1/4 | 2-1/2 | 37410-C6 | 85.80 |
| | .187 (3/16) | .150 | II | .746 | **.746** | 2.8° | 1/4 | 2-1/2 | 37412-C6 | 85.10 |
| | .187 (3/16) | .150 | II | 1.343 | **1.343** | 2.9° | 5/16 | 2-1/2 | 36949-C6 | 99.60 |
| | .187 (3/16) | .150 | II | 1.939 | **1.939** | 2.9° | 3/8 | 4 | 37712-C6 | 123.20 |
| | .250 (1/4) | .200 | II | 1.393 | **1.393** | 2.9° | 3/8 | 2-1/2 | 37716-C6 | 102.80 |
| | .015 (1/64) | .012 | I | .375 | **.469** | 10.6° | 3/16 | 2 | 66664-C6 | 70.90 |
| | .015 (1/64) | .012 | II | .998 | **.998** | 5.0° | 3/16 | 2 | 38515-C6 | 70.60 |
| | .020 | .016 | I | .562 | **.624** | 7.8° | 3/16 | 2 | 38907-C6 | 77.10 |
| | .020 | .016 | II | .973 | **.973** | 5.0° | 3/16 | 2 | 38520-C6 | 76.70 |
| 5° | .025 | .020 | I | .562 | **.621** | 7.6° | 3/16 | 2 | 38914-C6 | 77.90 |
| | .025 | .020 | II | .949 | **.949** | 5.0° | 3/16 | 2 | 38525-C6 | 77.50 |
| | .031 (1/32) | .025 | I | .375 | **.457** | 10.1° | 3/16 | 2 | 67065-C6 | 63.00 |
| | .031 (1/32) | .025 | II | .919 | **.919** | 5.0° | 3/16 | 2 | 38531-C6 | 63.00 |
| | .039 (1 mm) | .031 | I | .625 | **.664** | 6.6° | 3/16 | 2 | 38921-C6 | 76.70 |

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# HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

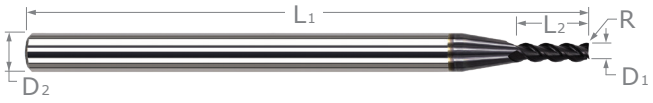
## Ball – Tapered Reach (Mold Cutters) (cont.)

continued from previous page

| NECK ANGLE | CUTTER DIAMETER | LENGTH OF CUT | TYPE | TAPERED REACH | OVERALL REACH | EFFECTIVE WALL ANGLE | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°00'}_{-0°30'}$ | $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $L_3$ | $L_4$ | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| 5° | .047 (3/64) | .038 | II | .841 | **.841** | 5.0° | 3/16 | 2 | 38547-C6 | 63.70 |
| | .047 (3/64) | .038 | II | 1.198 | **1.198** | 5.0° | 1/4 | 2-1/2 | 38947-C6 | 85.10 |
| | .050 | .040 | II | .826 | **.826** | 4.9° | 3/16 | 2 | 38928-C6 | 64.10 |
| | .060 | .048 | II | .777 | **.777** | 4.9° | 3/16 | 2 | 38935-C6 | 63.60 |
| | .060 | .048 | II | 1.134 | **1.134** | 5.0° | 1/4 | 2-1/2 | 38960-C6 | 85.10 |
| | .062 (1/16) | .050 | I | .375 | **.434** | 8.8° | 3/16 | 2 | 66963-C6 | 60.00 |
| | .062 (1/16) | .050 | II | .767 | **.767** | 4.9° | 3/16 | 2 | 38562-C6 | 59.40 |
| | .062 (1/16) | .050 | II | 1.124 | **1.124** | 5.0° | 1/4 | 2-1/2 | 38962-C6 | 85.10 |
| | .078 (5/64) | .062 | II | 1.045 | **1.045** | 4.9° | 1/4 | 2-1/2 | 38978-C6 | 81.20 |
| | .093 (3/32) | .074 | II | .972 | **.972** | 4.9° | 1/4 | 2-1/2 | 38993-C6 | 81.90 |
| | .093 (3/32) | .074 | II | 1.686 | **1.686** | 5.0° | 3/8 | 3 | 39293-C6 | 108.70 |
| | .100 | .080 | II | .937 | **.937** | 4.9° | 1/4 | 2-1/2 | 39000-C6 | 82.40 |
| | .109 (7/64) | .087 | II | .893 | **.893** | 4.8° | 1/4 | 2-1/2 | 39002-C6 | 82.40 |
| | .118 (3 mm) | .094 | II | .849 | **.849** | 4.7° | 1/4 | 2-1/2 | 39005-C6 | 81.70 |
| | .125 (1/8) | .100 | I | .500 | **.548** | 7.3° | 1/4 | 2-1/2 | 38942-C6 | 77.70 |
| | .125 (1/8) | .100 | II | .814 | **.814** | 4.8° | 1/4 | 2-1/2 | 39008-C6 | 77.30 |
| | .125 (1/8) | .100 | II | 1.529 | **1.529** | 4.9° | 3/8 | 3 | 39308-C6 | 103.90 |
| | .156 (5/32) | .125 | II | .661 | **.661** | 4.6° | 1/4 | 2-1/2 | 39010-C6 | 81.20 |
| | .187 (3/16) | .150 | II | 1.222 | **1.222** | 4.8° | 3/8 | 2-1/2 | 39312-C6 | 99.60 |
| | .187 (3/16) | .150 | II | 1.222 | **1.222** | 4.8° | 3/8 | 4 | 922312-C6 | 111.20 |
| | .250 (1/4) | .200 | II | .914 | **.914** | 4.5° | 3/8 | 2-1/2 | 39316-C6 | 100.70 |
| | .250 (1/4) | .200 | II | .914 | **.914** | 4.5° | 3/8 | 4 | 922316-C6 | 111.20 |
| 7° | .015 (1/64) | .012 | I | .187 | **.299** | 16.5° | 3/16 | 2 | 66678-C6 | 70.90 |
| | .015 (1/64) | .012 | II | .714 | **.714** | 7.0° | 3/16 | 2 | 40015-C6 | 71.60 |
| | .020 | .016 | II | .698 | **.698** | 7.0° | 3/16 | 2 | 40020-C6 | 70.90 |
| | .031 (1/32) | .025 | I | .250 | **.338** | 13.6° | 3/16 | 2 | 67078-C6 | 63.60 |
| | .031 (1/32) | .025 | II | .662 | **.662** | 6.9° | 3/16 | 2 | 40031-C6 | 63.60 |
| | .031 (1/32) | .025 | II | .917 | **.917** | 7.0° | 1/4 | 2-1/2 | 40431-C6 | 81.20 |
| | .039 (1 mm) | .031 | II | .636 | **.636** | 6.9° | 3/16 | 2 | 40007-C6 | 63.60 |
| | .047 (3/64) | .038 | I | .375 | **.425** | 9.9° | 3/16 | 2 | 40014-C6 | 63.60 |
| | .047 (3/64) | .038 | II | .610 | **.610** | 6.9° | 3/16 | 2 | 40047-C6 | 63.60 |
| | .047 (3/64) | .038 | II | .864 | **.864** | 6.9° | 1/4 | 2-1/2 | 40447-C6 | 81.20 |
| | .060 | .048 | II | .822 | **.822** | 6.9° | 1/4 | 2-1/2 | 40460-C6 | 81.90 |
| | .062 (1/16) | .050 | I | .500 | **.567** | 9.9° | 1/4 | 2-1/2 | 66980-C6 | 81.20 |
| | .062 (1/16) | .050 | II | .815 | **.815** | 6.9° | 1/4 | 2-1/2 | 40462-C6 | 81.20 |
| | .062 (1/16) | .050 | II | 1.324 | **1.324** | 6.9° | 3/8 | 2-1/2 | 40862-C6 | 104.10 |
| | .078 (5/64) | .062 | II | 1.272 | **1.272** | 6.9° | 3/8 | 2-1/2 | 40878-C6 | 104.10 |
| | .093 (3/32) | .074 | II | .714 | **.714** | 6.7° | 1/4 | 2-1/2 | 40493-C6 | 77.30 |
| | .093 (3/32) | .074 | II | 1.223 | **1.223** | 6.9° | 3/8 | 2-1/2 | 40893-C6 | 104.10 |
| | .125 (1/8) | .100 | II | .609 | **.609** | 6.5° | 1/4 | 2-1/2 | 40508-C6 | 73.70 |
| | .125 (1/8) | .100 | II | 1.118 | **1.118** | 6.8° | 3/8 | 2-1/2 | 40908-C6 | 100.70 |
| | .187 (3/16) | .150 | II | .914 | **.914** | 6.5° | 3/8 | 2-1/2 | 40912-C6 | 100.70 |
| | .187 (3/16) | .150 | II | .914 | **.914** | 6.5° | 3/8 | 4 | 917212-C6 | 112.30 |
| 10° | .031 (1/32) | .025 | I | .250 | **.317** | 14.5° | 3/16 | 2 | 774631-C6 | 64.10 |
| | .062 (1/16) | .050 | I | .500 | **.525** | 10.7° | 1/4 | 2 | 774662-C6 | 81.90 |
| | .125 (1/8) | .100 | II | .632 | **.632** | 9.0° | 5/16 | 2-1/2 | 774608-C6 | 100.70 |
| 15° | .031 (1/32) | .025 | I | .250 | **.281** | 16.3° | 3/16 | 2 | 773931-C6 | 64.10 |
| | .062 (1/16) | .050 | II | .401 | **.401** | 14.1° | 1/4 | 2 | 773962-C6 | 81.90 |
| | .125 (1/8) | .100 | II | .567 | **.567** | 13.7° | 3/8 | 2-1/2 | 773908-C6 | 100.70 |

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Corner Radius




- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | .2 mm | .0078 | **.05 mm** | .30 mm (1.5x) | 3 | 4 mm | 50 mm | 985604-C3 | 69.90 |
| | .2 mm | .0078 | **.05 mm** | .60 mm (3x) | 3 | 4 mm | 50 mm | 976804-C3 | 69.90 |
| .010 | | .0100 | **.003** | .015 (1.5x) | 3 | 1/8 | 1-1/2 | 52610-C3 | 65.60 |
| .010 | | .0100 | **.003** | .030 (3x) | 3 | 1/8 | 1-1/2 | 45610-C3 | 65.60 |
| | .3 mm | .0118 | **.08 mm** | .90 mm (3x) | 3 | 4 mm | 50 mm | 976806-C3 | 68.40 |
| .015 (1/64) | | .0150 | **.003** | .022 (1.5x) | 3 | 1/8 | 1-1/2 | 52615-C3 | 54.10 |
| .015 (1/64) | | .0150 | **.003** | .045 (3x) | 3 | 1/8 | 1-1/2 | 45615-C3 | 53.10 |
| .015 (1/64) | | .0150 | **.003** | .078 (5x) | 3 | 1/8 | 2-1/2 | 53815-C3 | 65.70 |
| | .4 mm | .0157 | **.08 mm** | .60 mm (1.5x) | 3 | 4 mm | 50 mm | 985609-C3 | 58.20 |
| | .4 mm | .0157 | **.08 mm** | 1.20 mm (3x) | 3 | 4 mm | 50 mm | 976809-C3 | 57.70 |
| | .5 mm | .0196 | **.10 mm** | .75 mm (1.5x) | 3 | 4 mm | 50 mm | 985611-C3 | 52.10 |
| | .5 mm | .0196 | **.10 mm** | 1.50 mm (3x) | 3 | 4 mm | 50 mm | 976811-C3 | 52.10 |
| .020 | | .0200 | **.004** | .030 (1.5x) | 3 | 1/8 | 1-1/2 | 52620-C3 | 47.40 |
| .020 | | .0200 | **.004** | .060 (3x) | 3 | 1/8 | 1-1/2 | 45620-C3 | 47.40 |
| .020 | | .0200 | **.004** | .100 (5x) | 3 | 1/8 | 2-1/2 | 53820-C3 | 58.10 |
| | .6 mm | .0236 | **.10 mm** | .90 mm (1.5x) | 3 | 4 mm | 50 mm | 985613-C3 | 50.60 |
| | .6 mm | .0236 | **.10 mm** | 1.80 mm (3x) | 3 | 4 mm | 50 mm | 976813-C3 | 50.60 |
| .025 | | .0250 | **.004** | .038 (1.5x) | 3 | 1/8 | 1-1/2 | 52625-C3 | 45.00 |
| .025 | | .0250 | **.004** | .075 (3x) | 3 | 1/8 | 1-1/2 | 45625-C3 | 46.00 |
| .025 | | .0250 | **.004** | .125 (5x) | 3 | 1/8 | 2-1/2 | 53825-C3 | 55.40 |
| | .7 mm | .0275 | **.10 mm** | 2.10 mm (3x) | 3 | 4 mm | 50 mm | 976815-C3 | 50.60 |
| .031 (1/32) | | .0310 | **.005** | .047 (1.5x) | 3 | 1/8 | 1-1/2 | 52631-C3 | 37.50 |
| .031 (1/32) | | .0310 | **.005** | .093 (3x) | 3 | 1/8 | 1-1/2 | 45631-C3 | 37.50 |
| .031 (1/32) | | .0310 | **.005** | .156 (5x) | 3 | 1/8 | 2-1/2 | 53831-C3 | 47.70 |
| .031 (1/32) | | .0310 | **.010** | .093 (3x) | 3 | 1/8 | 1-1/2 | 907231-C3 | 37.40 |
| | .8 mm | .0314 | **.10 mm** | 1.20 mm (1.5x) | 3 | 4 mm | 50 mm | 985618-C3 | 43.60 |
| | .8 mm | .0314 | **.10 mm** | 2.40 mm (3x) | 3 | 4 mm | 50 mm | 976818-C3 | 43.10 |
| .035 | | .0350 | **.005** | .053 (1.5x) | 3 | 1/8 | 1-1/2 | 52635-C3 | 38.80 |
| .035 | | .0350 | **.005** | .105 (3x) | 3 | 1/8 | 1-1/2 | 45635-C3 | 38.80 |
| .035 | | .0350 | **.005** | .187 (5x) | 3 | 1/8 | 2-1/2 | 53835-C3 | 48.80 |
| | .9 mm | .0354 | **.10 mm** | 2.70 mm (3x) | 3 | 4 mm | 50 mm | 976820-C3 | 43.10 |

continued on next page

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | 1.0 mm | .0393 | **.10 mm** | 1.50 mm (1.5x) | 3 | 4 mm | 50 mm | 985622-C3 | 43.60 |
| | 1.0 mm | .0393 | **.10 mm** | 3.00 mm (3x) | 3 | 4 mm | 50 mm | 976822-C3 | 43.60 |
| .040 | | .0400 | **.005** | .060 (1.5x) | 3 | 1/8 | 1-1/2 | 52640-C3 | 38.80 |
| .040 | | .0400 | **.005** | .120 (3x) | 3 | 1/8 | 1-1/2 | 45640-C3 | 38.80 |
| .040 | | .0400 | **.005** | .203 (5x) | 3 | 1/8 | 2-1/2 | 53840-C3 | 47.70 |
| | 1.1 mm | .0433 | **.10 mm** | 3.00 mm (3x) | 3 | 4 mm | 50 mm | 976824-C3 | 43.60 |
| .045 | | .0450 | **.005** | .068 (1.5x) | 3 | 1/8 | 1-1/2 | 52645-C3 | 38.80 |
| .045 | | .0450 | **.005** | .135 (3x) | 3 | 1/8 | 1-1/2 | 45645-C3 | 38.10 |
| .045 | | .0450 | **.005** | .225 (5x) | 3 | 1/8 | 2-1/2 | 53845-C3 | 48.80 |
| .047 (3/64) | | .0470 | **.005** | .071 (1.5x) | 3 | 1/8 | 1-1/2 | 52647-C3 | 38.20 |
| .047 (3/64) | | .0470 | **.005** | .141 (3x) | 3 | 1/8 | 1-1/2 | 45647-C3 | 37.50 |
| .047 (3/64) | | .0470 | **.005** | .250 (5x) | 3 | 1/8 | 2-1/2 | 53847-C3 | 47.70 |
| .047 (3/64) | | .0470 | **.010** | .141 (3x) | 3 | 1/8 | 1-1/2 | 907247-C3 | 37.50 |
| .047 (3/64) | | .0470 | **.015** | .141 (3x) | 3 | 1/8 | 1-1/2 | 903447-C3 | 37.50 |
| | 1.2 mm | .0472 | **.10 mm** | 1.80 mm (1.5x) | 3 | 4 mm | 50 mm | 985627-C3 | 43.60 |
| | 1.2 mm | .0472 | **.10 mm** | 3.50 mm (3x) | 3 | 4 mm | 50 mm | 976827-C3 | 43.10 |
| .050 | | .0500 | **.005** | .075 (1.5x) | 3 | 1/8 | 1-1/2 | 52650-C3 | 38.80 |
| .050 | | .0500 | **.005** | .150 (3x) | 3 | 1/8 | 1-1/2 | 45650-C3 | 38.10 |
| .050 | | .0500 | **.005** | .250 (5x) | 3 | 1/8 | 2-1/2 | 53850-C3 | 47.70 |
| | 1.3 mm | .0511 | **.10 mm** | 4.00 mm (3x) | 3 | 4 mm | 50 mm | 976829-C3 | 43.60 |
| .055 | | .0550 | **.005** | .083 (1.5x) | 3 | 1/8 | 1-1/2 | 52655-C3 | 38.80 |
| .055 | | .0550 | **.005** | .165 (3x) | 3 | 1/8 | 1-1/2 | 45655-C3 | 38.10 |
| .055 | | .0550 | **.005** | .275 (5x) | 3 | 1/8 | 2-1/2 | 53855-C3 | 47.70 |
| | 1.4 mm | .0551 | **.10 mm** | 2.10 mm (1.5x) | 3 | 4 mm | 50 mm | 985631-C3 | 43.60 |
| | 1.4 mm | .0551 | **.10 mm** | 4.00 mm (3x) | 3 | 4 mm | 50 mm | 976831-C3 | 43.60 |
| | 1.5 mm | .0590 | **.20 mm** | 2.20 mm (1.5x) | 3 | 4 mm | 50 mm | 985633-C3 | 41.00 |
| | 1.5 mm | .0590 | **.20 mm** | 4.50 mm (3x) | 3 | 4 mm | 50 mm | 976833-C3 | 40.60 |
| .060 | | .0600 | **.010** | .090 (1.5x) | 3 | 1/8 | 1-1/2 | 52660-C3 | 38.80 |
| .060 | | .0600 | **.010** | .180 (3x) | 3 | 1/8 | 1-1/2 | 45660-C3 | 38.80 |
| .060 | | .0600 | **.010** | .312 (5x) | 3 | 1/8 | 2-1/2 | 53860-C3 | 48.80 |
| .062 (1/16) | | .0620 | **.005** | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 881862-C3 | 34.70 |
| .062 (1/16) | | .0620 | **.005** | .186 (3x) | 3 | 1/8 | 1-1/2 | 913862-C3 | 34.70 |
| .062 (1/16) | | .0620 | **.005** | .312 (5x) | 3 | 1/8 | 2-1/2 | 759662-C3 | 46.90 |
| .062 (1/16) | | .0620 | **.010** | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 52662-C3 | 34.70 |
| .062 (1/16) | | .0620 | **.010** | .186 (3x) | 3 | 1/8 | 1-1/2 | 45662-C3 | 34.70 |
| .062 (1/16) | | .0620 | **.010** | .312 (5x) | 3 | 1/8 | 2-1/2 | 53862-C3 | 46.10 |
| .062 (1/16) | | .0620 | **.015** | .186 (3x) | 3 | 1/8 | 1-1/2 | 903462-C3 | 34.70 |
| .062 (1/16) | | .0620 | **.020** | .186 (3x) | 3 | 1/8 | 1-1/2 | 931362-C3 | 34.70 |
| | 1.6 mm | .0629 | **.20 mm** | 2.40 mm (1.5x) | 3 | 4 mm | 50 mm | 985636-C3 | 41.00 |
| | 1.6 mm | .0629 | **.20 mm** | 5.00 mm (3x) | 3 | 4 mm | 50 mm | 976836-C3 | 41.00 |
| | 1.7 mm | .0669 | **.20 mm** | 5.00 mm (3x) | 3 | 4 mm | 50 mm | 976838-C3 | 41.00 |
| .070 | | .0700 | **.010** | .105 (1.5x) | 3 | 1/8 | 1-1/2 | 52670-C3 | 36.00 |
| .070 | | .0700 | **.010** | .210 (3x) | 3 | 1/8 | 1-1/2 | 45670-C3 | 35.30 |
| | 1.8 mm | .0708 | **.20 mm** | 2.70 mm (1.5x) | 3 | 4 mm | 50 mm | 985640-C3 | 41.00 |
| | 1.8 mm | .0708 | **.20 mm** | 5.50 mm (3x) | 3 | 4 mm | 50 mm | 976840-C3 | 41.00 |

continued on next page

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | 1.9 mm | .0748 | **.20 mm** | 5.50 mm (3x) | 3 | 4 mm | 50 mm | 976842-C3 | 41.00 |
| .078 (5/64) | | .0780 | **.005** | .118 (1.5x) | 3 | 1/8 | 1-1/2 | 881878-C3 | 34.80 |
| .078 (5/64) | | .0780 | **.005** | .234 (3x) | 3 | 1/8 | 1-1/2 | 913878-C3 | 35.30 |
| .078 (5/64) | | .0780 | **.010** | .118 (1.5x) | 3 | 1/8 | 1-1/2 | 52678-C3 | 35.30 |
| .078 (5/64) | | .0780 | **.010** | .234 (3x) | 3 | 1/8 | 1-1/2 | 45678-C3 | 35.30 |
| .078 (5/64) | | .0780 | **.010** | .406 (5x) | 3 | 1/8 | 2-1/2 | 53878-C3 | 46.10 |
| .078 (5/64) | | .0780 | **.015** | .234 (3x) | 3 | 1/8 | 1-1/2 | 903478-C3 | 36.00 |
| .078 (5/64) | | .0780 | **.020** | .234 (3x) | 3 | 1/8 | 1-1/2 | 931378-C3 | 36.00 |
| | 2.0 mm | .0787 | **.20 mm** | 3.00 mm (1.5x) | 3 | 4 mm | 50 mm | 985645-C3 | 41.00 |
| | 2.0 mm | .0787 | **.20 mm** | 6.00 mm (3x) | 3 | 4 mm | 50 mm | 976845-C3 | 41.00 |
| .080 | | .0800 | **.010** | .120 (1.5x) | 3 | 1/8 | 1-1/2 | 52680-C3 | 36.00 |
| .080 | | .0800 | **.010** | .240 (3x) | 3 | 1/8 | 1-1/2 | 45680-C3 | 36.00 |
| .090 | | .0900 | **.010** | .270 (3x) | 3 | 1/8 | 1-1/2 | 45690-C3 | 36.00 |
| .093 (3/32) | | .0930 | **.005** | .140 (1.5x) | 3 | 1/8 | 1-1/2 | 881893-C3 | 34.70 |
| .093 (3/32) | | .0930 | **.005** | .279 (3x) | 3 | 1/8 | 1-1/2 | 913893-C3 | 34.70 |
| .093 (3/32) | | .0930 | **.005** | .500 (5x) | 3 | 1/8 | 2-1/2 | 759693-C3 | 46.90 |
| .093 (3/32) | | .0930 | **.010** | .140 (1.5x) | 3 | 1/8 | 1-1/2 | 52693-C3 | 34.70 |
| .093 (3/32) | | .0930 | **.010** | .279 (3x) | 3 | 1/8 | 1-1/2 | 45693-C3 | 34.70 |
| .093 (3/32) | | .0930 | **.010** | .500 (5x) | 3 | 1/8 | 2-1/2 | 53893-C3 | 46.10 |
| .093 (3/32) | | .0930 | **.015** | .140 (1.5x) | 3 | 1/8 | 1-1/2 | 792393-C3 | 34.70 |
| .093 (3/32) | | .0930 | **.015** | .279 (3x) | 3 | 1/8 | 1-1/2 | 903493-C3 | 34.70 |
| .093 (3/32) | | .0930 | **.020** | .279 (3x) | 3 | 1/8 | 1-1/2 | 931393-C3 | 34.70 |
| .093 (3/32) | | .0930 | **.030** | .279 (3x) | 3 | 1/8 | 1-1/2 | 927893-C3 | 40.70 |
| | 2.5 mm | .0984 | **.20 mm** | 3.70 mm (1.5x) | 3 | 4 mm | 50 mm | 985651-C3 | 40.60 |
| | 2.5 mm | .0984 | **.20 mm** | 7.50 mm (3x) | 3 | 4 mm | 50 mm | 976851-C3 | 40.60 |
| .100 | | .1000 | **.010** | .150 (1.5x) | 3 | 1/8 | 1-1/2 | 52700-C3 | 36.00 |
| .100 | | .1000 | **.010** | .300 (3x) | 3 | 1/8 | 1-1/2 | 45700-C3 | 36.00 |
| .100 | | .1000 | **.010** | .500 (5x) | 3 | 1/8 | 2-1/2 | 53900-C3 | 46.50 |
| .109 (7/64) | | .1090 | **.010** | .164 (1.5x) | 3 | 1/8 | 1-1/2 | 52702-C3 | 35.30 |
| .109 (7/64) | | .1090 | **.010** | .327 (3x) | 3 | 1/8 | 1-1/2 | 45702-C3 | 36.00 |
| | 3.0 mm | .1181 | **.20 mm** | 4.50 mm (1.5x) | 3 | 4 mm | 50 mm | 985657-C3 | 41.00 |
| | 3.0 mm | .1181 | **.20 mm** | 9.00 mm (3x) | 3 | 4 mm | 50 mm | 976857-C3 | 41.00 |

| $D_1$ +.000″ −.002″ | decimal equivalent | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | **.005** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 881908-C3 | 36.00 |
| .125 (1/8) | .1250 | **.005** | .375 (3x) | 4 | 1/8 | 1-1/2 | 913908-C3 | 35.30 |
| .125 (1/8) | .1250 | **.010** | .375 (3x) | 4 | 1/8 | 1-1/2 | 907308-C3 | 32.50 |
| .125 (1/8) | .1250 | **.015** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 52708-C3 | 32.10 |
| .125 (1/8) | .1250 | **.015** | .375 (3x) | 4 | 1/8 | 1-1/2 | 45708-C3 | 32.10 |
| .125 (1/8) | .1250 | **.015** | .625 (5x) | 4 | 1/8 | 2-1/2 | 53908-C3 | 46.10 |
| .125 (1/8) | .1250 | **.020** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 778708-C3 | 32.50 |
| .125 (1/8) | .1250 | **.020** | .375 (3x) | 4 | 1/8 | 1-1/2 | 931408-C3 | 32.10 |
| .125 (1/8) | .1250 | **.020** | .625 (5x) | 4 | 1/8 | 2-1/2 | 767308-C3 | 44.00 |
| .125 (1/8) | .1250 | **.030** | .375 (3x) | 4 | 1/8 | 1-1/2 | 927908-C3 | 38.00 |
| .140 (9/64) | .1406 | **.015** | .220 (1.5x) | 4 | 3/16 | 2 | 52709-C3 | 42.70 |
| .140 (9/64) | .1406 | **.015** | .425 (3x) | 4 | 3/16 | 2 | 45709-C3 | 43.40 |

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# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Corner Radius (cont.)

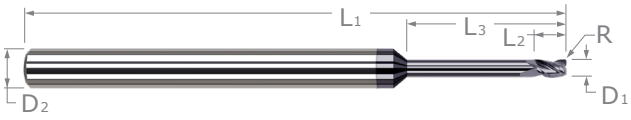
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| CUTTER DIAMETER | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | decimal equivalent | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .156 (5/32) | .1562 | **.015** | .235 (1.5x) | 4 | 3/16 | 2 | 52710-C3 | 38.30 |
| .156 (5/32) | .1562 | **.015** | .470 (3x) | 4 | 3/16 | 2 | 45710-C3 | 39.00 |
| .156 (5/32) | .1562 | **.015** | .750 (5x) | 4 | 3/16 | 3 | 53910-C3 | 50.80 |
| .156 (5/32) | .1562 | **.030** | .470 (3x) | 4 | 3/16 | 2 | 927910-C3 | 45.30 |
| .187 (3/16) | .1875 | **.005** | .562 (3x) | 4 | 3/16 | 2 | 913912-C3 | 38.90 |
| .187 (3/16) | .1875 | **.010** | .562 (3x) | 4 | 3/16 | 2 | 907312-C3 | 38.90 |
| .187 (3/16) | .1875 | **.015** | .285 (1.5x) | 4 | 3/16 | 2 | 52712-C3 | 35.20 |
| .187 (3/16) | .1875 | **.015** | .562 (3x) | 4 | 3/16 | 2 | 45712-C3 | 35.20 |
| .187 (3/16) | .1875 | **.015** | 1.000 (5x) | 4 | 3/16 | 3 | 53912-C3 | 50.80 |
| .187 (3/16) | .1875 | **.020** | .562 (3x) | 4 | 3/16 | 2 | 931412-C3 | 43.70 |
| .187 (3/16) | .1875 | **.030** | .562 (3x) | 4 | 3/16 | 2 | 927912-C3 | 43.70 |
| .187 (3/16) | .1875 | **.060** | .562 (3x) | 4 | 3/16 | 2 | 816812-C3 | 43.70 |
| .250 (1/4) | .2500 | **.015** | .375 (1.5x) | 4 | 1/4 | 2-1/2 | 52716-C3 | 44.30 |
| .250 (1/4) | .2500 | **.015** | .750 (3x) | 4 | 1/4 | 2-1/2 | 45716-C3 | 44.30 |
| .250 (1/4) | .2500 | **.015** | 1.250 (5x) | 4 | 1/4 | 4 | 53916-C3 | 63.00 |
| .250 (1/4) | .2500 | **.020** | .750 (3x) | 4 | 1/4 | 2-1/2 | 931416-C3 | 44.30 |
| .250 (1/4) | .2500 | **.060** | .750 (3x) | 4 | 1/4 | 2-1/2 | 816816-C3 | 44.30 |
| .312 (5/16) | .3125 | **.015** | .470 (1.5x) | 4 | 5/16 | 2-1/2 | 52720-C3 | 66.40 |
| .312 (5/16) | .3125 | **.015** | 1.000 (3x) | 4 | 5/16 | 2-1/2 | 45720-C3 | 65.30 |
| .375 (3/8) | .3750 | **.015** | .570 (1.5x) | 4 | 3/8 | 2-1/2 | 52724-C3 | 75.90 |
| .375 (3/8) | .3750 | **.015** | 1.125 (3x) | 4 | 3/8 | 2-1/2 | 45724-C3 | 75.90 |
| .500 (1/2) | .5000 | **.030** | .750 (1.5x) | 4 | 1/2 | 3 | 52732-C3 | 98.10 |

**Please See Speeds & Feeds On Page 193**

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Corner Radius – Long Reach, Stub Flute




- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- Corner radius for improved strength • AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders • Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .015 (1/64) | | .0150 | **.003** | .022 | .078 (5x) | 3 | 1/8 | 2-1/2 | 62415-C3 | 70.50 |
| .015 (1/64) | | .0150 | **.003** | .022 | .125 (8x) | 3 | 1/8 | 2-1/2 | 55015-C3 | 72.00 |
| .015 (1/64) | | .0150 | **.003** | .022 | .187 (12x) | 3 | 1/8 | 2-1/2 | 63815-C3 | 78.80 |
| | .4 mm | .0157 | **.08 mm** | .60 mm | 2.0 mm (5x) | 3 | 4 mm | 50 mm | 986709-C3 | 79.20 |
| | .4 mm | .0157 | **.08 mm** | .60 mm | 3.2 mm (8x) | 3 | 4 mm | 50 mm | 978009-C3 | 80.90 |
| | .4 mm | .0157 | **.08 mm** | .60 mm | 4.8 mm (12x) | 3 | 4 mm | 50 mm | 982309-C3 | 87.70 |
| | .5 mm | .0196 | **.10 mm** | .75 mm | 2.5 mm (5x) | 3 | 4 mm | 50 mm | 986711-C3 | 76.10 |
| | .5 mm | .0196 | **.10 mm** | .75 mm | 4.0 mm (8x) | 3 | 4 mm | 50 mm | 978011-C3 | 77.40 |
| | .5 mm | .0196 | **.10 mm** | .75 mm | 6.0 mm (12x) | 3 | 4 mm | 50 mm | 982311-C3 | 84.80 |
| | .5 mm | .0196 | **.10 mm** | .75 mm | 8.0 mm (16x) | 3 | 4 mm | 50 mm | 975511-C3 | 88.60 |
| .020 | | .0200 | **.004** | .030 | .100 (5x) | 3 | 1/8 | 2-1/2 | 62420-C3 | 67.20 |
| .020 | | .0200 | **.004** | .030 | .160 (8x) | 3 | 1/8 | 2-1/2 | 55020-C3 | 68.60 |
| .020 | | .0200 | **.004** | .030 | .250 (12x) | 3 | 1/8 | 2-1/2 | 63820-C3 | 76.00 |
| | .6 mm | .0236 | **.10 mm** | .90 mm | 3.0 mm (5x) | 3 | 4 mm | 50 mm | 986713-C3 | 74.40 |
| | .6 mm | .0236 | **.10 mm** | .90 mm | 4.8 mm (8x) | 3 | 4 mm | 50 mm | 978013-C3 | 76.10 |
| | .6 mm | .0236 | **.10 mm** | .90 mm | 7.2 mm (12x) | 3 | 4 mm | 50 mm | 982313-C3 | 81.20 |
| .025 | | .0250 | **.004** | .038 | .125 (5x) | 3 | 1/8 | 2-1/2 | 62425-C3 | 64.70 |
| .025 | | .0250 | **.004** | .038 | .203 (8x) | 3 | 1/8 | 2-1/2 | 55025-C3 | 66.50 |
| .025 | | .0250 | **.004** | .038 | .312 (12x) | 3 | 1/8 | 2-1/2 | 63825-C3 | 73.90 |
| .031 (1/32) | | .0310 | **.005** | .047 | .156 (5x) | 3 | 1/8 | 2-1/2 | 62431-C3 | 61.30 |
| .031 (1/32) | | .0310 | **.005** | .047 | .250 (8x) | 3 | 1/8 | 2-1/2 | 55031-C3 | 62.60 |
| .031 (1/32) | | .0310 | **.005** | .047 | .375 (12x) | 3 | 1/8 | 2-1/2 | 63831-C3 | 65.50 |
| | .8 mm | .0314 | **.10 mm** | 1.20 mm | 4.0 mm (5x) | 3 | 4 mm | 50 mm | 986718-C3 | 68.60 |
| | .8 mm | .0314 | **.10 mm** | 1.20 mm | 6.5 mm (8x) | 3 | 4 mm | 50 mm | 978018-C3 | 70.10 |
| | .8 mm | .0314 | **.10 mm** | 1.20 mm | 9.5 mm (12x) | 3 | 4 mm | 50 mm | 982318-C3 | 72.60 |
| .035 | | .0350 | **.005** | .053 | .187 (5x) | 3 | 1/8 | 2-1/2 | 62435-C3 | 62.30 |
| | 1.0 mm | .0393 | **.10 mm** | 1.50 mm | 5.0 mm (5x) | 3 | 4 mm | 50 mm | 986722-C3 | 68.60 |
| | 1.0 mm | .0393 | **.10 mm** | 1.50 mm | 8.0 mm (8x) | 3 | 4 mm | 50 mm | 978022-C3 | 69.20 |
| | 1.0 mm | .0393 | **.10 mm** | 1.50 mm | 12.0 mm (12x) | 3 | 4 mm | 50 mm | 982322-C3 | 72.60 |
| | 1.0 mm | .0393 | **.10 mm** | 1.50 mm | 16.0 mm (16x) | 3 | 4 mm | 50 mm | 975522-C3 | 76.80 |
| .040 | | .0400 | **.005** | .060 | .203 (5x) | 3 | 1/8 | 2-1/2 | 62440-C3 | 61.80 |
| .045 | | .0450 | **.005** | .068 | .225 (5x) | 3 | 1/8 | 2-1/2 | 62445-C3 | 62.30 |
| .047 (3/64) | | .0470 | **.005** | .070 | .250 (5x) | 3 | 1/8 | 2-1/2 | 62447-C3 | 61.80 |
| .047 (3/64) | | .0470 | **.005** | .070 | .375 (8x) | 3 | 1/8 | 2-1/2 | 55047-C3 | 62.60 |
| .047 (3/64) | | .0470 | **.005** | .070 | .570 (12x) | 3 | 1/8 | 2-1/2 | 63847-C3 | 66.00 |

continued on next page

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page

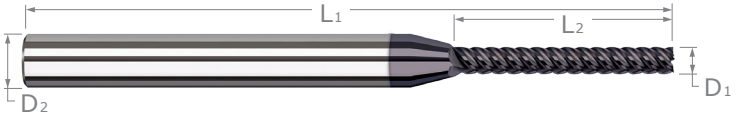


| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $D_1$ +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .050 | | .0500 | **.005** | .075 | .250 (5x) | 3 | 1/8 | 2-1/2 | 62450-C3 | 61.00 |
| .055 | | .0550 | **.005** | .083 | .275 (5x) | 3 | 1/8 | 2-1/2 | 62455-C3 | 61.70 |
| | 1.5 mm | .0590 | **.20 mm** | 2.20 mm | 7.5 mm (5x) | 3 | 4 mm | 50 mm | 986733-C3 | 68.60 |
| | 1.5 mm | .0590 | **.20 mm** | 2.20 mm | 12.0 mm (8x) | 3 | 4 mm | 50 mm | 978033-C3 | 70.10 |
| | 1.5 mm | .0590 | **.20 mm** | 2.20 mm | 18.0 mm (12x) | 3 | 4 mm | 50 mm | 982333-C3 | 72.60 |
| | 1.5 mm | .0590 | **.20 mm** | 2.20 mm | 24.0 mm (16x) | 3 | 4 mm | 63 mm | 975533-C3 | 76.80 |
| .060 | | .0600 | **.010** | .090 | .312 (5x) | 3 | 1/8 | 2-1/2 | 62460-C3 | 62.30 |
| .062 (1/16) | | .0620 | **.005** | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 815662-C3 | 64.60 |
| .062 (1/16) | | .0620 | **.005** | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 816562-C3 | 66.00 |
| .062 (1/16) | | .0620 | **.010** | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 62462-C3 | 61.30 |
| .062 (1/16) | | .0620 | **.010** | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 55062-C3 | 62.60 |
| .062 (1/16) | | .0620 | **.010** | .093 | .750 (12x) | 3 | 1/8 | 2-1/2 | 63862-C3 | 65.50 |
| .078 (5/64) | | .0780 | **.010** | .117 | .406 (5x) | 3 | 1/8 | 2-1/2 | 62478-C3 | 61.30 |
| .078 (5/64) | | .0780 | **.010** | .117 | .625 (8x) | 3 | 1/8 | 2-1/2 | 55078-C3 | 62.60 |
| .078 (5/64) | | .0780 | **.010** | .117 | .940 (12x) | 3 | 1/8 | 2-1/2 | 63878-C3 | 66.00 |
| | 2.0 mm | .0787 | **.20 mm** | 3.00 mm | 10.0 mm (5x) | 3 | 4 mm | 50 mm | 986745-C3 | 68.60 |
| | 2.0 mm | .0787 | **.20 mm** | 3.00 mm | 16.0 mm (8x) | 3 | 4 mm | 50 mm | 978045-C3 | 70.10 |
| | 2.0 mm | .0787 | **.20 mm** | 3.00 mm | 24.0 mm (12x) | 3 | 4 mm | 63 mm | 982345-C3 | 72.60 |
| | 2.0 mm | .0787 | **.20 mm** | 3.00 mm | 32.0 mm (16x) | 3 | 4 mm | 63 mm | 975545-C3 | 76.80 |
| .093 (3/32) | | .0930 | **.005** | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 815693-C3 | 64.60 |
| .093 (3/32) | | .0930 | **.005** | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 816593-C3 | 66.00 |
| .093 (3/32) | | .0930 | **.010** | .139 | .500 (5x) | 3 | 1/8 | 2-1/2 | 62493-C3 | 61.30 |
| .093 (3/32) | | .0930 | **.010** | .139 | .750 (8x) | 3 | 1/8 | 2-1/2 | 55093-C3 | 62.60 |
| .093 (3/32) | | .0930 | **.010** | .139 | 1.125 (12x) | 3 | 1/8 | 2-1/2 | 63893-C3 | 66.00 |
| .100 | | .1000 | **.010** | .150 | .500 (5x) | 3 | 1/8 | 2-1/2 | 62500-C3 | 64.30 |
| | 3.0 mm | .1181 | **.20 mm** | 4.50 mm | 15.0 mm (5x) | 3 | 4 mm | 50 mm | 986757-C3 | 64.50 |
| $D_1$ +.000″ −.002″ | | decimal equivalent | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .125 (1/8) | | .1250 | **.010** | .187 | .625 (5x) | 4 | 1/8 | 2-1/2 | 815708-C3 | 61.30 |
| .125 (1/8) | | .1250 | **.010** | .187 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 816608-C3 | 62.50 |
| .125 (1/8) | | .1250 | **.015** | .187 | .625 (5x) | 4 | 1/8 | 2-1/2 | 62508-C3 | 61.30 |
| .125 (1/8) | | .1250 | **.015** | .187 | 1.000 (8x) | 4 | 1/8 | 2-1/2 | 55108-C3 | 61.40 |
| .125 (1/8) | | .1250 | **.015** | .187 | 1.500 (12x) | 4 | 1/8 | 3 | 63908-C3 | 65.50 |
| .156 (5/32) | | .1562 | **.015** | .235 | .750 (5x) | 4 | 3/16 | 3 | 62510-C3 | 66.30 |
| .156 (5/32) | | .1562 | **.015** | .235 | 1.250 (8x) | 4 | 3/16 | 3 | 55110-C3 | 67.90 |
| .156 (5/32) | | .1562 | **.015** | .235 | 1.875 (12x) | 4 | 3/16 | 4 | 63910-C3 | 85.10 |
| .156 (5/32) | | .1562 | **.030** | .235 | 1.250 (8x) | 4 | 3/16 | 3 | 817310-C3 | 74.10 |
| .187 (3/16) | | .1875 | **.015** | .281 | 1.000 (5x) | 4 | 3 /16 | 3 | 62512-C3 | 66.30 |
| .187 (3/16) | | .1875 | **.015** | .281 | 1.500 (8x) | 4 | 3/16 | 3 | 55112-C3 | 67.90 |
| .187 (3/16) | | .1875 | **.015** | .281 | 2.250 (12x) | 4 | 3/16 | 4 | 63912-C3 | 85.10 |
| .187 (3/16) | | .1875 | **.030** | .281 | 1.500 (8x) | 4 | 3/16 | 3 | 817312-C3 | 75.60 |
| .250 (1/4) | | .2500 | **.015** | .375 | 1.250 (5x) | 4 | 1/4 | 4 | 62516-C3 | 75.40 |
| .250 (1/4) | | .2500 | **.015** | .375 | 2.000 (8x) | 4 | 1/4 | 4 | 55116-C3 | 75.40 |
| .250 (1/4) | | .2500 | **.015** | .375 | 3.000 (12x) | 4 | 1/4 | 6 | 63916-C3 | 94.00 |

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# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Finishers – Square




**Down to .2 mm!**

- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Multi-flute, high helix (approx. 44°), coated design improves finishing in carbon steels, 300 and 400 stainless steels, and machinable tool steels • Can be used in light duty roughing and profiling applications
- AlTiN Nano coating offers superior hardness and heat resistance • h6 shank tolerance for high precision tool holders
- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | .2 mm | .0078 | **.60 mm** (3x) | 4 | 4 mm | 50 mm | 977704-C6 | 65.50 |
| | .2 mm | .0078 | **1.00 mm** (5x) | 4 | 4 mm | 50 mm | 980104-C6 | 75.70 |
| | .2 mm | .0078 | **1.60 mm** (8x) | 4 | 4 mm | 50 mm | 981704-C6 | 77.50 |
| .010 | | .0100 | **.050** (5x) | 4 | 1/8 | 2-1/2 | 53310-C6 | 65.90 |
| | .3 mm | .0118 | **.90 mm** (3x) | 4 | 4 mm | 50 mm | 977706-C6 | 60.40 |
| .015 (1/64) | | .0150 | **.045** (3x) | 4 | 1/8 | 1-1/2 | 24315-C6 | 52.80 |
| .015 (1/64) | | .0150 | **.078** (5x) | 4 | 1/8 | 2-1/2 | 53315-C6 | 65.90 |
| .015 (1/64) | | .0150 | **.125** (8x) | 4 | 1/8 | 2-1/2 | 62815-C6 | 67.20 |
| | .4 mm | .0157 | **1.20 mm** (3x) | 4 | 4 mm | 50 mm | 977709-C6 | 57.50 |
| | .4 mm | .0157 | **2.00 mm** (5x) | 4 | 4 mm | 50 mm | 980109-C6 | 67.20 |
| | .4 mm | .0157 | **3.20 mm** (8x) | 4 | 4 mm | 50 mm | 981709-C6 | 69.50 |
| | .5 mm | .0196 | **1.50 mm** (3x) | 4 | 4 mm | 50 mm | 977711-C6 | 56.80 |
| | .5 mm | .0196 | **2.50 mm** (5x) | 4 | 4 mm | 50 mm | 980111-C6 | 65.50 |
| | .5 mm | .0196 | **4.00 mm** (8x) | 4 | 4 mm | 50 mm | 981711-C6 | 68.40 |
| .020 | | .0200 | **.030** (1.5x) | 4 | 1/8 | 1-1/2 | 935920-C6 | 52.10 |
| .020 | | .0200 | **.060** (3x) | 4 | 1/8 | 1-1/2 | 24320-C6 | 51.60 |
| .020 | | .0200 | **.080** (4x) | 4 | 1/8 | 1-1/2 | 835320-C6 | 54.50 |
| .020 | | .0200 | **.100** (5x) | 4 | 1/8 | 2-1/2 | 53320-C6 | 64.70 |
| .020 | | .0200 | **.160** (8x) | 4 | 1/8 | 2-1/2 | 62820-C6 | 66.60 |
| | .6 mm | .0236 | **1.80 mm** (3x) | 4 | 4 mm | 50 mm | 977713-C6 | 56.80 |
| | .6 mm | .0236 | **3.00 mm** (5x) | 4 | 4 mm | 50 mm | 980113-C6 | 66.00 |
| | .6 mm | .0236 | **4.80 mm** (8x) | 4 | 4 mm | 50 mm | 981713-C6 | 68.40 |
| .025 | | .0250 | **.038** (1.5x) | 4 | 1/8 | 1-1/2 | 935925-C6 | 48.60 |
| .025 | | .0250 | **.075** (3x) | 4 | 1/8 | 1-1/2 | 24325-C6 | 48.60 |
| .025 | | .0250 | **.125** (5x) | 4 | 1/8 | 2-1/2 | 53325-C6 | 62.60 |
| .025 | | .0250 | **.203** (8x) | 4 | 1/8 | 2-1/2 | 62825-C6 | 64.00 |
| | .7 mm | .0275 | **2.10 mm** (3x) | 4 | 4 mm | 50 mm | 977715-C6 | 56.80 |
| .030 | | .0300 | **.156** (5x) | 5 | 1/8 | 2-1/2 | 53330-C6 | 60.70 |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 5 | 1/8 | 1-1/2 | 935931-C6 | 42.60 |
| .031 (1/32) | | .0310 | **.093** (3x) | 5 | 1/8 | 1-1/2 | 24331-C6 | 42.60 |
| .031 (1/32) | | .0310 | **.125** (4x) | 5 | 1/8 | 2-1/2 | 835331-C6 | 60.20 |
| .031 (1/32) | | .0310 | **.156** (5x) | 5 | 1/8 | 2-1/2 | 53331-C6 | 60.20 |
| .031 (1/32) | | .0310 | **.250** (8x) | 5 | 1/8 | 2-1/2 | 62831-C6 | 62.00 |
| .031 (1/32) | | .0310 | **.312** (10x) | 5 | 1/8 | 2-1/2 | 882431-C6 | 70.90 |
| .031 (1/32) | | .0310 | **.375** (12x) | 5 | 1/8 | 2-1/2 | 68531-C6 | 75.70 |
| | .8 mm | .0314 | **2.40 mm** (3x) | 5 | 4 mm | 50 mm | 977718-C6 | 49.40 |
| | .8 mm | .0314 | **4.00 mm** (5x) | 5 | 4 mm | 50 mm | 980118-C6 | 62.30 |
| | .8 mm | .0314 | **6.50 mm** (8x) | 5 | 4 mm | 50 mm | 981718-C6 | 64.10 |
| | .9 mm | .0354 | **2.70 mm** (3x) | 5 | 4 mm | 50 mm | 977720-C6 | 49.40 |

continued on next page

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Finishers – Square (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | 1.0 mm | .0393 | **1.50 mm** (1.5x) | 5 | 4 mm | 50 mm | 778522-C6 | 49.80 |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 5 | 4 mm | 50 mm | 977722-C6 | 49.80 |
| | 1.0 mm | .0393 | **5.00 mm** (5x) | 5 | 4 mm | 50 mm | 980122-C6 | 61.80 |
| | 1.0 mm | .0393 | **8.00 mm** (8x) | 5 | 4 mm | 50 mm | 981722-C6 | 64.10 |
| .040 | | .0400 | **.060** (1.5x) | 5 | 1/8 | 1-1/2 | 935940-C6 | 43.10 |
| .040 | | .0400 | **.120** (3x) | 5 | 1/8 | 1-1/2 | 24340-C6 | 43.10 |
| .040 | | .0400 | **.160** (4x) | 5 | 1/8 | 2-1/2 | 835340-C6 | 60.20 |
| .040 | | .0400 | **.203** (5x) | 5 | 1/8 | 2-1/2 | 53340-C6 | 60.20 |
| .040 | | .0400 | **.325** (8x) | 5 | 1/8 | 2-1/2 | 62840-C6 | 61.30 |
| | 1.1 mm | .0433 | **3.00 mm** (3x) | 5 | 4 mm | 50 mm | 977724-C6 | 49.80 |
| .047 (3/64) | | .0470 | **.071** (1.5x) | 5 | 1/8 | 1-1/2 | 935947-C6 | 42.60 |
| .047 (3/64) | | .0470 | **.141** (3x) | 5 | 1/8 | 1-1/2 | 24347-C6 | 42.60 |
| .047 (3/64) | | .0470 | **.187** (4x) | 5 | 1/8 | 2-1/2 | 835347-C6 | 55.20 |
| .047 (3/64) | | .0470 | **.250** (5x) | 5 | 1/8 | 2-1/2 | 53347-C6 | 60.20 |
| .047 (3/64) | | .0470 | **.375** (8x) | 5 | 1/8 | 2-1/2 | 62847-C6 | 61.30 |
| .047 (3/64) | | .0470 | **.480** (10x) | 5 | 1/8 | 2-1/2 | 882447-C6 | 70.90 |
| .047 (3/64) | | .0470 | **.570** (12x) | 5 | 1/8 | 2-1/2 | 68547-C6 | 76.40 |
| | 1.2 mm | .0472 | **3.50 mm** (3x) | 5 | 4 mm | 50 mm | 977727-C6 | 49.40 |
| | 1.2 mm | .0472 | **6.00 mm** (5x) | 5 | 4 mm | 50 mm | 980127-C6 | 62.30 |
| | 1.2 mm | .0472 | **9.50 mm** (8x) | 5 | 4 mm | 50 mm | 981727-C6 | 64.10 |
| .050 | | .0500 | **.075** (1.5x) | 5 | 1/8 | 1-1/2 | 935950-C6 | 43.60 |
| .050 | | .0500 | **.150** (3x) | 5 | 1/8 | 1-1/2 | 24350-C6 | 43.10 |
| .050 | | .0500 | **.250** (5x) | 5 | 1/8 | 2-1/2 | 53350-C6 | 60.20 |
| .050 | | .0500 | **.400** (8x) | 5 | 1/8 | 2-1/2 | 62850-C6 | 61.30 |
| | 1.3 mm | .0511 | **4.00 mm** (3x) | 5 | 4 mm | 50 mm | 977729-C6 | 49.80 |
| | 1.4 mm | .0551 | **4.00 mm** (3x) | 5 | 4 mm | 50 mm | 977731-C6 | 49.80 |
| | 1.4 mm | .0551 | **7.00 mm** (5x) | 5 | 4 mm | 50 mm | 980131-C6 | 62.30 |
| | 1.4 mm | .0551 | **11.00 mm** (8x) | 5 | 4 mm | 50 mm | 981731-C6 | 64.10 |
| | 1.5 mm | .0590 | **4.50 mm** (3x) | 5 | 4 mm | 50 mm | 977733-C6 | 47.60 |
| | 1.5 mm | .0590 | **7.50 mm** (5x) | 5 | 4 mm | 50 mm | 980133-C6 | 60.40 |
| | 1.5 mm | .0590 | **12.00 mm** (8x) | 5 | 4 mm | 50 mm | 981733-C6 | 62.10 |
| .060 | | .0600 | **.090** (1.5x) | 5 | 1/8 | 1-1/2 | 935960-C6 | 43.60 |
| .060 | | .0600 | **.180** (3x) | 5 | 1/8 | 1-1/2 | 24360-C6 | 43.10 |
| .060 | | .0600 | **.312** (5x) | 5 | 1/8 | 2-1/2 | 53360-C6 | 60.20 |
| .060 | | .0600 | **.500** (8x) | 5 | 1/8 | 2-1/2 | 62860-C6 | 61.30 |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 5 | 1/8 | 1-1/2 | 935962-C6 | 40.10 |
| .062 (1/16) | | .0620 | **.186** (3x) | 5 | 1/8 | 1-1/2 | 24362-C6 | 40.10 |
| .062 (1/16) | | .0620 | **.250** (4x) | 5 | 1/8 | 2-1/2 | 835362-C6 | 56.20 |
| .062 (1/16) | | .0620 | **.312** (5x) | 5 | 1/8 | 2-1/2 | 53362-C6 | 56.80 |
| .062 (1/16) | | .0620 | **.375** (6x) | 5 | 1/8 | 2-1/2 | 778362-C6 | 56.80 |
| .062 (1/16) | | .0620 | **.437** (7x) | 5 | 1/8 | 2-1/2 | 726262-C6 | 57.50 |
| .062 (1/16) | | .0620 | **.500** (8x) | 5 | 1/8 | 2-1/2 | 62862-C6 | 57.50 |
| .062 (1/16) | | .0620 | **.625** (10x) | 5 | 1/8 | 2-1/2 | 882462-C6 | 71.60 |
| .062 (1/16) | | .0620 | **.750** (12x) | 5 | 1/8 | 2-1/2 | 68562-C6 | 80.90 |
| .062 (1/16) | | .0620 | **.950** (15x) | 5 | 1/8 | 2-1/2 | 68962-C6 | 101.80 |
| | 1.6 mm | .0629 | **5.00 mm** (3x) | 5 | 4 mm | 50 mm | 977736-C6 | 47.60 |
| | 1.6 mm | .0629 | **8.00 mm** (5x) | 5 | 4 mm | 50 mm | 980136-C6 | 60.20 |
| | 1.6 mm | .0629 | **13.00 mm** (8x) | 5 | 4 mm | 50 mm | 981736-C6 | 62.00 |
| | 1.7 mm | .0669 | **5.00 mm** (3x) | 5 | 4 mm | 50 mm | 977738-C6 | 47.60 |

continued on next page

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Finishers – Square (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .070 | | .0700 | **.210** (3x) | 5 | 1/8 | 1-1/2 | 24370-C6 | 40.60 |
| .070 | | .0700 | **.375** (5x) | 5 | 1/8 | 2-1/2 | 53370-C6 | 56.80 |
| .070 | | .0700 | **.570** (8x) | 5 | 1/8 | 2-1/2 | 62870-C6 | 58.10 |
| | 1.8 mm | .0708 | **5.50 mm** (3x) | 5 | 4 mm | 50 mm | 977740-C6 | 48.30 |
| | 1.8 mm | .0708 | **9.00 mm** (5x) | 5 | 4 mm | 50 mm | 980140-C6 | 60.40 |
| | 1.8 mm | .0708 | **14.00 mm** (8x) | 5 | 4 mm | 50 mm | 981740-C6 | 62.60 |
| | 1.9 mm | .0748 | **5.50 mm** (3x) | 5 | 4 mm | 50 mm | 977742-C6 | 48.30 |
| .078 (5/64) | | .0780 | **.117** (1.5x) | 5 | 1/8 | 1-1/2 | 935978-C6 | 40.10 |
| .078 (5/64) | | .0780 | **.234** (3x) | 5 | 1/8 | 1-1/2 | 24378-C6 | 40.10 |
| .078 (5/64) | | .0780 | **.312** (4x) | 5 | 1/8 | 2-1/2 | 835378-C6 | 51.70 |
| .078 (5/64) | | .0780 | **.406** (5x) | 5 | 1/8 | 2-1/2 | 53378-C6 | 56.80 |
| .078 (5/64) | | .0780 | **.475** (6x) | 5 | 1/8 | 2-1/2 | 778378-C6 | 56.80 |
| .078 (5/64) | | .0780 | **.625** (8x) | 5 | 1/8 | 2-1/2 | 62878-C6 | 57.50 |
| .078 (5/64) | | .0780 | **.800** (10x) | 5 | 1/8 | 2-1/2 | 882478-C6 | 72.30 |
| .078 (5/64) | | .0780 | **.940** (12x) | 5 | 1/8 | 2-1/2 | 68578-C6 | 80.90 |
| .078 (5/64) | | .0780 | **1.187** (15x) | 5 | 1/8 | 2-1/2 | 68978-C6 | 102.90 |
| | 2.0 mm | .0787 | **6.00 mm** (3x) | 5 | 4 mm | 50 mm | 977745-C6 | 47.60 |
| | 2.0 mm | .0787 | **10.00 mm** (5x) | 5 | 4 mm | 50 mm | 980145-C6 | 59.90 |
| | 2.0 mm | .0787 | **16.00 mm** (8x) | 5 | 4 mm | 50 mm | 981745-C6 | 62.60 |
| .080 | | .0800 | **.120** (1.5x) | 5 | 1/8 | 1-1/2 | 935980-C6 | 41.00 |
| .080 | | .0800 | **.240** (3x) | 5 | 1/8 | 1-1/2 | 24380-C6 | 40.60 |
| .080 | | .0800 | **.406** (5x) | 5 | 1/8 | 2-1/2 | 53380-C6 | 56.80 |
| .080 | | .0800 | **.650** (8x) | 5 | 1/8 | 2-1/2 | 62880-C6 | 58.10 |
| .090 | | .0900 | **.270** (3x) | 5 | 1/8 | 1-1/2 | 24390-C6 | 40.60 |
| .090 | | .0900 | **.450** (5x) | 5 | 1/8 | 2-1/2 | 53390-C6 | 56.80 |
| .090 | | .0900 | **.750** (8x) | 5 | 1/8 | 2-1/2 | 62890-C6 | 58.10 |
| .093 (3/32) | | .0930 | **.140** (1.5x) | 5 | 1/8 | 1-1/2 | 935993-C6 | 40.10 |
| .093 (3/32) | | .0930 | **.279** (3x) | 5 | 1/8 | 1-1/2 | 24393-C6 | 40.10 |
| .093 (3/32) | | .0930 | **.375** (4x) | 5 | 1/8 | 2-1/2 | 835393-C6 | 56.20 |
| .093 (3/32) | | .0930 | **.500** (5x) | 5 | 1/8 | 2-1/2 | 53393-C6 | 56.80 |
| .093 (3/32) | | .0930 | **.585** (6x) | 5 | 1/8 | 2-1/2 | 778393-C6 | 56.80 |
| .093 (3/32) | | .0930 | **.750** (8x) | 5 | 1/8 | 2-1/2 | 62893-C6 | 57.50 |
| .093 (3/32) | | .0930 | **.950** (10x) | 5 | 1/8 | 2-1/2 | 882493-C6 | 71.60 |
| .093 (3/32) | | .0930 | **1.125** (12x) | 5 | 1/8 | 2-1/2 | 68593-C6 | 81.60 |
| .093 (3/32) | | .0930 | **1.400** (15x) | 5 | 1/8 | 3 | 68993-C6 | 103.60 |
| | 2.5 mm | .0984 | **7.50 mm** (3x) | 5 | 4 mm | 50 mm | 977751-C6 | 47.60 |
| | 2.5 mm | .0984 | **12.00 mm** (5x) | 5 | 4 mm | 50 mm | 980151-C6 | 60.00 |
| .100 | | .1000 | **.150** (1.5x) | 5 | 1/8 | 1-1/2 | 936000-C6 | 41.00 |
| .100 | | .1000 | **.300** (3x) | 5 | 1/8 | 1-1/2 | 24399-C6 | 40.60 |
| .100 | | .1000 | **.500** (5x) | 5 | 1/8 | 2-1/2 | 53399-C6 | 56.80 |
| .100 | | .1000 | **.800** (8x) | 5 | 1/8 | 2-1/2 | 53400-C6 | 58.10 |
| .109 (7/64) | | .1090 | **.327** (3x) | 5 | 1/8 | 1-1/2 | 24402-C6 | 40.80 |
| .109 (7/64) | | .1090 | **.570** (5x) | 5 | 1/8 | 2-1/2 | 63502-C6 | 56.80 |
| | 3.0 mm | .1181 | **9.00 mm** (3x) | 5 | 4 mm | 50 mm | 977757-C6 | 47.60 |
| | 3.0 mm | .1181 | **15.00 mm** (5x) | 5 | 4 mm | 50 mm | 980157-C6 | 59.40 |
| | 3.0 mm | .1181 | **24.00 mm** (8x) | 5 | 4 mm | 50 mm | 981757-C6 | 62.30 |

continued on next page

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Finishers – Square (cont.)

continued from previous page

| CUTTER DIAMETER | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | decimal equivalent | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .125 (1/8) | .1250 | **.187** (1.5x) | 5 | 1/8 | 1-1/2 | 936008-C6 | 34.50 |
| .125 (1/8) | .1250 | **.375** (3x) | 5 | 1/8 | 1-1/2 | 795408-C6 | 34.90 |
| .125 (1/8) | .1250 | **.500** (4x) | 5 | 1/8 | 1-1/2 | 24408-C6 | 34.50 |
| .125 (1/8) | .1250 | **.625** (5x) | 5 | 1/8 | 2-1/2 | 776908-C6 | 54.70 |
| .125 (1/8) | .1250 | **.750** (6x) | 5 | 1/8 | 2-1/2 | 63508-C6 | 54.70 |
| .125 (1/8) | .1250 | **.875** (7x) | 5 | 1/8 | 2-1/2 | 726308-C6 | 56.80 |
| .125 (1/8) | .1250 | **1.000** (8x) | 5 | 1/8 | 2-1/2 | 53408-C6 | 56.80 |
| .125 (1/8) | .1250 | **1.125** (10x) | 5 | 1/8 | 2-1/2 | 882508-C6 | 70.50 |
| .125 (1/8) | .1250 | **1.500** (12x) | 5 | 1/8 | 3 | 68608-C6 | 80.30 |
| .125 (1/8) | .1250 | **1.875** (15x) | 5 | 1/8 | 3 | 69008-C6 | 101.40 |
| .140 (9/64) | .1406 | **.500** (3x) | 5 | 3/16 | 2 | 24409-C6 | 53.60 |
| .140 (9/64) | .1406 | **.750** (5x) | 5 | 3/16 | 3 | 63509-C6 | 55.90 |
| .156 (5/32) | .1562 | **.235** (1.5x) | 5 | 3/16 | 2 | 936010-C6 | 44.40 |
| .156 (5/32) | .1562 | **.562** (3x) | 5 | 3/16 | 2 | 24410-C6 | 44.00 |
| .156 (5/32) | .1562 | **.625** (4x) | 5 | 3/16 | 3 | 835410-C6 | 59.10 |
| .156 (5/32) | .1562 | **.875** (5x) | 5 | 3/16 | 3 | 63510-C6 | 59.70 |
| .156 (5/32) | .1562 | **1.250** (8x) | 5 | 3/16 | 3 | 53410-C6 | 60.50 |
| .187 (3/16) | .1875 | **.285** (1.5x) | 5 | 3/16 | 2 | 936012-C6 | 39.80 |
| .187 (3/16) | .1875 | **.625** (3x) | 5 | 3/16 | 2 | 24412-C6 | 39.80 |
| .187 (3/16) | .1875 | **.750** (4x) | 5 | 3/16 | 3 | 835412-C6 | 53.20 |
| .187 (3/16) | .1875 | **1.000** (5x) | 5 | 3/16 | 3 | 63512-C6 | 59.70 |
| .187 (3/16) | .1875 | **1.500** (8x) | 5 | 3/16 | 3 | 53412-C6 | 60.50 |
| .250 (1/4) | .2500 | **.375** (1.5x) | 5 | 1/4 | 2-1/2 | 936016-C6 | 50.60 |
| .250 (1/4) | .2500 | **.750** (3x) | 5 | 1/4 | 2-1/2 | 24416-C6 | 50.60 |
| .250 (1/4) | .2500 | **1.250** (5x) | 5 | 1/4 | 4 | 63516-C6 | 72.80 |
| .250 (1/4) | .2500 | **2.000** (8x) | 5 | 1/4 | 4 | 53416-C6 | 74.20 |
| .375 (3/8) | .3750 | **1.125** (3x) | 5 | 3/8 | 2-1/2 | 24424-C6 | 80.40 |
| .500 (1/2) | .5000 | **.750** (1.5x) | 5 | 1/2 | 3 | 936032-C6 | 111.90 |
| .500 (1/2) | .5000 | **1.500** (3x) | 5 | 1/2 | 3 | 24432-C6 | 104.70 |
| .500 (1/2) | .5000 | **2.625** (5x) | 5 | 1/2 | 4 | 63532-C6 | 120.50 |

**Please See Speeds & Feeds On Page 209**

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

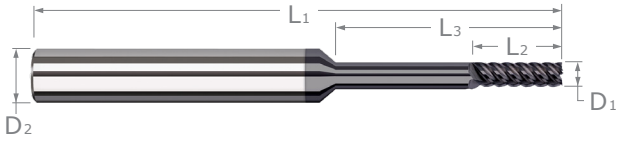
## Finishers

### SPEEDS & FEEDS (High-Helix Finishers for Medium Alloy Steels)

| Material | Hardness (HBn) | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | Radial | Axial |
| **Carbon Steels:** 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx | 225 - 250<br>250 - 275 | 600<br>550 | Finishing (1.5x LOC) | .00020 | .00041 | .00062 | .00082 | .00103 | .00123 | .00165 | .00247 | .00330 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00018 | .00037 | .00056 | .00074 | .00094 | .00112 | .00150 | .00224 | .00300 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00016 | .00032 | .00049 | .00065 | .00081 | .00097 | .00131 | .00195 | .00261 | < .09x Dia | .5x - 4x Dia |
| | | | Finishing (5x LOC) | .00014 | .00028 | .00042 | .00056 | .00070 | .00084 | .00113 | .00168 | .00225 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (6x LOC) | .00011 | .00023 | .00035 | .00047 | .00059 | .00070 | .00094 | .00140 | .00188 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (8x LOC) | .00010 | .00020 | .00031 | .00041 | .00051 | .00061 | .00083 | .00123 | .00165 | < .05x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00019 | .00029 | .00039 | .00049 | .00058 | .00078 | .00117 | .00156 | < .04x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00019 | .00028 | .00037 | .00047 | .00056 | .00075 | .00112 | .00150 | < .04x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00033 | .00042 | .00050 | .00068 | .00101 | .00135 | < .02x Dia | .5x - 15x Dia |
| | 275 - 300 | 500 | Finishing (1.5x LOC) | .00018 | .00038 | .00057 | .00075 | .00094 | .00113 | .00151 | .00226 | .00303 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00017 | .00034 | .00052 | .00068 | .00086 | .00102 | .00138 | .00206 | .00275 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00014 | .00030 | .00045 | .00059 | .00075 | .00089 | .00120 | .00179 | .00239 | < .09x Dia | .5x - 4x Dia |
| | | | Finishing (5x LOC) | .00012 | .00026 | .00039 | .00051 | .00064 | .00077 | .00103 | .00154 | .00206 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (6x LOC) | .00010 | .00021 | .00032 | .00043 | .00054 | .00064 | .00086 | .00129 | .00172 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (8x LOC) | .00009 | .00019 | .00028 | .00038 | .00047 | .00056 | .00076 | .00113 | .00151 | < .05x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00018 | .00027 | .00035 | .00045 | .00053 | .00072 | .00107 | .00143 | < .04x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00017 | .00026 | .00034 | .00043 | .00051 | .00069 | .00103 | .00138 | < .04x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00031 | .00039 | .00046 | .00062 | .00093 | .00124 | < .02x Dia | .5x - 15x Dia |
| **Stainless Steels:** 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502<br><br>**Tool Steels:** A, L, O, P, W series | 225 - 250<br>250 - 275 | 500<br>500 | Finishing (1.5x LOC) | .00017 | .00034 | .00052 | .00068 | .00086 | .00102 | .00138 | .00206 | .00275 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00015 | .00031 | .00047 | .00062 | .00078 | .00093 | .00125 | .00187 | .00250 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00013 | .00027 | .00041 | .00054 | .00068 | .00081 | .00109 | .00163 | .00218 | < .09x Dia | .5x - 4x Dia |
| | | | Finishing (5x LOC) | .00011 | .00023 | .00035 | .00047 | .00059 | .00070 | .00094 | .00140 | .00188 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (6x LOC) | .00009 | .00019 | .00029 | .00039 | .00049 | .00058 | .00078 | .00117 | .00156 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (8x LOC) | .00008 | .00017 | .00026 | .00034 | .00043 | .00051 | .00069 | .00103 | .00138 | < .05x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00016 | .00024 | .00032 | .00041 | .00048 | .00065 | .00097 | .00130 | < .04x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00014 | .00021 | .00028 | .00035 | .00042 | .00056 | .00084 | .00113 | < .04x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00028 | .00035 | .00042 | .00056 | .00084 | .00113 | < .02x Dia | .5x - 15x Dia |
| | 275 - 300<br>300 - 350 | 500<br>500 | Finishing (1.5x LOC) | .00015 | .00031 | .00047 | .00061 | .00077 | .00092 | .00124 | .00185 | .00248 | < .10x Dia | .5x - 1.5x Dia |
| | | | Finishing (3x LOC) | .00014 | .00028 | .00042 | .00056 | .00070 | .00084 | .00113 | .00168 | .00225 | < .10x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00012 | .00024 | .00037 | .00049 | .00061 | .00073 | .00098 | .00146 | .00196 | < .09x Dia | .5x - 4x Dia |
| | | | Finishing (5x LOC) | .00010 | .00021 | .00032 | .00042 | .00053 | .00063 | .00084 | .00126 | .00169 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (6x LOC) | .00008 | .00017 | .00026 | .00035 | .00044 | .00052 | .00070 | .00105 | .00141 | < .07x Dia | .5x - 5x Dia |
| | | | Finishing (8x LOC) | .00007 | .00015 | .00023 | .00031 | .00039 | .00046 | .00062 | .00093 | .00124 | < .05x Dia | .5x - 8x Dia |
| | | | Finishing (10x LOC) | - | .00015 | .00022 | .00029 | .00037 | .00044 | .00059 | .00088 | .00117 | < .04x Dia | .5x - 10x Dia |
| | | | Finishing (12x LOC) | - | .00014 | .00021 | .00028 | .00035 | .00042 | .00056 | .00084 | .00113 | < .04x Dia | .5x - 12x Dia |
| | | | Finishing (15x LOC) | - | - | - | .00025 | .00032 | .00038 | .00051 | .00076 | .00101 | < .02x Dia | .5x - 15x Dia |

# VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

## Finishers – Square – Long Reach



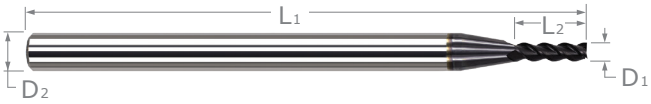

- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Multi-flute, high helix (approx. 44°), coated design improves finishing in carbon steels, 300 and 400 stainless steels, and machinable tool steels
- AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA



| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .031 (1/32) | .093 | **.156** (5x) | 1/8 | 2-1/2 | 718231-C6 | 64.70 |
| .047 (3/64) | .141 | **.250** (5x) | 1/8 | 2-1/2 | 718247-C6 | 64.70 |
| .062 (1/16) | .186 | **.312** (5x) | 1/8 | 2-1/2 | 718262-C6 | 61.80 |
| .078 (5/64) | .234 | **.406** (5x) | 1/8 | 2-1/2 | 718278-C6 | 61.80 |
| .093 (3/32) | .279 | **.500** (5x) | 1/8 | 2-1/2 | 718293-C6 | 61.80 |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 5 FL | USD$ |
| .125 (1/8) | .375 | **.625** (5x) | 1/8 | 2-1/2 | 718308-C6 | 59.80 |
| .187 (3/16) | .570 | **1.000** (5x) | 3/16 | 3 | 718312-C6 | 63.30 |
| .250 (1/4) | .750 | **1.250** (5x) | 1/4 | 4 | 718316-C6 | 76.40 |

# VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

## Square




- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

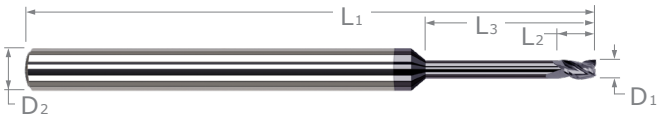
| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .015 (1/64) | | .0150 | **.023** (1.5x) | 3 | 1/8 | 1-1/2 | 939815-C3 | 52.40 |
| .015 (1/64) | | .0150 | **.045** (3x) | 3 | 1/8 | 1-1/2 | 945715-C3 | 51.40 |
| | .5 mm | .0196 | **1.50 mm** (3x) | 3 | 4 mm | 50 mm | 952411-C3 | 51.00 |
| .020 | | .0200 | **.060** (3x) | 3 | 1/8 | 1-1/2 | 945720-C3 | 47.20 |
| .025 | | .0250 | **.075** (3x) | 3 | 1/8 | 1-1/2 | 945725-C3 | 45.50 |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 3 | 1/8 | 1-1/2 | 939831-C3 | 37.20 |
| .031 (1/32) | | .0310 | **.093** (3x) | 3 | 1/8 | 1-1/2 | 945731-C3 | 37.20 |
| .031 (1/32) | | .0310 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 900531-C3 | 47.70 |
| | 1.0 mm | .0393 | **1.50 mm** (1.5x) | 3 | 4 mm | 50 mm | 926022-C3 | 42.10 |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 3 | 4 mm | 50 mm | 952422-C3 | 42.60 |
| .040 | | .0400 | **.120** (3x) | 3 | 1/8 | 1-1/2 | 945740-C3 | 38.30 |
| .047 (3/64) | | .0470 | **.071** (1.5x) | 3 | 1/8 | 1-1/2 | 939847-C3 | 37.90 |
| .047 (3/64) | | .0470 | **.141** (3x) | 3 | 1/8 | 1-1/2 | 945747-C3 | 37.20 |
| | 1.5 mm | .0590 | **4.50 mm** (3x) | 3 | 4 mm | 50 mm | 952433-C3 | 40.20 |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 3 | 1/8 | 1-1/2 | 939862-C3 | 34.70 |
| .062 (1/16) | | .0620 | **.186** (3x) | 3 | 1/8 | 1-1/2 | 945762-C3 | 34.70 |
| .062 (1/16) | | .0620 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 900562-C3 | 45.60 |
| .078 (5/64) | | .0780 | **.118** (1.5x) | 3 | 1/8 | 1-1/2 | 939878-C3 | 34.70 |
| .078 (5/64) | | .0780 | **.234** (3x) | 3 | 1/8 | 1-1/2 | 945778-C3 | 34.70 |
| | 2.0 mm | .0787 | **6.00 mm** (3x) | 3 | 4 mm | 50 mm | 952445-C3 | 40.20 |
| .093 (3/32) | | .0930 | **.140** (1.5x) | 3 | 1/8 | 1-1/2 | 939893-C3 | 34.70 |
| .093 (3/32) | | .0930 | **.279** (3x) | 3 | 1/8 | 1-1/2 | 945793-C3 | 34.70 |
| .093 (3/32) | | .0930 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 900593-C3 | 45.60 |
| | 3.0 mm | .1181 | **4.50 mm** (1.5x) | 3 | 4 mm | 50 mm | 926057-C3 | 39.90 |
| | 3.0 mm | .1181 | **9.00 mm** (3x) | 3 | 4 mm | 50 mm | 952457-C3 | 39.90 |

| $D_1$ +.000″ −.002″ | decimal equivalent | $L_2$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | **.187** (1.5x) | 4 | 1/8 | 1-1/2 | 939908-C3 | 31.60 |
| .125 (1/8) | .1250 | **.375** (3x) | 4 | 1/8 | 1-1/2 | 945808-C3 | 31.60 |
| .125 (1/8) | .1250 | **.625** (5x) | 4 | 1/8 | 2-1/2 | 900608-C3 | 44.70 |
| .156 (5/32) | .1562 | **.235** (1.5x) | 4 | 3/16 | 2 | 939910-C3 | 36.60 |
| .156 (5/32) | .1562 | **.470** (3x) | 4 | 3/16 | 2 | 945810-C3 | 36.60 |
| .187 (3/16) | .1875 | **.285** (1.5x) | 4 | 3/16 | 2 | 939912-C3 | 34.00 |
| .187 (3/16) | .1875 | **.562** (3x) | 4 | 3/16 | 2 | 945812-C3 | 34.40 |
| .250 (1/4) | .2500 | **.375** (1.5x) | 4 | 1/4 | 2-1/2 | 939916-C3 | 43.70 |
| .250 (1/4) | .2500 | **.750** (3x) | 4 | 1/4 | 2-1/2 | 945816-C3 | 43.70 |

**Please See Speeds & Feeds On Page 214**

# VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

## Square – Long Reach, Stub Flute




- Optimized for free machining varieties of carbon steels and stainless steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .015 (1/64) | .023 | **.078** (5x) | 3 | 1/8 | 2-1/2 | 915015-C3 | 68.10 |
| .015 (1/64) | .023 | **.125** (8x) | 3 | 1/8 | 2-1/2 | 920215-C3 | 69.40 |
| .020 | .030 | **.100** (5x) | 3 | 1/8 | 2-1/2 | 915020-C3 | 64.30 |
| .020 | .030 | **.160** (8x) | 3 | 1/8 | 2-1/2 | 920220-C3 | 67.20 |
| .025 | .038 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 915025-C3 | 63.80 |
| .025 | .038 | **.203** (8x) | 3 | 1/8 | 2-1/2 | 920225-C3 | 64.00 |
| .031 (1/32) | .047 | **.093** (3x) | 3 | 1/8 | 1-1/2 | 927331-C3 | 58.50 |
| .031 (1/32) | .047 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 915031-C3 | 60.10 |
| .031 (1/32) | .047 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 920231-C3 | 61.70 |
| .031 (1/32) | .047 | **.312** (10x) | 3 | 1/8 | 2-1/2 | 909531-C3 | 63.80 |
| .047 (3/64) | .071 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 915047-C3 | 60.10 |
| .047 (3/64) | .071 | **.375** (8x) | 3 | 1/8 | 2-1/2 | 920247-C3 | 60.40 |
| .062 (1/16) | .093 | **.186** (3x) | 3 | 1/8 | 1-1/2 | 927362-C3 | 59.70 |
| .062 (1/16) | .093 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 915062-C3 | 59.10 |
| .062 (1/16) | .093 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 920262-C3 | 60.10 |
| .062 (1/16) | .093 | **.625** (10x) | 3 | 1/8 | 2-1/2 | 909562-C3 | 63.80 |
| .078 (5/64) | .118 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 915078-C3 | 59.10 |
| .078 (5/64) | .118 | **.625** (8x) | 3 | 1/8 | 2-1/2 | 920278-C3 | 60.10 |
| .093 (3/32) | .140 | **.279** (3x) | 3 | 1/8 | 1-1/2 | 927393-C3 | 58.50 |
| .093 (3/32) | .140 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 915093-C3 | 59.10 |
| .093 (3/32) | .140 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 920293-C3 | 60.10 |
| .093 (3/32) | .140 | **.950** (10x) | 3 | 1/8 | 2-1/2 | 909593-C3 | 63.80 |

continued on next page

# VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

## Square – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .125 (1/8) | .187 | **.375** (3x) | 4 | 1/8 | 1-1/2 | 927408-C3 | 59.70 |
| .125 (1/8) | .187 | **.625** (5x) | 4 | 1/8 | 2-1/2 | 915108-C3 | 60.10 |
| .125 (1/8) | .187 | **1.000** (8x) | 4 | 1/8 | 2-1/2 | 920308-C3 | 61.30 |
| .125 (1/8) | .187 | **1.250** (10x) | 4 | 1/8 | 2-1/2 | 909608-C3 | 62.70 |
| .156 (5/32) | .235 | **.750** (5x) | 4 | 3/16 | 3 | 915110-C3 | 63.80 |
| .187 (3/16) | .285 | **1.000** (5x) | 4 | 3/16 | 3 | 915112-C3 | 63.80 |
| .250 (1/4) | .375 | **1.250** (5x) | 4 | 1/4 | 4 | 915116-C3 | 71.70 |

## Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For Free Machining Steels)

**Important Note:** Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material | Hardness (HBn) | SFM |
|---|---|---|
| **Carbon Steels**: 10xx - 1030, 10Lxx, 11xx - 1140, 11Lxx, 12xx - 1215, 12Lxx<br><br>**Stainless Steels**: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X,, 420 F, 420 F Se | 100-125 | 500 |
| | 125-150 | 425 |
| | 150-175 | 400 |
| | 175-200 | 375 |
| | 200-225 | 350 |

| Chip Load Per Tooth (IPT) By Cutter Diameter | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Slotting | .00010 | .00021 | .00031 | .00041 | .00052 | .00062 | .00079 | .00118 | .00158 | .00207 | .00249 | .00332 |
| Roughing | .00012 | .00025 | .00038 | .00050 | .00063 | .00075 | .00096 | .00144 | .00192 | .00252 | .00302 | .00403 |
| Finishing | .00014 | .00030 | .00045 | .00060 | .00075 | .00090 | .00115 | .00172 | .00230 | .00301 | .00362 | .00483 |
| Max | .00019 | .00039 | .00058 | .00077 | .00097 | .00116 | .00148 | .00221 | .00296 | .00388 | .00466 | .00622 |

**Radial Depth of Cut*:**

Slotting: 1x Dia

Roughing: .35x Dia

Finishing: .1x Dia

**Axial Depth of Cut*:**

Slotting: .35x Dia

Roughing: .5x - 1x Dia

Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

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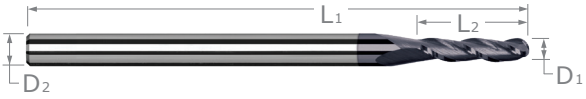
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# VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

## Ball




- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .015 (1/64) | **.045** (3x) | 3 | 1/8 | 1-1/2 | 950015-C3 | 62.30 |
| .031 (1/32) | **.047** (1.5x) | 3 | 1/8 | 1-1/2 | 911531-C3 | 46.10 |
| .031 (1/32) | **.093** (3x) | 3 | 1/8 | 1-1/2 | 950031-C3 | 46.90 |
| .047 (3/64) | **.141** (3x) | 3 | 1/8 | 1-1/2 | 950047-C3 | 46.90 |
| .062 (1/16) | **.093** (1.5x) | 3 | 1/8 | 1-1/2 | 911562-C3 | 46.10 |
| .062 (1/16) | **.186** (3x) | 3 | 1/8 | 1-1/2 | 950062-C3 | 44.70 |
| .078 (5/64) | **.234** (3x) | 3 | 1/8 | 1-1/2 | 950078-C3 | 43.40 |
| .093 (3/32) | **.140** (1.5x) | 3 | 1/8 | 1-1/2 | 911593-C3 | 44.30 |
| .093 (3/32) | **.279** (3x) | 3 | 1/8 | 1-1/2 | 950093-C3 | 43.40 |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .125 (1/8) | **.187** (1.5x) | 4 | 1/8 | 1-1/2 | 911608-C3 | 39.40 |
| .125 (1/8) | **.375** (3x) | 4 | 1/8 | 1-1/2 | 950108-C3 | 39.40 |
| .156 (5/32) | **.470** (3x) | 4 | 3/16 | 2 | 950110-C3 | 47.20 |
| .187 (3/16) | **.562** (3x) | 4 | 3/16 | 2 | 950112-C3 | 42.50 |
| .250 (1/4) | **.750** (3x) | 4 | 1/4 | 2-1/2 | 950116-C3 | 51.90 |

FREE MACHINING STEELS

## Speeds & Feeds (Variable Helix For Free Machining Steels)

**Important Note**: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

| Material | Hardness (HBn) | SFM |
|---|---|---|
| **Carbon Steels**: 10xx - 1030, 10Lxx, 11xx - 1140, 11Lxx, 12xx - 1215, 12Lxx | 100-125 | 500 |
| | 125-150 | 425 |
| **Stainless Steels**: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X, 420 F, 420 F Se | 150-175 | 400 |
| | 175-200 | 375 |
| | 200-225 | 350 |

| | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 |
| Slotting | .00013 | .00026 | .00040 | .00053 | .00067 | .00079 | .00099 | .00148 | .00198 | .00259 | .00311 | .00415 |
| Roughing | .00016 | .00032 | .00049 | .00064 | .00081 | .00096 | .00120 | .00180 | .00240 | .00314 | .00378 | .00504 |
| Finishing | .00019 | .00039 | .00058 | .00077 | .00097 | .00116 | .00144 | .00215 | .00288 | .00377 | .00453 | .00604 |
| Max | .00024 | .00050 | .00075 | .00099 | .00125 | .00149 | .00185 | .00277 | .00370 | .00485 | .00583 | .00777 |

**Radial Depth of Cut*:**

Slotting: 1x Dia

Roughing: .5x Dia

Finishing: .1x Dia

**Axial Depth of Cut*:**

Slotting: .5x Dia

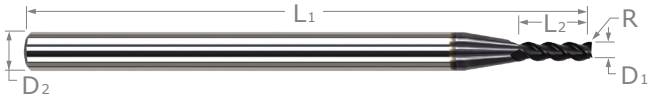
Roughing: .5x - 1x Dia

Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

# VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

## Corner Radius




- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.25mm −.25mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .015 (1/64) | | .0150 | **.002** | .023 (1.5x) | 3 | 1/8 | 1-1/2 | 969415-C3 | 54.10 |
| .015 (1/64) | | .0150 | **.002** | .045 (3x) | 3 | 1/8 | 1-1/2 | 971215-C3 | 54.10 |
| .015 (1/64) | | .0150 | **.002** | .078 (5x) | 3 | 1/8 | 2-1/2 | 980315-C3 | 65.70 |
| .015 (1/64) | | .0150 | **.005** | .045 (3x) | 3 | 1/8 | 1-1/2 | 859815-C3 | 54.10 |
| .020 | | .0200 | **.002** | .060 (3x) | 3 | 1/8 | 1-1/2 | 971220-C3 | 47.70 |
| .020 | | .0200 | **.005** | .060 (3x) | 3 | 1/8 | 1-1/2 | 859820-C3 | 47.20 |
| .025 | | .0250 | **.002** | .075 (3x) | 3 | 1/8 | 1-1/2 | 971225-C3 | 46.20 |
| .025 | | .0250 | **.005** | .075 (3x) | 3 | 1/8 | 1-1/2 | 859825-C3 | 46.20 |
| .031 (1/32) | | .0310 | **.003** | .047 (1.5x) | 3 | 1/8 | 1-1/2 | 969431-C3 | 38.10 |
| .031 (1/32) | | .0310 | **.003** | .093 (3x) | 3 | 1/8 | 1-1/2 | 971231-C3 | 38.10 |
| .031 (1/32) | | .0310 | **.003** | .156 (5x) | 3 | 1/8 | 2-1/2 | 980331-C3 | 47.70 |
| .031 (1/32) | | .0310 | **.005** | .093 (3x) | 3 | 1/8 | 1-1/2 | 859831-C3 | 38.70 |
| .031 (1/32) | | .0310 | **.010** | .093 (3x) | 3 | 1/8 | 1-1/2 | 856631-C3 | 41.50 |
| | 1.0 mm | .0393 | **.08 mm** | 3.00 mm (3x) | 3 | 4 mm | 50 mm | 901822-C3 | 43.00 |
| .040 | | .0400 | **.003** | .120 (3x) | 3 | 1/8 | 1-1/2 | 971240-C3 | 39.00 |
| .040 | | .0400 | **.005** | .120 (3x) | 3 | 1/8 | 1-1/2 | 859840-C3 | 38.90 |
| .047 (3/64) | | .0470 | **.003** | .071 (1.5x) | 3 | 1/8 | 1-1/2 | 969447-C3 | 38.10 |
| .047 (3/64) | | .0470 | **.003** | .141 (3x) | 3 | 1/8 | 1-1/2 | 971247-C3 | 38.10 |
| .047 (3/64) | | .0470 | **.003** | .250 (5x) | 3 | 1/8 | 2-1/2 | 980347-C3 | 47.70 |
| .047 (3/64) | | .0470 | **.005** | .141 (3x) | 3 | 1/8 | 1-1/2 | 859847-C3 | 38.70 |
| .047 (3/64) | | .0470 | **.010** | .141 (3x) | 3 | 1/8 | 1-1/2 | 856647-C3 | 38.70 |
| .047 (3/64) | | .0470 | **.015** | .141 (3x) | 3 | 1/8 | 1-1/2 | 857447-C3 | 41.50 |
| .050 | | .0500 | **.003** | .150 (3x) | 3 | 1/8 | 1-1/2 | 971250-C3 | 38.90 |
| .050 | | .0500 | **.005** | .150 (3x) | 3 | 1/8 | 1-1/2 | 859850-C3 | 38.90 |
| .060 | | .0600 | **.005** | .180 (3x) | 3 | 1/8 | 1-1/2 | 971260-C3 | 38.90 |
| .060 | | .0600 | **.010** | .180 (3x) | 3 | 1/8 | 1-1/2 | 856660-C3 | 38.90 |
| .062 (1/16) | | .0620 | **.005** | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 969462-C3 | 35.30 |
| .062 (1/16) | | .0620 | **.005** | .186 (3x) | 3 | 1/8 | 1-1/2 | 971262-C3 | 35.30 |
| .062 (1/16) | | .0620 | **.005** | .312 (5x) | 3 | 1/8 | 2-1/2 | 980362-C3 | 46.10 |
| .062 (1/16) | | .0620 | **.010** | .186 (3x) | 3 | 1/8 | 1-1/2 | 856662-C3 | 36.00 |
| .062 (1/16) | | .0620 | **.020** | .186 (3x) | 3 | 1/8 | 1-1/2 | 858262-C3 | 38.80 |
| .078 (5/64) | | .0780 | **.005** | .118 (1.5x) | 3 | 1/8 | 1-1/2 | 969478-C3 | 35.30 |
| .078 (5/64) | | .0780 | **.005** | .234 (3x) | 3 | 1/8 | 1-1/2 | 971278-C3 | 35.30 |
| .078 (5/64) | | .0780 | **.005** | .406 (5x) | 3 | 1/8 | 2-1/2 | 980378-C3 | 46.90 |
| .078 (5/64) | | .0780 | **.010** | .234 (3x) | 3 | 1/8 | 1-1/2 | 856678-C3 | 35.30 |
| .078 (5/64) | | .0780 | **.020** | .234 (3x) | 3 | 1/8 | 1-1/2 | 858278-C3 | 38.10 |

continued on next page

# VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

## Corner Radius (cont.)

continued from previous page

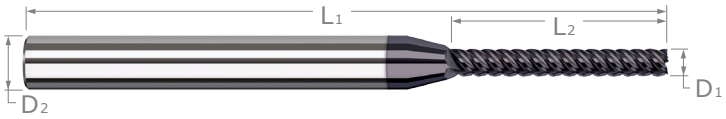
| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.25mm −.25mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| | 2.0 mm | .0787 | **.10 mm** | 6.00 mm (3x) | 3 | 4 mm | 50 mm | 901845-C3 | 40.60 |
| .093 (3/32) | | .0930 | **.005** | .140 (1.5x) | 3 | 1/8 | 1-1/2 | 969493-C3 | 35.30 |
| .093 (3/32) | | .0930 | **.005** | .279 (3x) | 3 | 1/8 | 1-1/2 | 971293-C3 | 35.30 |
| .093 (3/32) | | .0930 | **.005** | .500 (5x) | 3 | 1/8 | 2-1/2 | 980393-C3 | 46.10 |
| .093 (3/32) | | .0930 | **.010** | .279 (3x) | 3 | 1/8 | 1-1/2 | 856693-C3 | 35.30 |
| .093 (3/32) | | .0930 | **.030** | .279 (3x) | 3 | 1/8 | 1-1/2 | 859093-C3 | 38.80 |
| .100 | | .1000 | **.005** | .300 (3x) | 3 | 1/8 | 1-1/2 | 971300-C3 | 36.10 |
| | 3.0 mm | .1181 | **.10 mm** | 9.00 mm (3x) | 3 | 4 mm | 50 mm | 901857-C3 | 40.60 |

| $D_1$ +.000″ −.002″ | decimal equivalent | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | **.005** | .187 (1.5x) | 4 | 1/8 | 1-1/2 | 969508-C3 | 32.10 |
| .125 (1/8) | .1250 | **.005** | .375 (3x) | 4 | 1/8 | 1-1/2 | 971308-C3 | 32.10 |
| .125 (1/8) | .1250 | **.005** | .625 (5x) | 4 | 1/8 | 2-1/2 | 980408-C3 | 46.10 |
| .125 (1/8) | .1250 | **.010** | .375 (3x) | 4 | 1/8 | 1-1/2 | 856708-C3 | 36.00 |
| .125 (1/8) | .1250 | **.030** | .375 (3x) | 4 | 1/8 | 1-1/2 | 859108-C3 | 38.80 |
| .156 (5/32) | .1562 | **.010** | .235 (1.5x) | 4 | 3/16 | 2 | 969510-C3 | 38.30 |
| .156 (5/32) | .1562 | **.010** | .470 (3x) | 4 | 3/16 | 2 | 971310-C3 | 39.00 |
| .156 (5/32) | .1562 | **.010** | .750 (5x) | 4 | 3/16 | 3 | 980410-C3 | 50.80 |
| .187 (3/16) | .1875 | **.010** | .285 (1.5x) | 4 | 3/16 | 2 | 969512-C3 | 34.90 |
| .187 (3/16) | .1875 | **.010** | .562 (3x) | 4 | 3/16 | 2 | 971312-C3 | 35.20 |
| .187 (3/16) | .1875 | **.010** | 1.000 (5x) | 4 | 3/16 | 3 | 980412-C3 | 50.80 |
| .250 (1/4) | .2500 | **.010** | .375 (1.5x) | 4 | 1/4 | 2-1/2 | 969516-C3 | 44.30 |
| .250 (1/4) | .2500 | **.010** | .750 (3x) | 4 | 1/4 | 2-1/2 | 971316-C3 | 44.30 |
| .250 (1/4) | .2500 | **.010** | 1.250 (5x) | 4 | 1/4 | 4 | 980416-C3 | 63.00 |
| .312 (5/16) | .3125 | **.010** | .470 (1.5x) | 4 | 5/16 | 2-1/2 | 969520-C3 | 66.40 |
| .312 (5/16) | .3125 | **.010** | 1.000 (3x) | 4 | 5/16 | 2-1/2 | 971320-C3 | 65.30 |
| .375 (3/8) | .3750 | **.010** | .570 (1.5x) | 4 | 3/8 | 2-1/2 | 969524-C3 | 75.20 |
| .375 (3/8) | .3750 | **.010** | 1.125 (3x) | 4 | 3/8 | 2-1/2 | 971324-C3 | 75.20 |
| .500 (1/2) | .5000 | **.015** | .750 (1.5x) | 4 | 1/2 | 3 | 969532-C3 | 98.10 |

**Please See Speeds & Feeds On Page 214**

# VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

## Finishers – Square




- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 47°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| .015 (1/64) | | .0150 | **.045** (3x) | 4 | 1/8 | 1-1/2 | 967815-C3 | 53.00 |
| .015 (1/64) | | .0150 | **.078** (5x) | 4 | 1/8 | 2-1/2 | 972415-C3 | 65.10 |
| .015 (1/64) | | .0150 | **.125** (8x) | 4 | 1/8 | 2-1/2 | 983615-C3 | 66.60 |
| .020 | | .0200 | **.060** (3x) | 4 | 1/8 | 1-1/2 | 967820-C3 | 52.10 |
| .020 | | .0200 | **.100** (5x) | 4 | 1/8 | 2-1/2 | 972420-C3 | 65.50 |
| .025 | | .0250 | **.075** (3x) | 4 | 1/8 | 1-1/2 | 967825-C3 | 49.00 |
| .025 | | .0250 | **.125** (5x) | 4 | 1/8 | 2-1/2 | 972425-C3 | 62.60 |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 5 | 1/8 | 1-1/2 | 935131-C3 | 43.10 |
| .031 (1/32) | | .0310 | **.093** (3x) | 5 | 1/8 | 1-1/2 | 967831-C3 | 43.10 |
| .031 (1/32) | | .0310 | **.156** (5x) | 5 | 1/8 | 2-1/2 | 972431-C3 | 60.20 |
| .031 (1/32) | | .0310 | **.250** (8x) | 5 | 1/8 | 2-1/2 | 983631-C3 | 61.30 |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 5 | 4 mm | 50 mm | 921922-C3 | 49.80 |
| | 1.0 mm | .0393 | **5.00 mm** (5x) | 5 | 4 mm | 50 mm | 916422-C3 | 62.30 |
| .040 | | .0400 | **.120** (3x) | 5 | 1/8 | 1-1/2 | 967840-C3 | 44.40 |
| .040 | | .0400 | **.203** (5x) | 5 | 1/8 | 2-1/2 | 972440-C3 | 61.70 |
| .047 (3/64) | | .0470 | **.141** (3x) | 5 | 1/8 | 1-1/2 | 967847-C3 | 43.60 |
| .047 (3/64) | | .0470 | **.250** (5x) | 5 | 1/8 | 2-1/2 | 972447-C3 | 60.20 |
| .047 (3/64) | | .0470 | **.375** (8x) | 5 | 1/8 | 2-1/2 | 983647-C3 | 61.30 |
| .050 | | .0500 | **.150** (3x) | 5 | 1/8 | 1-1/2 | 967850-C3 | 44.00 |
| .050 | | .0500 | **.250** (5x) | 5 | 1/8 | 2-1/2 | 972450-C3 | 61.70 |
| .060 | | .0600 | **.180** (3x) | 5 | 1/8 | 1-1/2 | 967860-C3 | 44.40 |
| .060 | | .0600 | **.312** (5x) | 5 | 1/8 | 2-1/2 | 972460-C3 | 61.70 |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 5 | 1/8 | 1-1/2 | 935162-C3 | 41.00 |
| .062 (1/16) | | .0620 | **.186** (3x) | 5 | 1/8 | 1-1/2 | 967862-C3 | 40.60 |
| .062 (1/16) | | .0620 | **.312** (5x) | 5 | 1/8 | 2-1/2 | 972462-C3 | 56.80 |
| .062 (1/16) | | .0620 | **.500** (8x) | 5 | 1/8 | 2-1/2 | 983662-C3 | 57.50 |
| .078 (5/64) | | .0780 | **.234** (3x) | 5 | 1/8 | 1-1/2 | 967878-C3 | 40.60 |
| .078 (5/64) | | .0780 | **.406** (5x) | 5 | 1/8 | 2-1/2 | 972478-C3 | 56.80 |
| .078 (5/64) | | .0780 | **.625** (8x) | 5 | 1/8 | 2-1/2 | 983678-C3 | 58.10 |
| | 2.0 mm | .0787 | **6.00 mm** (3x) | 5 | 4 mm | 50 mm | 921945-C3 | 47.60 |
| | 2.0 mm | .0787 | **10.00 mm** (5x) | 5 | 4 mm | 50 mm | 916445-C3 | 60.40 |

continued on next page

# VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

## Finishers – Square (cont.)

continued from previous page

| CUTTER DIAMETER $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | LENGTH OF CUT $L_2$ +.010″ −.000″ +.25mm −.00mm | FLUTES | SHANK DIAMETER $D_2$ (h6) | OVERALL LENGTH $L_1$ | AlTiN COATED TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|
| .093 (3/32) | | .0930 | **.140** (1.5x) | 5 | 1/8 | 1-1/2 | 935193-C3 | 40.60 |
| .093 (3/32) | | .0930 | **.279** (3x) | 5 | 1/8 | 1-1/2 | 967893-C3 | 40.60 |
| .093 (3/32) | | .0930 | **.500** (5x) | 5 | 1/8 | 2-1/2 | 972493-C3 | 56.80 |
| .093 (3/32) | | .0930 | **.750** (8x) | 5 | 1/8 | 2-1/2 | 983693-C3 | 57.50 |
| .100 | | .1000 | **.300** (3x) | 5 | 1/8 | 1-1/2 | 967900-C3 | 41.60 |
| .100 | | .1000 | **.500** (5x) | 5 | 1/8 | 2-1/2 | 972500-C3 | 57.30 |
| | 3.0 mm | .1181 | **9.00 mm** (3x) | 5 | 4 mm | 50 mm | 921957-C3 | 47.60 |
| | 3.0 mm | .1181 | **15.00 mm** (5x) | 5 | 4 mm | 50 mm | 916457-C3 | 59.90 |

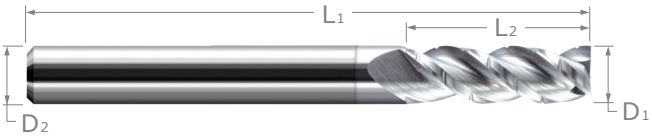
| $D_1$ +.000″ −.002″ | decimal equivalent | $L_2$ +.030″ −.000″ | FLUTES | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | **.187** (1.5x) | 5 | 1/8 | 1-1/2 | 935208-C3 | 38.90 |
| .125 (1/8) | .1250 | **.375** (3x) | 5 | 1/8 | 1-1/2 | 967908-C3 | 38.50 |
| .125 (1/8) | .1250 | **.625** (5x) | 5 | 1/8 | 2-1/2 | 972508-C3 | 55.30 |
| .125 (1/8) | .1250 | **1.000** (8x) | 5 | 1/8 | 2-1/2 | 983708-C3 | 56.80 |
| .156 (5/32) | .1562 | **.470** (3x) | 5 | 3/16 | 2 | 967910-C3 | 44.40 |
| .156 (5/32) | .1562 | **.750** (5x) | 5 | 3/16 | 3 | 972510-C3 | 59.10 |
| .187 (3/16) | .1875 | **.570** (3x) | 5 | 3/16 | 2 | 967912-C3 | 44.00 |
| .187 (3/16) | .1875 | **1.000** (5x) | 5 | 3/16 | 3 | 972512-C3 | 59.10 |
| .187 (3/16) | .1875 | **1.500** (8x) | 5 | 3/16 | 3 | 983712-C3 | 60.50 |
| .250 (1/4) | .2500 | **.750** (3x) | 5 | 1/4 | 2-1/2 | 967916-C3 | 56.40 |
| .250 (1/4) | .2500 | **1.250** (5x) | 5 | 1/4 | 4 | 972516-C3 | 72.80 |
| .250 (1/4) | .2500 | **2.000** (8x) | 5 | 1/4 | 4 | 983716-C3 | 74.20 |

### Speeds & Feeds (High-Helix Finishers For Free Machining Steels)

| Material | Hardness (HBn) | SFM | Chip Load Per Tooth (IPT) By Cutter Diameter | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | Depth of Cut Radial | Depth of Cut Axial |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Carbon Steels:** 10xx - 1030 & all 10Lxx, 11xx - 1140 & all 11Lxx, 12xx - 1215 & all 12Lxx | 100 - 125 | 500 | Finishing (1.5x LOC) | .00025 | .00051 | .00078 | .00102 | .00129 | .00153 | .00206 | .00309 | .00413 | < .10x Dia | .5x - 1.5x Dia |
| | 125 - 150 | 425 | Finishing (3x LOC) | .00023 | .00047 | .00071 | .00093 | .00117 | .00140 | .00188 | .00281 | .00375 | < .10x Dia | .5x - 3x Dia |
| | 150 - 175 | 400 | | | | | | | | | | | | |
| **Stainless Steels:** 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X, 420 F, 420 F Se, 440 F, 440 F Se | 175 - 200 | 375 | Finishing (5x LOC) | .00017 | .00035 | .00053 | .00070 | .00088 | .00105 | .00141 | .00210 | .00281 | < .07x Dia | .5x - 5x Dia |
| | 200 - 225 | 350 | Finishing (8x LOC) | .00012 | .00026 | .00039 | .00051 | .00064 | .00077 | .00103 | .00154 | .00206 | < .05x Dia | .5x - 8x Dia |

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Chipbreaker Roughers – Square




- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Chipbreaker geometry to improve chip management
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

| | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .062 (1/16) | .186 (3x) | 3 | 1/8 | 1-1/2 | 769062 | 33.00 | 769062-C8 | 41.90 |
| NEW | .062 (1/16) | .312 (5x) | 3 | 1/8 | 2-1/2 | 695962 | 34.00 | 695962-C8 | 42.20 |
| | .078 (5/64) | .234 (3x) | 3 | 1/8 | 1-1/2 | 769078 | 33.60 | 769078-C8 | 42.40 |
| NEW | .078 (5/64) | .406 (5x) | 3 | 1/8 | 2-1/2 | 695978 | 34.80 | 695978-C8 | 43.00 |
| | .093 (3/32) | .279 (3x) | 3 | 1/8 | 1-1/2 | 769093 | 33.60 | 769093-C8 | 42.40 |
| NEW | .093 (3/32) | .500 (5x) | 3 | 1/8 | 2-1/2 | 695993 | 34.80 | 695993-C8 | 43.00 |
| | $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .125 (1/8) | .375 (3x) | 3 | 1/8 | 1-1/2 | 769108 | 32.20 | 769108-C8 | 41.20 |
| NEW | .125 (1/8) | .625 (5x) | 3 | 1/8 | 2-1/2 | 696008 | 34.90 | 696008-C8 | 43.10 |
| | .187 (3/16) | .562 (3x) | 3 | 3/16 | 2 | 769112 | 35.90 | 769112-C8 | 44.50 |
| NEW | .187 (3/16) | 1.000 (5x) | 3 | 3/16 | 3 | 696012 | 38.00 | 696012-C8 | 47.20 |
| | .250 (1/4) | .750 (3x) | 3 | 1/4 | 2-1/2 | 769116 | 44.80 | 769116-C8 | 55.10 |
| NEW | .250 (1/4) | 1.250 (5x) | 3 | 1/4 | 4 | 696016 | 57.60 | 696016-C8 | 69.40 |
| NEW | .375 (3/8) | 2.000 (5x) | 3 | 3/8 | 4 | 696024 | 71.10 | 696024-C8 | 88.10 |



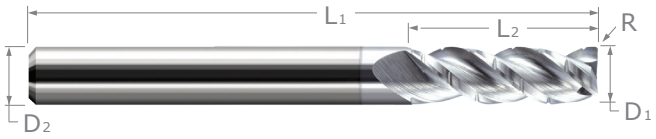
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NEW

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Chipbreaker Roughers – Corner Radius



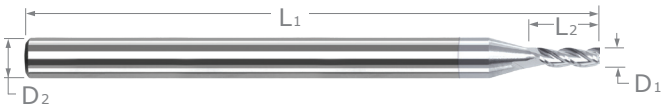

- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Chipbreaker geometry to improve chip management
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | $TiB_2$ COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | |
| .062 (1/16) | **.005** | .186 (3x) | 3 | 1/8 | 1-1/2 | 695762 | 36.30 | 695762-C8 | 44.00 | NEW |
| .062 (1/16) | **.005** | .312 (5x) | 3 | 1/8 | 2-1/2 | 695562 | 39.40 | 695562-C8 | 47.10 | NEW |
| .078 (5/64) | **.005** | .234 (3x) | 3 | 1/8 | 1-1/2 | 695778 | 36.30 | 695778-C8 | 44.00 | NEW |
| .078 (5/64) | **.005** | .406 (5x) | 3 | 1/8 | 2-1/2 | 695578 | 39.40 | 695578-C8 | 47.10 | NEW |
| .093 (3/32) | **.005** | .279 (3x) | 3 | 1/8 | 1-1/2 | 695793 | 36.30 | 695793-C8 | 44.00 | NEW |
| .093 (3/32) | **.005** | .500 (5x) | 3 | 1/8 | 2-1/2 | 695593 | 39.40 | 695593-C8 | 47.10 | NEW |
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | |
| .125 (1/8) | **.005** | .375 (3x) | 3 | 1/8 | 1-1/2 | 695808 | 43.60 | 695808-C8 | 51.30 | NEW |
| .125 (1/8) | **.005** | .625 (5x) | 3 | 1/8 | 2-1/2 | 695608 | 45.20 | 695608-C8 | 52.90 | NEW |
| .187 (3/16) | **.005** | .562 (3x) | 3 | 3/16 | 2 | 695812 | 50.90 | 695812-C8 | 58.60 | NEW |
| .187 (3/16) | **.005** | 1.000 (5x) | 3 | 3/16 | 3 | 695612 | 53.50 | 695612-C8 | 61.20 | NEW |
| .250 (1/4) | **.005** | .750 (3x) | 3 | 1/4 | 2-1/2 | 695816 | 60.20 | 695816-C8 | 67.90 | NEW |
| .250 (1/4) | **.005** | 1.250 (5x) | 3 | 1/4 | 4 | 695616 | 61.80 | 695616-C8 | 69.50 | NEW |
| .375 (3/8) | **.005** | 1.125 (3x) | 3 | 3/8 | 2-1/2 | 695824 | 89.30 | 695824-C8 | 97.00 | NEW |
| .375 (3/8) | **.005** | 2.000 (5x) | 3 | 3/8 | 4 | 695624 | 93.20 | 695624-C8 | 100.90 | NEW |

NEW SIZES!

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Square




- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics, and increases material removal rates
- h6 shank tolerance for high precision tool holders • Center cutting
- Solid carbide • CNC ground in the USA

| | CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | | AMORPHOUS DIAMOND | | ZrN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0005" −.0005" | +.00mm −.02mm | decimal equiv. | $L_2$ +.010" −.000" +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| | .010 | | .0100 | **.015** (1.5x) | 3 | 1/8 | 1-1/2 | 968710 | 58.00 | 968710-C8 | 65.70 | | | | |
| | .010 | | .0100 | **.030** (3x) | 3 | 1/8 | 1-1/2 | 942210 | 58.00 | 942210-C8 | 67.00 | | | | |
| | .015 (1/64) | | .0150 | **.023** (1.5x) | 3 | 1/8 | 1-1/2 | 968715 | 46.10 | 968715-C8 | 54.90 | | | | |
| | .015 (1/64) | | .0150 | **.045** (3x) | 3 | 1/8 | 1-1/2 | 942215 | 46.10 | 942215-C8 | 54.90 | 942215-C4 | 61.00 | | |
| | .015 (1/64) | | .0150 | **.078** (5x) | 3 | 1/8 | 2-1/2 | 923015 | 59.20 | 923015-C8 | 68.00 | | | | |
| | | 0.5 mm | .0196 | **1.50 mm** (3x) | 3 | 4 mm | 50 mm | 900411 | 47.20 | 900411-C8 | 55.80 | | | | |
| | .020 | | .0200 | **.030** (1.5x) | 3 | 1/8 | 1-1/2 | 968720 | 41.10 | 968720-C8 | 48.80 | 968720-C4 | 56.10 | | |
| | .020 | | .0200 | **.060** (3x) | 3 | 1/8 | 1-1/2 | 942220 | 41.10 | 942220-C8 | 48.80 | 942220-C4 | 56.10 | | |
| | .020 | | .0200 | **.100** (5x) | 3 | 1/8 | 2-1/2 | 923020 | 53.40 | 923020-C8 | 62.30 | | | | |
| | .025 | | .0250 | **.038** (1.5x) | 3 | 1/8 | 1-1/2 | 968725 | 41.10 | 968725-C8 | 48.80 | | | | |
| | .025 | | .0250 | **.075** (3x) | 3 | 1/8 | 1-1/2 | 942225 | 41.10 | 942225-C8 | 48.80 | 942225-C4 | 56.10 | | |
| | .025 | | .0250 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 923025 | 53.40 | 923025-C8 | 62.30 | | | | |
| | .030 | | .0300 | **.045** (1.5x) | 3 | 1/8 | 1-1/2 | 968730 | 41.10 | 968730-C8 | 48.80 | | | | |
| | .030 | | .0300 | **.090** (3x) | 3 | 1/8 | 1-1/2 | 942230 | 41.10 | 942230-C8 | 48.80 | 942230-C4 | 56.10 | | |
| | .030 | | .0300 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 923030 | 53.40 | 923030-C8 | 62.30 | | | | |
| | .031 (1/32) | | .0310 | **.025** (.8x) | 3 | 1/8 | 1-1/2 | 873531 | 36.20 | 873531-C8 | 45.20 | | | | |
| | .031 (1/32) | | .0310 | **.047** (1.5x) | 3 | 1/8 | 1-1/2 | 968731 | 32.30 | 968731-C8 | 40.00 | 968731-C4 | 47.20 | | |
| | .031 (1/32) | | .0310 | **.093** (3x) | 2 | 1/8 | 1-1/2 | 792131 | 32.30 | 792131-C8 | 41.10 | | | | |
| | .031 (1/32) | | .0310 | **.093** (3x) | 3 | 1/8 | 1-1/2 | 942231 | 32.30 | 942231-C8 | 40.00 | 942231-C4 | 47.20 | 942231-C7 | 40.00 |
| | .031 (1/32) | | .0310 | **.125** (4x) | 3 | 1/8 | 2-1/2 | 857231 | 45.00 | 857231-C8 | 54.00 | | | | |
| | .031 (1/32) | | .0310 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 923031 | 45.00 | 923031-C8 | 53.00 | 923031-C4 | 60.40 | | |
| | .031 (1/32) | | .0310 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 746031 | 49.40 | 746031-C8 | 58.40 | | | | |
| | | 0.8 mm | .0314 | **2.40 mm** (3x) | 3 | 4 mm | 50 mm | 900418 | 36.80 | 900418-C8 | 45.50 | | | | |
| | .035 | | .0350 | **.105** (3x) | 3 | 1/8 | 1-1/2 | 942235 | 37.70 | 942235-C8 | 46.30 | | | | |
| | | 1.0 mm | .0393 | **1.50 mm** (1.5x) | 3 | 4 mm | 50 mm | 858422 | 36.80 | 858422-C8 | 45.50 | | | | |
| | | 1.0 mm | .0393 | **3.00 mm** (3x) | 3 | 4 mm | 50 mm | 900422 | 36.50 | 900422-C8 | 44.50 | 900422-C4 | 53.20 | | |
| | | 1.0 mm | .0393 | **5.00 mm** (5x) | 3 | 4 mm | 50 mm | 845922 | 38.70 | 845922-C8 | 48.10 | | | | |
| | .040 | | .0400 | **.060** (1.5x) | 3 | 1/8 | 1-1/2 | 968740 | 33.00 | 968740-C8 | 40.70 | | | | |
| | .040 | | .0400 | **.120** (3x) | 3 | 1/8 | 1-1/2 | 942240 | 33.00 | 942240-C8 | 40.70 | 942240-C4 | 48.00 | | |
| | .040 | | .0400 | **.160** (4x) | 3 | 1/8 | 2-1/2 | 857240 | 45.00 | 857240-C8 | 54.00 | | | | |
| | .040 | | .0400 | **.203** (5x) | 3 | 1/8 | 2-1/2 | 923040 | 45.00 | 923040-C8 | 53.00 | 923040-C4 | 60.80 | | |
| NEW | .040 | | .0400 | **.325** (8x) | 3 | 1/8 | 2-1/2 | 746040 | 49.40 | 746040-C8 | 57.60 | | | | |
| | .045 | | .0450 | **.135** (3x) | 3 | 1/8 | 1-1/2 | 942245 | 33.00 | 942245-C8 | 41.90 | | | | |
| | .047 (3/64) | | .0470 | **.071** (1.5x) | 3 | 1/8 | 1-1/2 | 968747 | 32.30 | 968747-C8 | 40.00 | 968747-C4 | 47.20 | | |
| | .047 (3/64) | | .0470 | **.141** (3x) | 2 | 1/8 | 1-1/2 | 792147 | 32.30 | 792147-C8 | 41.10 | | | | |
| | .047 (3/64) | | .0470 | **.141** (3x) | 3 | 1/8 | 1-1/2 | 942247 | 32.30 | 942247-C8 | 40.00 | 942247-C4 | 47.20 | 942247-C7 | 40.00 |
| | .047 (3/64) | | .0470 | **.187** (4x) | 3 | 1/8 | 2-1/2 | 857247 | 45.00 | 857247-C8 | 54.00 | | | | |
| | .047 (3/64) | | .0470 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 923047 | 45.00 | 923047-C8 | 53.00 | 923047-C4 | 60.40 | | |
| NEW | .047 (3/64) | | .0470 | **.375** (8x) | 3 | 1/8 | 2-1/2 | 746047 | 49.40 | 746047-C8 | 57.60 | | | | |

continued on next page

NEW SIZES!

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Square (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | TiB$_2$ COATED | | AMORPHOUS DIAMOND | | ZrN COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equiv. | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| .050 | | .0500 | **.075** (1.5x) | 3 | 1/8 | 1-1/2 | 968750 | 33.00 | 968750-C8 | 40.70 | | | | | |
| .050 | | .0500 | **.150** (3x) | 3 | 1/8 | 1-1/2 | 942250 | 33.60 | 942250-C8 | 41.30 | 942250-C4 | 48.20 | | | |
| .050 | | .0500 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 923050 | 45.00 | 923050-C8 | 53.00 | | | | | |
| .055 | | .0550 | **.083** (1.5x) | 3 | 1/8 | 1-1/2 | 968755 | 33.00 | 968755-C8 | 41.90 | | | | | |
| .055 | | .0550 | **.165** (3x) | 3 | 1/8 | 1-1/2 | 942255 | 33.00 | 942255-C8 | 41.90 | 942255-C4 | 48.00 | | | |
| .055 | | .0550 | **.275** (5x) | 3 | 1/8 | 2-1/2 | 923055 | 46.00 | 923055-C8 | 54.80 | | | | | |
| | 1.5 mm | .0590 | **4.50 mm** (3x) | 3 | 4 mm | 50 mm | 900433 | 38.70 | 900433-C8 | 48.10 | | | | | |
| .060 | | .0600 | **.090** (1.5x) | 3 | 1/8 | 1-1/2 | 968760 | 30.60 | 968760-C8 | 39.50 | | | | | |
| .060 | | .0600 | **.180** (3x) | 3 | 1/8 | 1-1/2 | 942260 | 33.00 | 942260-C8 | 40.70 | 942260-C4 | 48.00 | | | |
| .060 | | .0600 | **.250** (4x) | 3 | 1/8 | 2-1/2 | 857260 | 46.00 | 857260-C8 | 54.80 | | | | | |
| .060 | | .0600 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 923060 | 45.00 | 923060-C8 | 53.00 | | | | | |
| .062 (1/16) | | .0620 | **.050** (.8x) | 3 | 1/8 | 1-1/2 | 873562 | 32.80 | 873562-C8 | 41.70 | 873562-C4 | 55.40 | | | |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 3 | 1/8 | 1-1/2 | 968762 | 30.00 | 968762-C8 | 37.40 | 968762-C4 | 44.50 | | | |
| .062 (1/16) | | .0620 | **.186** (3x) | 2 | 1/8 | 1-1/2 | 792162 | 30.00 | 792162-C8 | 37.70 | | | | | |
| .062 (1/16) | | .0620 | **.186** (3x) | 3 | 1/8 | 1-1/2 | 942262 | 30.00 | 942262-C8 | 37.40 | 942262-C4 | 44.50 | 942262-C7 | 37.30 | |
| .062 (1/16) | | .0620 | **.250** (4x) | 3 | 1/8 | 2-1/2 | 857262 | 42.60 | 857262-C8 | 51.50 | 857262-C4 | 57.90 | | | |
| .062 (1/16) | | .0620 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 923062 | 42.60 | 923062-C8 | 50.30 | 923062-C4 | 57.90 | | | |
| .062 (1/16) | | .0620 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 746062 | 46.10 | 746062-C8 | 54.90 | | | | | |
| .070 | | .0700 | **.105** (1.5x) | 3 | 1/8 | 1-1/2 | 968770 | 30.60 | 968770-C8 | 39.50 | | | | | |
| .070 | | .0700 | **.210** (3x) | 3 | 1/8 | 1-1/2 | 942270 | 30.60 | 942270-C8 | 37.90 | 942270-C4 | 45.20 | | | |
| .070 | | .0700 | **.375** (5x) | 3 | 1/8 | 2-1/2 | 923070 | 42.60 | 923070-C8 | 50.30 | | | | | |
| .075 | | .0750 | **.225** (3x) | 3 | 1/8 | 1-1/2 | 942275 | 30.60 | 942275-C8 | 38.30 | | | | | |
| .078 (5/64) | | .0780 | **.117** (1.5x) | 3 | 1/8 | 1-1/2 | 968778 | 30.00 | 968778-C8 | 37.40 | 968778-C4 | 44.90 | | | |
| .078 (5/64) | | .0780 | **.234** (3x) | 2 | 1/8 | 1-1/2 | 792178 | 30.00 | 792178-C8 | 37.70 | | | | | |
| .078 (5/64) | | .0780 | **.234** (3x) | 3 | 1/8 | 1-1/2 | 942278 | 30.00 | 942278-C8 | 37.40 | 942278-C4 | 44.50 | 942278-C7 | 37.30 | |
| .078 (5/64) | | .0780 | **.312** (4x) | 3 | 1/8 | 2-1/2 | 857278 | 42.60 | 857278-C8 | 51.50 | | | | | |
| .078 (5/64) | | .0780 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 923078 | 42.60 | 923078-C8 | 50.30 | 923078-C4 | 58.30 | | | |
| .078 (5/64) | | .0780 | **.625** (8x) | 3 | 1/8 | 2-1/2 | 746078 | 46.10 | 746078-C8 | 54.30 | | | | | NEW |
| | 2.0 mm | .0787 | **3.00 mm** (1.5x) | 3 | 4 mm | 50 mm | 858445 | 34.30 | 858445-C8 | 43.80 | | | | | |
| | 2.0 mm | .0787 | **6.00 mm** (3x) | 3 | 4 mm | 50 mm | 900445 | 34.00 | 900445-C8 | 41.90 | 900445-C4 | 50.80 | | | |
| | 2.0 mm | .0787 | **10.00 mm** (5x) | 3 | 4 mm | 50 mm | 845945 | 36.20 | 845945-C8 | 45.70 | | | | | |
| .080 | | .0800 | **.120** (1.5x) | 3 | 1/8 | 1-1/2 | 968780 | 30.60 | 968780-C8 | 38.30 | | | | | |
| .080 | | .0800 | **.240** (3x) | 3 | 1/8 | 1-1/2 | 942280 | 30.60 | 942280-C8 | 37.90 | 942280-C4 | 45.60 | | | |
| .080 | | .0800 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 923080 | 42.60 | 923080-C8 | 50.30 | | | | | |
| .090 | | .0900 | **.135** (1.5x) | 3 | 1/8 | 1-1/2 | 968790 | 30.60 | 968790-C8 | 39.50 | | | | | |
| .090 | | .0900 | **.270** (3x) | 3 | 1/8 | 1-1/2 | 942290 | 30.60 | 942290-C8 | 37.90 | 942290-C4 | 45.60 | | | |
| .090 | | .0900 | **.450** (5x) | 3 | 1/8 | 2-1/2 | 923090 | 42.60 | 923090-C8 | 50.30 | | | | | |
| .093 (3/32) | | .0930 | **.074** (.8x) | 3 | 1/8 | 1-1/2 | 873593 | 32.80 | 873593-C8 | 41.70 | | | | | |
| .093 (3/32) | | .0930 | **.140** (1.5x) | 3 | 1/8 | 1-1/2 | 968793 | 30.00 | 968793-C8 | 37.40 | 968793-C4 | 44.50 | | | |
| .093 (3/32) | | .0930 | **.279** (3x) | 2 | 1/8 | 1-1/2 | 792193 | 30.00 | 792193-C8 | 37.70 | | | | | |
| .093 (3/32) | | .0930 | **.279** (3x) | 3 | 1/8 | 1-1/2 | 942293 | 30.00 | 942293-C8 | 37.40 | 942293-C4 | 44.50 | 942293-C7 | 37.30 | |
| .093 (3/32) | | .0930 | **.375** (4x) | 3 | 1/8 | 2-1/2 | 857293 | 42.60 | 857293-C8 | 51.50 | 857293-C4 | 57.90 | | | |
| .093 (3/32) | | .0930 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 923093 | 42.60 | 923093-C8 | 50.30 | 923093-C4 | 57.90 | | | |
| .093 (3/32) | | .0930 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 746093 | 46.10 | 746093-C8 | 54.90 | | | | | |
| | 2.5 mm | .0984 | **7.50 mm** (3x) | 3 | 4 mm | 50 mm | 900451 | 36.60 | 900451-C8 | 46.00 | | | | | |

continued on next page

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Square (cont.)

continued from previous page

| CUTTER DIAMETER $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equiv. | LENGTH OF CUT $L_2$ +.010″ −.000″ | +.25mm −.00mm | FLUTES | SHANK DIA. $D_2$ (h6) | OAL $L_1$ | UNCOATED TOOL # | USD$ | $TiB_2$ COATED TOOL # | USD$ | AMORPHOUS DIAMOND TOOL # | USD$ | ZrN COATED TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .100 | | .1000 | **.150** | (1.5x) | 3 | 1/8 | 1-1/2 | 968800 | 30.60 | 968800-C8 | 37.90 | | | | |
| .100 | | .1000 | **.300** | (3x) | 3 | 1/8 | 1-1/2 | 942300 | 30.60 | 942300-C8 | 37.90 | 942300-C4 | 45.20 | | |
| .100 | | .1000 | **.500** | (5x) | 3 | 1/8 | 2-1/2 | 923100 | 42.60 | 923100-C8 | 50.30 | | | | |
| .109 (7/64) | | .1090 | **.164** | (1.5x) | 3 | 1/8 | 1-1/2 | 968802 | 30.60 | 968802-C8 | 37.90 | | | | |
| .109 (7/64) | | .1090 | **.327** | (3x) | 3 | 1/8 | 1-1/2 | 942302 | 30.60 | 942302-C8 | 37.90 | 942302-C4 | 45.60 | | |
| .109 (7/64) | | .1090 | **.570** | (5x) | 3 | 1/8 | 2-1/2 | 923102 | 42.60 | 923102-C8 | 50.30 | | | | |
| | 3.0 mm | .1181 | **4.50 mm** | (1.5x) | 3 | 4 mm | 50mm | 858457 | 34.40 | 858457-C8 | 43.90 | | | | |
| | 3.0 mm | .1181 | **9.00 mm** | (3x) | 3 | 4 mm | 50 mm | 900457 | 34.00 | 900457-C8 | 41.90 | 900457-C4 | 52.10 | | |
| | 3.0 mm | .1181 | **12.00 mm** | (4x) | 3 | 4 mm | 50 mm | 770057 | 36.20 | 770057-C8 | 45.70 | | | | |
| | 3.0 mm | .1181 | **15.00 mm** | (5x) | 3 | 4 mm | 50 mm | 845957 | 38.20 | 845957-C8 | 47.70 | | | | |

| | $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equiv. | $L_2$ +.030″ −.000″ | +.75mm −.00mm | FLUTES | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .125 (1/8) | | .1250 | **.100** | (.8x) | 3 | 1/8 | 1-1/2 | 873608 | 33.70 | 873608-C8 | 41.40 | 873608-C4 | 48.70 | | |
| | .125 (1/8) | | .1250 | **.187** | (1.5x) | 3 | 1/8 | 1-1/2 | 968808 | 27.70 | 968808-C8 | 35.40 | 968808-C4 | 42.70 | | |
| | .125 (1/8) | | .1250 | **.375** | (3x) | 2 | 1/8 | 1-1/2 | 792208 | 27.70 | 792208-C8 | 35.40 | | | | |
| | .125 (1/8) | | .1250 | **.375** | (3x) | 3 | 1/8 | 1-1/2 | 942308 | 27.70 | 942308-C8 | 35.40 | 942308-C4 | 42.70 | 942308-C7 | 35.40 |
| | .125 (1/8) | | .1250 | **.500** | (4x) | 3 | 1/8 | 2-1/2 | 857308 | 41.60 | 857308-C8 | 50.30 | 857308-C4 | 56.50 | | |
| | .125 (1/8) | | .1250 | **.625** | (5x) | 3 | 1/8 | 2-1/2 | 923108 | 41.60 | 923108-C8 | 49.60 | 923108-C4 | 56.50 | | |
| | .125 (1/8) | | .1250 | **1.000** | (8x) | 3 | 1/8 | 2-1/2 | 746108 | 44.90 | 746108-C8 | 53.80 | | | | |
| | .140 (9/64) | | .1406 | **.220** | (1.5x) | 3 | 3/16 | 2 | 968809 | 31.00 | 968809-C8 | 39.70 | | | | |
| NEW | .140 (9/64) | | .1406 | **.425** | (3x) | 3 | 3/16 | 2 | 942309 | 31.00 | 942309-C8 | 39.70 | 942309-C4 | 47.70 | | |
| | .140 (9/64) | | .1406 | **.750** | (5x) | 3 | 3/16 | 3 | 923109 | 43.10 | 923109-C8 | 51.80 | | | | |
| | .156 (5/32) | | .1562 | **.235** | (1.5x) | 3 | 3/16 | 2 | 968810 | 31.20 | 968810-C8 | 39.90 | 968810-C4 | 49.10 | | |
| | .156 (5/32) | | .1562 | **.469** | (3x) | 3 | 3/16 | 2 | 942310 | 31.20 | 942310-C8 | 39.90 | 942310-C4 | 49.10 | | |
| NEW | .156 (5/32) | | .1562 | **.625** | (4x) | 3 | 3/16 | 3 | 857310 | 43.10 | 857310-C8 | 52.30 | | | | |
| | .156 (5/32) | | .1562 | **.750** | (5x) | 3 | 3/16 | 3 | 923110 | 43.10 | 923110-C8 | 51.80 | 923110-C4 | 63.80 | | |
| NEW | .156 (5/32) | | .1562 | **1.250** | (8x) | 3 | 3/16 | 3 | 746110 | 44.90 | 746110-C8 | 54.20 | | | | |
| | | 4.0 mm | .1574 | **12.00 mm** | (3x) | 3 | 6 mm | 63 mm | 900461 | 47.40 | 900461-C8 | 57.50 | | | | |
| | .187 (3/16) | | .1875 | **.150** | (.8x) | 3 | 3/16 | 2 | 873612 | 35.10 | 873612-C8 | 43.70 | | | | |
| | .187 (3/16) | | .1875 | **.285** | (1.5x) | 3 | 3/16 | 2 | 968812 | 29.80 | 968812-C8 | 38.40 | 968812-C4 | 46.50 | | |
| | .187 (3/16) | | .1875 | **.562** | (3x) | 2 | 3/16 | 2 | 792212 | 29.80 | 792212-C8 | 38.40 | | | | |
| | .187 (3/16) | | .1875 | **.562** | (3x) | 3 | 3/16 | 2 | 942312 | 29.80 | 942312-C8 | 38.40 | 942312-C4 | 46.50 | 942312-C7 | 38.90 |
| | .187 (3/16) | | .1875 | **.750** | (4x) | 3 | 3/16 | 3 | 857312 | 34.80 | 857312-C8 | 43.50 | | | | |
| | .187 (3/16) | | .1875 | **1.000** | (5x) | 3 | 3/16 | 3 | 923112 | 43.10 | 923112-C8 | 51.80 | 923112-C4 | 63.80 | | |
| NEW | .187 (3/16) | | .1875 | **1.500** | (8x) | 3 | 3/16 | 3 | 746112 | 44.90 | 746112-C8 | 54.20 | | | | |
| | | 5.0 mm | .1968 | **15.00 mm** | (3x) | 3 | 6 mm | 63 mm | 900464 | 47.40 | 900464-C8 | 57.50 | | | | |
| | .218 (7/32) | | .2187 | **.625** | (3x) | 3 | 1/4 | 2-1/2 | 942314 | 45.30 | 942314-C8 | 55.50 | | | | |
| | | 6.0 mm | .2362 | **18.00 mm** | (3x) | 3 | 6 mm | 63 mm | 900466 | 47.00 | 900466-C8 | 57.00 | | | | |
| | .250 (1/4) | | .2500 | **.200** | (.8x) | 3 | 1/4 | 2-1/2 | 873616 | 44.60 | 873616-C8 | 54.90 | | | | |
| | .250 (1/4) | | .2500 | **.375** | (1.5x) | 3 | 1/4 | 2-1/2 | 968816 | 36.00 | 968816-C8 | 46.20 | 968816-C4 | 57.40 | | |
| | .250 (1/4) | | .2500 | **.750** | (3x) | 3 | 1/4 | 2-1/2 | 942316 | 36.30 | 942316-C8 | 46.60 | 942316-C4 | 57.70 | 942316-C7 | 47.60 |
| | .250 (1/4) | | .2500 | **1.000** | (4x) | 3 | 1/4 | 4 | 857316 | 41.30 | 857316-C8 | 52.50 | | | | |
| | .250 (1/4) | | .2500 | **1.250** | (5x) | 3 | 1/4 | 4 | 923116 | 51.10 | 923116-C8 | 62.30 | 923116-C4 | 74.60 | | |

continued on next page

NEW SIZES!

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Square (cont.)

continued from previous page

| CUTTER DIAMETER | | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | | AMORPHOUS DIAMOND | | ZrN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $D_1$ +.00mm −.04mm decimal equiv. | $L_2$ +.030″ −.000″ (3x) +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .312 (5/16) | .3125 | **1.000** (3x) | 3 | 5/16 | 2-1/2 | 942320 | 45.60 | 942320-C8 | 62.30 | | | | |
| .375 (3/8) | .3750 | **.570** (1.5x) | 3 | 3/8 | 2-1/2 | 968824 | 49.60 | 968824-C8 | 70.20 | | | | |
| .375 (3/8) | .3750 | **1.125** (3x) | 3 | 3/8 | 2-1/2 | 942324 | 49.60 | 942324-C8 | 70.20 | 942324-C4 | 79.00 | 942324-C7 | 61.20 |
| .375 (3/8) | .3750 | **2.000** (5x) | 3 | 3/8 | 4 | 923124 | 55.40 | 923124-C8 | 79.40 | | | | |
| .500 (1/2) | .5000 | **.750** (1.5x) | 3 | 1/2 | 3 | 968832 | 52.50 | 968832-C8 | 77.00 | | | | |
| .500 (1/2) | .5000 | **1.500** (3x) | 3 | 1/2 | 3 | 942332 | 51.90 | 942332-C8 | 76.30 | 942332-C4 | 88.40 | 942332-C7 | 69.90 |
| .500 (1/2) | .5000 | **2.625** (5x) | 3 | 1/2 | 4 | 923132 | 57.40 | 923132-C8 | 77.00 | | | | |



## Speeds & Feeds (Variable Helix For Aluminum & Non-Ferrous Alloys)

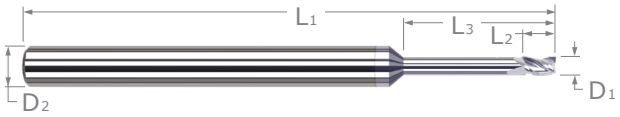
**Important Note**: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For 2 flutes, table values of IPT must be increased to 110% before adjustments for different lengths of cut. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 115%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%; for 8x, reduce to 58%). For complete speeds and feeds charts, please see www.harveytool.com

| Cutter Series | Material | SFM | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 |
| Uncoated | **Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx) | 750 | Slotting | .00020 | .00041 | .00062 | .00082 | .00103 | .00123 | .00165 | .00247 | .00330 |
| | Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1000 | Roughing | .00023 | .00048 | .00072 | .00095 | .00120 | .00143 | .00193 | .00288 | .00385 |
| | **Magnesium Alloys:** All alloys | 1500 | Finishing | .00025 | .00051 | .00078 | .00102 | .00129 | .00153 | .00206 | .00309 | .00413 |
| | **Zinc Alloys:** All alloys | 800 | Max | .00026 | .00055 | .00083 | .00109 | .00137 | .00164 | .00220 | .00329 | .00440 |
| | **Copper Alloys:** High Coppers - 90%+ (C1xxxx) | 225 | Slotting | .00016 | .00033 | .00050 | .00065 | .00082 | .00098 | .00132 | .00197 | .00264 |
| | Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx) | 500 | Roughing | .00018 | .00038 | .00058 | .00076 | .00096 | .00115 | .00154 | .00230 | .00308 |
| | Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 225 | Finishing | .00020 | .00041 | .00062 | .00082 | .00103 | .00123 | .00165 | .00247 | .00330 |
| | Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 500 | Max | .00021 | .00044 | .00066 | .00087 | .00110 | .00131 | .00176 | .00263 | .00352 |
| | Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 500 | | | **Radial Depth of Cut*:** Slotting: 1x Dia Roughing: .5x Dia Finishing: .1x Dia | | | **Axial Depth of Cut*:** Slotting: .5x Dia Roughing: .5x - 1x Dia Finishing: .5x - 1x Dia | | | | |
| | Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 225 | | | | | | | | | | | |
| | Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 550 | | | | | | | | | | | |
| $TiB_2$ | **Aluminum:** Casting (2xx, 5xx, 7xx, 8xx) | 1000 | Slotting | .00026 | .00053 | .00081 | .00106 | .00134 | .00160 | .00215 | .00321 | .00429 |
| | Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1400 | Roughing | .00030 | .00062 | .00094 | .00124 | .00156 | .00186 | .00250 | .00374 | .00501 |
| | **Magnesium Alloys:** All alloys | 2000 | Finishing | .00032 | .00066 | .00101 | .00133 | .00167 | .00199 | .00268 | .00401 | .00536 |
| | **Zinc Alloys:** All alloys | 1100 | Max | .00034 | .00071 | .00108 | .00142 | .00178 | .00213 | .00286 | .00428 | .00572 |
| | | | | | **Radial Depth of Cut*:** Slotting: 1x Dia Roughing: .5x Dia Finishing: .1x Dia | | | **Axial Depth of Cut*:** Slotting: .5x Dia Roughing: .5x - 1x Dia Finishing: .5x - 1x Dia | | | | |
| Amorphous Diamond | **Aluminum (High Silicon):** Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 2500 | Slotting | .00022 | .00045 | .00068 | .00090 | .00113 | .00135 | .00182 | .00272 | .00363 |
| | Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 2000 | Roughing | .00025 | .00053 | .00080 | .00105 | .00132 | .00158 | .00212 | .00317 | .00424 |
| | Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 1500 | Finishing | .00027 | .00056 | .00085 | .00113 | .00142 | .00169 | .00227 | .00339 | .00454 |
| | Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 1000 | Max | .00029 | .00060 | .00091 | .00120 | .00151 | .00180 | .00242 | .00362 | .00484 |
| | Wrought - 5% - 8% Si (4xxx) | 2200 | | | | | | | | | | | |
| | Wrought - 8% - 12% Si (4xxx) | 1700 | | | | | | | | | | | |
| | **Copper Alloys:** High Coppers - 90%+ (C1xxxx) | 800 | Slotting | .00017 | .00036 | .00055 | .00072 | .00091 | .00108 | .00145 | .00217 | .00290 |
| | Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx) | 1500 | Roughing | .00020 | .00042 | .00064 | .00084 | .00106 | .00126 | .00169 | .00253 | .00339 |
| | Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 800 | Finishing | .00022 | .00045 | .00068 | .00090 | .00113 | .00135 | .00182 | .00272 | .00363 |
| | Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 1000 | Max | .00023 | .00048 | .00073 | .00096 | .00121 | .00144 | .00194 | .00290 | .00387 |
| | Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 1000 | | | | | | | | | | | |
| | Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 800 | | | **Radial Depth of Cut*:** Slotting: 1x Dia Roughing: .4x Dia Finishing: .1x Dia | | | **Axial Depth of Cut*:** Slotting: .4x Dia Roughing: .3x - .8x Dia Finishing: .5x - 1x Dia | | | | |
| | Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300) | 150 | | | | | | | | | | | |
| | Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 750 | | | | | | | | | | | |

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Square – Long Reach, Stub Flute




- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes • Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| .015 (1/64) | | .0150 | .023 | **.078** (5x) | 3 | 1/8 | 2-1/2 | 930815 | 60.80 | 930815-C8 | 69.70 | | |
| .015 (1/64) | | .0150 | .023 | **.125** (8x) | 3 | 1/8 | 2-1/2 | 927115 | 62.20 | 927115-C8 | 71.20 | | |
| .020 | | .0200 | .030 | **.100** (5x) | 3 | 1/8 | 2-1/2 | 930820 | 58.10 | 930820-C8 | 67.10 | | |
| .020 | | .0200 | .030 | **.160** (8x) | 3 | 1/8 | 2-1/2 | 927120 | 59.80 | 927120-C8 | 68.80 | | |
| .020 | | .0200 | .030 | **.200** (10x) | 3 | 1/8 | 2-1/2 | 919320 | 63.00 | 919320-C8 | 72.00 | | |
| .025 | | .0250 | .038 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 930825 | 56.90 | 930825-C8 | 65.70 | | |
| .025 | | .0250 | .038 | **.203** (8x) | 3 | 1/8 | 2-1/2 | 927125 | 58.10 | 927125-C8 | 67.10 | | |
| .030 | | .0300 | .045 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 927130 | 58.10 | 927130-C8 | 67.10 | | |
| .031 (1/32) | | .0310 | .047 | **.093** (3x) | 3 | 1/8 | 1-1/2 | 924531 | 51.80 | 924531-C8 | 60.60 | | |
| .031 (1/32) | | .0310 | .047 | **.125** (4x) | 3 | 1/8 | 2-1/2 | 814331 | 53.10 | 814331-C8 | 62.00 | | |
| .031 (1/32) | | .0310 | .047 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 930831 | 53.10 | 930831-C8 | 62.00 | 930831-C4 | 68.90 |
| .031 (1/32) | | .0310 | .047 | **.186** (6x) | 3 | 1/8 | 2-1/2 | 814131 | 53.10 | 814131-C8 | 62.00 | | |
| .031 (1/32) | | .0310 | .047 | **.218** (7x) | 3 | 1/8 | 2-1/2 | 813931 | 54.50 | 813931-C8 | 63.30 | | |
| .031 (1/32) | | .0310 | .047 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 927131 | 54.50 | 927131-C8 | 63.30 | 927131-C4 | 69.60 |
| .031 (1/32) | | .0310 | .047 | **.312** (10x) | 3 | 1/8 | 2-1/2 | 919331 | 57.50 | 919331-C8 | 66.50 | | |
| .031 (1/32) | | .0310 | .047 | **.375** (12x) | 3 | 1/8 | 2-1/2 | 879231 | 59.70 | 879231-C8 | 68.60 | | |
| | 1.0 mm | .0393 | 1.5 mm | **8 mm** (8x) | 3 | 4 mm | 50 mm | 795322 | 59.90 | 795322-C8 | 69.30 | | |
| .040 | | .0400 | .060 | **.325** (8x) | 3 | 1/8 | 2-1/2 | 927140 | 57.20 | 927140-C8 | 66.10 | | |
| .047 (3/64) | | .0470 | .071 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 930847 | 53.10 | 930847-C8 | 62.00 | | |
| .047 (3/64) | | .0470 | .071 | **.375** (8x) | 3 | 1/8 | 2-1/2 | 927147 | 54.50 | 927147-C8 | 63.30 | | |
| .047 (3/64) | | .0470 | .071 | **.480** (10x) | 3 | 1/8 | 2-1/2 | 919347 | 57.90 | 919347-C8 | 66.90 | | |
| .050 | | .0500 | .075 | **.400** (8x) | 3 | 1/8 | 2-1/2 | 927150 | 59.20 | 927150-C8 | 68.00 | | |
| .055 | | .0550 | .083 | **.450** (8x) | 3 | 1/8 | 2-1/2 | 927155 | 59.20 | 927155-C8 | 68.00 | | |
| .060 | | .0600 | .090 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 927160 | 59.20 | 927160-C8 | 68.00 | | |
| .062 (1/16) | | .0620 | .093 | **.186** (3x) | 3 | 1/8 | 1-1/2 | 924562 | 51.80 | 924562-C8 | 60.60 | | |
| .062 (1/16) | | .0620 | .093 | **.250** (4x) | 3 | 1/8 | 2-1/2 | 814362 | 53.10 | 814362-C8 | 62.00 | | |
| .062 (1/16) | | .0620 | .093 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 930862 | 53.10 | 930862-C8 | 62.00 | 930862-C4 | 68.90 |
| .062 (1/16) | | .0620 | .093 | **.375** (6x) | 3 | 1/8 | 2-1/2 | 814162 | 54.00 | 814162-C8 | 63.00 | | |
| .062 (1/16) | | .0620 | .093 | **.437** (7x) | 3 | 1/8 | 2-1/2 | 813962 | 54.00 | 813962-C8 | 63.00 | | |
| .062 (1/16) | | .0620 | .093 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 927162 | 54.00 | 927162-C8 | 63.00 | 927162-C4 | 69.30 |
| .062 (1/16) | | .0620 | .093 | **.625** (10x) | 3 | 1/8 | 2-1/2 | 919362 | 57.50 | 919362-C8 | 66.50 | | |
| .062 (1/16) | | .0620 | .093 | **.750** (12x) | 3 | 1/8 | 2-1/2 | 879262 | 59.70 | 879262-C8 | 68.60 | | |
| .070 | | .0700 | .105 | **.570** (8x) | 3 | 1/8 | 2-1/2 | 927170 | 55.30 | 927170-C8 | 64.20 | | |

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# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Square – Long Reach, Stub Flute (cont.)

continued from previous page

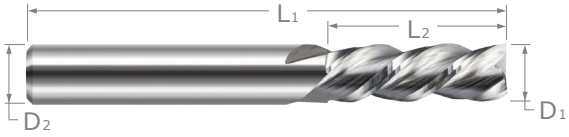
| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| .078 (5/64) | | .0780 | .118 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 930878 | 53.10 | 930878-C8 | 62.00 | | |
| .078 (5/64) | | .0780 | .118 | **.625** (8x) | 3 | 1/8 | 2-1/2 | 927178 | 54.00 | 927178-C8 | 63.00 | | |
| .078 (5/64) | | .0780 | .118 | **.800** (10x) | 3 | 1/8 | 2-1/2 | 919378 | 57.90 | 919378-C8 | 66.90 | | |
| | 2.0 mm | .0787 | 3 mm | **16 mm** (8x) | 3 | 4 mm | 50 mm | 795345 | 59.90 | 795345-C8 | 69.30 | | |
| .080 | | .0800 | .120 | **.650** (8x) | 3 | 1/8 | 2-1/2 | 927180 | 56.70 | 927180-C8 | 65.50 | | |
| .090 | | .0900 | .135 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 927190 | 56.70 | 927190-C8 | 64.90 | | |
| .093 (3/32) | | .0930 | .140 | **.279** (3x) | 3 | 1/8 | 1-1/2 | 924593 | 51.80 | 924593-C8 | 60.60 | | |
| .093 (3/32) | | .0930 | .140 | **.375** (4x) | 3 | 1/8 | 2-1/2 | 814393 | 53.10 | 814393-C8 | 62.00 | | |
| .093 (3/32) | | .0930 | .140 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 930893 | 53.10 | 930893-C8 | 62.00 | 930893-C4 | 68.40 |
| .093 (3/32) | | .0930 | .140 | **.585** (6x) | 3 | 1/8 | 2-1/2 | 814193 | 54.00 | 814193-C8 | 63.00 | | |
| .093 (3/32) | | .0930 | .140 | **.670** (7x) | 3 | 1/8 | 2-1/2 | 813993 | 54.00 | 813993-C8 | 63.00 | | |
| .093 (3/32) | | .0930 | .140 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 927193 | 54.00 | 927193-C8 | 63.00 | 927193-C4 | 69.80 |
| .093 (3/32) | | .0930 | .140 | **.950** (10x) | 3 | 1/8 | 2-1/2 | 919393 | 57.50 | 919393-C8 | 66.50 | | |
| .093 (3/32) | | .0930 | .140 | **1.125** (12x) | 3 | 1/8 | 2-1/2 | 879293 | 59.70 | 879293-C8 | 68.60 | | |
| .100 | | .1000 | .150 | **.800** (8x) | 3 | 1/8 | 2-1/2 | 927200 | 59.20 | 927200-C8 | 68.00 | | |
| .109 (7/64) | | .1090 | .164 | **.900** (8x) | 3 | 1/8 | 2-1/2 | 927202 | 59.20 | 927202-C8 | 68.00 | | |
| | 3.0 mm | .1181 | 4.50 mm | **24.0 mm** (8x) | 3 | 4 mm | 50 mm | 795357 | 62.40 | 795357-C8 | 71.80 | | |

| $D_1$ +.000″ −.002″ | decimal equivalent | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | .187 | **.375** (3x) | 3 | 1/8 | 1-1/2 | 924608 | 51.80 | 924608-C8 | 60.60 | | |
| .125 (1/8) | .1250 | .187 | **.500** (4x) | 3 | 1/8 | 2-1/2 | 814408 | 53.10 | 814408-C8 | 62.00 | | |
| .125 (1/8) | .1250 | .187 | **.625** (5x) | 3 | 1/8 | 2-1/2 | 930908 | 53.10 | 930908-C8 | 62.00 | 930908-C4 | 68.90 |
| .125 (1/8) | .1250 | .187 | **.750** (6x) | 3 | 1/8 | 2-1/2 | 814208 | 54.00 | 814208-C8 | 63.00 | | |
| .125 (1/8) | .1250 | .187 | **.875** (7x) | 3 | 1/8 | 2-1/2 | 814008 | 54.00 | 814008-C8 | 63.00 | | |
| .125 (1/8) | .1250 | .187 | **1.000** (8x) | 3 | 1/8 | 2-1/2 | 927208 | 54.00 | 927208-C8 | 63.00 | 927208-C4 | 69.30 |
| .125 (1/8) | .1250 | .187 | **1.250** (10x) | 3 | 1/8 | 2-1/2 | 919408 | 57.50 | 919408-C8 | 66.50 | | |
| .125 (1/8) | .1250 | .187 | **1.500** (12x) | 3 | 1/8 | 3 | 879308 | 59.70 | 879308-C8 | 68.60 | | |
| .140 (9/64) | .1406 | .220 | **1.125** (8x) | 3 | 3/16 | 3 | 927209 | 62.70 | 927209-C8 | 71.60 | | |
| .156 (5/32) | .1562 | .235 | **.750** (5x) | 3 | 3/16 | 3 | 930910 | 58.10 | 930910-C8 | 67.10 | | |
| .156 (5/32) | .1562 | .235 | **1.250** (8x) | 3 | 3/16 | 3 | 927210 | 59.80 | 927210-C8 | 68.80 | | |
| .156 (5/32) | .1562 | .235 | **1.570** (10x) | 3 | 3/16 | 3 | 919410 | 61.90 | 919410-C8 | 70.70 | | |
| .187 (3/16) | .1875 | .285 | **1.000** (5x) | 3 | 3/16 | 3 | 930912 | 58.10 | 930912-C8 | 67.10 | 930912-C4 | 76.00 |
| .187 (3/16) | .1875 | .285 | **1.156** (6x) | 3 | 3/16 | 3 | 814212 | 58.10 | 814212-C8 | 67.10 | | |
| .187 (3/16) | .1875 | .285 | **1.312** (7x) | 3 | 3/16 | 3 | 814012 | 59.80 | 814012-C8 | 68.80 | | |
| .187 (3/16) | .1875 | .285 | **1.500** (8x) | 3 | 3/16 | 3 | 927212 | 59.80 | 927212-C8 | 68.80 | | |
| .187 (3/16) | .1875 | .285 | **1.875** (10x) | 3 | 3/16 | 4 | 919412 | 61.90 | 919412-C8 | 71.50 | | |
| .250 (1/4) | .2500 | .375 | **1.250** (5x) | 3 | 1/4 | 4 | 930916 | 62.10 | 930916-C8 | 73.60 | | |
| .250 (1/4) | .2500 | .375 | **2.000** (8x) | 3 | 1/4 | 4 | 927216 | 63.50 | 927216-C8 | 75.00 | | |
| .250 (1/4) | .2500 | .375 | **2.500** (10x) | 3 | 1/4 | 4 | 919416 | 65.70 | 919416-C8 | 77.20 | | |
| .375 (3/8) | .3750 | .570 | **2.000** (5x) | 3 | 3/8 | 4 | 930924 | 74.20 | 930924-C8 | 97.50 | | |
| .500 (1/2) | .5000 | .750 | **2.500** (5x) | 3 | 1/2 | 4 | 930932 | 90.00 | 930932-C8 | 110.20 | | |

**Please See Speeds & Feeds On Page 238**

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Square – Downcut




- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- Prevents lifting of workpiece
- h6 shank tolerance for high precision tool holders
- 3 left hand spiral, right hand cut flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

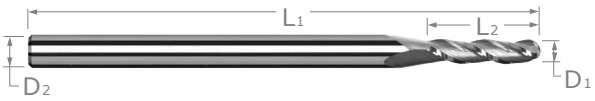
| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| .015 (1/64) | | .0150 | .045 (3x) | 3 | 1/8 | 1-1/2 | 896215 | 53.60 | 896215-C8 | 62.50 |
| .031 (1/32) | | .0310 | .047 (1.5x) | 3 | 1/8 | 1-1/2 | 858531 | 38.00 | 858531-C8 | 46.90 |
| .031 (1/32) | | .0310 | .093 (3x) | 3 | 1/8 | 1-1/2 | 896231 | 37.80 | 896231-C8 | 46.70 |
| .047 (3/64) | | .0470 | .141 (3x) | 3 | 1/8 | 1-1/2 | 896247 | 37.80 | 896247-C8 | 46.70 |
| .062 (1/16) | | .0620 | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 858562 | 35.40 | 858562-C8 | 44.30 |
| .062 (1/16) | | .0620 | .186 (3x) | 3 | 1/8 | 1-1/2 | 896262 | 35.20 | 896262-C8 | 44.10 |
| .078 (5/64) | | .0780 | .234 (3x) | 3 | 1/8 | 1-1/2 | 896278 | 35.20 | 896278-C8 | 44.10 |
| .093 (3/32) | | .0930 | .140 (1.5x) | 3 | 1/8 | 1-1/2 | 858593 | 35.40 | 858593-C8 | 44.30 |
| .093 (3/32) | | .0930 | .279 (3x) | 3 | 1/8 | 1-1/2 | 896293 | 35.20 | 896293-C8 | 44.10 |
| | 3.00 mm | .1181 | 4.50 mm (1.5x) | 3 | 4 mm | 50 mm | 756057 | 39.00 | 756057-C8 | 47.60 |
| | 3.00 mm | .1181 | 9.00 mm (3x) | 3 | 4 mm | 50 mm | 754057 | 38.80 | 754057-C8 | 47.40 |

| $D_1$ +.000″ −.002″ | +.00mm −.04mm | decimal equivalent | $L_2$ +.030″ −.000″ +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | | .1250 | .187 (1.5x) | 3 | 1/8 | 1-1/2 | 858608 | 35.10 | 858608-C8 | 44.00 |
| .125 (1/8) | | .1250 | .375 (3x) | 3 | 1/8 | 1-1/2 | 896308 | 34.90 | 896308-C8 | 43.80 |
| .156 (5/32) | | .1560 | .235 (1.5x) | 3 | 3/16 | 2 | 858610 | 39.80 | 858610-C8 | 48.40 |
| .156 (5/32) | | .1560 | .469 (3x) | 3 | 3/16 | 2 | 896310 | 39.50 | 896310-C8 | 48.20 |
| .187 (3/16) | | .1870 | .285 (1.5x) | 3 | 3/16 | 2 | 858612 | 36.60 | 858612-C8 | 45.30 |
| .187 (3/16) | | .1870 | .562 (3x) | 3 | 3/16 | 2 | 896312 | 36.30 | 896312-C8 | 44.90 |
| | 6.00 mm | .2362 | 9.00 mm (1.5x) | 3 | 6 mm | 63 mm | 756066 | 49.40 | 756066-C8 | 60.50 |
| | 6.00 mm | .2362 | 18.00 mm (3x) | 3 | 6 mm | 63 mm | 754066 | 49.00 | 754066-C8 | 59.00 |
| .250 (1/4) | | .2500 | .375 (1.5x) | 3 | 1/4 | 2-1/2 | 858616 | 45.90 | 858616-C8 | 55.90 |
| .250 (1/4) | | .2500 | .750 (3x) | 3 | 1/4 | 2-1/2 | 896316 | 45.40 | 896316-C8 | 55.40 |
| .375 (3/8) | | .3750 | .570 (1.5x) | 3 | 3/8 | 2-1/2 | 858624 | 61.30 | 858624-C8 | 77.10 |
| .375 (3/8) | | .3750 | 1.125 (3x) | 3 | 3/8 | 2-1/2 | 896324 | 60.70 | 896324-C8 | 80.50 |
| .500 (1/2) | | .5000 | .750 (1.5x) | 3 | 1/2 | 3 | 858632 | 118.10 | 858632-C8 | 138.60 |
| .500 (1/2) | | .5000 | 1.500 (3x) | 3 | 1/2 | 3 | 896332 | 120.40 | 896332-C8 | 140.80 |

**Please See Speeds & Feeds On Page 224**

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Ball




- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders • 3 flutes
- Center cutting • Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | TiB2 COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D1 +.0005" −.0005" | +.00mm −.02mm | decimal equivalent | L2 +.010" −.000" +.25mm −.00mm | | D2 (h6) | L1 | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| | .2 mm | .0078 | **.60 mm** (3x) | 3 | 4 mm | 50 mm | 977504 | 69.50 | 977504-C8 | 78.20 | | |
| .010 | | .0100 | **.015** (1.5x) | 3 | 1/8 | 1-1/2 | 958110 | 69.40 | 958110-C8 | 77.10 | | |
| .010 | | .0100 | **.030** (3x) | 3 | 1/8 | 1-1/2 | 989710 | 68.30 | 989710-C8 | 76.00 | | |
| .015 (1/64) | | .0150 | **.023** (1.5x) | 3 | 1/8 | 1-1/2 | 958115 | 55.00 | 958115-C8 | 63.90 | | |
| .015 (1/64) | | .0150 | **.045** (3x) | 3 | 1/8 | 1-1/2 | 989715 | 55.00 | 989715-C8 | 63.90 | | |
| | .4 mm | .0157 | **1.20 mm** (3x) | 3 | 4 mm | 50 mm | 977509 | 56.20 | 977509-C8 | 64.80 | | |
| | .5 mm | .0196 | **1.50 mm** (3x) | 3 | 4 mm | 50 mm | 977511 | 50.30 | 977511-C8 | 59.60 | | |
| .020 | | .0200 | **.030** (1.5x) | 3 | 1/8 | 1-1/2 | 958120 | 48.20 | 958120-C8 | 57.00 | | |
| .020 | | .0200 | **.060** (3x) | 3 | 1/8 | 1-1/2 | 989720 | 48.20 | 989720-C8 | 55.80 | | |
| .020 | | .0200 | **.100** (5x) | 3 | 1/8 | 2-1/2 | 850020 | 49.80 | 850020-C8 | 58.00 | | |
| | .6 mm | .0236 | **1.80 mm** (3x) | 3 | 4 mm | 50 mm | 977513 | 47.20 | 977513-C8 | 56.60 | | |
| .025 | | .0250 | **.075** (3x) | 3 | 1/8 | 1-1/2 | 989725 | 46.40 | 989725-C8 | 54.10 | | |
| .030 | | .0300 | **.090** (3x) | 3 | 1/8 | 1-1/2 | 989730 | 40.70 | 989730-C8 | 49.50 | | |
| .031 (1/32) | | .0310 | **.047** (1.5x) | 3 | 1/8 | 1-1/2 | 958131 | 40.30 | 958131-C8 | 49.00 | | |
| .031 (1/32) | | .0310 | **.093** (3x) | 3 | 1/8 | 1-1/2 | 989731 | 39.80 | 989731-C8 | 48.60 | 989731-C4 | 54.70 |
| .031 (1/32) | | .0310 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 850031 | 49.50 | 850031-C8 | 57.70 | | |
| | .8 mm | .0314 | **2.40 mm** (3x) | 3 | 4 mm | 50 mm | 977518 | 40.60 | 977518-C8 | 49.20 | | |
| | 1.0 mm | .0393 | **1.50 mm** (1.5x) | 3 | 4 mm | 50 mm | 908322 | 41.00 | 908322-C8 | 49.60 | | |
| | 1.0 mm | .0393 | **3.00 mm** (3x) | 3 | 4 mm | 50 mm | 977522 | 41.00 | 977522-C8 | 50.40 | | |
| .040 | | .0400 | **.060** (1.5x) | 3 | 1/8 | 1-1/2 | 958140 | 43.80 | 958140-C8 | 51.50 | | |
| .040 | | .0400 | **.120** (3x) | 3 | 1/8 | 1-1/2 | 989740 | 42.50 | 989740-C8 | 51.30 | | |
| .047 (3/64) | | .0470 | **.071** (1.5x) | 3 | 1/8 | 1-1/2 | 958147 | 40.30 | 958147-C8 | 48.00 | | |
| .047 (3/64) | | .0470 | **.141** (3x) | 3 | 1/8 | 1-1/2 | 989747 | 39.80 | 989747-C8 | 48.60 | | |
| .047 (3/64) | | .0470 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 850047 | 49.50 | 850047-C8 | 57.70 | | |
| | 1.2 mm | .0472 | **3.50 mm** (3x) | 3 | 4 mm | 50 mm | 977527 | 41.00 | 977527-C8 | 49.60 | | |
| .050 | | .0500 | **.150** (3x) | 3 | 1/8 | 1-1/2 | 989750 | 41.50 | 989750-C8 | 50.40 | | |
| | 1.4 mm | .0551 | **4.00 mm** (3x) | 3 | 4 mm | 50 mm | 977531 | 41.00 | 977531-C8 | 49.60 | | |
| | 1.5 mm | .0590 | **4.50 mm** (3x) | 3 | 4 mm | 50 mm | 977533 | 38.00 | 977533-C8 | 47.50 | | |
| .060 | | .0600 | **.180** (3x) | 3 | 1/8 | 1-1/2 | 989760 | 40.60 | 989760-C8 | 49.60 | | |
| .062 (1/16) | | .0620 | **.093** (1.5x) | 3 | 1/8 | 1-1/2 | 958162 | 37.70 | 958162-C8 | 46.30 | | |
| .062 (1/16) | | .0620 | **.186** (3x) | 3 | 1/8 | 1-1/2 | 989762 | 37.70 | 989762-C8 | 46.30 | 989762-C4 | 52.60 |
| .062 (1/16) | | .0620 | **.248** (4x) | 3 | 1/8 | 2-1/2 | 791162 | 47.10 | 791162-C8 | 55.90 | | |
| .062 (1/16) | | .0620 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 850062 | 47.10 | 850062-C8 | 55.90 | | |
| | 1.6 mm | .0629 | **5.00 mm** (3x) | 3 | 4 mm | 50 mm | 977536 | 38.30 | 977536-C8 | 46.90 | | |
| | 1.8 mm | .0708 | **5.50 mm** (3x) | 3 | 4 mm | 50 mm | 977540 | 38.00 | 977540-C8 | 46.60 | | |

continued on next page

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Ball (cont.)

continued from previous page

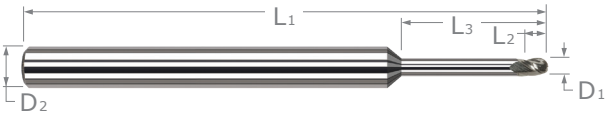
| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| .078 (5/64) | | .0780 | **.118** (1.5x) | 3 | 1/8 | 1-1/2 | 958178 | 37.70 | 958178-C8 | 46.30 | | |
| .078 (5/64) | | .0780 | **.234** (3x) | 3 | 1/8 | 1-1/2 | 989778 | 37.70 | 989778-C8 | 46.30 | | |
| .078 (5/64) | | .0780 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 850078 | 47.10 | 850078-C8 | 55.90 | | |
| | 2.0 mm | .0787 | **3.00 mm** (1.5x) | 3 | 4 mm | 50 mm | 908345 | 38.00 | 908345-C8 | 47.50 | | |
| | 2.0 mm | .0787 | **6.00 mm** (3x) | 3 | 4 mm | 50 mm | 977545 | 38.00 | 977545-C8 | 47.50 | | |
| .093 (3/32) | | .0930 | **.140** (1.5x) | 3 | 1/8 | 1-1/2 | 958193 | 37.70 | 958193-C8 | 46.30 | | |
| .093 (3/32) | | .0930 | **.279** (3x) | 3 | 1/8 | 1-1/2 | 989793 | 37.70 | 989793-C8 | 46.30 | 989793-C4 | 52.60 |
| .093 (3/32) | | .0930 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 850093 | 47.10 | 850093-C8 | 55.90 | | |
| .100 | | .1000 | **.300** (3x) | 3 | 1/8 | 1-1/2 | 989800 | 38.30 | 989800-C8 | 47.30 | | |
| .109 (7/64) | | .1094 | **.327** (3x) | 3 | 1/8 | 1-1/2 | 989802 | 39.30 | 989802-C8 | 47.00 | | |
| | 3.0 mm | .1181 | **9.00 mm** (3x) | 3 | 4 mm | 50 mm | 977557 | 39.20 | 977557-C8 | 48.50 | | |

| $D_1$ +.000″ −.002″ | decimal equivalent | $L_2$ +.030″ −.000″ | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | **.187** (1.5x) | 3 | 1/8 | 1-1/2 | 958208 | 34.90 | 958208-C8 | 42.60 | | |
| .125 (1/8) | .1250 | **.375** (3x) | 3 | 1/8 | 1-1/2 | 989808 | 34.90 | 989808-C8 | 42.60 | 989808-C4 | 49.80 |
| .125 (1/8) | .1250 | **.500** (4x) | 3 | 1/8 | 2-1/2 | 791208 | 47.10 | 791208-C8 | 55.90 | | |
| .125 (1/8) | .1250 | **.625** (5x) | 3 | 1/8 | 2-1/2 | 850108 | 47.10 | 850108-C8 | 55.90 | | |
| .156 (5/32) | .1562 | **.235** (1.5x) | 3 | 3/16 | 2 | 958210 | 38.80 | 958210-C8 | 47.40 | | |
| .156 (5/32) | .1562 | **.470** (3x) | 3 | 3/16 | 2 | 989810 | 38.80 | 989810-C8 | 47.40 | | |
| .187 (3/16) | .1875 | **.285** (1.5x) | 3 | 3/16 | 2 | 958212 | 36.00 | 958212-C8 | 44.60 | | |
| .187 (3/16) | .1875 | **.562** (3x) | 3 | 3/16 | 2 | 989812 | 36.30 | 989812-C8 | 44.90 | 989812-C4 | 53.00 |
| .187 (3/16) | .1875 | **1.000** (5x) | 3 | 3/16 | 3 | 850112 | 37.90 | 850112-C8 | 46.70 | | |
| .250 (1/4) | .2500 | **.375** (1.5x) | 3 | 1/4 | 2-1/2 | 958216 | 43.00 | 958216-C8 | 53.30 | | |
| .250 (1/4) | .2500 | **.750** (3x) | 3 | 1/4 | 2-1/2 | 989816 | 43.30 | 989816-C8 | 53.60 | 989816-C4 | 64.70 |
| .250 (1/4) | .2500 | **1.250** (5x) | 3 | 1/4 | 4 | 850116 | 57.40 | 850116-C8 | 68.80 | | |
| .375 (3/8) | .3750 | **.570** (1.5x) | 3 | 3/8 | 2-1/2 | 958224 | 57.70 | 958224-C8 | 77.50 | | |
| .375 (3/8) | .3750 | **1.125** (3x) | 3 | 3/8 | 2-1/2 | 989824 | 57.70 | 989824-C8 | 77.50 | | |
| .500 (1/2) | .5000 | **.750** (1.5x) | 3 | 1/2 | 3 | 958232 | 60.60 | 958232-C8 | 84.20 | | |
| .500 (1/2) | .5000 | **1.500** (3x) | 3 | 1/2 | 3 | 989832 | 60.60 | 989832-C8 | 84.20 | | |

**Please See Speeds & Feeds On Page 224**

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Ball – Long Reach, Stub Flute




- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) improves performance in off-center contour milling applications
- Reduced neck diameter to avoid heeling • Ball end for profiling
- h6 shank tolerance for high precision tool holders • 3 flutes
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIA | OAL | UNCOATED | | TiB2 COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D1 +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | L2 +.010″ −.000″ +.25mm −.00mm | L3 +.010″ −.000″ +.25mm −.00mm | | D2 (h6) | L1 | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| .015 (1/64) | | .0150 | .022 | **.078** (5x) | 3 | 1/8 | 2-1/2 | 947015 | 62.10 | 947015-C8 | 70.30 | | |
| .015 (1/64) | | .0150 | .022 | **.125** (8x) | 3 | 1/8 | 2-1/2 | 54415 | 72.10 | 54415-C8 | 80.30 | | |
| .020 | | .0200 | .030 | **.100** (5x) | 3 | 1/8 | 2-1/2 | 947020 | 66.70 | 947020-C8 | 74.90 | | |
| .020 | | .0200 | .030 | **.160** (8x) | 3 | 1/8 | 2-1/2 | 54420 | 68.10 | 54420-C8 | 76.30 | | |
| .025 | | .0250 | .037 | **.125** (5x) | 3 | 1/8 | 2-1/2 | 947025 | 65.70 | 947025-C8 | 73.90 | | |
| .025 | | .0250 | .037 | **.203** (8x) | 3 | 1/8 | 2-1/2 | 54425 | 67.20 | 54425-C8 | 75.40 | | |
| .031 (1/32) | | .0310 | .046 | **.156** (5x) | 3 | 1/8 | 2-1/2 | 947031 | 61.30 | 947031-C8 | 70.20 | | |
| .031 (1/32) | | .0310 | .046 | **.250** (8x) | 3 | 1/8 | 2-1/2 | 54431 | 64.90 | 54431-C8 | 73.90 | 54431-C4 | 80.70 |
| .031 (1/32) | | .0310 | .046 | **.312** (10x) | 3 | 1/8 | 2-1/2 | 925131 | 68.80 | 925131-C8 | 77.00 | | |
| .031 (1/32) | | .0310 | .046 | **.375** (12x) | 3 | 1/8 | 2-1/2 | 879431 | 70.80 | 879431-C8 | 79.80 | | |
| | 1.0 mm | .0393 | 1.50 mm | **5.0 mm** (5x) | 3 | 4 mm | 50 mm | 851322 | 68.80 | 851322-C8 | 78.30 | | |
| .047 (3/64) | | .0470 | .070 | **.250** (5x) | 3 | 1/8 | 2-1/2 | 947047 | 61.30 | 947047-C8 | 70.20 | | |
| .047 (3/64) | | .0470 | .070 | **.375** (8x) | 3 | 1/8 | 2-1/2 | 54447 | 62.10 | 54447-C8 | 71.10 | 54447-C4 | 77.90 |
| .062 (1/16) | | .0620 | .093 | **.312** (5x) | 3 | 1/8 | 2-1/2 | 947062 | 61.30 | 947062-C8 | 70.20 | | |
| .062 (1/16) | | .0620 | .093 | **.500** (8x) | 3 | 1/8 | 2-1/2 | 54462 | 62.10 | 54462-C8 | 71.10 | 54462-C4 | 77.30 |
| .062 (1/16) | | .0620 | .093 | **.625** (10x) | 3 | 1/8 | 2-1/2 | 925162 | 68.80 | 925162-C8 | 77.90 | | |
| .062 (1/16) | | .0620 | .093 | **.750** (12x) | 3 | 1/8 | 2-1/2 | 879462 | 72.50 | 879462-C8 | 81.40 | | |
| .078 (5/64) | | .0780 | .117 | **.406** (5x) | 3 | 1/8 | 2-1/2 | 947078 | 61.30 | 947078-C8 | 70.20 | | |
| .078 (5/64) | | .0780 | .117 | **.625** (8x) | 3 | 1/8 | 2-1/2 | 54478 | 62.10 | 54478-C8 | 71.10 | 54478-C4 | 77.90 |
| | 2.0 mm | .0787 | 3.00 mm | **10.0 mm** (5x) | 3 | 4 mm | 50 mm | 851345 | 64.00 | 851345-C8 | 72.70 | | |
| .093 (3/32) | | .0930 | .139 | **.500** (5x) | 3 | 1/8 | 2-1/2 | 947093 | 61.30 | 947093-C8 | 70.20 | | |
| .093 (3/32) | | .0930 | .139 | **.750** (8x) | 3 | 1/8 | 2-1/2 | 54493 | 62.10 | 54493-C8 | 71.10 | 54493-C4 | 77.90 |
| .093 (3/32) | | .0930 | .139 | **.950** (10x) | 3 | 1/8 | 2-1/2 | 925193 | 68.80 | 925193-C8 | 77.90 | | |
| .093 (3/32) | | .0930 | .139 | **1.125** (12x) | 3 | 1/8 | 2-1/2 | 879493 | 72.50 | 879493-C8 | 81.40 | | |
| | 3.0 mm | .1181 | 4.50 mm | **15.0 mm** (5x) | 3 | 4 mm | 50 mm | 851357 | 68.80 | 851357-C8 | 78.30 | | |

| D1 +.000″ −.002″ | decimal equivalent | L2 +.030″ −.000″ | L3 +.030″ −.000″ | | D2 (h6) | L1 | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | .187 | **.625** (5x) | 3 | 1/8 | 2-1/2 | 947108 | 60.00 | 947108-C8 | 69.00 | | |
| .125 (1/8) | .1250 | .187 | **1.000** (8x) | 3 | 1/8 | 2-1/2 | 54508 | 61.30 | 54508-C8 | 70.20 | 54508-C4 | 76.70 |
| .125 (1/8) | .1250 | .187 | **1.250** (10x) | 3 | 1/8 | 2-1/2 | 925208 | 68.80 | 925208-C8 | 77.00 | | |
| .125 (1/8) | .1250 | .187 | **1.500** (12x) | 3 | 1/8 | 3 | 879508 | 72.50 | 879508-C8 | 81.40 | | |
| .156 (5/32) | .1562 | .234 | **.750** (5x) | 3 | 3/16 | 3 | 947110 | 67.90 | 947110-C8 | 76.80 | | |
| .156 (5/32) | .1562 | .234 | **1.250** (8x) | 3 | 3/16 | 3 | 54510 | 68.10 | 54510-C8 | 77.00 | | |
| .187 (3/16) | .1875 | .281 | **1.000** (5x) | 3 | 3/16 | 3 | 947112 | 67.90 | 947112-C8 | 76.80 | | |
| .187 (3/16) | .1875 | .281 | **1.500** (8x) | 3 | 3/16 | 3 | 54512 | 68.40 | 54512-C8 | 77.30 | 54512-C4 | 86.30 |
| .250 (1/4) | .2500 | .375 | **1.250** (5x) | 3 | 1/4 | 4 | 947116 | 70.40 | 947116-C8 | 81.60 | | |
| .250 (1/4) | .2500 | .375 | **2.000** (8x) | 3 | 1/4 | 4 | 54516 | 71.60 | 54516-C8 | 83.00 | 54516-C4 | 94.50 |

**Please See Speeds & Feeds On Page 238**

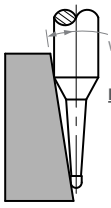
# HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

## Ball – Tapered Reach (Mold Cutters)




**Excellent in Aluminum & Other Non-Ferrous Materials**

- Very short length of cut and solid tapered neck for maximum rigidity
- 1°, 1.5°, 3°, 5°, and 7° neck angles to address common draft angles for molds
- 45° helix, large flute valley, and sharper cutting edge for faster chip removal and better finish
- Offered with $TiB_2$ coating to minimize galling and enhance performance
- 2 flutes to center
- Solid carbide
- CNC ground in the USA

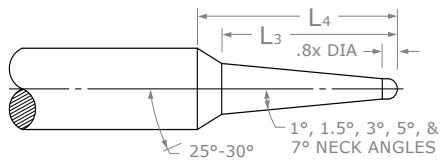



**Effective Wall Angle**
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

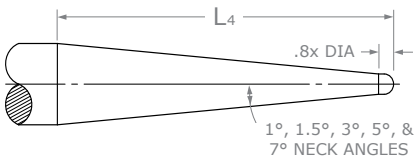
| NECK ANGLE | CUTTER DIA. | LENGTH OF CUT | TYPE | TAPERED REACH | OVERALL REACH | EFFECTIVE WALL ANGLE | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ +0°00′ −0°30′ | $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | | $L_3$ | $L_4$ | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1° | .062 (1/16) | .050 | I | .500 | **.595** | 6.4° | 3/16 | 2 | 925049 | 62.30 | 925049-C8 | 70.90 |
| | .062 (1/16) | .050 | I | 1.000 | **1.080** | 3.5° | 3/16 | 2-1/2 | 925056 | 62.30 | 925056-C8 | 71.30 |
| | .093 (3/32) | .074 | I | .750 | **.811** | 3.6° | 3/16 | 2 | 925070 | 59.70 | 925070-C8 | 68.30 |
| | .093 (3/32) | .074 | I | 1.125 | **1.175** | 2.4° | 3/16 | 2-1/2 | 925072 | 62.30 | 925072-C8 | 71.30 |
| | .125 (1/8) | .100 | I | 1.000 | **1.027** | 1.9° | 3/16 | 2 | 925091 | 75.50 | 925091-C8 | 84.10 |
| | .125 (1/8) | .100 | II | 1.890 | **1.890** | 1.0° | 3/16 | 3 | 925077 | 78.00 | 925077-C8 | 86.90 |
| | .187 (3/16) | .150 | II | 1.940 | **1.940** | 1.0° | 1/4 | 4 | 925087 | 78.60 | 925087-C8 | 89.90 |
| | .250 (1/4) | .200 | II | 1.990 | **1.990** | 1.0° | 5/16 | 4 | 925092 | 84.20 | 925092-C8 | 98.40 |
| 1.5° | .015 (1/64) | .012 | I | .125 | **.269** | 18.2° | 3/16 | 2 | 997807 | 70.50 | 997807-C8 | 79.10 |
| | .015 (1/64) | .012 | I | .250 | **.389** | 12.8° | 3/16 | 2 | 997814 | 69.90 | 997814-C8 | 78.50 |
| | .031 (1/32) | .025 | I | .250 | **.375** | 12.3° | 3/16 | 2 | 997821 | 64.10 | 997821-C8 | 72.80 |
| | .031 (1/32) | .025 | I | .500 | **.614** | 7.5° | 3/16 | 2 | 997828 | 64.10 | 997828-C8 | 72.80 |
| | .047 (3/64) | .038 | I | .375 | **.481** | 8.7° | 3/16 | 2 | 997835 | 63.80 | 997835-C8 | 72.50 |
| | .047 (3/64) | .038 | I | .750 | **.839** | 5.0° | 3/16 | 2 | 997842 | 63.80 | 997842-C8 | 72.50 |
| | .062 (1/16) | .050 | I | .500 | **.588** | 6.4° | 3/16 | 2 | 997849 | 62.30 | 997849-C8 | 70.90 |
| | .062 (1/16) | .050 | I | 1.000 | **1.066** | 3.5° | 3/16 | 2-1/2 | 997856 | 62.30 | 997856-C8 | 71.30 |
| | .078 (5/64) | .062 | I | .625 | **.694** | 4.8° | 3/16 | 2 | 997863 | 60.70 | 997863-C8 | 69.30 |
| | .093 (3/32) | .074 | I | .750 | **.801** | 3.6° | 3/16 | 2 | 997870 | 59.70 | 997870-C8 | 68.30 |
| | .125 (1/8) | .100 | II | 1.293 | **1.293** | 1.5° | 3/16 | 2-1/2 | 997877 | 75.50 | 997877-C8 | 84.40 |
| | .187 (3/16) | .150 | II | 1.343 | **1.343** | 1.5° | 1/4 | 2-1/2 | 997887 | 76.40 | 997887-C8 | 87.50 |
| | .250 (1/4) | .200 | II | 1.393 | **1.393** | 1.5° | 5/16 | 2-1/2 | 997892 | 82.40 | 997892-C8 | 95.70 |

continued on next page

**TYPE I**




**TYPE II**



# HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

## Ball – Tapered Reach (Mold Cutters) (cont.)

continued from previous page

| NECK ANGLE | CUTTER DIA. | LENGTH OF CUT | TYPE | TAPERED REACH | OVERALL REACH | EFFECTIVE WALL ANGLE | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°00'}_{-0°30'}$ | $D_1$ $^{+.000"}_{-.001"}$ | $L_2$ $^{+.010"}_{-.000"}$ | | $L_3$ | $L_4$ | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 3° | .031 (1/32) | .025 | I | .750 | **.820** | 5.6° | 3/16 | 2-1/2 | 996607 | 66.30 | 996607-C8 | 75.60 |
| | .031 (1/32) | .025 | II | 1.518 | **1.518** | 3.0° | 3/16 | 2-1/2 | 996614 | 66.30 | 996614-C8 | 75.30 |
| | .047 (3/64) | .038 | I | .875 | **.921** | 4.5° | 3/16 | 2-1/2 | 996621 | 62.10 | 996621-C8 | 71.10 |
| | .047 (3/64) | .038 | II | 1.378 | **1.378** | 3.0° | 3/16 | 2-1/2 | 996628 | 62.60 | 996628-C8 | 71.60 |
| | .062 (1/16) | .050 | I | .625 | **.681** | 5.5° | 3/16 | 2-1/2 | 996635 | 62.60 | 996635-C8 | 71.60 |
| | .062 (1/16) | .050 | II | 1.247 | **1.247** | 3.0° | 3/16 | 2-1/2 | 996642 | 62.60 | 996642-C8 | 71.60 |
| | .078 (5/64) | .062 | II | 1.107 | **1.107** | 3.0° | 3/16 | 2-1/2 | 996649 | 60.70 | 996649-C8 | 70.00 |
| | .093 (3/32) | .074 | II | .976 | **.976** | 3.0° | 3/16 | 2 | 996656 | 55.00 | 996656-C8 | 63.60 |
| | .125 (1/8) | .100 | II | 1.293 | **1.293** | 2.9° | 1/4 | 2-1/2 | 996663 | 75.50 | 996663-C8 | 85.60 |
| | .187 (3/16) | .150 | II | .746 | **.746** | 2.8° | 1/4 | 2-1/2 | 996670 | 81.70 | 996670-C8 | 92.80 |
| | .187 (3/16) | .150 | II | 1.939 | **1.939** | 2.9° | 3/8 | 4 | 996674 | 85.10 | 996674-C8 | 107.40 |
| | .250 (1/4) | .200 | II | 1.393 | **1.393** | 2.9° | 3/8 | 2-1/2 | 996692 | 83.20 | 996692-C8 | 101.70 |
| 5° | .031 (1/32) | .025 | II | .919 | **.919** | 5.0° | 3/16 | 2 | 996007 | 60.40 | 996007-C8 | 69.00 |
| | .047 (3/64) | .038 | II | .841 | **.841** | 5.0° | 3/16 | 2 | 996014 | 59.90 | 996014-C8 | 68.50 |
| | .062 (1/16) | .050 | II | .767 | **.767** | 4.9° | 3/16 | 2 | 996021 | 56.30 | 996021-C8 | 64.90 |
| | .078 (5/64) | .062 | II | 1.045 | **1.045** | 4.9° | 1/4 | 2-1/2 | 996028 | 78.00 | 996028-C8 | 88.20 |
| | .093 (3/32) | .074 | II | .971 | **.971** | 4.9° | 1/4 | 2-1/2 | 996035 | 78.70 | 996035-C8 | 88.90 |
| | .125 (1/8) | .100 | II | .814 | **.814** | 4.8° | 1/4 | 2-1/2 | 996042 | 81.20 | 996042-C8 | 91.40 |
| | .187 (3/16) | .150 | II | 1.222 | **1.222** | 4.8° | 3/8 | 2-1/2 | 996087 | 84.00 | 996087-C8 | 99.80 |
| | .250 (1/4) | .200 | II | .914 | **.914** | 4.5° | 3/8 | 2-1/2 | 996092 | 84.00 | 996092-C8 | 99.80 |
| 7° | .031 (1/32) | .025 | II | .662 | **.662** | 6.9° | 3/16 | 2 | 995607 | 59.90 | 995607-C8 | 68.50 |
| | .047 (3/64) | .038 | II | .610 | **.610** | 6.9° | 3/16 | 2 | 995614 | 60.40 | 995614-C8 | 69.00 |
| | .062 (1/16) | .050 | II | .816 | **.816** | 6.9° | 1/4 | 2-1/2 | 995621 | 78.00 | 995621-C8 | 88.20 |
| | .078 (5/64) | .062 | II | .762 | **.762** | 6.8° | 1/4 | 2-1/2 | 995628 | 78.70 | 995628-C8 | 88.90 |
| | .093 (3/32) | .074 | II | .713 | **.713** | 6.7° | 1/4 | 2-1/2 | 995635 | 74.10 | 995635-C8 | 85.20 |
| | .125 (1/8) | .100 | II | .609 | **.609** | 6.5° | 1/4 | 2-1/2 | 995642 | 71.20 | 995642-C8 | 81.30 |
| | .187 (3/16) | .150 | II | .914 | **.914** | 6.5° | 3/8 | 2-1/2 | 995687 | 84.00 | 995687-C8 | 99.80 |

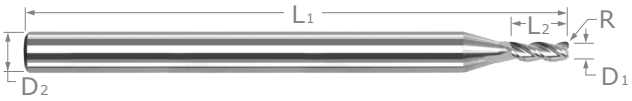


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# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Corner Radius




- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics, and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes • Center cutting
- Solid carbide • CNC ground in the USA

| | |
|---|---|
| **$TiB_2$** Titanium Diboride | **Best used in Non-Abrasive Aluminum Alloys and Magnesium Alloys!** Extremely low affinity to aluminum. Prevents build-up on cutting edge and chip packing, extending tool life. |
| **Amorphous Diamond** | **Outstanding performance in Copper, Brass, Bronze and High Silicon Aluminum!** Improves wear resistance and lubricity. Thin film coating maintains sharp edge, improving performance and finish. |

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | +.00mm −.02mm | decimal equivalent | R +.001" −.001" +.025mm −.025mm | $L_2$ +.010" −.000" +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| | .2 mm | .0078 | **.03 mm** | .30 mm (1.5x) | 3 | 4 mm | 50 mm | 986204 | 63.00 | 986204-C8 | 71.60 | | |
| | .2 mm | .0078 | **.03 mm** | .60 mm (3x) | 3 | 4 mm | 50 mm | 973504 | 63.00 | 973504-C8 | 71.60 | | |
| .010 | | .0100 | **.002** | .030 (3x) | 3 | 1/8 | 1-1/2 | 50010 | 51.40 | 50010-C8 | 59.10 | | |
| | .3 mm | .0118 | **.05 mm** | .90 mm (3x) | 3 | 4 mm | 50 mm | 973506 | 61.30 | 973506-C8 | 70.00 | | |
| .015 (1/64) | | .0150 | **.002** | .022 (1.5x) | 3 | 1/8 | 1-1/2 | 61715 | 49.00 | 61715-C8 | 58.00 | | |
| .015 (1/64) | | .0150 | **.002** | .045 (3x) | 3 | 1/8 | 1-1/2 | 50015 | 48.20 | 50015-C8 | 55.80 | 50015-C4 | 63.10 |
| .015 (1/64) | | .0150 | **.002** | .078 (5x) | 3 | 1/8 | 2-1/2 | 53015 | 58.40 | 53015-C8 | 66.60 | 53015-C4 | 74.20 |
| | .4 mm | .0157 | **.05 mm** | .60 mm (1.5x) | 3 | 4 mm | 50 mm | 986209 | 51.90 | 986209-C8 | 60.50 | | |
| | .4 mm | .0157 | **.05 mm** | 1.20 mm (3x) | 3 | 4 mm | 50 mm | 973509 | 51.90 | 973509-C8 | 60.50 | | |
| | .5 mm | .0196 | **.05 mm** | .75 mm (1.5x) | 3 | 4 mm | 50 mm | 986211 | 45.80 | 986211-C8 | 54.40 | | |
| | .5 mm | .0196 | **.05 mm** | 1.50 mm (3x) | 3 | 4 mm | 50 mm | 973511 | 45.80 | 973511-C8 | 54.40 | | |
| .020 | | .0200 | **.002** | .030 (1.5x) | 3 | 1/8 | 1-1/2 | 61720 | 41.10 | 61720-C8 | 50.10 | | |
| .020 | | .0200 | **.002** | .060 (3x) | 3 | 1/8 | 1-1/2 | 50020 | 41.10 | 50020-C8 | 48.80 | 50020-C4 | 56.10 |
| .020 | | .0200 | **.002** | .100 (5x) | 3 | 1/8 | 2-1/2 | 53020 | 51.20 | 53020-C8 | 59.40 | 53020-C4 | 67.00 |
| | .6 mm | .0236 | **.05 mm** | .90 mm (1.5x) | 3 | 4 mm | 50 mm | 986213 | 44.00 | 986213-C8 | 52.60 | | |
| | .6 mm | .0236 | **.05 mm** | 1.80 mm (3x) | 3 | 4 mm | 50 mm | 973513 | 43.70 | 973513-C8 | 52.30 | | |
| .025 | | .0250 | **.002** | .038 (1.5x) | 3 | 1/8 | 1-1/2 | 61725 | 39.80 | 61725-C8 | 47.40 | | |
| .025 | | .0250 | **.002** | .075 (3x) | 3 | 1/8 | 1-1/2 | 50025 | 39.80 | 50025-C8 | 47.40 | 50025-C4 | 54.70 |
| .025 | | .0250 | **.002** | .125 (5x) | 3 | 1/8 | 2-1/2 | 53025 | 49.50 | 53025-C8 | 58.50 | 53025-C4 | 65.30 |
| | .7 mm | .0275 | **.08 mm** | 2.10 mm (3x) | 3 | 4 mm | 50 mm | 973515 | 43.70 | 973515-C8 | 52.30 | | |
| .031 (1/32) | | .0310 | **.003** | .047 (1.5x) | 3 | 1/8 | 1-1/2 | 61731 | 33.00 | 61731-C8 | 41.90 | | |
| .031 (1/32) | | .0310 | **.003** | .093 (3x) | 3 | 1/8 | 1-1/2 | 50031 | 33.00 | 50031-C8 | 41.90 | 50031-C4 | 48.00 |
| .031 (1/32) | | .0310 | **.003** | .156 (5x) | 3 | 1/8 | 2-1/2 | 53031 | 42.10 | 53031-C8 | 51.10 | 53031-C4 | 57.90 |
| .031 (1/32) | | .0310 | **.005** | .093 (3x) | 3 | 1/8 | 1-1/2 | 901531 | 32.00 | 901531-C8 | 39.70 | | |
| .031 (1/32) | | .0310 | **.010** | .093 (3x) | 3 | 1/8 | 1-1/2 | 904631 | 32.00 | 904631-C8 | 40.70 | | |
| | .8 mm | .0314 | **.08 mm** | 1.20 mm (1.5x) | 3 | 4 mm | 50 mm | 986218 | 37.20 | 986218-C8 | 45.80 | | |
| | .8 mm | .0314 | **.08 mm** | 2.40 mm (3x) | 3 | 4 mm | 50 mm | 973518 | 37.20 | 973518-C8 | 45.80 | | |
| .035 | | .0350 | **.003** | .053 (1.5x) | 3 | 1/8 | 1-1/2 | 61735 | 33.00 | 61735-C8 | 40.70 | | |
| .035 | | .0350 | **.003** | .105 (3x) | 3 | 1/8 | 1-1/2 | 50035 | 32.30 | 50035-C8 | 40.00 | | |
| | .9 mm | .0354 | **.08 mm** | 2.7 mm (3x) | 3 | 4 mm | 50 mm | 973520 | 37.20 | 973520-C8 | 45.80 | | |
| | 1.0 mm | .0393 | **.08 mm** | 1.50 mm (1.5x) | 3 | 4 mm | 50 mm | 986222 | 37.20 | 986222-C8 | 45.80 | | |
| | 1.0 mm | .0393 | **.08 mm** | 3.00 mm (3x) | 3 | 4 mm | 50 mm | 973522 | 36.70 | 973522-C8 | 45.40 | | |

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# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | TiB$_2$ COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ | | | R | $L_2$ | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | +.001″ −.001″ +.025mm −.025mm | +.010″ −.000″ +.25mm −.00mm | | | | | | | | | |
| .040 | | .0400 | **.003** | .060 (1.5x) | 3 | 1/8 | 1-1/2 | 61740 | 33.00 | 61740-C8 | 41.90 | | |
| .040 | | .0400 | **.003** | .120 (3x) | 3 | 1/8 | 1-1/2 | 50040 | 33.00 | 50040-C8 | 40.70 | | |
| .040 | | .0400 | **.003** | .203 (5x) | 3 | 1/8 | 2-1/2 | 53040 | 42.10 | 53040-C8 | 51.10 | | |
| | 1.1 mm | .0433 | **.08 mm** | 3.00 mm (3x) | 3 | 4 mm | 50 mm | 973524 | 37.20 | 973524-C8 | 45.80 | | |
| .045 | | .0450 | **.003** | .135 (3x) | 3 | 1/8 | 1-1/2 | 50045 | 33.00 | 50045-C8 | 40.70 | | |
| .047 (3/64) | | .0470 | **.003** | .070 (1.5x) | 3 | 1/8 | 1-1/2 | 61747 | 33.00 | 61747-C8 | 41.90 | | |
| .047 (3/64) | | .0470 | **.003** | .141 (3x) | 3 | 1/8 | 1-1/2 | 50047 | 32.30 | 50047-C8 | 41.10 | 50047-C4 | 47.20 |
| .047 (3/64) | | .0470 | **.003** | .250 (5x) | 3 | 1/8 | 2-1/2 | 53047 | 42.10 | 53047-C8 | 51.10 | 53047-C4 | 57.90 |
| .047 (3/64) | | .0470 | **.005** | .141 (3x) | 3 | 1/8 | 1-1/2 | 901547 | 32.00 | 901547-C8 | 39.70 | | |
| .047 (3/64) | | .0470 | **.010** | .141 (3x) | 3 | 1/8 | 1-1/2 | 904647 | 32.00 | 904647-C8 | 40.70 | 904647-C4 | 46.90 |
| .047 (3/64) | | .0470 | **.010** | .250 (5x) | 3 | 1/8 | 2-1/2 | 840747 | 42.40 | 840747-C8 | 50.60 | | |
| .047 (3/64) | | .0470 | **.015** | .141 (3x) | 3 | 1/8 | 1-1/2 | 912347 | 32.00 | 912347-C8 | 40.70 | | |
| | 1.2 mm | .0472 | **.08 mm** | 1.80 mm (1.5x) | 3 | 4 mm | 50 mm | 986227 | 37.20 | 986227-C8 | 45.80 | | |
| | 1.2 mm | .0472 | **.08 mm** | 3.50 mm (3x) | 3 | 4 mm | 50 mm | 973527 | 37.20 | 973527-C8 | 45.80 | | |
| .050 | | .0500 | **.003** | .075 (1.5x) | 3 | 1/8 | 1-1/2 | 61750 | 32.80 | 61750-C8 | 40.50 | | |
| .050 | | .0500 | **.003** | .150 (3x) | 3 | 1/8 | 1-1/2 | 50050 | 32.80 | 50050-C8 | 40.50 | | |
| .050 | | .0500 | **.003** | .250 (5x) | 3 | 1/8 | 2-1/2 | 53050 | 42.10 | 53050-C8 | 50.30 | | |
| | 1.3 mm | .0511 | **.08 mm** | 4.00 mm (3x) | 3 | 4 mm | 50 mm | 973529 | 37.20 | 973529-C8 | 45.80 | | |
| .055 | | .0550 | **.003** | .083 (1.5x) | 3 | 1/8 | 1-1/2 | 61755 | 32.80 | 61755-C8 | 40.50 | | |
| .055 | | .0550 | **.003** | .165 (3x) | 3 | 1/8 | 1-1/2 | 50055 | 32.80 | 50055-C8 | 40.50 | | |
| .055 | | .0550 | **.003** | .275 (5x) | 3 | 1/8 | 2-1/2 | 53055 | 42.10 | 53055-C8 | 51.10 | | |
| | 1.4 mm | .0551 | **.08 mm** | 2.10 mm (1.5x) | 3 | 4 mm | 50 mm | 986231 | 36.70 | 986231-C8 | 46.10 | | |
| | 1.4 mm | .0551 | **.08 mm** | 4.00 mm (3x) | 3 | 4 mm | 50 mm | 973531 | 37.20 | 973531-C8 | 45.80 | | |
| | 1.5 mm | .0590 | **.10 mm** | 2.20 mm (1.5x) | 3 | 4 mm | 50 mm | 986233 | 34.30 | 986233-C8 | 42.90 | | |
| | 1.5 mm | .0590 | **.10 mm** | 4.50 mm (3x) | 3 | 4 mm | 50 mm | 973533 | 34.30 | 973533-C8 | 42.90 | | |
| .060 | | .0600 | **.005** | .090 (1.5x) | 3 | 1/8 | 1-1/2 | 61760 | 32.80 | 61760-C8 | 41.70 | | |
| .060 | | .0600 | **.005** | .180 (3x) | 3 | 1/8 | 1-1/2 | 50060 | 32.80 | 50060-C8 | 41.70 | | |
| .060 | | .0600 | **.005** | .312 (5x) | 3 | 1/8 | 2-1/2 | 53060 | 42.60 | 53060-C8 | 50.80 | | |
| .060 | | .0600 | **.010** | .180 (3x) | 3 | 1/8 | 1-1/2 | 904660 | 41.50 | 904660-C8 | 50.40 | | |
| .062 (1/16) | | .0620 | **.005** | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 61762 | 30.30 | 61762-C8 | 39.30 | 61762-C4 | 45.30 |
| .062 (1/16) | | .0620 | **.005** | .186 (3x) | 3 | 1/8 | 1-1/2 | 50062 | 29.80 | 50062-C8 | 37.50 | 50062-C4 | 44.70 |
| .062 (1/16) | | .0620 | **.005** | .312 (5x) | 3 | 1/8 | 2-1/2 | 53062 | 40.00 | 53062-C8 | 48.80 | 53062-C4 | 55.60 |
| .062 (1/16) | | .0620 | **.010** | .093 (1.5x) | 3 | 1/8 | 1-1/2 | 878562 | 30.30 | 878562-C8 | 39.30 | | |
| .062 (1/16) | | .0620 | **.010** | .186 (3x) | 3 | 1/8 | 1-1/2 | 904662 | 29.80 | 904662-C8 | 37.50 | | |
| .062 (1/16) | | .0620 | **.010** | .312 (5x) | 3 | 1/8 | 2-1/2 | 840762 | 40.00 | 840762-C8 | 48.80 | | |
| .062 (1/16) | | .0620 | **.015** | .186 (3x) | 3 | 1/8 | 1-1/2 | 912362 | 29.80 | 912362-C8 | 37.50 | | |
| .062 (1/16) | | .0620 | **.020** | .186 (3x) | 3 | 1/8 | 1-1/2 | 925862 | 29.80 | 925862-C8 | 37.50 | | |
| | 1.6 mm | .0629 | **.10 mm** | 2.40 mm (1.5x) | 3 | 4 mm | 50 mm | 986236 | 34.00 | 986236-C8 | 43.50 | | |
| | 1.6 mm | .0629 | **.10 mm** | 5.00 mm (3x) | 3 | 4 mm | 50 mm | 973536 | 34.30 | 973536-C8 | 42.90 | | |
| | 1.7 mm | .0669 | **.10 mm** | 5.00 mm (3x) | 3 | 4 mm | 50 mm | 973538 | 34.30 | 973538-C8 | 42.90 | | |
| .070 | | .0700 | **.005** | .210 (3x) | 3 | 1/8 | 1-1/2 | 50070 | 31.60 | 50070-C8 | 40.40 | | |
| | 1.8 mm | .0708 | **.10 mm** | 2.70 mm (1.5x) | 3 | 4 mm | 50 mm | 986240 | 34.00 | 986240-C8 | 43.50 | | |
| | 1.8 mm | .0708 | **.10 mm** | 5.50 mm (3x) | 3 | 4 mm | 50 mm | 973540 | 34.30 | 973540-C8 | 42.90 | | |
| | 1.9 mm | .0748 | **.10 mm** | 5.50 mm (3x) | 3 | 4 mm | 50 mm | 973542 | 34.00 | 973542-C8 | 43.50 | | |

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# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | TiB$_2$ COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| .078 (5/64) | | .0780 | **.005** | .118 (1.5x) | 3 | 1/8 | 1-1/2 | 61778 | 30.30 | 61778-C8 | 39.30 | 61778-C4 | 45.30 |
| .078 (5/64) | | .0780 | **.005** | .234 (3x) | 3 | 1/8 | 1-1/2 | 50078 | 29.80 | 50078-C8 | 37.50 | 50078-C4 | 44.70 |
| .078 (5/64) | | .0780 | **.005** | .406 (5x) | 3 | 1/8 | 2-1/2 | 53078 | 40.00 | 53078-C8 | 48.80 | 53078-C4 | 55.60 |
| .078 (5/64) | | .0780 | **.010** | .118 (1.5x) | 3 | 1/8 | 1-1/2 | 878578 | 30.30 | 878578-C8 | 39.30 | | |
| .078 (5/64) | | .0780 | **.010** | .234 (3x) | 3 | 1/8 | 1-1/2 | 904678 | 29.80 | 904678-C8 | 37.50 | | |
| .078 (5/64) | | .0780 | **.015** | .117 (1.5x) | 3 | 1/8 | 1-1/2 | 831178 | 29.80 | 831178-C8 | 37.50 | | |
| .078 (5/64) | | .0780 | **.015** | .234 (3x) | 3 | 1/8 | 1-1/2 | 912378 | 29.80 | 912378-C8 | 37.50 | 912378-C4 | 44.70 |
| .078 (5/64) | | .0780 | **.020** | .118 (1.5x) | 3 | 1/8 | 1-1/2 | 725878 | 29.80 | 725878-C8 | 37.50 | | |
| .078 (5/64) | | .0780 | **.020** | .234 (3x) | 3 | 1/8 | 1-1/2 | 925878 | 29.80 | 925878-C8 | 37.50 | 925878-C4 | 44.70 |
| .078 (5/64) | | .0780 | **.020** | .406 (5x) | 3 | 1/8 | 2-1/2 | 838278 | 40.40 | 838278-C8 | 49.40 | | |
| | 2.0 mm | .0787 | **.10 mm** | 3.00 mm (1.5x) | 3 | 4 mm | 50 mm | 986245 | 34.00 | 986245-C8 | 43.50 | | |
| | 2.0 mm | .0787 | **.10 mm** | 6.00 mm (3x) | 3 | 4 mm | 50 mm | 973545 | 34.30 | 973545-C8 | 43.80 | | |
| .080 | | .0800 | **.005** | .240 (3x) | 3 | 1/8 | 1-1/2 | 50080 | 31.60 | 50080-C8 | 39.20 | | |
| .090 | | .0900 | **.005** | .270 (3x) | 3 | 1/8 | 1-1/2 | 50090 | 31.60 | 50090-C8 | 40.40 | | |
| .093 (3/32) | | .0930 | **.005** | .139 (1.5x) | 3 | 1/8 | 1-1/2 | 61793 | 30.30 | 61793-C8 | 39.30 | 61793-C4 | 45.30 |
| .093 (3/32) | | .0930 | **.005** | .279 (3x) | 3 | 1/8 | 1-1/2 | 50093 | 29.80 | 50093-C8 | 37.50 | 50093-C4 | 44.70 |
| .093 (3/32) | | .0930 | **.005** | .500 (5x) | 3 | 1/8 | 2-1/2 | 53093 | 40.00 | 53093-C8 | 48.80 | 53093-C4 | 55.70 |
| .093 (3/32) | | .0930 | **.010** | .139 (1.5x) | 3 | 1/8 | 1-1/2 | 878593 | 30.30 | 878593-C8 | 39.30 | 878593-C4 | 45.30 |
| .093 (3/32) | | .0930 | **.010** | .279 (3x) | 3 | 1/8 | 1-1/2 | 904693 | 29.80 | 904693-C8 | 37.50 | 904693-C4 | 44.70 |
| .093 (3/32) | | .0930 | **.010** | .500 (5x) | 3 | 1/8 | 2-1/2 | 840793 | 40.00 | 840793-C8 | 48.80 | | |
| .093 (3/32) | | .0930 | **.015** | .279 (3x) | 3 | 1/8 | 1-1/2 | 912393 | 29.80 | 912393-C8 | 37.50 | | |
| .093 (3/32) | | .0930 | **.020** | .139 (1.5x) | 3 | 1/8 | 1-1/2 | 889493 | 30.90 | 889493-C8 | 39.80 | | |
| .093 (3/32) | | .0930 | **.020** | .279 (3x) | 3 | 1/8 | 1-1/2 | 925893 | 29.80 | 925893-C8 | 37.50 | | |
| .093 (3/32) | | .0930 | **.030** | .139 (1.5x) | 3 | 1/8 | 1-1/2 | 893893 | 30.30 | 893893-C8 | 39.30 | | |
| .093 (3/32) | | .0930 | **.030** | .279 (3x) | 3 | 1/8 | 1-1/2 | 904193 | 29.80 | 904193-C8 | 37.50 | | |
| | 2.5 mm | .0984 | **.10 mm** | 7.50 mm (3x) | 3 | 4 mm | 50 mm | 973551 | 34.30 | 973551-C8 | 42.90 | | |
| .100 | | .1000 | **.005** | .150 (1.5x) | 3 | 1/8 | 1-1/2 | 61800 | 30.30 | 61800-C8 | 38.00 | | |
| .100 | | .1000 | **.005** | .300 (3x) | 3 | 1/8 | 1-1/2 | 50100 | 30.30 | 50100-C8 | 39.30 | | |
| .109 (7/64) | | .1090 | **.005** | .164 (1.5x) | 3 | 1/8 | 1-1/2 | 61807 | 30.30 | 61807-C8 | 38.00 | | |
| .109 (7/64) | | .1090 | **.005** | .327 (3x) | 3 | 1/8 | 1-1/2 | 50107 | 30.30 | 50107-C8 | 38.00 | | |
| | 3.0 mm | .1181 | **.10 mm** | 9.00 mm (3x) | 3 | 4 mm | 50 mm | 973557 | 34.00 | 973557-C8 | 43.50 | | |

| $D_1$ +.000″ −.002″ | decimal equivalent | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | **.005** | .187 (1.5x) | 3 | 1/8 | 1-1/2 | 61808 | 29.80 | 61808-C8 | 37.50 | 61808-C4 | 44.70 |
| .125 (1/8) | .1250 | **.005** | .375 (3x) | 3 | 1/8 | 1-1/2 | 50108 | 29.80 | 50108-C8 | 37.50 | 50108-C4 | 44.70 |
| .125 (1/8) | .1250 | **.005** | .625 (5x) | 3 | 1/8 | 2-1/2 | 53108 | 40.00 | 53108-C8 | 48.80 | 53108-C4 | 55.60 |
| .125 (1/8) | .1250 | **.010** | .187 (1.5x) | 3 | 1/8 | 1-1/2 | 878608 | 28.20 | 878608-C8 | 35.90 | | |
| .125 (1/8) | .1250 | **.010** | .375 (3x) | 3 | 1/8 | 1-1/2 | 904708 | 27.50 | 904708-C8 | 35.20 | 904708-C4 | 42.50 |
| .125 (1/8) | .1250 | **.010** | .625 (5x) | 3 | 1/8 | 2-1/2 | 840808 | 39.40 | 840808-C8 | 48.30 | | |
| .125 (1/8) | .1250 | **.015** | .187 (1.5x) | 3 | 1/8 | 1-1/2 | 831208 | 27.70 | 831208-C8 | 35.40 | | |
| .125 (1/8) | .1250 | **.015** | .375 (3x) | 3 | 1/8 | 1-1/2 | 912408 | 27.50 | 912408-C8 | 35.20 | 912408-C4 | 42.50 |
| .125 (1/8) | .1250 | **.015** | .625 (5x) | 3 | 1/8 | 2-1/2 | 852408 | 39.40 | 852408-C8 | 48.30 | | |
| .125 (1/8) | .1250 | **.020** | .187 (1.5x) | 3 | 1/8 | 1-1/2 | 889508 | 31.10 | 889508-C8 | 38.80 | | |
| .125 (1/8) | .1250 | **.020** | .375 (3x) | 3 | 1/8 | 1-1/2 | 925908 | 27.50 | 925908-C8 | 35.20 | 925908-C4 | 42.50 |
| .125 (1/8) | .1250 | **.020** | .625 (5x) | 3 | 1/8 | 2-1/2 | 838308 | 39.00 | 838308-C8 | 48.00 | | |

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# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Corner Radius (cont.)

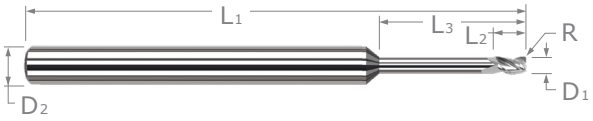
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| CUTTER DIAMETER | | CORNER RADIUS | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | decimal equivalent | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| .125 (1/8) | .1250 | **.030** | .187 (1.5x) | 3 | 1/8 | 1-1/2 | 893908 | 31.10 | 893908-C8 | 38.80 | | |
| .125 (1/8) | .1250 | **.030** | .375 (3x) | 3 | 1/8 | 1-1/2 | 904208 | 27.50 | 904208-C8 | 35.20 | 904208-C4 | 42.50 |
| .125 (1/8) | .1250 | **.030** | .625 (5x) | 3 | 1/8 | 2-1/2 | 829708 | 39.00 | 829708-C8 | 48.00 | | |
| .125 (1/8) | .1250 | **.040** | .375 (3x) | 3 | 1/8 | 1-1/2 | 892808 | 33.60 | 892808-C8 | 42.50 | | |
| .140 (9/64) | .1406 | **.015** | .425 (3x) | 3 | 3/16 | 2 | 912409 | 31.00 | 912409-C8 | 39.70 | | |
| .156 (5/32) | .1562 | **.005** | .235 (1.5x) | 3 | 3/16 | 2 | 61810 | 31.00 | 61810-C8 | 39.70 | | |
| .156 (5/32) | .1562 | **.005** | .470 (3x) | 3 | 3/16 | 2 | 50110 | 31.00 | 50110-C8 | 39.70 | 50110-C4 | 47.70 |
| .156 (5/32) | .1562 | **.005** | .750 (5x) | 3 | 3/16 | 3 | 53110 | 44.50 | 53110-C8 | 53.80 | | |
| .156 (5/32) | .1562 | **.020** | .470 (3x) | 3 | 3/16 | 2 | 925910 | 31.00 | 925910-C8 | 39.70 | | |
| .156 (5/32) | .1562 | **.030** | .470 (3x) | 3 | 3/16 | 2 | 904210 | 31.00 | 904210-C8 | 39.70 | | |
| .187 (3/16) | .1875 | **.005** | .285 (1.5x) | 3 | 3/16 | 2 | 61812 | 31.00 | 61812-C8 | 39.70 | 61812-C4 | 48.90 |
| .187 (3/16) | .1875 | **.005** | .562 (3x) | 3 | 3/16 | 2 | 50112 | 31.00 | 50112-C8 | 39.70 | 50112-C4 | 48.90 |
| .187 (3/16) | .1875 | **.005** | 1.000 (5x) | 3 | 3/16 | 3 | 53112 | 44.50 | 53112-C8 | 53.80 | 53112-C4 | 62.50 |
| .187 (3/16) | .1875 | **.010** | .562 (3x) | 3 | 3/16 | 2 | 904712 | 42.80 | 904712-C8 | 51.40 | | |
| .187 (3/16) | .1875 | **.015** | .285 (1.5x) | 3 | 3/16 | 2 | 831212 | 43.90 | 831212-C8 | 52.50 | | |
| .187 (3/16) | .1875 | **.015** | .562 (3x) | 3 | 3/16 | 2 | 912412 | 42.80 | 912412-C8 | 51.40 | | |
| .187 (3/16) | .1875 | **.020** | .285 (1.5x) | 3 | 3/16 | 2 | 889512 | 42.80 | 889512-C8 | 51.40 | | |
| .187 (3/16) | .1875 | **.020** | .562 (3x) | 3 | 3/16 | 2 | 925912 | 42.80 | 925912-C8 | 51.40 | | |
| .187 (3/16) | .1875 | **.030** | .285 (1.5x) | 3 | 3/16 | 2 | 893912 | 42.80 | 893912-C8 | 51.40 | | |
| .187 (3/16) | .1875 | **.030** | .562 (3x) | 3 | 3/16 | 2 | 904212 | 42.80 | 904212-C8 | 51.40 | 904212-C4 | 59.50 |
| .187 (3/16) | .1875 | **.030** | 1.000 (5x) | 3 | 3/16 | 3 | 829712 | 47.70 | 829712-C8 | 56.70 | | |
| .187 (3/16) | .1875 | **.060** | .562 (3x) | 3 | 3/16 | 2 | 834812 | 42.80 | 834812-C8 | 51.40 | | |
| .250 (1/4) | .2500 | **.005** | .375 (1.5x) | 3 | 1/4 | 2-1/2 | 726116 | 40.80 | 726116-C8 | 51.90 | | |
| .250 (1/4) | .2500 | **.005** | .750 (3x) | 3 | 1/4 | 2-1/2 | 901616 | 40.80 | 901616-C8 | 50.90 | | |
| .250 (1/4) | .2500 | **.010** | .375 (1.5x) | 3 | 1/4 | 2-1/2 | 61816 | 36.00 | 61816-C8 | 46.20 | 61816-C4 | 57.40 |
| .250 (1/4) | .2500 | **.010** | .750 (3x) | 3 | 1/4 | 2-1/2 | 50116 | 36.00 | 50116-C8 | 46.20 | 50116-C4 | 57.40 |
| .250 (1/4) | .2500 | **.010** | 1.250 (5x) | 3 | 1/4 | 4 | 53116 | 54.50 | 53116-C8 | 65.70 | 53116-C4 | 77.30 |
| .250 (1/4) | .2500 | **.015** | .750 (3x) | 3 | 1/4 | 2-1/2 | 912416 | 38.20 | 912416-C8 | 48.50 | | |
| .250 (1/4) | .2500 | **.020** | .375 (1.5x) | 3 | 1/4 | 2-1/2 | 889516 | 38.20 | 889516-C8 | 48.50 | | |
| .250 (1/4) | .2500 | **.020** | .750 (3x) | 3 | 1/4 | 2-1/2 | 925916 | 38.20 | 925916-C8 | 48.50 | 925916-C4 | 59.60 |
| .250 (1/4) | .2500 | **.030** | .375 (1.5x) | 3 | 1/4 | 2-1/2 | 893916 | 38.20 | 893916-C8 | 48.50 | | |
| .250 (1/4) | .2500 | **.030** | .750 (3x) | 3 | 1/4 | 2-1/2 | 904216 | 38.20 | 904216-C8 | 48.50 | | |
| .250 (1/4) | .2500 | **.060** | .750 (3x) | 3 | 1/4 | 2-1/2 | 834816 | 38.20 | 834816-C8 | 48.50 | | |
| .375 (3/8) | .3750 | **.015** | 1.125 (3x) | 3 | 3/8 | 2-1/2 | 912424 | 62.40 | 912424-C8 | 82.40 | | |
| .375 (3/8) | .3750 | **.030** | 1.125 (3x) | 3 | 3/8 | 2-1/2 | 904224 | 62.40 | 904224-C8 | 82.40 | | |
| .375 (3/8) | .3750 | **.060** | .570 (1.5x) | 3 | 3/8 | 2-1/2 | 744960 | 62.40 | 744960-C8 | 82.40 | | |
| .500 (1/2) | .5000 | **.015** | .750 (1.5x) | 3 | 1/2 | 3 | 831232 | 91.00 | 831232-C8 | 109.40 | | |
| .500 (1/2) | .5000 | **.030** | .750 (1.5x) | 3 | 1/2 | 3 | 893932 | 91.00 | 893932-C8 | 109.40 | | |

**Please See Speeds & Feeds On Page 224**

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Corner Radius – Long Reach, Stub Flute




- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Long reach design for deep cavities • Reduced neck diameter to avoid heeling
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- Small corner radius for improved strength • 3 flutes • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | R +.001″ −.001″ +.025mm −.025mm | $L_2$ +.010″ −.000″ +.25mm −.00mm | $L_3$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| .015 (1/64) | | .0150 | **.002** | .023 | .078 (5x) | 3 | 1/8 | 2-1/2 | 956515 | 63.60 | 956515-C8 | 71.80 |
| .015 (1/64) | | .0150 | **.002** | .023 | .125 (8x) | 3 | 1/8 | 2-1/2 | 961315 | 65.70 | 961315-C8 | 73.90 |
| .020 | | .0200 | **.002** | .030 | .100 (5x) | 3 | 1/8 | 2-1/2 | 956520 | 60.20 | 956520-C8 | 69.20 |
| .025 | | .0250 | **.002** | .038 | .125 (5x) | 3 | 1/8 | 2-1/2 | 956525 | 59.30 | 956525-C8 | 67.50 |
| .031 (1/32) | | .0310 | **.003** | .047 | .156 (5x) | 3 | 1/8 | 2-1/2 | 956531 | 54.80 | 956531-C8 | 63.70 |
| .031 (1/32) | | .0310 | **.003** | .047 | .250 (8x) | 3 | 1/8 | 2-1/2 | 961331 | 56.30 | 961331-C8 | 65.20 |
| .031 (1/32) | | .0310 | **.003** | .047 | .312 (10x) | 3 | 1/8 | 2-1/2 | 861031 | 61.40 | 861031-C8 | 69.60 |
| .031 (1/32) | | .0310 | **.003** | .047 | .375 (12x) | 3 | 1/8 | 2-1/2 | 949631 | 62.30 | 949631-C8 | 70.50 |
| .031 (1/32) | | .0310 | **.010** | .047 | .250 (8x) | 3 | 1/8 | 2-1/2 | 876231 | 56.80 | 876231-C8 | 65.00 |
| | 1.0 mm | .0393 | **.08 mm** | 1.50 mm | 5.0 mm (5x) | 3 | 4 mm | 50 mm | 907622 | 60.80 | 907622-C8 | 69.40 |
| .040 | | .0400 | **.003** | .060 | .203 (5x) | 3 | 1/8 | 2-1/2 | 956540 | 55.10 | 956540-C8 | 63.30 |
| .040 | | .0400 | **.003** | .060 | .325 (8x) | 3 | 1/8 | 2-1/2 | 961340 | 56.30 | 961340-C8 | 65.20 |
| .047 (3/64) | | .0470 | **.003** | .071 | .250 (5x) | 3 | 1/8 | 2-1/2 | 956547 | 54.80 | 956547-C8 | 63.70 |
| .047 (3/64) | | .0470 | **.003** | .071 | .375 (8x) | 3 | 1/8 | 2-1/2 | 961347 | 56.30 | 961347-C8 | 65.20 |
| .047 (3/64) | | .0470 | **.003** | .071 | .570 (12x) | 3 | 1/8 | 2-1/2 | 949647 | 62.30 | 949647-C8 | 70.50 |
| .047 (3/64) | | .0470 | **.010** | .071 | .375 (8x) | 3 | 1/8 | 2-1/2 | 876247 | 56.80 | 876247-C8 | 65.70 |
| .062 (1/16) | | .0620 | **.005** | .093 | .312 (5x) | 3 | 1/8 | 2-1/2 | 956562 | 54.80 | 956562-C8 | 63.70 |
| .062 (1/16) | | .0620 | **.005** | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 961362 | 56.30 | 961362-C8 | 65.20 |
| .062 (1/16) | | .0620 | **.005** | .093 | .625 (10x) | 3 | 1/8 | 2-1/2 | 861062 | 60.80 | 861062-C8 | 69.80 |
| .062 (1/16) | | .0620 | **.005** | .093 | .750 (12x) | 3 | 1/8 | 2-1/2 | 949662 | 62.30 | 949662-C8 | 70.50 |
| .062 (1/16) | | .0620 | **.005** | .093 | .950 (15x) | 3 | 1/8 | 2-1/2 | 886862 | 62.30 | 886862-C8 | 70.50 |
| .062 (1/16) | | .0620 | **.010** | .093 | .500 (8x) | 3 | 1/8 | 2-1/2 | 876262 | 56.30 | 876262-C8 | 65.20 |
| .078 (5/64) | | .0780 | **.005** | .118 | .406 (5x) | 3 | 1/8 | 2-1/2 | 956578 | 54.80 | 956578-C8 | 63.70 |
| .078 (5/64) | | .0780 | **.005** | .118 | .625 (8x) | 3 | 1/8 | 2-1/2 | 961378 | 56.30 | 961378-C8 | 65.20 |
| .078 (5/64) | | .0780 | **.005** | .118 | .940 (12x) | 3 | 1/8 | 2-1/2 | 949678 | 62.30 | 949678-C8 | 70.50 |
| .078 (5/64) | | .0780 | **.010** | .118 | .625 (8x) | 3 | 1/8 | 2-1/2 | 876278 | 56.30 | 876278-C8 | 65.20 |
| | 2.0 mm | .0787 | **.10 mm** | 3.00 mm | 10.0 mm (5x) | 3 | 4 mm | 50 mm | 907645 | 60.80 | 907645-C8 | 69.40 |
| .093 (3/32) | | .0930 | **.005** | .140 | .500 (5x) | 3 | 1/8 | 2-1/2 | 956593 | 54.80 | 956593-C8 | 63.70 |
| .093 (3/32) | | .0930 | **.005** | .140 | .750 (8x) | 3 | 1/8 | 2-1/2 | 961393 | 56.30 | 961393-C8 | 65.20 |
| .093 (3/32) | | .0930 | **.005** | .140 | .950 (10x) | 3 | 1/8 | 2-1/2 | 861093 | 60.80 | 861093-C8 | 69.80 |
| .093 (3/32) | | .0930 | **.005** | .140 | 1.125 (12x) | 3 | 1/8 | 2-1/2 | 949693 | 62.30 | 949693-C8 | 70.50 |
| .093 (3/32) | | .0930 | **.005** | .140 | 1.400 (15x) | 3 | 1/8 | 3 | 886893 | 65.50 | 886893-C8 | 73.70 |
| .093 (3/32) | | .0930 | **.010** | .140 | .750 (8x) | 3 | 1/8 | 2-1/2 | 876293 | 56.30 | 876293-C8 | 64.50 |
| .093 (3/32) | | .0930 | **.030** | .140 | .500 (5x) | 3 | 1/8 | 2-1/2 | 761093 | 54.80 | 761093-C8 | 63.00 |
| .093 (3/32) | | .0930 | **.030** | .140 | .750 (8x) | 3 | 1/8 | 2-1/2 | 891893 | 56.30 | 891893-C8 | 64.50 |
| | 3.0 mm | .1181 | **.10 mm** | 4.50 mm | 15.0 mm (5x) | 3 | 4 mm | 50 mm | 907657 | 57.30 | 907657-C8 | 66.70 |

| $D_1$ +.000″ −.002″ | | decimal equivalent | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | | .1250 | **.005** | .187 | .625 (5x) | 3 | 1/8 | 2-1/2 | 956608 | 53.10 | 956608-C8 | 62.00 |
| .125 (1/8) | | .1250 | **.005** | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 961408 | 54.50 | 961408-C8 | 63.30 |

continued on next page

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page

| CUTTER DIAMETER | | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | decimal equivalent | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| .125 (1/8) | .1250 | **.005** | .187 | 1.250 (10x) | 3 | 1/8 | 2-1/2 | 861108 | 58.20 | 861108-C8 | 67.20 |
| .125 (1/8) | .1250 | **.005** | .187 | 1.500 (12x) | 3 | 1/8 | 3 | 949708 | 59.70 | 949708-C8 | 68.60 |
| .125 (1/8) | .1250 | **.005** | .187 | 1.875 (15x) | 3 | 1/8 | 3 | 886908 | 63.50 | 886908-C8 | 72.40 |
| .125 (1/8) | .1250 | **.010** | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 876308 | 54.50 | 876308-C8 | 63.30 |
| .125 (1/8) | .1250 | **.030** | .187 | 1.000 (8x) | 3 | 1/8 | 2-1/2 | 891908 | 54.50 | 891908-C8 | 63.30 |
| .156 (5/32) | .1562 | **.005** | .235 | .750 (5x) | 3 | 3/16 | 3 | 956610 | 59.80 | 956610-C8 | 68.80 |
| .156 (5/32) | .1562 | **.005** | .235 | 1.250 (8x) | 3 | 3/16 | 3 | 961410 | 61.40 | 961410-C8 | 70.30 |
| .187 (3/16) | .1875 | **.005** | .285 | 1.000 (5x) | 3 | 3/16 | 3 | 956612 | 59.80 | 956612-C8 | 68.80 |
| .187 (3/16) | .1875 | **.005** | .285 | 1.500 (8x) | 3 | 3/16 | 3 | 961412 | 61.40 | 961412-C8 | 70.30 |
| .187 (3/16) | .1875 | **.005** | .285 | 2.250 (12x) | 3 | 3/16 | 4 | 949712 | 77.70 | 949712-C8 | 87.30 |
| .187 (3/16) | .1875 | **.030** | .285 | 1.000 (5x) | 3 | 3/16 | 3 | 761112 | 59.80 | 761112-C8 | 68.80 |
| .187 (3/16) | .1875 | **.030** | .285 | 1.500 (8x) | 3 | 3/16 | 3 | 891912 | 61.40 | 891912-C8 | 70.30 |
| .250 (1/4) | .2500 | **.010** | .375 | 1.250 (5x) | 3 | 1/4 | 4 | 956616 | 63.80 | 956616-C8 | 75.40 |
| .250 (1/4) | .2500 | **.010** | .375 | 2.000 (8x) | 3 | 1/4 | 4 | 961416 | 65.10 | 961416-C8 | 76.70 |
| .250 (1/4) | .2500 | **.010** | .375 | 3.000 (12x) | 3 | 1/4 | 6 | 949716 | 82.40 | 949716-C8 | 97.80 |
| .250 (1/4) | .2500 | **.030** | .375 | 1.250 (5x) | 3 | 1/4 | 4 | 761116 | 63.80 | 761116-C8 | 75.40 |
| .250 (1/4) | .2500 | **.030** | .375 | 2.000 (8x) | 3 | 1/4 | 4 | 891916 | 65.10 | 891916-C8 | 76.70 |

## Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For Aluminum Alloys)

**Important Note**: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com.

| Cutter Series | Material | SFM | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 |
| Uncoated | **Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx) | 750 | Slotting | .00016 | .00033 | .00050 | .00065 | .00082 | .00098 | .00132 | .00197 | .00264 |
| | Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1000 | Roughing | .00018 | .00038 | .00058 | .00076 | .00096 | .00115 | .00154 | .00230 | .00308 |
| | **Magnesium Alloys:** All alloys | 1500 | Finishing | .00020 | .00041 | .00062 | .00082 | .00103 | .00123 | .00165 | .00247 | .00330 |
| | **Zinc Alloys:** All alloys | 800 | Max | .00021 | .00044 | .00066 | .00087 | .00110 | .00131 | .00176 | .00263 | .00352 |
| | **Copper Alloys:** High Coppers - 90%+ (C1xxxx) | 225 | Slotting | .00013 | .00026 | .00040 | .00052 | .00066 | .00079 | .00106 | .00158 | .00211 |
| | Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800) | 500 | Roughing | .00015 | .00031 | .00046 | .00061 | .00077 | .00092 | .00123 | .00184 | .00246 |
| | | | Finishing | .00016 | .00033 | .00050 | .00065 | .00082 | .00098 | .00132 | .00197 | .00264 |
| | Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 225 | Max | .00017 | .00035 | .00053 | .00070 | .00088 | .00105 | .00141 | .00211 | .00282 |
| | Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 500 | | | | | | | | | | |
| | Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 500 | | | | | | | | | | |
| | Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 225 | | | | | | | | | | |
| | Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 550 | | | | | | | | | | |
| $TiB_2$ | **Aluminum:** Casting (2xx, 5xx, 7xx, 8xx) | 1000 | Slotting | .00021 | .00043 | .00065 | .00085 | .00107 | .00128 | .00172 | .00257 | .00343 |
| | Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1400 | Roughing | .00024 | .00050 | .00075 | .00099 | .00125 | .00149 | .00200 | .00299 | .00400 |
| | **Magnesium Alloys**: All alloys | 2000 | Finishing | .00026 | .00053 | .00081 | .00106 | .00134 | .00160 | .00215 | .00321 | .00429 |
| | **Zinc Alloys:** All alloys | 1100 | Max | .00027 | .00057 | .00086 | .00113 | .00143 | .00170 | .00229 | .00342 | .00458 |
| Amorphous Diamond | **Aluminum (High Silicon):** Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 2500 | Slotting | .00017 | .00036 | .00055 | .00072 | .00091 | .00108 | .00145 | .00217 | .00290 |
| | Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 2000 | Roughing | .00020 | .00042 | .00064 | .00084 | .00106 | .00126 | .00169 | .00253 | .00339 |
| | Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 1500 | Finishing | .00022 | .00045 | .00068 | .00090 | .00113 | .00135 | .00182 | .00272 | .00363 |
| | Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 1000 | Max | .00023 | .00048 | .00073 | .00096 | .00121 | .00144 | .00194 | .00290 | .00387 |
| | Wrought - 5% - 8% Si (4xxx) | 2200 | | | | | | | | | | |
| | Wrought - 8% - 12% Si (4xxx) | 1700 | | | | | | | | | | |
| | **Copper Alloys:** High Coppers - 90%+ (C1xxxx) | 800 | Slotting | .00014 | .00029 | .00044 | .00058 | .00072 | .00086 | .00116 | .00174 | .00232 |
| | Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800) | 1500 | Roughing | .00016 | .00034 | .00051 | .00067 | .00085 | .00101 | .00136 | .00203 | .00271 |
| | | | Finishing | .00017 | .00036 | .00055 | .00072 | .00091 | .00108 | .00145 | .00217 | .00290 |
| | Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 800 | Max | .00019 | .00038 | .00058 | .00077 | .00097 | .00115 | .00155 | .00232 | .00310 |
| | Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 1000 | | | | | | | | | | |
| | Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 1000 | | | | | | | | | | |
| | Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 800 | | | | | | | | | | |
| | Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300) | 150 | | | | | | | | | | |
| | Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 750 | | | | | | | | | | |

**Radial Depth of Cut*:** Slotting: 1x Dia; Roughing: .4x Dia; Finishing: .1x Dia
**Axial Depth of Cut*:** Slotting: .4x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia

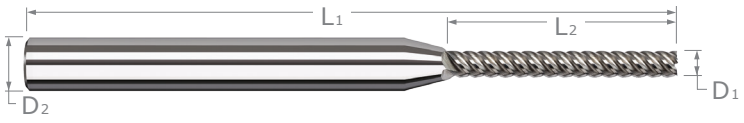
**Radial Depth of Cut*:** Slotting: 1x Dia; Roughing: .4x Dia; Finishing: .1x Dia
**Axial Depth of Cut*:** Slotting: .4x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia

**Radial Depth of Cut*:** Slotting: 1x Dia; Roughing: .3x Dia; Finishing: .1x Dia
**Axial Depth of Cut*:** Slotting: .3x Dia; Roughing: .3x - .8x Dia; Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Finishers – Square




- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 50°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation • h6 shank tolerance for high precision tool holders
- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | TiB$_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .015 (1/64) | | .0150 | **.078** (5x) | 4 | 1/8 | 2-1/2 | 66715 | 57.50 | 66715-C8 | 65.70 |
| .015 (1/64) | | .0150 | **.125** (8x) | 4 | 1/8 | 2-1/2 | 67115 | 57.20 | 67115-C8 | 65.40 |
| .020 | | .0200 | **.100** (5x) | 4 | 1/8 | 2-1/2 | 66720 | 54.90 | 66720-C8 | 63.70 |
| .020 | | .0200 | **.160** (8x) | 4 | 1/8 | 2-1/2 | 67120 | 57.80 | 67120-C8 | 66.00 |
| .025 | | .0250 | **.125** (5x) | 4 | 1/8 | 2-1/2 | 66725 | 53.40 | 66725-C8 | 62.30 |
| .025 | | .0250 | **.203** (8x) | 4 | 1/8 | 2-1/2 | 67125 | 54.70 | 67125-C8 | 62.90 |
| .031 (1/32) | | .0310 | **.093** (3x) | 5 | 1/8 | 1-1/2 | 948831 | 36.30 | 948831-C8 | 45.30 |
| .031 (1/32) | | .0310 | **.156** (5x) | 5 | 1/8 | 2-1/2 | 66731 | 51.00 | 66731-C8 | 59.80 |
| .031 (1/32) | | .0310 | **.250** (8x) | 5 | 1/8 | 2-1/2 | 67131 | 52.40 | 67131-C8 | 61.20 |
| .031 (1/32) | | .0310 | **.312** (10x) | 5 | 1/8 | 2-1/2 | 917631 | 66.80 | 917631-C8 | 75.70 |
| | 1.0 mm | .0393 | **5.00 mm** (5x) | 5 | 4 mm | 50 mm | 915522 | 53.00 | 915522-C8 | 61.70 |
| | 1.0 mm | .0393 | **8.00 mm** (8x) | 5 | 4 mm | 50 mm | 907122 | 55.30 | 907122-C8 | 63.90 |
| .040 | | .0400 | **.203** (5x) | 5 | 1/8 | 2-1/2 | 66740 | 51.00 | 66740-C8 | 59.80 |
| .040 | | .0400 | **.325** (8x) | 5 | 1/8 | 2-1/2 | 67140 | 52.40 | 67140-C8 | 61.20 |
| .047 (3/64) | | .0470 | **.141** (3x) | 5 | 1/8 | 1-1/2 | 948847 | 36.30 | 948847-C8 | 45.30 |
| .047 (3/64) | | .0470 | **.250** (5x) | 5 | 1/8 | 2-1/2 | 66747 | 51.00 | 66747-C8 | 59.80 |
| .047 (3/64) | | .0470 | **.375** (8x) | 5 | 1/8 | 2-1/2 | 67147 | 52.40 | 67147-C8 | 60.60 |
| .050 | | .0500 | **.250** (5x) | 5 | 1/8 | 2-1/2 | 66750 | 51.00 | 66750-C8 | 59.80 |
| .050 | | .0500 | **.400** (8x) | 5 | 1/8 | 2-1/2 | 67150 | 52.40 | 67150-C8 | 61.20 |
| .060 | | .0600 | **.312** (5x) | 5 | 1/8 | 2-1/2 | 66760 | 47.20 | 66760-C8 | 56.20 |
| .060 | | .0600 | **.500** (8x) | 5 | 1/8 | 2-1/2 | 67160 | 48.80 | 67160-C8 | 57.00 |
| .062 (1/16) | | .0620 | **.186** (3x) | 5 | 1/8 | 1-1/2 | 948862 | 33.90 | 948862-C8 | 42.80 |
| .062 (1/16) | | .0620 | **.312** (5x) | 5 | 1/8 | 2-1/2 | 66762 | 47.20 | 66762-C8 | 56.20 |
| .062 (1/16) | | .0620 | **.500** (8x) | 5 | 1/8 | 2-1/2 | 67162 | 48.80 | 67162-C8 | 57.70 |
| .062 (1/16) | | .0620 | **.625** (10x) | 5 | 1/8 | 2-1/2 | 917662 | 71.70 | 917662-C8 | 79.90 |
| .078 (5/64) | | .0780 | **.234** (3x) | 5 | 1/8 | 1-1/2 | 948878 | 33.90 | 948878-C8 | 42.80 |
| .078 (5/64) | | .0780 | **.406** (5x) | 5 | 1/8 | 2-1/2 | 66778 | 47.20 | 66778-C8 | 56.20 |
| .078 (5/64) | | .0780 | **.625** (8x) | 5 | 1/8 | 2-1/2 | 67178 | 48.80 | 67178-C8 | 57.70 |
| | 2.0 mm | .0787 | **10.00 mm** (5x) | 5 | 4 mm | 50 mm | 915545 | 51.90 | 915545-C8 | 60.50 |
| | 2.0 mm | .0787 | **16.00 mm** (8x) | 5 | 4 mm | 50 mm | 907145 | 53.00 | 907145-C8 | 61.70 |
| .093 (3/32) | | .0930 | **.279** (3x) | 5 | 1/8 | 1-1/2 | 948893 | 33.90 | 948893-C8 | 42.80 |
| .093 (3/32) | | .0930 | **.375** (4x) | 5 | 1/8 | 2-1/2 | 829493 | 46.70 | 829493-C8 | 55.60 |
| .093 (3/32) | | .0930 | **.500** (5x) | 5 | 1/8 | 2-1/2 | 66793 | 47.20 | 66793-C8 | 56.20 |
| .093 (3/32) | | .0930 | **.750** (8x) | 5 | 1/8 | 2-1/2 | 67193 | 48.80 | 67193-C8 | 57.70 |
| .093 (3/32) | | .0930 | **.950** (10x) | 5 | 1/8 | 2-1/2 | 917693 | 73.20 | 917693-C8 | 81.40 |

continued on next page

# VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

## Finishers – Square (cont.)

continued from previous page

| CUTTER DIAMETER | | | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | +.00mm −.02mm | decimal equivalent | $L_2$ +.010″ −.000″ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .100 | | .1000 | **.500** (5x) | 5 | 1/8 | 2-1/2 | 66800 | 47.20 | 66800-C8 | 56.20 |
| .100 | | .1000 | **.800** (8x) | 5 | 1/8 | 2-1/2 | 67200 | 48.80 | 67200-C8 | 57.70 |
| .109 (7/64) | | .1090 | **.570** (5x) | 5 | 1/8 | 2-1/2 | 66802 | 47.20 | 66802-C8 | 56.20 |
| .109 (7/64) | | .1090 | **.900** (8x) | 5 | 1/8 | 2-1/2 | 67202 | 48.80 | 67202-C8 | 57.70 |
| | 3.0 mm | .1181 | **15.00 mm** (5x) | 5 | 4 mm | 50 mm | 915557 | 51.40 | 915557-C8 | 60.90 |
| | 3.0 mm | .1181 | **24.00 mm** (8x) | 5 | 4 mm | 50 mm | 907157 | 53.00 | 907157-C8 | 62.40 |

| $D_1$ +.000″ −.002″ | decimal equivalent | $L_2$ +.030″ −.000″ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | .1250 | **.187** (1.5x) | 5 | 1/8 | 1-1/2 | 856908 | 31.00 | 856908-C8 | 39.70 |
| .125 (1/8) | .1250 | **.375** (3x) | 5 | 1/8 | 1-1/2 | 948908 | 31.00 | 948908-C8 | 39.70 |
| .125 (1/8) | .1250 | **.500** (4x) | 5 | 1/8 | 2-1/2 | 829508 | 44.80 | 829508-C8 | 53.60 |
| .125 (1/8) | .1250 | **.625** (5x) | 5 | 1/8 | 2-1/2 | 66808 | 45.50 | 66808-C8 | 54.20 |
| .125 (1/8) | .1250 | **1.000** (8x) | 5 | 1/8 | 2-1/2 | 67208 | 47.70 | 67208-C8 | 56.70 |
| .125 (1/8) | .1250 | **1.125** (10x) | 5 | 1/8 | 2-1/2 | 917708 | 71.90 | 917708-C8 | 80.80 |
| .156 (5/32) | .1562 | **.750** (5x) | 5 | 3/16 | 3 | 66810 | 48.60 | 66810-C8 | 57.50 |
| .156 (5/32) | .1562 | **1.250** (8x) | 5 | 3/16 | 3 | 67210 | 52.40 | 67210-C8 | 61.20 |
| .187 (3/16) | .1875 | **.285** (1.5x) | 5 | 3/16 | 2 | 856912 | 36.40 | 856912-C8 | 45.00 |
| .187 (3/16) | .1875 | **.570** (3x) | 5 | 3/16 | 2 | 948912 | 36.40 | 948912-C8 | 45.00 |
| .187 (3/16) | .1875 | **1.000** (5x) | 5 | 3/16 | 3 | 66812 | 48.60 | 66812-C8 | 57.50 |
| .187 (3/16) | .1875 | **1.500** (8x) | 5 | 3/16 | 3 | 67212 | 52.40 | 67212-C8 | 61.20 |
| .187 (3/16) | .1875 | **1.875** (10x) | 5 | 3/16 | 4 | 917712 | 73.00 | 917712-C8 | 82.70 |
| .250 (1/4) | .2500 | **.375** (1.5x) | 5 | 1/4 | 2-1/2 | 856916 | 48.20 | 856916-C8 | 58.30 |
| .250 (1/4) | .2500 | **.750** (3x) | 5 | 1/4 | 2-1/2 | 948916 | 48.20 | 948916-C8 | 58.30 |
| .250 (1/4) | .2500 | **1.250** (5x) | 5 | 1/4 | 4 | 66816 | 59.40 | 66816-C8 | 70.70 |
| .250 (1/4) | .2500 | **2.000** (8x) | 5 | 1/4 | 4 | 67216 | 63.00 | 67216-C8 | 74.60 |
| .375 (3/8) | .3750 | **1.125** (3x) | 5 | 3/8 | 2-1/2 | 948924 | 67.30 | 948924-C8 | 86.60 |
| .500 (1/2) | .5000 | **1.500** (3x) | 5 | 1/2 | 3 | 948932 | 90.70 | 948932-C8 | 109.10 |

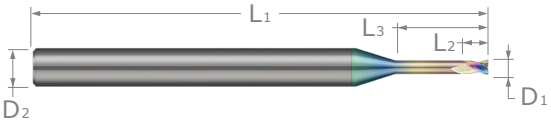


## SPEEDS & FEEDS (High Helix Finishers for Aluminum & Non-Ferrous Alloys)

| Cutter Series | Material | SFM | | Chip Load Per Tooth (IPT) .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | Depth of Cut Radial | Axial |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Uncoated | **Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx) | 750 | | | | | | | | | | | | |
| | Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1000 | Finishing (3x LOC) | .00027 | .00056 | .00085 | .00112 | .00140 | .00167 | .00225 | .00337 | .00450 | .12x Dia | .5x - 3x Dia |
| | **Magnesium Alloys:** All alloys | 1500 | | | | | | | | | | | | |
| | **Zinc Alloys:** All alloys | 800 | | | | | | | | | | | | |
| | **Copper Alloys:** High Coppers - 90%+ (C1xxxx) | 225 | | | | | | | | | | | | |
| | Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800) | 500 | Finishing (4x LOC) | 00024 | .00049 | 00074 | .00098 | .00123 | 00146 | 00197 | 00295 | 00394 | .10x Dia | .5x - 4x Dia |
| | Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 225 | | | | | | | | | | | | |
| | Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 500 | Finishing (5x LOC) | .00020 | .00042 | .00063 | .00084 | .00105 | .00126 | .00169 | .00252 | .00338 | .09x Dia | .5x - 5x Dia |
| | Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 500 | | | | | | | | | | | | |
| | Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 225 | Finishing (8x LOC) | .00015 | .00031 | .00047 | .00061 | .00077 | .00092 | .00124 | .00185 | .00248 | .07x Dia | .5x - 8x Dia |
| | Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 550 | Finishing (10x LOC) | .00014 | .00029 | .00044 | .00058 | .00073 | .00087 | .00117 | .00175 | .00234 | .05x Dia | .5x - 10x Dia |
| $TiB_2$ | **Aluminum:** Casting (2xx, 5xx, 7xx, 8xx) | 1000 | Finishing (3x LOC) | .00035 | .00073 | .00110 | .00145 | .00183 | .00218 | .00293 | .00438 | .00585 | .12x Dia | .5x - 3x Dia |
| | | | Finishing (4x LOC) | .00031 | .00063 | .00096 | .00127 | .00160 | .00190 | .00256 | .00383 | .00512 | .10x Dia | .5x - 4x Dia |
| | Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1400 | Finishing (5x LOC) | .00026 | .00054 | .00082 | .00109 | .00137 | .00163 | .00219 | .00328 | .00439 | .09x Dia | .5x - 5x Dia |
| | **Magnesium Alloys**: All alloys | 2000 | Finishing (8x LOC) | .00019 | .00040 | .00060 | .00080 | .00100 | .00120 | .00161 | .00241 | .00322 | .07x Dia | .5x - 8x Dia |
| | **Zinc Alloys:** All alloys | 1100 | Finishing (10x LOC) | .00018 | .00038 | .00057 | .00075 | .00095 | .00113 | .00152 | .00228 | .00304 | .05x Dia | .5x - 10x Dia |

# END MILLS FOR ALUMINUM ALLOYS

## Finishers – Tight Tolerance – Square

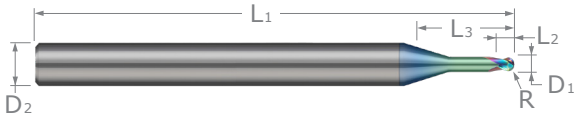



- Tight tolerance diameter offers unparalleled precision and consistency, ensuring a perfect fit for high-precision applications
- h5 shank tolerance for high precision tool holders
- Thin amorphous diamond coating enhances sharpness and provides a better finish on parts while creating a distinctive rainbow sheen
- Reduced neck diameter to avoid heeling
- Manufactured to DIN 6535 Form HA
- 2 flute
- Center cutting
- CNC ground in Switzerland

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.000mm}_{-.008mm}$ | $L_2$ $^{+.10mm}_{-.10mm}$ | $L_3$ $^{+.20mm}_{-.00mm}$ | $D_2$ (h5) | $L_1$ | 2 FL | USD$ |
| .20 mm | .30 mm | .50 mm (2x) | 4 mm | 50 mm | 689504-C4 | 58.00 |
| .50 mm | .75 mm | 2.00 mm (4x) | 4 mm | 50 mm | 689411-C4 | 55.40 |
| .50 mm | .75 mm | 3.00 mm (6x) | 4 mm | 50 mm | 689211-C4 | 55.40 |
| .80 mm | 1.20 mm | 2.00 mm (2x) | 4 mm | 50 mm | 689518-C4 | 55.40 |
| 1.00 mm | 1.50 mm | 5.00 mm (5x) | 4 mm | 50 mm | 689322-C4 | 55.40 |
| 1.00 mm | 1.50 mm | 6.00 mm (6x) | 4 mm | 50 mm | 689222-C4 | 55.40 |
| 1.50 mm | 2.25 mm | 6.00 mm (4x) | 4 mm | 50 mm | 689433-C4 | 55.40 |
| 2.00 mm | 3.00 mm | 4.00 mm (2x) | 4 mm | 50 mm | 689545-C4 | 54.90 |
| 2.00 mm | 3.00 mm | 8.00 mm (4x) | 4 mm | 50 mm | 689445-C4 | 54.90 |

# END MILLS FOR ALUMINUM ALLOYS

## Finishers – Tight Tolerance – Ball



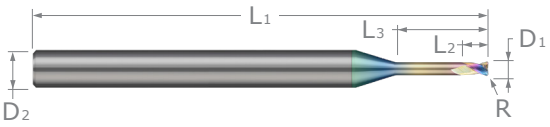

- Tightly-toleranced radii offers unparalleled precision and consistency, ensuring a perfect fit for high-precision applications
- h5 shank tolerance for high precision tool holders
- Thin amorphous diamond coating enhances sharpness and provides a better finish on parts while creating a distinctive rainbow sheen
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • CNC ground in Switzerland

| CUTTER DIAMETER | RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000mm}_{-.008mm}$ | R $^{+.002mm}_{-.002mm}$ | $L_2$ $^{+.10mm}_{-.10mm}$ | $L_3$ $^{+.20mm}_{-.00mm}$ | $D_2$ (h5) | $L_1$ | 2 FL | USD$ |
| .30 mm | .15 mm | .25 mm | 1.00 mm (3x) | 4 mm | 50 mm | 690206-C4 | 60.80 |
| .30 mm | .15 mm | .25 mm | 1.50 mm (5x) | 4 mm | 50 mm | 690006-C4 | 60.80 |
| .30 mm | .15 mm | .25 mm | 2.00 mm (6x) | 4 mm | 50 mm | 689906-C4 | 60.80 |
| .40 mm | .20 mm | .30 mm | 2.00 mm (5x) | 4 mm | 50 mm | 690009-C4 | 60.80 |
| .40 mm | .20 mm | .30 mm | 4.00 mm (10x) | 4 mm | 50 mm | 689609-C4 | 60.80 |
| .50 mm | .25 mm | .40 mm | 2.00 mm (4x) | 4 mm | 50 mm | 690111-C4 | 57.60 |
| .50 mm | .25 mm | .40 mm | 3.00 mm (6x) | 4 mm | 50 mm | 689911-C4 | 57.60 |
| .50 mm | .25 mm | .40 mm | 4.00 mm (8x) | 4 mm | 50 mm | 689711-C4 | 57.60 |
| .60 mm | .30 mm | .50 mm | 4.00 mm (6x) | 4 mm | 50 mm | 689913-C4 | 57.60 |
| .60 mm | .30 mm | .50 mm | 6.00 mm (10x) | 4 mm | 50 mm | 689613-C4 | 57.60 |
| .60 mm | .30 mm | .50 mm | 2.00 mm (3x) | 4 mm | 50 mm | 690213-C4 | 57.60 |
| .80 mm | .40 mm | .60 mm | 4.00 mm (5x) | 4 mm | 50 mm | 690018-C4 | 57.60 |
| .80 mm | .40 mm | .60 mm | 6.00 mm (7x) | 4 mm | 50 mm | 689818-C4 | 57.60 |
| 1.00 mm | .50 mm | .80 mm | 5.00 mm (5x) | 4 mm | 50 mm | 690022-C4 | 57.60 |
| 1.00 mm | .50 mm | .80 mm | 10.00 mm (10x) | 4 mm | 50 mm | 689622-C4 | 57.60 |
| 1.00 mm | .50 mm | .80 mm | 8.00 mm (8x) | 4 mm | 50 mm | 689722-C4 | 57.60 |
| 1.00 mm | .50 mm | .80 mm | 6.00 mm (6x) | 4 mm | 50 mm | 689922-C4 | 57.60 |
| 1.50 mm | .75 mm | 1.20 mm | 8.00 mm (5x) | 4 mm | 50 mm | 690033-C4 | 58.60 |
| 1.50 mm | .75 mm | 1.20 mm | 12.00 mm (8x) | 4 mm | 55 mm | 689733-C4 | 58.60 |
| 1.50 mm | .75 mm | 1.20 mm | 10.00 mm (6x) | 4 mm | 50 mm | 689933-C4 | 58.60 |
| 2.00 mm | 1.00 mm | 1.50 mm | 10.00 mm (5x) | 4 mm | 50 mm | 690045-C4 | 58.60 |
| 2.00 mm | 1.00 mm | 1.50 mm | 20.00 mm (10x) | 4 mm | 60 mm | 689645-C4 | 58.60 |
| 2.00 mm | 1.00 mm | 1.50 mm | 15.00 mm (7x) | 4 mm | 55 mm | 689845-C4 | 58.60 |
| 2.00 mm | 1.00 mm | 1.50 mm | 6.00 mm (3x) | 4 mm | 50 mm | 690245-C4 | 58.60 |
| 2.00 mm | 1.00 mm | 1.50 mm | 12.00 mm (6x) | 4 mm | 55 mm | 689945-C4 | 58.60 |
| 3.00 mm | 1.50 mm | 3.00 mm | 10.00 mm (3x) | 4 mm | 65 mm | 690257-C4 | 59.80 |
| 3.00 mm | 1.50 mm | 3.00 mm | 15.00 mm (5x) | 4 mm | 65 mm | 690057-C4 | 59.80 |
| 3.00 mm | 1.50 mm | 3.00 mm | 20.00 mm (6x) | 4 mm | 65 mm | 689957-C4 | 59.80 |
| 4.00 mm | 2.00 mm | 4.00 mm | 20.00 mm (5x) | 6 mm | 65 mm | 690061-C4 | 69.50 |

| $D_1$ $^{-.006mm}_{-.014mm}$ | R $^{+.002mm}_{-.002mm}$ | $L_2$ $^{+.10mm}_{-.10mm}$ | $L_3$ $^{+.20mm}_{-.00mm}$ | $D_2$ (h5) | $L_1$ | 2 FL | USD$ |
|---|---|---|---|---|---|---|---|
| 6.00 mm | 3.00 mm | 6.00 mm | 30.00 mm (5x) | 6 mm | 75 mm | 690066-C4 | 72.90 |

# END MILLS FOR ALUMINUM ALLOYS

## Finishers – Tight Tolerance – Corner Radius



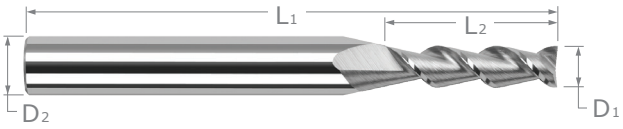

- Tightly-toleranced radii offers unparalleled precision and consistency, ensuring a perfect fit for high-precision applications
- h5 shank tolerance for high precision tool holders
- Thin amorphous diamond coating enhances sharpness and provides a better finish on parts while creating a distinctive rainbow sheen
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • CNC ground in Switzerland

| CUTTER DIAMETER | RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000mm}_{-.008mm}$ | R $^{+.000mm}_{-.004mm}$ | $L_2$ $^{+.10mm}_{-.10mm}$ | $L_3$ $^{+.20mm}_{-.00mm}$ | $D_2$ (h5) | $L_1$ | 2 FL | USD$ |
| .50 mm | .05 mm | .35 mm | 2 mm (4x) | 4 mm | 50 mm | 686611-C4 | 59.60 |
| 1.00 mm | .10 mm | .80 mm | 3 mm (3x) | 4 mm | 50 mm | 686822-C4 | 59.60 |
| 1.00 mm | .10 mm | .80 mm | 5 mm (5x) | 4 mm | 50 mm | 686422-C4 | 59.60 |
| 1.00 mm | .10 mm | .80 mm | 7 mm (7x) | 4 mm | 50 mm | 685822-C4 | 59.60 |
| 1.00 mm | .20 mm | .80 mm | 8 mm (8x) | 4 mm | 50 mm | 685622-C4 | 59.60 |
| 1.00 mm | .10 mm | .80 mm | 10 mm (10x) | 4 mm | 50 mm | 685422-C4 | 61.10 |
| 1.00 mm | .20 mm | .80 mm | 10 mm (10x) | 4 mm | 50 mm | 685322-C4 | 61.10 |
| 1.50 mm | .15 mm | 1.35 mm | 8 mm (5x) | 4 mm | 50 mm | 686133-C4 | 59.10 |
| 1.50 mm | .15 mm | 1.35 mm | 12 mm (8x) | 4 mm | 55 mm | 685533-C4 | 59.10 |
| 2.00 mm | .20 mm | 1.70 mm | 10 mm (5x) | 4 mm | 50 mm | 686345-C4 | 59.10 |
| 2.00 mm | .20 mm | 1.70 mm | 12 mm (6x) | 4 mm | 55 mm | 686045-C4 | 59.10 |
| 2.00 mm | .20 mm | 1.70 mm | 15 mm (7x) | 4 mm | 55 mm | 685745-C4 | 59.10 |
| 2.00 mm | .20 mm | 1.70 mm | 20 mm (10x) | 4 mm | 60 mm | 685345-C4 | 60.50 |
| 3.00 mm | .30 mm | 3.00 mm | 15 mm (5x) | 4 mm | 65 mm | 686257-C4 | 61.30 |
| 3.00 mm | .30 mm | 3.00 mm | 20 mm (6x) | 4 mm | 65 mm | 685957-C4 | 61.30 |
| 4.00 mm | .30 mm | 4.00 mm | 20 mm (5x) | 6 mm | 65 mm | 686261-C4 | 71.70 |
| 5.00 mm | .30 mm | 5.00 mm | 20 mm (4x) | 6 mm | 65 mm | 686564-C4 | 71.70 |

| $D_1$ $^{-.006mm}_{-.014mm}$ | R $^{+.000mm}_{-.004mm}$ | $L_2$ $^{+.10mm}_{-.10mm}$ | $L_3$ $^{+.20mm}_{-.00mm}$ | $D_2$ (h5) | $L_1$ | 2 FL | USD$ |
|---|---|---|---|---|---|---|---|
| 6.00 mm | .30 mm | 6.00 mm | 20 mm (3x) | 6 mm | 65 mm | 686766-C4 | 71.70 |

# HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

## 45° Helix – Square




◀ **Down to .010"!**

- 2 flute and 3 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

Outstanding in Aluminum!

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIA. | OVERALL LENGTH | UNCOATED | | | ZrN COATED | | $TiB_2$ COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005" −.0005" | $L_2$ +.010" −.000" | $D_2$ (h6) | $L_1$ | 2 FL | 3 FL | USD$ | 2 FL | USD$ | 2 FL | 3 FL | USD$ |
| .010 | **.030** (3x) | 1/8 | 1-1/2 | 24110 | | 36.10 | | | 24110-C8 | | 43.80 |
| .015 (1/64) | **.045** (3x) | 1/8 | 1-1/2 | 24115 | | 35.30 | | | 24115-C8 | | 43.00 |
| .020 | **.060** (3x) | 1/8 | 1-1/2 | 24120 | | 33.10 | | | 24120-C8 | | 41.90 |
| .025 | **.075** (3x) | 1/8 | 1-1/2 | 24125 | | 30.70 | | | 24125-C8 | | 39.50 |
| .030 | **.090** (3x) | 1/8 | 1-1/2 | 24130 | | 26.60 | | | 24130-C8 | | 34.30 |
| .031 (1/32) | **.047** (1.5x) | 1/8 | 1-1/2 | 935531 | | 26.60 | | | 935531-C8 | | 34.30 |
| .031 (1/32) | **.093** (3x) | 1/8 | 1-1/2 | 24131 | 747431 | 26.60 | 24131-C7 | 33.90 | 24131-C8 | 747431-C8 | 34.30 |
| .031 (1/32) | **.156** (5x) | 1/8 | 2-1/2 | 932031 | | 34.70 | | | 932031-C8 | | 43.60 |
| .039 (1 mm) | **.117** (3x) | 1/8 | 1-1/2 | 24139 | | 26.60 | | | 24139-C8 | | 34.30 |
| .040 | **.120** (3x) | 1/8 | 1-1/2 | 24140 | | 26.60 | 24140-C7 | 33.90 | 24140-C8 | | 34.30 |
| .040 | **.203** (5x) | 1/8 | 2-1/2 | 932040 | | 34.70 | | | 932040-C8 | | 42.90 |
| .047 (3/64) | **.071** (1.5x) | 1/8 | 1-1/2 | 935547 | | 26.60 | | | 935547-C8 | | 34.30 |
| .047 (3/64) | **.141** (3x) | 1/8 | 1-1/2 | 24147 | 747447 | 26.60 | 24147-C7 | 33.90 | 24147-C8 | 747447-C8 | 34.30 |
| .047 (3/64) | **.250** (5x) | 1/8 | 2-1/2 | 932047 | | 34.70 | | | 932047-C8 | | 43.60 |
| .050 | **.150** (3x) | 1/8 | 1-1/2 | 24150 | | 26.60 | 24150-C7 | 33.90 | 24150-C8 | | 34.30 |
| .050 | **.250** (5x) | 1/8 | 2-1/2 | 932050 | | 34.70 | | | 932050-C8 | | 43.60 |
| .060 | **.180** (3x) | 1/8 | 1-1/2 | 24160 | | 26.60 | 24160-C7 | 33.90 | 24160-C8 | | 34.30 |
| .060 | **.312** (5x) | 1/8 | 2-1/2 | 932060 | | 36.60 | | | 932060-C8 | | 45.60 |
| .062 (1/16) | **.093** (1.5x) | 1/8 | 1-1/2 | 935562 | | 23.30 | | | 935562-C8 | | 30.90 |
| .062 (1/16) | **.186** (3x) | 1/8 | 1-1/2 | 24162 | 747462 | 23.30 | 24162-C7 | 30.50 | 24162-C8 | 747462-C8 | 30.90 |
| .062 (1/16) | **.250** (4x) | 1/8 | 2-1/2 | 789662 | | 36.00 | | | 789662-C8 | | 44.90 |
| .062 (1/16) | **.312** (5x) | 1/8 | 2-1/2 | 932062 | | 36.00 | 932062-C7 | 43.10 | 932062-C8 | | 44.90 |
| .070 | **.210** (3x) | 1/8 | 1-1/2 | 24170 | | 23.30 | 24170-C7 | 30.50 | 24170-C8 | | 30.90 |
| .078 (5/64) | **.117** (1.5x) | 1/8 | 1-1/2 | 935578 | | 23.30 | | | 935578-C8 | | 30.90 |
| .078 (5/64) | **.234** (3x) | 1/8 | 1-1/2 | 24178 | 747478 | 23.30 | 24178-C7 | 30.50 | 24178-C8 | 747478-C8 | 30.90 |
| .078 (5/64) | **.406** (5x) | 1/8 | 2-1/2 | 932078 | | 36.00 | | | 932078-C8 | | 44.20 |
| .080 | **.240** (3x) | 1/8 | 1-1/2 | 24180 | | 23.30 | 24180-C7 | 30.90 | 24180-C8 | | 30.90 |
| .090 | **.270** (3x) | 1/8 | 1-1/2 | 24190 | | 23.30 | 24190-C7 | 30.90 | 24190-C8 | | 30.90 |
| .093 (3/32) | **.140** (1.5x) | 1/8 | 1-1/2 | 935593 | | 23.30 | | | 935593-C8 | | 30.90 |
| .093 (3/32) | **.279** (3x) | 1/8 | 1-1/2 | 24193 | 747493 | 23.30 | 24193-C7 | 30.50 | 24193-C8 | 747493-C8 | 30.90 |
| .093 (3/32) | **.375** (4x) | 1/8 | 2-1/2 | 789693 | | 36.00 | | | 789693-C8 | | 44.90 |
| .093 (3/32) | **.500** (5x) | 1/8 | 2-1/2 | 932093 | | 36.00 | | | 932093-C8 | | 44.90 |
| .100 | **.300** (3x) | 1/8 | 1-1/2 | 24199 | | 23.30 | 24199-C7 | 30.50 | 24199-C8 | | 30.90 |
| .109 (7/64) | **.327** (3x) | 1/8 | 1-1/2 | 24202 | | 35.30 | | | 24202-C8 | | 43.00 |
| .118 (3 mm) | **.354** (3x) | 1/8 | 1-1/2 | 24205 | | 34.90 | | | 24205-C8 | | 42.60 |

continued on next page

# HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

## 45° Helix – Square (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIA. | OVERALL LENGTH | UNCOATED | | | ZrN COATED | | $TiB_2$ COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $D_2$ (h6) | $L_1$ | 2 FL | 3 FL | USD$ | 2 FL | USD$ | 2 FL | 3 FL | USD$ |
| .125 (1/8) | **.187** (1.5x) | 1/8 | 1-1/2 | 935608 | | 20.70 | | | 935608-C8 | | 29.30 |
| .125 (1/8) | **.375** (3x) | 1/8 | 1-1/2 | 752708 | 747508 | 20.90 | | | 752708-C8 | 747508-C8 | 28.50 |
| .125 (1/8) | **.500** (4x) | 1/8 | 1-1/2 | 24208 | | 20.70 | 24208-C7 | 28.00 | 24208-C8 | | 29.30 |
| .125 (1/8) | **.625** (5x) | 1/8 | 2-1/2 | 932108 | | 29.50 | | | 932108-C8 | | 38.40 |
| .140 (9/64) | **.500** (3x) | 3/16 | 2 | 24209 | | 29.00 | | | 24209-C8 | | 37.60 |
| .156 (5/32) | **.235** (1.5x) | 3/16 | 2 | 935610 | | 23.60 | | | 935610-C8 | | 32.20 |
| .156 (5/32) | **.562** (3x) | 3/16 | 2 | 24210 | | 23.60 | 24210-C7 | 32.70 | 24210-C8 | | 32.20 |
| .156 (5/32) | **.750** (5x) | 3/16 | 3 | 932110 | | 29.50 | | | 932110-C8 | | 38.70 |
| .187 (3/16) | **.285** (1.5x) | 3/16 | 2 | 935612 | | 23.60 | | | 935612-C8 | | 32.20 |
| .187 (3/16) | **.625** (3x) | 3/16 | 2 | 24212 | | 23.40 | 24212-C7 | 31.30 | 24212-C8 | | 32.00 |
| .187 (3/16) | **1.000** (5x) | 3/16 | 3 | 932112 | | 29.50 | | | 932112-C8 | | 38.70 |
| .250 (1/4) | **.375** (1.5x) | 1/4 | 2-1/2 | 935616 | | 29.20 | | | 935616-C8 | | 39.30 |
| .250 (1/4) | **.750** (3x) | 1/4 | 2-1/2 | 24216 | | 29.20 | 24216-C7 | 40.30 | 24216-C8 | | 39.30 |
| .250 (1/4) | **1.250** (5x) | 1/4 | 4 | 932116 | | 36.80 | | | 932116-C8 | | 48.70 |
| .375 (3/8) | **1.125** (3x) | 3/8 | 2-1/2 | 752724 | | 39.90 | | | 752724-C8 | | 60.80 |

## Speeds & Feeds (45° Helix )

**Important Note**: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 90%; for 5x, reduce to 80%), For complete speeds and feeds charts, please see www.harveytool.com

| SERIES | MATERIAL | SFM | CHIP LOAD PER TOOTH (IPT) BY CUTTER DIAMETER |
|---|---|---|---|
| Uncoated | **Aluminum Alloys:** | | |
| | Casting (2xx, 5xx, 7xx, 8xx) | 750 | |
| | Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1000 | |
| | **Copper Alloys:** | | |
| | High Coppers - 90%+ (C1xxxx) | 225 | |
| | Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800) | 500 | |
| | Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 225 | |
| | Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 500 | |
| | Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 500 | |
| | Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 225 | |
| | Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 550 | |
| | **Magnesium Alloys** | 1500 | |
| | **Zinc Alloys** | 800 | |
| ZrN | **Aluminum Alloys (High Silicon):** | | |
| | Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 2500 | |
| | Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 2000 | |
| | Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 1500 | |
| | Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 1000 | |
| | Wrought - 5% - 8% Si (4xxx) | 2200 | |
| | Wrought - 8% - 12% Si (4xxx) | 1700 | |
| | **Copper Alloys:** | | |
| | High Coppers - 90%+ (C1xxxx) | 800 | |
| | Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800) | 1500 | |
| | Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 800 | |
| | Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 1000 | |
| | Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 1000 | |
| | Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 800 | |
| | Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300) | 150 | |
| | Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 750 | |
| | **Magnesium Alloys** | 2000 | |
| | **Zinc Alloys** | 1100 | |
| $TiB_2$ | **Aluminum Alloys:** | | |
| | Casting (2xx, 5xx, 7xx, 8xx) | 1000 | |
| | Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1400 | |
| | **Magnesium Alloys** | 2000 | |
| | **Zinc Alloys** | 1100 | |

| | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 |
|---|---|---|---|---|---|---|---|---|
| Slotting | .00031 | .00047 | .00062 | .00078 | .00093 | .00125 | .00187 | .00250 |
| Roughing | .00037 | .00056 | .00074 | .00094 | .00112 | .00150 | .00224 | .00300 |
| Finishing | .00025 | .00038 | .00050 | .00062 | .00074 | .00100 | .00150 | .00200 |

**Radial Depth of Cut*:**
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

**Axial Depth of Cut*:**
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: 1x - 3x Dia

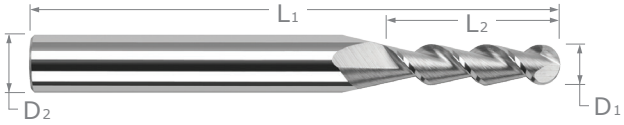
| | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 |
|---|---|---|---|---|---|---|---|---|
| Slotting | .00039 | .00059 | .00078 | .00098 | .00116 | .00156 | .00234 | .00313 |
| Roughing | .00042 | .00063 | .00084 | .00105 | .00126 | .00169 | .00252 | .00338 |
| Finishing | .00031 | .00047 | .00062 | .00078 | .00093 | .00125 | .00187 | .00250 |

**Radial Depth of Cut*:**
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

**Axial Depth of Cut*:**
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: 1x - 3x Dia

# HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

## 45° Helix – Ball




- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

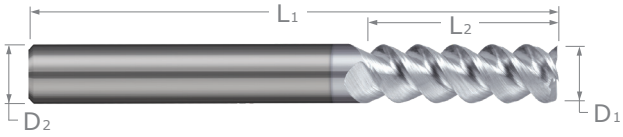
Outstanding in Aluminum!

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | ZrN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| .015 (1/64) | **.045** (3x) | 1/8 | 1-1/2 | 27815 | 40.60 | | | 27815-C8 | 48.30 |
| .020 | **.060** (3x) | 1/8 | 1-1/2 | 27820 | 37.90 | | | 27820-C8 | 45.60 |
| .031 (1/32) | **.047** (1.5x) | 1/8 | 1-1/2 | 894831 | 30.70 | | | 894831-C8 | 38.40 |
| .031 (1/32) | **.093** (3x) | 1/8 | 1-1/2 | 27831 | 30.70 | 27831-C7 | 37.90 | 27831-C8 | 39.50 |
| .031 (1/32) | **.156** (5x) | 1/8 | 2-1/2 | 887631 | 38.50 | | | 887631-C8 | 46.70 |
| .040 | **.120** (3x) | 1/8 | 1-1/2 | 27840 | 30.70 | 27840-C7 | 37.90 | 27840-C8 | 38.40 |
| .047 (3/64) | **.141** (3x) | 1/8 | 1-1/2 | 27847 | 30.70 | 27847-C7 | 37.90 | 27847-C8 | 39.50 |
| .050 | **.150** (3x) | 1/8 | 1-1/2 | 27850 | 30.70 | 27850-C7 | 38.40 | 27850-C8 | 38.40 |
| .060 | **.180** (3x) | 1/8 | 1-1/2 | 27860 | 30.70 | 27860-C7 | 37.90 | 27860-C8 | 38.40 |
| .062 (1/16) | **.093** (1.5x) | 1/8 | 1-1/2 | 894862 | 29.10 | | | 894862-C8 | 36.70 |
| .062 (1/16) | **.186** (3x) | 1/8 | 1-1/2 | 27862 | 29.10 | 27862-C7 | 36.30 | 27862-C8 | 37.70 |
| .062 (1/16) | **.312** (5x) | 1/8 | 2-1/2 | 887662 | 38.50 | | | 887662-C8 | 46.70 |
| .070 | **.210** (3x) | 1/8 | 1-1/2 | 27870 | 29.60 | 27870-C7 | 37.30 | 27870-C8 | 37.30 |
| .078 (5/64) | **.234** (3x) | 1/8 | 1-1/2 | 27878 | 29.10 | 27878-C7 | 36.30 | 27878-C8 | 36.70 |
| .080 | **.240** (3x) | 1/8 | 1-1/2 | 27880 | 29.10 | 27880-C7 | 36.70 | 27880-C8 | 36.70 |
| .090 | **.270** (3x) | 1/8 | 1-1/2 | 27890 | 29.60 | 27890-C7 | 37.30 | 27890-C8 | 37.30 |
| .093 (3/32) | **.140** (1.5x) | 1/8 | 1-1/2 | 894893 | 29.10 | | | 894893-C8 | 36.70 |
| .093 (3/32) | **.279** (3x) | 1/8 | 1-1/2 | 27893 | 29.10 | 27893-C7 | 36.30 | 27893-C8 | 36.70 |
| .093 (3/32) | **.500** (5x) | 1/8 | 2-1/2 | 887693 | 39.30 | | | 887693-C8 | 47.50 |
| .100 | **.300** (3x) | 1/8 | 1-1/2 | 27899 | 29.10 | 27899-C7 | 36.70 | 27899-C8 | 36.70 |
| .118 (3 mm) | **.354** (3x) | 1/8 | 1-1/2 | 27905 | 39.50 | | | 27905-C8 | 47.20 |
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| .125 (1/8) | **.187** (1.5x) | 1/8 | 1-1/2 | 894908 | 26.60 | | | 894908-C8 | 34.30 |
| .125 (1/8) | **.500** (4x) | 1/8 | 1-1/2 | 27908 | 25.80 | 27908-C7 | 33.20 | 27908-C8 | 33.50 |
| .125 (1/8) | **.625** (5x) | 1/8 | 2-1/2 | 887708 | 32.60 | | | 887708-C8 | 41.30 |
| .156 (5/32) | **.562** (3x) | 3/16 | 2 | 27910 | 28.00 | | | 27910-C8 | 36.60 |
| .187 (3/16) | **.625** (3x) | 3/16 | 2 | 27912 | 28.00 | 27912-C7 | 36.10 | 27912-C8 | 36.60 |
| .250 (1/4) | **.750** (3x) | 1/4 | 2-1/2 | 27916 | 32.10 | 27916-C7 | 43.20 | 27916-C8 | 42.30 |

**Please See Speeds & Feeds On Page 245**

# HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

## 60° Helix – Square



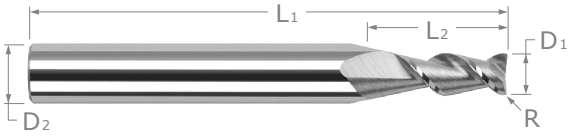

- 60° helix for excellent finishing operations in aluminum and other non-ferrous materials
- High helix design for faster chip removal
- h6 tolerance for high precision holders
- Center cutting
- Solid carbide
- CNC ground in the USA

Outstanding in Aluminum!

| | CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0005″ −.0005″ | $L_2$ +.010″ −.000″ | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| | .031 (1/32) | **.093** (3x) | 1/8 | 1-1/2 | 745231 | 28.50 | 745231-C8 | 36.20 |
| | .062 (1/16) | **.186** (3x) | 1/8 | 1-1/2 | 745262 | 25.10 | 745262-C8 | 34.10 |
| | .093 (3/32) | **.279** (3x) | 1/8 | 1-1/2 | 745293 | 25.10 | 745293-C8 | 32.80 |
| | $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| | .125 (1/8) | **.375** (3x) | 1/8 | 1-1/2 | 745308 | 22.70 | 745308-C8 | 31.70 |
| NEW | .125 (1/8) | **.625** (5x) | 1/8 | 2-1/2 | 695408 | 32.40 | 695408-C8 | 40.60 |
| NEW | .140 (9/64) | **.425** (3x) | 3/16 | 2 | 745309 | 31.90 | 745309-C8 | 40.50 |
| NEW | .140 (9/64) | **.750** (5x) | 3/16 | 3 | 695409 | 37.70 | 695409-C8 | 46.90 |
| NEW | .156 (5/32) | **.469** (3x) | 3/16 | 2 | 745310 | 25.60 | 745310-C8 | 34.30 |
| NEW | .156 (5/32) | **.750** (5x) | 3/16 | 3 | 695410 | 32.40 | 695410-C8 | 41.60 |
| | .187 (3/16) | **.563** (3x) | 3/16 | 2 | 745312 | 25.60 | 745312-C8 | 34.30 |
| NEW | .187 (3/16) | **1.000** (5x) | 3/16 | 3 | 695412 | 32.40 | 695412-C8 | 41.60 |
| | .250 (1/4) | **.750** (3x) | 1/4 | 2-1/2 | 745316 | 31.80 | 745316-C8 | 41.70 |
| NEW | .250 (1/4) | **1.250** (5x) | 1/4 | 4 | 695416 | 40.50 | 695416-C8 | 52.30 |
| | .375 (3/8) | **1.125** (3x) | 3/8 | 2-1/2 | 745324 | 43.30 | 745324-C8 | 59.10 |
| NEW | .375 (3/8) | **2.000** (5x) | 3/8 | 4 | 695424 | 47.00 | 695424-C8 | 64.00 |

# HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

## 45° Helix – Corner Radius




- Corner radius for improved strength
- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- TiB2 coating prevents built-up edge and extends tool life
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0005″ −.0005″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| .031 (1/32) | .010 | **.093** (3x) | 1/8 | 1-1/2 | 718031 | 28.60 | 718031-C8 | 36.30 |
| .047 (3/64) | .010 | **.141** (3x) | 1/8 | 1-1/2 | 718047 | 28.60 | 718047-C8 | 36.30 |
| .062 (1/16) | .010 | **.186** (3x) | 1/8 | 1-1/2 | 718062 | 26.20 | 718062-C8 | 33.80 |
| .078 (5/64) | .010 | **.234** (3x) | 1/8 | 1-1/2 | 718078 | 26.20 | 718078-C8 | 33.80 |
| .093 (3/32) | .010 | **.279** (3x) | 1/8 | 1-1/2 | 718093 | 26.20 | 718093-C8 | 33.80 |
| $D_1$ +.000″ −.002″ | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| .125 (1/8) | .010 | **.375** (3x) | 1/8 | 1-1/2 | 718108 | 23.50 | 718108-C8 | 31.10 |
| .187 (3/16) | .010 | **.570** (3x) | 3/16 | 2 | 718112 | 25.80 | 718112-C8 | 34.50 |
| .250 (1/4) | .010 | **.750** (3x) | 1/4 | 2-1/2 | 718116 | 30.70 | 718116-C8 | 41.80 |



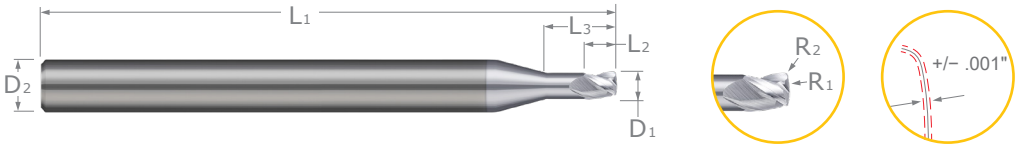
## SPEEDS & FEEDS (High Helix for Aluminum & Non-Ferrous Alloys)

**Important Note**: : Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased. For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 90%; for 5x, reduce to 80%), For complete speeds and feeds charts, please see www.harveytool.com

| Cutter Series | Material | SFM | | Chip Load Per Tooth (IPT) .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | Depth of Cut Radial | Axial |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Uncoated | **Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx) | 750 | Slotting | .00014 | .00028 | .00043 | .00049 | .00062 | .00074 | .00099 | .00148 | .00198 | 1x Dia | .5x Dia |
| | Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1000 | | | | | | | | | | | | |
| | **Magnesium Alloys** | 1500 | | | | | | | | | | | | |
| | **Zinc Alloys** | 800 | | | | | | | | | | | | |
| | Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 225 | Roughing | .00014 | .00028 | .00043 | .00049 | .00062 | .00074 | .00099 | .00148 | .00198 | .5x Dia | .5x - 1x Dia |
| | Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 500 | | | | | | | | | | | | |
| | Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 225 | Finishing | .00017 | .00036 | .00054 | .00062 | .00078 | .00093 | .00125 | .00187 | .00250 | .1x Dia | 1x - 3x Dia |
| | Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 550 | | | | | | | | | | | | |
| $TiB_2$ | **Aluminum:** Casting (2xx, 5xx, 7xx, 8xx) | 1000 | Slotting | .00018 | .00037 | .00056 | .00064 | .00080 | .00096 | .00129 | .00193 | .00257 | .12x Dia | .5x Dia |
| | Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1400 | | | | | | | | | | | | |
| | **Magnesium Alloys** | 2000 | Roughing | .00018 | .00037 | .00056 | .00064 | .00080 | .00096 | .00129 | .001993 | .00257 | .05x Dia | .5x - 1x Dia |
| | **Zinc Alloys** | 1100 | Finishing | .00022 | .00046 | .00070 | .00081 | .00102 | .00121 | .00163 | .00243 | .00325 | 1x Dia | 1x - 3x Dia |

# MULTI-AXIS FINISHERS FOR ALUMINUM ALLOYS

## Lens Form




- Designed for massive reduction in cycle time with top quality results for finishing operations
- Lens form with two tangential radii for finishing floors
- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

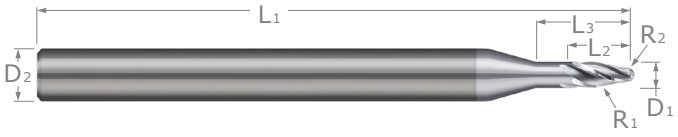
| CUTTER DIAMETER | SKANK DIAMETER | MAJOR RADIUS | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | OVERALL LENGTH | BENEFIT MULTIPLE | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $D_2$ (h6) | $R_1$ | $R_2$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | $L_1$ | | 3 FL | USD$ |
| .062 (1/16) | 1/8 | .125 (1/8) | .004 | .062 (1/16) | .163 | 1-1/2 | 2x | 699862-C8 | 37.70 |
| .078 (5/64) | 1/8 | .156 (5/32) | .005 | .078 (5/64) | .178 | 1-1/2 | 2x | 699878-C8 | 37.70 |
| .093 (3/32) | 1/8 | .187 (3/16) | .006 | .093 (3/32) | .194 | 1-1/2 | 2x | 699893-C8 | 37.70 |

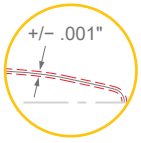
| $D_1$ $^{+.000''}_{-.002''}$ | $D_2$ (h6) | $R_1$ | $R_2$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | $L_1$ | | 3 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | 1/8 | .250 (1/4) | .008 | .125 (1/8) | | 1-1/2 | 2x | 699908-C8 | 40.10 |
| .156 (5/32) | 3/16 | .312 (5/16) | .010 | .156 (5/32) | .356 | 2 | 2x | 699910-C8 | 48.40 |
| .187 (3/16) | 3/16 | .375 (3/8) | .012 | .187 (3/16) | | 2 | 2x | 699912-C8 | 57.10 |
| .250 (1/4) | 1/4 | .500 (1/2) | .015 | .250 (1/4) | | 2 | 2x | 699916-C8 | 72.80 |
| .312 (5/16) | 5/16 | .625 (5/8) | .018 | .312 (5/16) | | 2-1/2 | 2x | 699920-C8 | 80.70 |
| .375 (3/8) | 3/8 | .750 (3/4) | .020 | .375 (3/8) | | 2-1/2 | 2x | 699924-C8 | 88.00 |
| .500 (1/2) | 1/2 | 1.000 | .030 | .500 (1/2) | | 3 | 2x | 699932-C8 | 105.00 |

Technical information found on page 185.

# MULTI-AXIS FINISHERS FOR ALUMINUM ALLOYS

## Oval Form




- Designed for massive reduction in cycle time with top quality results for finishing operations
- Oval form with two tangential radii for versatility in angle of approach and clearance in tight spaces
- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | SKANK DIAMETER | MAJOR RADIUS | TIP RADIUS | LENGTH OF CUT | OVERALL REACH | OVERALL LENGTH | BENEFIT MULTIPLE | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0005''}_{-.0005''}$ | $D_2$ (h6) | $R_1$ | $R_2$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | $L_1$ | | 4 FL | USD$ |
| .062 (1/16) | 1/8 | .500 (1/2) | .016 | .138 | .168 | 1-1/2 | 4x | 699662-C8 | 38.70 |
| .078 (5/64) | 1/8 | .625 (5/8) | .020 | .172 | .202 | 1-1/2 | 4x | 699678-C8 | 38.70 |
| .093 (3/32) | 1/8 | .750 (3/4) | .023 | .206 | .236 | 1-1/2 | 4x | 699693-C8 | 38.70 |

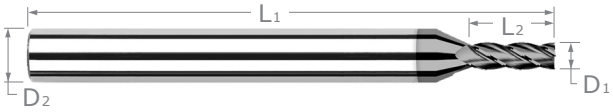
| $D_1$ $^{+.000''}_{-.002''}$ | $D_2$ (h6) | $R_1$ | $R_2$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | $L_1$ | | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | 1/8 | 1.000 | .031 | .275 | | 2 | 4x | 699708-C8 | 41.00 |
| .156 (5/32) | 3/16 | 1.250 | .039 | .344 | .374 | 2 | 4x | 699710-C8 | 49.50 |
| .187 (3/16) | 3/16 | 1.500 | .047 | .413 | | 2 | 4x | 699712-C8 | 58.40 |
| .250 (1/4) | 1/4 | 2.000 | .063 | .551 | | 2-1/2 | 4x | 699716-C8 | 74.60 |
| .312 (5/16) | 5/16 | 2.500 | .078 | .688 | | 2-1/2 | 4x | 699720-C8 | 82.50 |
| .375 (3/8) | 3/8 | 3.000 | .094 | .826 | | 2-1/2 | 4x | 699724-C8 | 90.20 |
| .500 (1/2) | 1/2 | 4.000 | .125 | 1.101 | | 3 | 4x | 699732-C8 | 107.60 |

Technical information found on page 185.

NEW SIZES!

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Square




**Outstanding in Graphite!**

- True crystalline CVD diamond on solid carbide substrate
- 4 µm CVD diamond coating yields a sharper cutting edge and therefore leaves a smoother finish on non-ferrous alloys and composites
- 9 µm CVD diamond coating offers increased tool life for non-ferrous alloys and composites, especially higher abrasive materials such as graphite, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- 4 flutes • h6 shank tolerance for high precision tool holders
- Center cutting • CNC ground in the USA



CVD diamond (4 µm) layer for a balance between wear resistance and edge sharpness.



CVD diamond (9 µm) layer for increased tool life, especially in abrasive materials.

| | CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (4 µm) | | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| | .015 (1/64) | **.023** (1.5x) | 1/8 | 1-1/2 | | | 962715 | 106.00 |
| | .015 (1/64) | **.045** (3x) | 1/8 | 1-1/2 | 799715 | 90.90 | 995715 | 106.00 |
| | .015 (1/64) | **.078** (5x) | 1/8 | 2-1/2 | | | 936615 | 120.00 |
| | .020 | **.030** (1.5x) | 1/8 | 1-1/2 | | | 962720 | 107.00 |
| | .020 | **.060** (3x) | 1/8 | 1-1/2 | 799720 | 90.90 | 995720 | 106.00 |
| | .020 | **.100** (5x) | 1/8 | 2-1/2 | | | 936620 | 120.00 |
| NEW | .025 | **.075** (3x) | 1/8 | 1-1/2 | | | 995725 | 106.00 |
| NEW | .025 | **.125** (5x) | 1/8 | 2-1/2 | | | 936625 | 120.00 |
| | .031 (1/32) | **.047** (1.5x) | 1/8 | 1-1/2 | | | 962731 | 106.00 |
| | .031 (1/32) | **.093** (3x) | 1/8 | 1-1/2 | 799731 | 90.90 | 995731 | 106.00 |
| | .031 (1/32) | **.156** (5x) | 1/8 | 2-1/2 | | | 936631 | 120.00 |
| | .031 (1/32) | **.250** (8x) | 1/8 | 2-1/2 | | | 891531 | 107.00 |
| | .039 (1 mm) | **.117** (3x) | 1/8 | 1-1/2 | | | 995739 | 106.00 |
| | .040 | **.120** (3x) | 1/8 | 1-1/2 | | | 995740 | 106.00 |
| | .040 | **.203** (5x) | 1/8 | 2-1/2 | | | 936640 | 120.00 |
| | .047 (3/64) | **.071** (1.5x) | 1/8 | 1-1/2 | | | 962747 | 106.00 |
| | .047 (3/64) | **.141** (3x) | 1/8 | 1-1/2 | 799747 | 90.90 | 995747 | 106.00 |
| | .047 (3/64) | **.250** (5x) | 1/8 | 2-1/2 | | | 936647 | 120.00 |
| | .050 | **.150** (3x) | 1/8 | 1-1/2 | | | 995750 | 106.00 |
| | .050 | **.250** (5x) | 1/8 | 2-1/2 | | | 936650 | 120.00 |
| NEW | .055 | **.165** (3x) | 1/8 | 1-1/2 | | | 995755 | 106.00 |
| NEW | .055 | **.275** (5x) | 1/8 | 2-1/2 | | | 936655 | 120.00 |
| | .060 | **.090** (1.5x) | 1/8 | 1-1/2 | | | 962760 | 107.00 |
| | .060 | **.180** (3x) | 1/8 | 1-1/2 | | | 995760 | 106.00 |
| | .060 | **.312** (5x) | 1/8 | 2-1/2 | | | 936660 | 120.00 |
| | .062 (1/16) | **.050** (0.8x) | 1/8 | 1-1/2 | | | 700462 | 106.80 |
| NEW | .062 (1/16) | **.093** (1.5x) | 1/8 | 1-1/2 | 699462 | 89.20 | 962762 | 105.00 |
| | .062 (1/16) | **.186** (3x) | 1/8 | 1-1/2 | 799762 | 89.20 | 995762 | 105.00 |
| | .062 (1/16) | **.250** (4x) | 1/8 | 2-1/2 | | | 871262 | 118.20 |
| | .062 (1/16) | **.312** (5x) | 1/8 | 2-1/2 | | | 936662 | 119.40 |
| | .062 (1/16) | **.500** (8x) | 1/8 | 2-1/2 | | | 891562 | 122.80 |
| | .078 (5/64) | **.118** (1.5x) | 1/8 | 1-1/2 | | | 962778 | 106.10 |
| | .078 (5/64) | **.234** (3x) | 1/8 | 1-1/2 | | | 995778 | 105.00 |
| | .078 (5/64) | **.406** (5x) | 1/8 | 2-1/2 | | | 936678 | 119.40 |

continued on next page

NEW SIZES!

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Square (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (4 µm) | | CVD DIAMOND (9 µm) | | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | |
| .093 (3/32) | **.140** (1.5x) | 1/8 | 1-1/2 | | | 962793 | 105.00 | |
| .093 (3/32) | **.279** (3x) | 1/8 | 1-1/2 | 799793 | 90.10 | 995793 | 105.00 | |
| .093 (3/32) | **.375** (4x) | 1/8 | 2-1/2 | | | 871293 | 118.20 | |
| .093 (3/32) | **.500** (5x) | 1/8 | 2-1/2 | | | 936693 | 119.40 | |
| .093 (3/32) | **.750** (8x) | 1/8 | 2-1/2 | | | 891593 | 122.80 | |
| .100 | **.300** (3x) | 1/8 | 1-1/2 | | | 995800 | 106.10 | |
| .109 (7/64) | **.327** (3x) | 1/8 | 1-1/2 | | | 995802 | 105.00 | |
| .118 (3 mm) | **.354** (3x) | 1/8 | 1-1/2 | | | 995805 | 105.00 | |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | |
| .125 (1/8) | **.100** (0.8x) | 1/8 | 1-1/2 | | | 700508 | 108.70 | |
| .125 (1/8) | **.187** (1.5x) | 1/8 | 1-1/2 | 699508 | 90.80 | 962808 | 107.00 | NEW |
| .125 (1/8) | **.375** (3x) | 1/8 | 1-1/2 | 799808 | 90.80 | 995808 | 107.00 | |
| .125 (1/8) | **.500** (4x) | 1/8 | 2-1/2 | | | 871308 | 118.50 | |
| .125 (1/8) | **.625** (5x) | 1/8 | 2-1/2 | 699208 | 101.80 | 936708 | 120.00 | NEW |
| .125 (1/8) | **1.000** (8x) | 1/8 | 2-1/2 | | | 891608 | 123.30 | |
| .140 (9/64) | **.425** (3x) | 3/16 | 2 | | | 995809 | 135.70 | |
| .156 (5/32) | **.235** (1.5x) | 3/16 | 2 | | | 962810 | 134.30 | |
| .156 (5/32) | **.470** (3x) | 3/16 | 2 | | | 995810 | 134.30 | |
| .187 (3/16) | **.285** (1.5x) | 3/16 | 2 | | | 962812 | 134.30 | |
| .187 (3/16) | **.570** (3x) | 3/16 | 2 | 799812 | 114.20 | 995812 | 134.30 | |
| .187 (3/16) | **.750** (4x) | 3/16 | 3 | | | 871312 | 154.10 | |
| .187 (3/16) | **1.000** (5x) | 3/16 | 3 | 741912 | 144.90 | 936712 | 171.00 | |
| .187 (3/16) | **1.500** (8x) | 3/16 | 3 | | | 891612 | 190.30 | |
| .250 (1/4) | **.200** (0.8x) | 1/4 | 2-1/2 | | | 700516 | 180.90 | |
| .250 (1/4) | **.375** (1.5x) | 1/4 | 2-1/2 | 699516 | 152.20 | 962816 | 179.20 | NEW |
| .250 (1/4) | **.750** (3x) | 1/4 | 2-1/2 | 799816 | 152.20 | 995816 | 179.20 | |
| .250 (1/4) | **1.000** (4x) | 1/4 | 4 | | | 871316 | 189.70 | |
| .250 (1/4) | **1.250** (5x) | 1/4 | 4 | | | 936716 | 192.70 | |
| .312 (5/16) | **.470** (1.5x) | 5/16 | 2-1/2 | | | 962820 | 201.10 | |
| .312 (5/16) | **1.000** (3x) | 5/16 | 2-1/2 | | | 995820 | 201.10 | |
| .375 (3/8) | **.570** (1.5x) | 3/8 | 2-1/2 | 699524 | 182.20 | 962824 | 215.10 | NEW |
| .375 (3/8) | **1.125** (3x) | 3/8 | 2-1/2 | 741924 | 192.20 | 995824 | 226.90 | |
| .375 (3/8) | **2.000** (5x) | 3/8 | 4 | | | 936724 | 237.10 | |
| .500 (1/2) | **.750** (1.5x) | 1/2 | 3 | | | 962832 | 346.90 | |
| .500 (1/2) | **1.500** (3x) | 1/2 | 3 | 741932 | 302.40 | 995832 | 357.10 | |
| .500 (1/2) | **2.625** (5x) | 1/2 | 6 | | | 936732 | 368.90 | |



In The Loupe TV

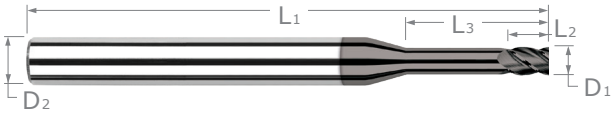
**Check Out Our New CNC Show!**

Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

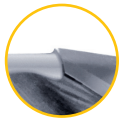
youtube.com/intheloupetv

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Square – Long Reach, Stub Flute




**Outstanding in Graphite!**



Reduced Neck Diameter to Avoid Heeling

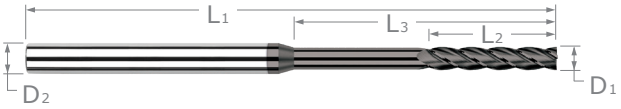
- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity • 4 flutes
- h6 shank tolerance for high precision tool holders • Center cutting • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.000″}_{-.001″}$ | $L_2$ $^{+.010″}_{-.000″}$ | $L_3$ $^{+.010″}_{-.000″}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .015 (1/64) | .023 | **.078** (5x) | 1/8 | 2-1/2 | 943015 | 160.00 |
| .015 (1/64) | .023 | **.125** (8x) | 1/8 | 2-1/2 | 960215 | 160.00 |
| .015 (1/64) | .023 | **.187** (12x) | 1/8 | 2-1/2 | 974615 | 163.90 |
| .020 | .030 | **.100** (5x) | 1/8 | 2-1/2 | 943020 | 160.00 |
| .020 | .030 | **.160** (8x) | 1/8 | 2-1/2 | 960220 | 160.00 |
| .020 | .030 | **.250** (12x) | 1/8 | 2-1/2 | 974620 | 163.90 |
| .025 | .038 | **.125** (5x) | 1/8 | 2-1/2 | 943025 | 160.00 |
| .025 | .038 | **.203** (8x) | 1/8 | 2-1/2 | 960225 | 160.00 |
| .025 | .038 | **.312** (12x) | 1/8 | 2-1/2 | 974625 | 163.90 |
| .031 (1/32) | .047 | **.156** (5x) | 1/8 | 2-1/2 | 943031 | 160.00 |
| .031 (1/32) | .047 | **.250** (8x) | 1/8 | 2-1/2 | 960231 | 160.00 |
| .031 (1/32) | .047 | **.375** (12x) | 1/8 | 2-1/2 | 974631 | 163.90 |
| .039 (1 mm) | .059 | **.203** (5x) | 1/8 | 2-1/2 | 943039 | 160.00 |
| .039 (1 mm) | .059 | **.325** (8x) | 1/8 | 2-1/2 | 960239 | 160.00 |
| .047 (3/64) | .071 | **.250** (5x) | 1/8 | 2-1/2 | 943047 | 160.00 |
| .047 (3/64) | .071 | **.375** (8x) | 1/8 | 2-1/2 | 960247 | 160.00 |
| .047 (3/64) | .071 | **.570** (12x) | 1/8 | 2-1/2 | 974647 | 163.90 |
| .062 (1/16) | .093 | **.312** (5x) | 1/8 | 2-1/2 | 943062 | 145.80 |
| .062 (1/16) | .093 | **.500** (8x) | 1/8 | 2-1/2 | 960262 | 145.80 |
| .062 (1/16) | .093 | **.750** (12x) | 1/8 | 2-1/2 | 974662 | 150.10 |
| .078 (5/64) | .117 | **.406** (5x) | 1/8 | 2-1/2 | 943078 | 145.80 |
| .078 (5/64) | .117 | **.625** (8x) | 1/8 | 2-1/2 | 960278 | 145.80 |
| .078 (5/64) | .117 | **.940** (12x) | 1/8 | 2-1/2 | 974678 | 150.10 |
| .093 (3/32) | .140 | **.500** (5x) | 1/8 | 2-1/2 | 943093 | 145.80 |
| .093 (3/32) | .140 | **.750** (8x) | 1/8 | 2-1/2 | 960293 | 145.80 |
| .093 (3/32) | .140 | **1.125** (12x) | 1/8 | 2-1/2 | 974693 | 150.10 |
| .118 (3 mm) | .177 | **.625** (5x) | 1/8 | 2-1/2 | 943105 | 145.80 |
| .118 (3 mm) | .177 | **.950** (8x) | 1/8 | 2-1/2 | 960305 | 145.80 |
| $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.030″}_{-.000″}$ | $L_3$ $^{+.030″}_{-.000″}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .125 (1/8) | .187 | **.625** (5x) | 1/8 | 2-1/2 | 943108 | 148.70 |
| .125 (1/8) | .187 | **1.000** (8x) | 1/8 | 2-1/2 | 960308 | 148.70 |
| .125 (1/8) | .187 | **1.500** (12x) | 1/8 | 3 | 974708 | 153.00 |
| .187 (3/16) | .285 | **1.000** (5x) | 3/16 | 3 | 943112 | 203.90 |
| .187 (3/16) | .285 | **1.500** (8x) | 3/16 | 3 | 960312 | 203.90 |
| .250 (1/4) | .375 | **1.250** (5x) | 1/4 | 4 | 943116 | 226.80 |
| .250 (1/4) | .375 | **2.000** (8x) | 1/4 | 4 | 960316 | 226.80 |
| .375 (3/8) | .570 | **1.250** (3x) | 3/8 | 2-1/2 | 977924 | 278.70 |
| .375 (3/8) | .570 | **2.000** (5x) | 3/8 | 4 | 943124 | 307.80 |
| .500 (1/2) | .750 | **1.500** (3x) | 1/2 | 3 | 977932 | 417.90 |
| .500 (1/2) | .750 | **2.625** (5x) | 1/2 | 4 | 943132 | 437.10 |

NEW SIZES!

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Square – Long Reach, Long Flute




**Outstanding in Graphite!**

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity
- h6 shank tolerance for high precision tool holders
- 4 flutes
- Center cutting
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (9 µm) | | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | |
| .015 (1/64) | .078 | **.156** (10x) | 1/8 | 2-1/2 | 36315 | 183.40 | |
| .020 | .100 | **.200** (10x) | 1/8 | 2-1/2 | 36320 | 183.40 | |
| .025 | .125 | **.250** (10x) | 1/8 | 2-1/2 | 36325 | 183.40 | |
| .031 (1/32) | .156 | **.250** (8x) | 1/8 | 2-1/2 | 746231 | 179.30 | |
| .031 (1/32) | .156 | **.312** (10x) | 1/8 | 2-1/2 | 36331 | 183.40 | |
| .031 (1/32) | .156 | **.375** (12x) | 1/8 | 2-1/2 | 695131 | 185.50 | NEW |
| .047 (3/64) | .250 | **.480** (10x) | 1/8 | 2-1/2 | 36347 | 183.40 | |
| .047 (3/64) | .250 | **.570** (12x) | 1/8 | 2-1/2 | 695147 | 185.50 | NEW |
| .062 (1/16) | .312 | **.500** (8x) | 1/8 | 2-1/2 | 746262 | 163.70 | |
| .062 (1/16) | .312 | **.625** (10x) | 1/8 | 2-1/2 | 36362 | 167.80 | |
| .062 (1/16) | .312 | **.750** (12x) | 1/8 | 2-1/2 | 695162 | 169.90 | NEW |
| .078 (5/64) | .406 | **.800** (10x) | 1/8 | 2-1/2 | 36378 | 167.80 | |
| .093 (3/32) | .500 | **.750** (8x) | 1/8 | 2-1/2 | 746293 | 163.70 | |
| .093 (3/32) | .500 | **.950** (10x) | 1/8 | 2-1/2 | 36393 | 167.80 | |

| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
|---|---|---|---|---|---|---|
| .125 (1/8) | .625 | **1.00** (8x) | 1/8 | 2-1/2 | 746308 | 174.80 |
| .125 (1/8) | .625 | **1.250** (10x) | 1/8 | 2-1/2 | 36408 | 179.30 |
| .187 (3/16) | 1.000 | **1.875** (10x) | 3/16 | 3 | 36412 | 236.50 |
| .250 (1/4) | 1.250 | **2.500** (10x) | 1/4 | 4 | 36416 | 262.60 |

NEW SIZES!

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Ball




**Outstanding in Graphite!**

- True crystalline CVD diamond on solid carbide substrate
- 4 µm CVD diamond coating yields a sharper cutting edge and therefore leaves a smoother finish on non-ferrous alloys and composites
- 9 µm CVD diamond coating offers increased tool life for non-ferrous alloys and composites, especially higher abrasive materials such as graphite, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- 4 flutes • h6 shank tolerance for high precision tool holders
- Center cutting • CNC ground in the USA



CVD diamond (4 µm) layer for a balance between wear resistance and edge sharpness.



CVD diamond (9 µm) layer for increased tool life, especially in abrasive materials.

| | CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (4 µm) | | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| | .015 (1/64) | **.023** (1.5x) | 1/8 | 1-1/2 | | | 914415 | 115.50 |
| | .015 (1/64) | **.045** (3x) | 1/8 | 1-1/2 | 799515 | 99.00 | 999315 | 115.50 |
| | .015 (1/64) | **.078** (5x) | 1/8 | 2-1/2 | | | 940915 | 129.20 |
| | .020 | **.030** (1.5x) | 1/8 | 1-1/2 | | | 914420 | 115.50 |
| | .020 | **.060** (3x) | 1/8 | 1-1/2 | 799520 | 99.00 | 999320 | 115.50 |
| | .020 | **.100** (5x) | 1/8 | 2-1/2 | | | 940920 | 129.20 |
| | .031 (1/32) | **.047** (1.5x) | 1/8 | 1-1/2 | | | 914431 | 115.50 |
| | .031 (1/32) | **.093** (3x) | 1/8 | 1-1/2 | 799531 | 99.00 | 999331 | 115.50 |
| | .031 (1/32) | **.125** (4x) | 1/8 | 2-1/2 | | | 818631 | 128.00 |
| NEW | .031 (1/32) | **.156** (5x) | 1/8 | 2-1/2 | 699031 | 110.80 | 940931 | 129.20 |
| | .031 (1/32) | **.250** (8x) | 1/8 | 2-1/2 | | | 704731 | 136.80 |
| | .039 (1 mm) | **.117** (3x) | 1/8 | 1-1/2 | | | 999339 | 115.50 |
| | .040 | **.120** (3x) | 1/8 | 1-1/2 | | | 999340 | 116.60 |
| NEW | .040 | **.203** (5x) | 1/8 | 2-1/2 | | | 940940 | 129.20 |
| | .047 (3/64) | **.071** (1.5x) | 1/8 | 1-1/2 | | | 914447 | 116.60 |
| | .047 (3/64) | **.141** (3x) | 1/8 | 1-1/2 | 799547 | 99.00 | 999347 | 115.50 |
| | .047 (3/64) | **.250** (5x) | 1/8 | 2-1/2 | | | 940947 | 129.20 |
| | .050 | **.150** (3x) | 1/8 | 1-1/2 | | | 999350 | 116.60 |
| | .060 | **.180** (3x) | 1/8 | 1-1/2 | | | 999360 | 115.50 |
| NEW | .060 | **.312** (5x) | 1/8 | 2-1/2 | | | 940960 | 125.80 |
| | .062 (1/16) | **.093** (1.5x) | 1/8 | 1-1/2 | | | 914462 | 111.80 |
| | .062 (1/16) | **.186** (3x) | 1/8 | 1-1/2 | 799562 | 95.00 | 999362 | 111.80 |
| | .062 (1/16) | **.250** (4x) | 1/8 | 2-1/2 | | | 818662 | 124.80 |
| | .062 (1/16) | **.312** (5x) | 1/8 | 2-1/2 | | | 940962 | 125.80 |
| | .062 (1/16) | **.500** (8x) | 1/8 | 2-1/2 | | | 704762 | 133.50 |
| | .078 (5/64) | **.118** (1.5x) | 1/8 | 1-1/2 | | | 914478 | 111.80 |
| | .078 (5/64) | **.234** (3x) | 1/8 | 1-1/2 | | | 999378 | 111.80 |
| | .078 (5/64) | **.406** (5x) | 1/8 | 2-1/2 | | | 940978 | 125.80 |
| | .093 (3/32) | **.140** (1.5x) | 1/8 | 1-1/2 | | | 914493 | 112.70 |
| | .093 (3/32) | **.279** (3x) | 1/8 | 1-1/2 | 799593 | 95.90 | 999393 | 111.80 |
| | .093 (3/32) | **.500** (5x) | 1/8 | 2-1/2 | | | 940993 | 125.80 |
| | .100 | **.300** (3x) | 1/8 | 1-1/2 | | | 999400 | 112.70 |
| | .118 (3 mm) | **.354** (3x) | 1/8 | 1-1/2 | | | 999405 | 111.80 |

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NEW SIZES!

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Ball (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (4 µm) | | CVD DIAMOND (9 µm) | | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | |
| .125 (1/8) | **.187** (1.5x) | 1/8 | 1-1/2 | | | 914508 | 113.50 | |
| .125 (1/8) | **.375** (3x) | 1/8 | 1-1/2 | 799608 | 96.40 | 999408 | 113.50 | |
| .125 (1/8) | **.500** (4x) | 1/8 | 2-1/2 | | | 818708 | 127.70 | |
| .125 (1/8) | **.625** (5x) | 1/8 | 2-1/2 | | | 941008 | 129.00 | |
| .125 (1/8) | **1.000** (8x) | 1/8 | 2-1/2 | | | 704808 | 136.60 | |
| .140 | **.425** (3x) | 3/16 | 2 | | | 999409 | 140.90 | NEW |
| .156 (5/32) | **.235** (1.5x) | 3/16 | 2 | | | 914510 | 142.10 | |
| .156 (5/32) | **.470** (3x) | 3/16 | 2 | | | 999410 | 140.90 | |
| .156 (5/32) | **.750** (5x) | 3/16 | 3 | | | 941010 | 144.10 | NEW |
| .187 (3/16) | **.285** (1.5x) | 3/16 | 2 | | | 914512 | 142.10 | |
| .187 (3/16) | **.570** (3x) | 3/16 | 2 | 799612 | 120.80 | 999412 | 140.90 | |
| .250 (1/4) | **.375** (1.5x) | 1/4 | 2-1/2 | | | 914516 | 186.20 | |
| .250 (1/4) | **.750** (3x) | 1/4 | 2-1/2 | 799616 | 158.30 | 999416 | 186.20 | |
| .250 (1/4) | **1.250** (5x) | 1/4 | 4 | | | 941016 | 199.70 | |
| .375 (3/8) | **.570** (1.5x) | 3/8 | 2-1/2 | | | 914524 | 232.30 | |
| .500 (1/2) | **.750** (1.5x) | 1/2 | 3 | | | 914532 | 365.00 | |
| .500 (1/2) | **1.500** (3x) | 1/2 | 3 | | | 999432 | 368.50 | |

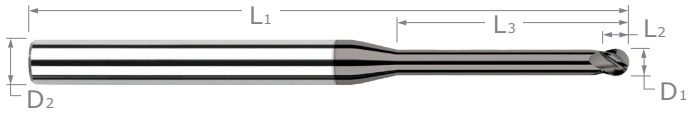


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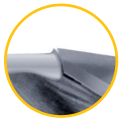
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# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Ball – Long Reach, Stub Flute




**Outstanding in Graphite!**



Reduced Neck Diameter to Avoid Heeling

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity • 4 flutes
- h6 shank tolerance for high precision tool holders • Center cutting • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .015 (1/64) | .023 | **.078** (5x) | 1/8 | 2-1/2 | 61015 | 167.20 |
| .015 (1/64) | .023 | **.125** (8x) | 1/8 | 2-1/2 | 62015 | 167.20 |
| .015 (1/64) | .023 | **.156** (10x) | 1/8 | 2-1/2 | 939515 | 171.50 |
| .015 (1/64) | .023 | **.187** (12x) | 1/8 | 2-1/2 | 65215 | 171.50 |
| .015 (1/64) | .023 | **.225** (15x) | 1/8 | 2-1/2 | 76015 | 180.20 |
| .015 (1/64) | .023 | **.270** (18x) | 1/8 | 2-1/2 | 841815 | 188.70 |
| .020 | .030 | **.100** (5x) | 1/8 | 2-1/2 | 61020 | 167.20 |
| .020 | .030 | **.160** (8x) | 1/8 | 2-1/2 | 62020 | 167.20 |
| .020 | .030 | **.200** (10x) | 1/8 | 2-1/2 | 939520 | 171.50 |
| .020 | .030 | **.250** (12x) | 1/8 | 2-1/2 | 65220 | 171.50 |
| .020 | .030 | **.300** (15x) | 1/8 | 2-1/2 | 76020 | 180.20 |
| .020 | .030 | **.360** (18x) | 1/8 | 2-1/2 | 841820 | 188.70 |
| .025 | .038 | **.125** (5x) | 1/8 | 2-1/2 | 61025 | 167.20 |
| .025 | .038 | **.203** (8x) | 1/8 | 2-1/2 | 62025 | 167.20 |
| .025 | .038 | **.312** (12x) | 1/8 | 2-1/2 | 65225 | 171.50 |
| .025 | .038 | **.375** (15x) | 1/8 | 2-1/2 | 76025 | 180.20 |
| .030 | .045 | **.250** (8x) | 1/8 | 2-1/2 | 62030 | 167.20 |
| .031 (1/32) | .047 | **.093** (3x) | 1/8 | 1-1/2 | 922231 | 150.50 |
| .031 (1/32) | .047 | **.156** (5x) | 1/8 | 2-1/2 | 61031 | 167.20 |
| .031 (1/32) | .047 | **.187** (6x) | 1/8 | 2-1/2 | 795131 | 167.20 |
| .031 (1/32) | .047 | **.218** (7x) | 1/8 | 2-1/2 | 794931 | 167.20 |
| .031 (1/32) | .047 | **.250** (8x) | 1/8 | 2-1/2 | 62031 | 167.20 |
| .031 (1/32) | .047 | **.312** (10x) | 1/8 | 2-1/2 | 939531 | 171.50 |
| .031 (1/32) | .047 | **.375** (12x) | 1/8 | 2-1/2 | 65231 | 171.50 |
| .031 (1/32) | .047 | **.470** (15x) | 1/8 | 2-1/2 | 76031 | 180.20 |
| .031 (1/32) | .047 | **.565** (18x) | 1/8 | 2-1/2 | 841831 | 188.70 |
| .039 (1 mm) | .059 | **.203** (5x) | 1/8 | 2-1/2 | 61039 | 167.20 |
| .039 (1 mm) | .059 | **.325** (8x) | 1/8 | 2-1/2 | 62039 | 167.20 |
| .040 | .060 | **.203** (5x) | 1/8 | 2-1/2 | 61040 | 167.20 |
| .040 | .060 | **.325** (8x) | 1/8 | 2-1/2 | 62040 | 167.20 |
| .047 (3/64) | .071 | **.250** (5x) | 1/8 | 2-1/2 | 61047 | 167.20 |
| .047 (3/64) | .071 | **.375** (8x) | 1/8 | 2-1/2 | 62047 | 167.20 |
| .047 (3/64) | .071 | **.480** (10x) | 1/8 | 2-1/2 | 939547 | 171.50 |
| .047 (3/64) | .071 | **.570** (12x) | 1/8 | 2-1/2 | 65247 | 171.50 |
| .047 (3/64) | .071 | **.710** (15x) | 1/8 | 2-1/2 | 76047 | 180.20 |
| .047 (3/64) | .071 | **.850** (18x) | 1/8 | 2-1/2 | 841847 | 188.70 |
| .050 | .075 | **.250** (5x) | 1/8 | 2-1/2 | 61050 | 167.20 |
| .050 | .075 | **.400** (8x) | 1/8 | 2-1/2 | 62050 | 167.20 |
| .060 | .090 | **.312** (5x) | 1/8 | 2-1/2 | 61060 | 167.20 |
| .060 | .090 | **.500** (8x) | 1/8 | 2-1/2 | 62060 | 167.20 |

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# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Ball – Long Reach, Stub Flute (cont.)

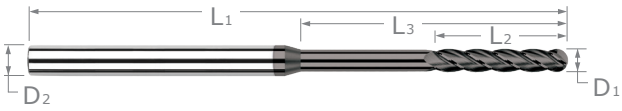
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| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .062 (1/16) | .093 | **.186** (3x) | 1/8 | 1-1/2 | 922262 | 132.80 |
| .062 (1/16) | .093 | **.312** (5x) | 1/8 | 2-1/2 | 61062 | 150.10 |
| .062 (1/16) | .093 | **.375** (6x) | 1/8 | 2-1/2 | 795162 | 150.10 |
| .062 (1/16) | .093 | **.437** (7x) | 1/8 | 2-1/2 | 794962 | 150.10 |
| .062 (1/16) | .093 | **.500** (8x) | 1/8 | 2-1/2 | 62062 | 150.10 |
| .062 (1/16) | .093 | **.625** (10x) | 1/8 | 2-1/2 | 939562 | 154.60 |
| .062 (1/16) | .093 | **.750** (12x) | 1/8 | 2-1/2 | 65262 | 154.60 |
| .062 (1/16) | .093 | **.950** (15x) | 1/8 | 2-1/2 | 76062 | 162.60 |
| .062 (1/16) | .093 | **1.125** (18x) | 1/8 | 2-1/2 | 841862 | 170.60 |
| .078 (5/64) | .117 | **.406** (5x) | 1/8 | 2-1/2 | 61078 | 150.10 |
| .078 (5/64) | .117 | **.625** (8x) | 1/8 | 2-1/2 | 62078 | 150.10 |
| .078 (5/64) | .117 | **.800** (10x) | 1/8 | 2-1/2 | 939578 | 154.60 |
| .078 (5/64) | .117 | **.940** (12x) | 1/8 | 2-1/2 | 65278 | 154.60 |
| .078 (5/64) | .117 | **1.187** (15x) | 1/8 | 2-1/2 | 76078 | 162.60 |
| .078 (5/64) | .117 | **1.400** (18x) | 1/8 | 2-1/2 | 841878 | 170.60 |
| .093 (3/32) | .140 | **.279** (3x) | 1/8 | 1-1/2 | 922293 | 132.80 |
| .093 (3/32) | .140 | **.500** (5x) | 1/8 | 2-1/2 | 61093 | 150.10 |
| .093 (3/32) | .140 | **.585** (6x) | 1/8 | 2-1/2 | 795193 | 150.10 |
| .093 (3/32) | .140 | **.670** (7x) | 1/8 | 2-1/2 | 794993 | 150.10 |
| .093 (3/32) | .140 | **.750** (8x) | 1/8 | 2-1/2 | 62093 | 150.10 |
| .093 (3/32) | .140 | **.950** (10x) | 1/8 | 2-1/2 | 939593 | 154.60 |
| .093 (3/32) | .140 | **1.125** (12x) | 1/8 | 2-1/2 | 65293 | 154.60 |
| .093 (3/32) | .140 | **1.400** (15x) | 1/8 | 2-1/2 | 76093 | 162.60 |
| .093 (3/32) | .140 | **1.675** (18x) | 1/8 | 3 | 841893 | 170.60 |
| .100 | .150 | **.800** (8x) | 1/8 | 2-1/2 | 62100 | 150.10 |
| .109 (7/64) | .164 | **.900** (8x) | 1/8 | 2-1/2 | 62102 | 150.10 |
| .118 (3 mm) | .177 | **.625** (5x) | 1/8 | 2-1/2 | 61105 | 150.10 |
| .118 (3 mm) | .177 | **.950** (8x) | 1/8 | 2-1/2 | 62105 | 150.10 |

| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
|---|---|---|---|---|---|---|
| .125 (1/8) | .187 | **.375** (3x) | 1/8 | 1-1/2 | 64008 | 146.80 |
| .125 (1/8) | .187 | **.625** (5x) | 1/8 | 2-1/2 | 61108 | 163.70 |
| .125 (1/8) | .187 | **.750** (6x) | 1/8 | 2-1/2 | 795208 | 163.70 |
| .125 (1/8) | .187 | **.875** (7x) | 1/8 | 2-1/2 | 795008 | 163.70 |
| .125 (1/8) | .187 | **1.000** (8x) | 1/8 | 2-1/2 | 62108 | 163.70 |
| .125 (1/8) | .187 | **1.250** (10x) | 1/8 | 2-1/2 | 939608 | 168.50 |
| .125 (1/8) | .187 | **1.500** (12x) | 1/8 | 3 | 65308 | 168.50 |
| .125 (1/8) | .187 | **1.875** (15x) | 1/8 | 3 | 944108 | 177.30 |
| .125 (1/8) | .187 | **2.250** (18x) | 1/8 | 4 | 841908 | 187.90 |
| .140 (9/64) | .220 | **1.125** (8x) | 3/16 | 3 | 62109 | 211.20 |
| .156 (5/32) | .235 | **.750** (5x) | 3/16 | 3 | 61110 | 211.20 |
| .156 (5/32) | .235 | **1.250** (8x) | 3/16 | 3 | 62110 | 211.20 |
| .187 (3/16) | .285 | **1.000** (5x) | 3/16 | 3 | 61112 | 211.20 |
| .187 (3/16) | .285 | **1.500** (8x) | 3/16 | 3 | 62112 | 211.20 |
| .187 (3/16) | .285 | **2.250** (12x) | 3/16 | 4 | 65312 | 222.50 |
| .250 (1/4) | .375 | **1.250** (5x) | 1/4 | 4 | 61116 | 234.70 |
| .250 (1/4) | .375 | **2.000** (8x) | 1/4 | 4 | 62116 | 234.70 |
| .250 (1/4) | .375 | **3.000** (12x) | 1/4 | 6 | 65316 | 245.10 |
| .312 (5/16) | .470 | **2.500** (8x) | 5/16 | 4 | 62120 | 255.90 |
| .375 (3/8) | .570 | **1.250** (3x) | 3/8 | 2-1/2 | 64024 | 294.90 |
| .500 (1/2) | .750 | **1.500** (3x) | 1/2 | 3 | 64032 | 438.20 |

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Ball – Long Reach, Long Flute




**Outstanding in Graphite!**

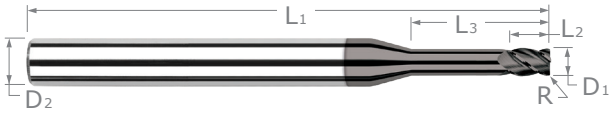
- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity
- h6 shank tolerance for high precision tool holders
- 4 flutes
- Center cutting
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.000″}_{-.001″}$ | $L_2$ $^{+.010″}_{-.000″}$ | $L_3$ $^{+.010″}_{-.000″}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .015 (1/64) | **.078** | **.156** (10x) | 1/8 | 2-1/2 | 36515 | 196.20 |
| .020 | **.100** | **.200** (10x) | 1/8 | 2-1/2 | 36520 | 196.20 |
| .025 | **.125** | **.250** (10x) | 1/8 | 2-1/2 | 36525 | 196.20 |
| .031 (1/32) | **.156** | **.250** (8x) | 1/8 | 2-1/2 | 745831 | 191.90 |
| .031 (1/32) | **.156** | **.312** (10x) | 1/8 | 2-1/2 | 36531 | 196.20 |
| .031 (1/32) | **.156** | **.375** (12x) | 1/8 | 2-1/2 | 717831 | 200.50 |
| .047 (3/64) | **.250** | **.480** (10x) | 1/8 | 2-1/2 | 36547 | 196.20 |
| .062 (1/16) | **.312** | **.500** (8x) | 1/8 | 2-1/2 | 745862 | 171.80 |
| .062 (1/16) | **.312** | **.625** (10x) | 1/8 | 2-1/2 | 36562 | 175.90 |
| .062 (1/16) | **.312** | **.750** (12x) | 1/8 | 2-1/2 | 717862 | 200.50 |
| .078 (5/64) | **.406** | **.800** (10x) | 1/8 | 2-1/2 | 36578 | 175.90 |
| .093 (3/32) | **.500** | **.750** (8x) | 1/8 | 2-1/2 | 745893 | 171.80 |
| .093 (3/32) | **.500** | **.950** (10x) | 1/8 | 2-1/2 | 36593 | 175.90 |
| .093 (3/32) | **.500** | **1.125** (12x) | 1/8 | 2-1/2 | 717893 | 200.50 |
| $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.030″}_{-.000″}$ | $L_3$ $^{+.030″}_{-.000″}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .125 (1/8) | **.625** | **1.000** (8x) | 1/8 | 2-1/2 | 745908 | 182.80 |
| .125 (1/8) | **.625** | **1.250** (10x) | 1/8 | 2-1/2 | 36608 | 187.20 |
| .187 (3/16) | **1.000** | **1.875** (10x) | 3/16 | 3 | 36612 | 247.40 |
| .250 (1/4) | **1.250** | **2.500** (10x) | 1/4 | 4 | 36616 | 274.70 |

NEW SIZES!

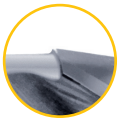
# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Corner Radius – Long Reach, Stub Flute




**Outstanding in Graphite!**

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity
- Corner radius for improved strength
- 4 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting • CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $L_3$ +.010″ −.000″ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .015 (1/64) | **.003** | .023 | **.078** (5x) | 1/8 | 2-1/2 | 61615 | 167.20 |
| .015 (1/64) | **.003** | .023 | **.125** (8x) | 1/8 | 2-1/2 | 61915 | 167.20 |
| .015 (1/64) | **.003** | .023 | **.187** (12x) | 1/8 | 2-1/2 | 62215 | 171.50 |
| .020 | **.005** | .030 | **.100** (5x) | 1/8 | 2-1/2 | 62920 | 167.20 |
| .020 | **.005** | .030 | **.160** (8x) | 1/8 | 2-1/2 | 63220 | 167.20 |
| .020 | **.005** | .030 | **.250** (12x) | 1/8 | 2-1/2 | 64120 | 171.50 |
| .025 | **.005** | .038 | **.125** (5x) | 1/8 | 2-1/2 | 62925 | 167.20 |
| .025 | **.005** | .038 | **.203** (8x) | 1/8 | 2-1/2 | 63225 | 167.20 |
| .025 | **.005** | .038 | **.312** (12x) | 1/8 | 2-1/2 | 64125 | 171.50 |
| .031 (1/32) | **.005** | .047 | **.156** (5x) | 1/8 | 2-1/2 | 62931 | 167.20 |
| .031 (1/32) | **.005** | .047 | **.250** (8x) | 1/8 | 2-1/2 | 63231 | 167.20 |
| .031 (1/32) | **.005** | .047 | **.375** (12x) | 1/8 | 2-1/2 | 64131 | 171.50 |
| .039 (1 mm) | **.005** | .059 | **.203** (5x) | 1/8 | 2-1/2 | 62939 | 167.20 |
| .039 (1 mm) | **.005** | .059 | **.325** (8x) | 1/8 | 2-1/2 | 63239 | 167.20 |
| .047 (3/64) | **.005** | .071 | **.250** (5x) | 1/8 | 2-1/2 | 62947 | 167.20 |
| .047 (3/64) | **.005** | .071 | **.375** (8x) | 1/8 | 2-1/2 | 63247 | 167.20 |
| .047 (3/64) | **.005** | .071 | **.570** (12x) | 1/8 | 2-1/2 | 64147 | 171.50 |
| .062 (1/16) | **.005** | .093 | **.312** (5x) | 1/8 | 2-1/2 | 62962 | 150.10 |
| .062 (1/16) | **.005** | .093 | **.500** (8x) | 1/8 | 2-1/2 | 63262 | 150.10 |
| .062 (1/16) | **.010** | .093 | **.312** (5x) | 1/8 | 2-1/2 | 65062 | 150.10 |
| .062 (1/16) | **.010** | .093 | **.500** (8x) | 1/8 | 2-1/2 | 66562 | 150.10 |
| .062 (1/16) | **.010** | .093 | **.625** (10x) | 1/8 | 2-1/2 | 717462 | 152.30 |
| .062 (1/16) | **.010** | .093 | **.750** (12x) | 1/8 | 2-1/2 | 65962 | 154.60 |
| .062 (1/16) | **.015** | .093 | **.312** (5x) | 1/8 | 2-1/2 | 695062 | 150.10 NEW |
| .062 (1/16) | **.015** | .093 | **.500** (8x) | 1/8 | 2-1/2 | 694962 | 150.10 NEW |
| .078 (5/64) | **.010** | .117 | **.406** (5x) | 1/8 | 2-1/2 | 65078 | 150.10 |
| .078 (5/64) | **.010** | .117 | **.625** (8x) | 1/8 | 2-1/2 | 66578 | 150.10 |
| .078 (5/64) | **.010** | .117 | **.940** (12x) | 1/8 | 2-1/2 | 65978 | 154.60 |
| .093 (3/32) | **.010** | .140 | **.500** (5x) | 1/8 | 2-1/2 | 65093 | 150.10 |
| .093 (3/32) | **.010** | .140 | **.750** (8x) | 1/8 | 2-1/2 | 66593 | 150.10 |
| .093 (3/32) | **.010** | .140 | **.950** (10x) | 1/8 | 2-1/2 | 717493 | 152.30 |
| .093 (3/32) | **.010** | .140 | **1.125** (12x) | 1/8 | 2-1/2 | 65993 | 154.60 |
| .118 (3 mm) | **.010** | .177 | **.625** (5x) | 1/8 | 2-1/2 | 916305 | 150.10 |
| .118 (3 mm) | **.010** | .177 | **.950** (8x) | 1/8 | 2-1/2 | 914705 | 150.10 |

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# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page

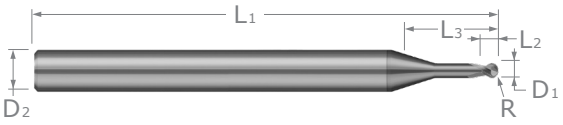
| | CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| | .125 (1/8) | **.010** | .187 | **.625** (5x) | 1/8 | 2-1/2 | 916308 | 163.70 |
| | .125 (1/8) | **.010** | .187 | **1.000** (8x) | 1/8 | 2-1/2 | 914708 | 163.70 |
| | .125 (1/8) | **.015** | .187 | **.625** (5x) | 1/8 | 2-1/2 | 66208 | 163.70 |
| | .125 (1/8) | **.015** | .187 | **1.000** (8x) | 1/8 | 2-1/2 | 64708 | 163.70 |
| | .125 (1/8) | **.015** | .187 | **1.250** (10x) | 1/8 | 3 | 717308 | 166.10 |
| | .125 (1/8) | **.015** | .187 | **1.500** (12x) | 1/8 | 3 | 66408 | 168.50 |
| | .187 (3/16) | **.030** | .285 | **1.000** (5x) | 3/16 | 3 | 63312 | 211.20 |
| | .187 (3/16) | **.030** | .285 | **1.500** (8x) | 3/16 | 3 | 65612 | 211.20 |
| | .250 (1/4) | **.030** | .375 | **1.250** (5x) | 1/4 | 4 | 63316 | 234.70 |
| | .250 (1/4) | **.030** | .375 | **2.000** (8x) | 1/4 | 4 | 65616 | 234.70 |
| | .250 (1/4) | **.030** | .375 | **2.500** (10x) | 1/4 | 4 | 717116 | 237.10 |
| NEW | .375 (3/8) | **.030** | .570 | **2.000** (5x) | 3/8 | 4 | 63324 | 288.60 |
| NEW | .375 (3/8) | **.030** | .570 | **3.000** (8x) | 3/8 | 6 | 65624 | 318.70 |

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# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Finishers – Tight Tolerance – Ball




| DIAMETER (mm) | THICKNESS (Microns) |
|---|---|
| 0.20 - 0.59 | 4 µm +2 µm / -0 µm |
| 0.60 - 0.99 | 6 µm +2 µm / -0 µm |
| 1.00 - 5.99 | 8 µm +2 µm / -0 µm |
| 6.00+ | 10 µm +3µm / -0 µm |

- Tight tolerance radii offers unparalleled precision and consistency, ensuring a perfect fit for high-precision applications.
- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- h5 shank tolerance for high precision tool holders
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • CNC ground in Switzerland

| CUTTER DIAMETER | RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (Variable µm) | |
|---|---|---|---|---|---|---|---|
| $D_1$ +.000mm −.001mm | R +.002mm −.002mm | $L_2$ +.010mm −.010mm | $L_3$ +.020mm −.000mm | $D_2$ | $L_1$ | 2 FL | USD$ |
| .20 mm | .10 mm | .30 mm | 1 mm (5x) | 3 mm | 55 mm | 689004 | 94.60 |
| .30 mm | .15 mm | .40 mm | 3 mm (10x) | 3 mm | 55 mm | 688706 | 94.60 |
| .40 mm | .20 mm | .50 mm | 4 mm (10x) | 3 mm | 55 mm | 688709 | 94.60 |
| .50 mm | .25 mm | .60 mm | 10 mm (20x) | 3 mm | 55 mm | 688411 | 91.80 |
| .50 mm | .25 mm | .60 mm | 5 mm (10x) | 3 mm | 55 mm | 688711 | 91.80 |
| .60 mm | .30 mm | .80 mm | 6 mm (10x) | 3 mm | 55 mm | 688713 | 95.70 |
| .60 mm | .30 mm | .80 mm | 9 mm (15x) | 3 mm | 55 mm | 688513 | 95.70 |
| .60 mm | .30 mm | .80 mm | 12 mm (20x) | 3 mm | 55 mm | 688413 | 95.70 |
| .80 mm | .40 mm | 1.00 mm | 8 mm (10x) | 3 mm | 55 mm | 688718 | 95.70 |
| 1.00 mm | .50 mm | 1.20 mm | 5 mm (5x) | 3 mm | 55 mm | 689022 | 99.90 |
| 1.00 mm | .50 mm | 1.20 mm | 10 mm (10x) | 3 mm | 55 mm | 688722 | 99.90 |
| 1.00 mm | .50 mm | 1.20 mm | 15 mm (15x) | 3 mm | 55 mm | 688522 | 99.90 |
| 1.00 mm | .50 mm | 1.20 mm | 20 mm (20x) | 3 mm | 55 mm | 688422 | 99.90 |
| 1.50 mm | .75 mm | 1.80 mm | 10 mm (6x) | 3 mm | 55 mm | 688933 | 99.20 |
| 1.50 mm | .75 mm | 1.80 mm | 15 mm (10x) | 3 mm | 55 mm | 688733 | 99.20 |
| 2.00 mm | 1.00 mm | 2.00 mm | 10 mm (5x) | 3 mm | 65 mm | 689045 | 102.10 |
| 2.00 mm | 1.00 mm | 2.00 mm | 15 mm (7x) | 3 mm | 65 mm | 688845 | 102.10 |
| 2.00 mm | 1.00 mm | 2.00 mm | 20 mm (10x) | 3 mm | 65 mm | 688745 | 102.10 |
| 2.00 mm | 1.00 mm | 2.00 mm | 25 mm (12x) | 3 mm | 65 mm | 688645 | 102.10 |
| 3.00 mm | 1.50 mm | 3.00 mm | 10 mm (3x) | 4 mm | 65 mm | 689157 | 122.50 |
| 3.00 mm | 1.50 mm | 3.00 mm | 15 mm (5x) | 4 mm | 65 mm | 689057 | 122.50 |
| 3.00 mm | 1.50 mm | 3.00 mm | 20 mm (6x) | 4 mm | 65 mm | 688957 | 122.50 |
| 3.00 mm | 1.50 mm | 3.00 mm | 30 mm (10x) | 4 mm | 75 mm | 688757 | 125.00 |
| 4.00 mm | 2.00 mm | 4.00 mm | 20 mm (5x) | 6 mm | 65 mm | 689061 | 144.40 |
| 4.00 mm | 2.00 mm | 4.00 mm | 30 mm (7x) | 6 mm | 75 mm | 688861 | 147.90 |
| 4.00 mm | 2.00 mm | 4.00 mm | 40 mm (10x) | 6 mm | 90 mm | 688761 | 167.60 |
| 6.00 mm | 3.00 mm | 6.00 mm | 30 mm (5x) | 6 mm | 75 mm | 689066 | 195.90 |

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Corner Radius




**Outstanding in Graphite!**

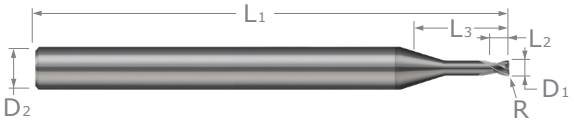
- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Corner radius for improved strength
- 4 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting
- CNC ground in the USA

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.000″}_{-.001″}$ | R $^{+.001″}_{-.001″}$ | $L_2$ $^{+.010″}_{-.000″}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| .015 (1/64) | **.003** | **.023** (1.5x) | 1/8 | 1-1/2 | 717615 | 116.60 |
| .015 (1/64) | **.003** | **.045** (3x) | 1/8 | 1-1/2 | 942015 | 115.50 |
| .020 | **.005** | **.060** (3x) | 1/8 | 1-1/2 | 955420 | 116.60 |
| .031 (1/32) | **.005** | **.047** (1.5x) | 1/8 | 1-1/2 | 746831 | 116.60 |
| .031 (1/32) | **.005** | **.093** (3x) | 1/8 | 1-1/2 | 955431 | 115.50 |
| .031 (1/32) | **.005** | **.156** (5x) | 1/8 | 2-1/2 | 819331 | 129.20 |
| .031 (1/32) | **.010** | **.093** (3x) | 1/8 | 1-1/2 | 977131 | 116.60 |
| .047 (3/64) | **.005** | **.141** (3x) | 1/8 | 1-1/2 | 955447 | 115.50 |
| .062 (1/16) | **.005** | **.186** (3x) | 1/8 | 1-1/2 | 955462 | 111.80 |
| .062 (1/16) | **.010** | **.093** (1.5x) | 1/8 | 1-1/2 | 745062 | 112.70 |
| .062 (1/16) | **.010** | **.186** (3x) | 1/8 | 1-1/2 | 977162 | 111.80 |
| .062 (1/16) | **.010** | **.312** (5x) | 1/8 | 2-1/2 | 820462 | 125.80 |
| .062 (1/16) | **.020** | **.186** (3x) | 1/8 | 1-1/2 | 768262 | 112.70 |
| .078 (5/64) | **.010** | **.234** (3x) | 1/8 | 1-1/2 | 977178 | 112.70 |
| .093 (3/32) | **.005** | **.140** (1.5x) | 1/8 | 1-1/2 | 746893 | 112.70 |
| .093 (3/32) | **.005** | **.279** (3x) | 1/8 | 1-1/2 | 955493 | 111.80 |
| .093 (3/32) | **.010** | **.279** (3x) | 1/8 | 1-1/2 | 977193 | 111.80 |
| .093 (3/32) | **.015** | **.279** (3x) | 1/8 | 1-1/2 | 938593 | 111.80 |
| .093 (3/32) | **.030** | **.279** (3x) | 1/8 | 1-1/2 | 906293 | 112.70 |

| | $D_1$ $^{+.000″}_{-.002″}$ | R $^{+.001″}_{-.001″}$ | $L_2$ $^{+.030″}_{-.000″}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|
| | .125 (1/8) | **.005** | **.187** (1.5x) | 1/8 | 1-1/2 | 746908 | 114.60 |
| | .125 (1/8) | **.005** | **.375** (3x) | 1/8 | 1-1/2 | 955508 | 113.50 |
| | .125 (1/8) | **.010** | **.375** (3x) | 1/8 | 1-1/2 | 977208 | 113.50 |
| | .125 (1/8) | **.015** | **.187** (1.5x) | 1/8 | 1-1/2 | 748408 | 114.60 |
| | .125 (1/8) | **.015** | **.375** (3x) | 1/8 | 1-1/2 | 938608 | 113.50 |
| | .125 (1/8) | **.015** | **.625** (5x) | 1/8 | 2-1/2 | 855208 | 126.60 |
| | .125 (1/8) | **.030** | **.375** (3x) | 1/8 | 1-1/2 | 906308 | 113.50 |
| | .156 (5/32) | **.015** | **.470** (3x) | 3/16 | 2 | 938610 | 142.10 |
| | .187 (3/16) | **.015** | **.570** (3x) | 3/16 | 2 | 938612 | 140.90 |
| | .187 (3/16) | **.030** | **.570** (3x) | 3/16 | 2 | 906312 | 140.90 |
| | .250 (1/4) | **.010** | **.750** (3x) | 1/4 | 2-1/2 | 977216 | 186.20 |
| NEW | .250 (1/4) | **.015** | **.750** (3x) | 1/4 | 2-1/2 | 938616 | 186.20 |
| NEW | .250 (1/4) | **.015** | **1.250** (5x) | 1/4 | 4 | 855216 | 201.60 |
| | .250 (1/4) | **.030** | **.375** (1.5x) | 1/4 | 2-1/2 | 747716 | 188.10 |
| | .250 (1/4) | **.030** | **.750** (3x) | 1/4 | 2-1/2 | 906316 | 186.20 |
| | .250 (1/4) | **.030** | **1.250** (5x) | 1/4 | 4 | 862116 | 201.60 |
| NEW | .375 (3/8) | **.015** | **1.125** (3x) | 3/8 | 2-1/2 | 938624 | 221.70 |
| | .375 (3/8) | **.030** | **1.125** (3x) | 3/8 | 2-1/2 | 906324 | 221.70 |

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## CVD Diamond – Finishers – Tight Tolerance – Corner Radius




| DIAMETER (mm) | THICKNESS (Microns) |
|---|---|
| 1.00 - 5.99 | 8 µm +2 µm / -0 µm |
| 6.00+ | 10 µm +3 µm / -0 µm |

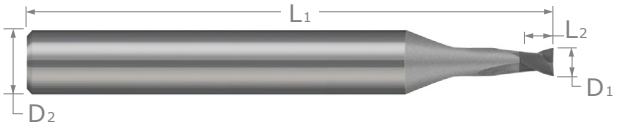
- Tight tolerance radii offers unparalleled precision and consistency, ensuring a perfect fit for high-precision applications.
- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- h5 shank tolerance for high precision tool holders
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • CNC ground in Switzerland

| CUTTER DIAMETER | RADIUS | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | CVD DIAMOND (Variable µm) | |
|---|---|---|---|---|---|---|---|
| $D_1$ +.000mm −.010mm | R +.000mm −.004mm | $L_2$ +.010mm −.010mm | $L_3$ +.020mm −.000mm | $D_2$ | $L_1$ | 2 FL | USD$ |
| 1.00 mm | .10 mm | 1.20 mm | 10 mm (10x) | 3 mm | 55 mm | 684422 | 103.00 |
| 1.00 mm | .10 mm | 1.20 mm | 15 mm (15x) | 3 mm | 55 mm | 684022 | 103.00 |
| 1.50 mm | .15 mm | 1.80 mm | 15 mm (10x) | 3 mm | 55 mm | 684333 | 102.50 |
| 2.00 mm | .20 mm | 2.00 mm | 10 mm (5x) | 3 mm | 65 mm | 685245 | 105.40 |
| 2.00 mm | .50 mm | 2.00 mm | 15 mm (7x) | 3 mm | 65 mm | 684745 | 105.40 |
| 2.00 mm | .20 mm | 2.00 mm | 15 mm (7x) | 3 mm | 65 mm | 684845 | 105.40 |
| 2.00 mm | .20 mm | 2.00 mm | 20 mm (10x) | 3 mm | 65 mm | 684245 | 105.40 |
| 3.00 mm | .30 mm | 3.00 mm | 15 mm (5x) | 4 mm | 65 mm | 685157 | 126.20 |
| 3.00 mm | .50 mm | 3.00 mm | 20 mm (6x) | 4 mm | 65 mm | 684957 | 126.20 |
| 3.00 mm | .30 mm | 3.00 mm | 25 mm (8x) | 4 mm | 75 mm | 684657 | 128.90 |
| 3.00 mm | .50 mm | 3.00 mm | 30 mm (10x) | 4 mm | 75 mm | 684157 | 128.90 |
| 4.00 mm | .50 mm | 4.00 mm | 20 mm (5x) | 6 mm | 65 mm | 685061 | 148.80 |
| 4.00 mm | .50 mm | 4.00 mm | 30 mm (7x) | 6 mm | 75 mm | 684761 | 152.60 |
| 4.00 mm | .50 mm | 4.00 mm | 40 mm (10x) | 6 mm | 90 mm | 684161 | 172.90 |
| 6.00 mm | .50 mm | 6.00 mm | 30 mm (5x) | 6 mm | 75 mm | 685066 | 202.00 |
| 6.00 mm | .50 mm | 6.00 mm | 40 mm (6x) | 6 mm | 90 mm | 684966 | 222.40 |
| 6.00 mm | .50 mm | 6.00 mm | 50 mm (8x) | 6 mm | 90 mm | 684566 | 222.40 |

NEW

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## PCD Diamond – Full Nib Square




- Traditional end mill design ground into a full PCD diamond nib allows for improved edge retention and cutting speeds when compared to PCD diamond wafer tools
- PCD diamond allows for significant tool life improvement over carbide
- Diameter sizes smaller than traditional PCD diamond wafer tools – down to .040”
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- 2 flute • Center cutting
- h6 tolerance for high precision tool holders

| | CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | PCD DIAMOND | |
|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0008''}_{-.0008''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| NEW | .040 | .068 | 1/8 | 1-1/2 | 822840 | 376.80 |
| NEW | .062 (1/16) | .135 | 1/8 | 1-1/2 | 822862 | 414.20 |
| NEW | .078 (5/64) | .135 | 1/8 | 1-1/2 | 822878 | 464.00 |
| NEW | .093 (3/32) | .135 | 1/8 | 1-1/2 | 822893 | 476.40 |
| NEW | .125 (1/8) | .135 | 1/8 | 1-1/2 | 822808 | 495.10 |

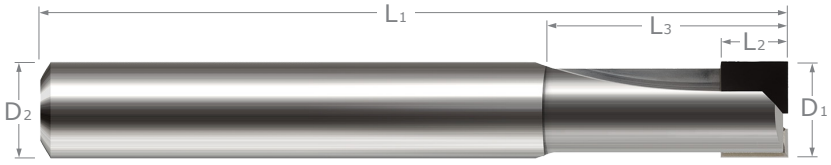
## SPEEDS & FEEDS (Square PCD Diamond Full Nib End Mills)

**Important Note:** Values in table are in inches and are based on advertised length of cut end mills. For complete speeds and feeds charts, please see www.harveytool.com

| Material | SFM | | Chip Load Per Tooth (IPT) .040 | .062 | .078 | .093 | .125 | Depth of Cut Radial | Axial |
|---|---|---|---|---|---|---|---|---|---|
| **Aluminum Alloys:** 0% - 5% Silicon (2xx, 3xx, 4xx, 5xx, 7xx, 8xx, A3xx, A4xx, B4xx, C3xx, 1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1500 - 3000 | Roughing | .00067 | .00091 | .00114 | .00136 | .00183 | .60 x Dia | 1 x Dia |
| | | Finishing | .00058 | .00079 | .00099 | .00118 | .00159 | .25 x Dia | 1 x Dia |
| 5%-8% Silicon (3xx, A3xx, C3xx, 4xx, A4xx, B4xx, 4xxx) | 1500 - 3000 | Roughing | .00060 | .00081 | .00103 | .00122 | .00164 | .60 x Dia | 1 x Dia |
| | | Finishing | .00053 | .00089 | .00089 | .00106 | .00143 | .25 x Dia | 1 x Dia |
| 8%-12% Silicon (3xx, A3xx, C3xx, 4xx, A4xx, B4xx, 4xxx) | 1100 - 2200 | Roughing | .00050 | .00068 | .00085 | .00102 | .00137 | .60 x Dia | 1 x Dia |
| | | Finishing | .00044 | .00059 | .00074 | .00089 | .00119 | .25 x Dia | 1 x Dia |
| 12%-16% Silicon (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 750 - 1500 | Roughing | .00040 | .00054 | .00068 | .00081 | .00110 | .60 x Dia | 1 x Dia |
| | | Finishing | .00035 | .00047 | .00059 | .00071 | .00095 | .25 x Dia | 1 x Dia |
| **PLASTICS:** Unfilled | 750 - 1500 | Roughing | .00071 | .00095 | .00120 | .00143 | .00192 | .60 x Dia | 1 x Dia |
| | | Finishing | .00061 | .00083 | .00104 | .00124 | .00167 | .25 x Dia | 1 x Dia |
| 5% - 20% Filled or Fiber Reinforced | 550 - 1100 | Roughing | .00064 | .00086 | .00108 | .00129 | .00173 | .60 x Dia | 1 x Dia |
| | | Finishing | .00055 | .00075 | .00094 | .00112 | .00151 | .25 x Dia | 1 x Dia |
| 21% - 40% Filled or Fiber Reinforced | 400 - 750 | Roughing | .00057 | .00077 | .00097 | .00115 | .00155 | .60 x Dia | 1 x Dia |
| | | Finishing | .00050 | .00067 | .00084 | .00100 | .00135 | .25 x Dia | 1 x Dia |
| **GRAPHITE:** POCO 3 | 600 - 1200 | Roughing | .00077 | .00104 | .00131 | .00156 | .00210 | .75 x Dia | Max LoC |
| | | Finishing | .00067 | .00091 | .00114 | .00136 | .00183 | .30 x Dia | 1 x Dia |
| **GREEN CARBIDE & GREEN CERAMICS:** | 100 - 750 | Roughing | .00071 | .00095 | .00120 | .00143 | .00192 | .75 x Dia | Max LoC |
| | | Finishing | .00061 | .00083 | .00104 | .00124 | .00167 | .30 x Dia | 1 x Dia |

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## PCD Diamond – Square




- PCD diamond brazed wafer on solid carbide body allows for significant tool life improvement over carbide
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting for 1 and 2 flutes
- End cutting (not center cutting) for 4 flutes

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | PCD DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.020″}_{-.000″}$ | $L_3$ $^{+.020″}_{-.000″}$ | | $D_2$ | $L_1$ | TOOL # | USD$ |
| 3/32 | 3/16 | **3/8** | 1 | 1/8 | 1-1/2 | 12106 | 310.50 |
| 3 mm | 1/4 | **1/2** | 1 | 1/8 | 1-1/2 | 1213M | 310.50 |
| 1/8 | 1/16 | **1/4** | 1 | 1/8 | 1-1/2 | 709608 | 266.50 |
| 1/8 | 1/8 | **5/16** | 1 | 1/8 | 1-1/2 | 760008 | 282.10 |
| 1/8 | 1/4 | **1/2** | 1 | 1/8 | 1-1/2 | 12108 | 310.50 |
| 1/8 | 3/8 | **5/8** | 1 | 1/8 | 1-1/2 | 709508 | 314.80 |
| 5/32 | 1/4 | **1/2** | 1 | 3/16 | 2 | 12110 | 346.90 |
| 3/16 | 3/16 | **3/8** | 2 | 3/16 | 2 | 709412 | 338.00 |
| 3/16 | 1/4 | **5/8** | 2 | 3/16 | 2 | 12112 | 346.90 |
| 3/16 | 1/2 | **7/8** | 2 | 3/16 | 2-1/2 | 739212 | 355.80 |
| 1/4 | 1/4 | **3/4** | 2 | 1/4 | 2-1/2 | 12116 | 376.70 |
| 1/4 | 1/4 | **3/4** | 4 | 1/4 | 2-1/2 | 708816 | 531.60 |
| 1/4 | 1/2 | **1** | 2 | 1/4 | 2-1/2 | 739216 | 457.90 |
| 1/4 | 1/2 | **1** | 4 | 1/4 | 2-1/2 | 914116 | 606.60 |
| 5/16 | 1/4 | **13/16** | 2 | 5/16 | 2-1/2 | 12120 | 412.20 |
| 5/16 | 1/2 | **1-1/16** | 4 | 5/16 | 2-1/2 | 914120 | 670.40 |
| 3/8 | 1/4 | **15/16** | 2 | 3/8 | 2-1/2 | 12124 | 442.00 |
| 3/8 | 1/2 | **1-3/16** | 2 | 3/8 | 2-1/2 | 739224 | 457.80 |
| 3/8 | 3/4 | **1-7/16** | 2 | 3/8 | 3 | 708324 | 692.60 |
| 3/8 | 3/4 | **1-7/16** | 4 | 3/8 | 3 | 914124 | 766.70 |
| 1/2 | 1/4 | **1** | 2 | 1/2 | 3 | 12132 | 563.50 |
| 1/2 | 1/2 | **1-1/4** | 4 | 1/2 | 3 | 708732 | 638.10 |
| 1/2 | 3/4 | **1-1/2** | 2 | 1/2 | 3 | 709332 | 667.20 |
| 1/2 | 1 | **1-3/4** | 2 | 1/2 | 3 | 739232 | 690.80 |
| 1/2 | 1 | **1-3/4** | 4 | 1/2 | 3 | 914132 | 904.30 |
| 5/8 | 3/8 | **1** | 2 | 5/8 | 3-1/2 | 12140 | 696.10 |
| 5/8 | 5/8 | **1-1/4** | 2 | 5/8 | 3-1/2 | 739240 | 812.40 |
| 5/8 | 1 | **1-3/4** | 4 | 5/8 | 3-1/2 | 914140 | 1059.70 |
| 3/4 | 3/8 | **1-1/8** | 2 | 3/4 | 4 | 12148 | 847.70 |
| 3/4 | 1-1/4 | **2** | 4 | 3/4 | 4 | 914148 | 1238.50 |

* End cutting (not center cutting) for 4 flutes

**Single Flute** designed for smaller diameters



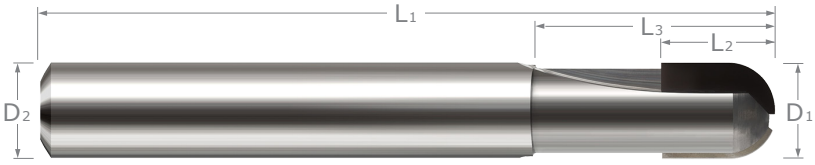
**4 Flute** ideal for finishing operations

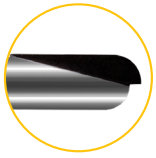


For PCD High Performance Drills, see page 509

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## PCD Diamond – Ball



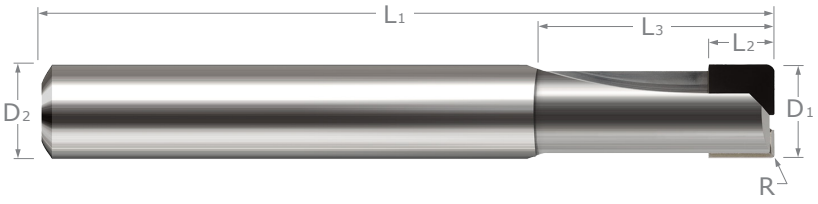
Also Stocked in Single Flute Style

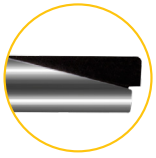
- PCD diamond brazed wafer on solid carbide body allows for significant tool life improvement over carbide.
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | PCD DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.020''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ |
| 3/32 | 3/16 | **3/8** | 1 | 1/8 | 1-1/2 | 12006 | 376.70 |
| 1/8 | 1/8 | **5/16** | 1 | 1/8 | 1-1/2 | 709208 | 348.40 |
| 1/8 | 1/4 | **1/2** | 1 | 1/8 | 1-1/2 | 12008 | 376.70 |
| 1/8 | 1/2 | **3/4** | 1 | 1/8 | 2 | 714108 | 401.60 |
| 3/16 | 1/4 | **5/8** | 2 | 3/16 | 2 | 12012 | 403.40 |
| 1/4 | 1/4 | **3/4** | 2 | 1/4 | 2-1/2 | 708416 | 409.20 |
| 1/4 | 5/16 | **3/4** | 2 | 1/4 | 2-1/2 | 12016 | 423.20 |
| 1/4 | 1/2 | **1** | 2 | 1/4 | 2-1/2 | 714116 | 480.00 |
| 3/8 | 7/16 | **15/16** | 2 | 3/8 | 2-1/2 | 12024 | 522.80 |
| 1/2 | 1/2 | **1** | 2 | 1/2 | 3 | 12032 | 606.40 |
| 1/2 | 1/2 | **1-1/4** | 2 | 1/2 | 3 | 714132 | 637.50 |
| 1/2 | 1 | **1-1/4** | 2 | 1/2 | 3 | 708932 | 713.80 |
| 5/8 | 1/2 | **1** | 2 | 5/8 | 3-1/2 | 12040 | 738.30 |
| 3/4 | 5/8 | **1-1/8** | 2 | 3/4 | 4 | 12048 | 889.90 |

# DIAMOND END MILLS FOR NON-FERROUS MATERIALS

## PCD Diamond – Corner Radius



Also Stocked in Single Flute Style

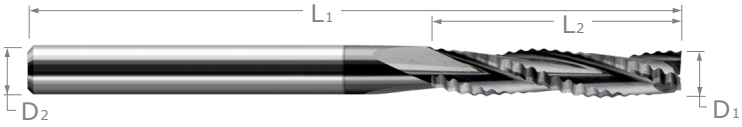
- PCD diamond brazed wafer on solid carbide body allows for significant tool life improvement over carbide.
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | CORNER RADIUS | FLUTES | SHANK DIAMETER | OVERALL LENGTH | PCD DIAMOND | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.020''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | R $^{+.001''}_{-.001''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ |
| 3/32 | 3/16 | **3/8** | **.010** | 1 | 1/8 | 1-1/2 | 12206 | 376.70 |
| 1/8 | 1/4 | **1/2** | **.010** | 1 | 1/8 | 1-1/2 | 858908 | 376.70 |
| 1/8 | 1/4 | **1/2** | **.015** | 1 | 1/8 | 1-1/2 | 12208 | 376.70 |
| 3/16 | 1/4 | **5/8** | **.015** | 2 | 3/16 | 2 | 12212 | 403.40 |
| 1/4 | 1/8 | **5/16** | **.010** | 2 | 1/4 | 2-1/2 | 709116 | 330.80 |
| 1/4 | 1/4 | **3/4** | **.010** | 2 | 1/4 | 2-1/2 | 858916 | 423.20 |
| 1/4 | 1/8 | **5/16** | **.030** | 2 | 1/4 | 2-1/2 | 708616 | 330.80 |
| 1/4 | 1/4 | **3/4** | **.030** | 2 | 1/4 | 2-1/2 | 12216 | 423.20 |
| 1/4 | 1/8 | **5/16** | **.060** | 2 | 1/4 | 2-1/2 | 709016 | 330.80 |
| 1/4 | 1/4 | **3/4** | **.060** | 2 | 1/4 | 2-1/2 | 847316 | 423.20 |
| 3/8 | 1/4 | **15/16** | **.030** | 2 | 3/8 | 2-1/2 | 12224 | 522.80 |
| 1/2 | 1/4 | **1** | **.010** | 2 | 1/2 | 3 | 858932 | 606.40 |
| 1/2 | 1/4 | **1** | **.030** | 2 | 1/2 | 3 | 12232 | 606.40 |
| 1/2 | 1/2 | **1-1/4** | **.030** | 2 | 1/2 | 3 | 708532 | 645.20 |
| 1/2 | 1/4 | **1** | **.060** | 2 | 1/2 | 3 | 847332 | 606.40 |

For PCD High Performance Drills, see page 509

# END MILLS FOR PLASTICS

## Rougher – Square Upcut – 3 Flute (Slow Helix)

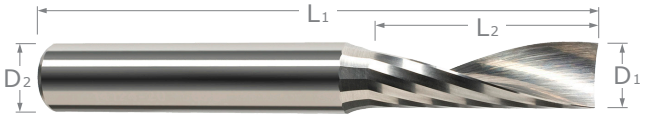



- Optimized for roughing applications in plastics
- Engineered with irregular edge geometry for chip control and minimized cutting forces
- 3 flute design strengthens rigidity of tool
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| 1/16 | **.186** (3x) | 1/8 | 1-1/2 | 798662 | 38.30 | 798662-C4 | 53.20 |
| 1/16 | **5/16** (5x) | 1/8 | 2 | 770662 | 45.00 | 770662-C4 | 60.00 |
| 3/32 | **.279** (3x) | 1/8 | 1-1/2 | 798693 | 38.30 | 798693-C4 | 53.20 |
| 3/32 | **1/2** (5x) | 1/8 | 2 | 770693 | 45.00 | 770693-C4 | 60.00 |
| 1/8 | **3/8** (3x) | 1/8 | 1-1/2 | 798708 | 38.30 | 798708-C4 | 53.20 |
| 1/8 | **5/8** (5x) | 1/8 | 2 | 770708 | 45.00 | 770708-C4 | 63.70 |
| 3/16 | **.570** (3x) | 3/16 | 2 | 798712 | 59.70 | 798712-C4 | 76.40 |
| 3/16 | **1** (5x) | 3/16 | 3 | 770712 | 62.30 | 770712-C4 | 80.10 |
| 1/4 | **3/4** (3x) | 1/4 | 2-1/2 | 798716 | 62.30 | 798716-C4 | 86.30 |
| 1/4 | **1-1/4** (5x) | 1/4 | 3 | 770716 | 70.50 | 770716-C4 | 94.40 |

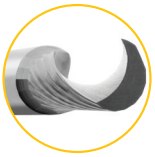
# END MILLS FOR PLASTICS

## Square Upcut – Single Flute




**2x the Material Removal with Improved Finish Over Standard End Mills!**

- Design allows for maximum stock removal while maintaining excellent finish
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Large flute valley creates room for the chip and aids in chip evacuation
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Select sizes available with oversized, router-style shanks
- High flute finish resists chip welding • Will ramp or plunge if required
- Right hand spiral, right hand cut • Solid carbide • CNC ground in the USA



Single Spiral Upcut Flute

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | SOFT PLASTICS | | HARD PLASTICS | | HARD PLASTICS AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 1 FL | USD$ | 1 FL | USD$ | 1 FL | USD$ |
| .020 | **.060** (3x) | 1/8 | 1-1/2 | | | 51420 | 41.20 | | |
| .020 | **.100** (5x) | 1/8 | 1-1/2 | | | 52420 | 43.70 | | |
| 1/32 | **3/32** (3x) | 1/8 | 1-1/2 | | | 51431 | 41.20 | 51431-C4 | 56.20 |
| 1/32 | **5/32** (5x) | 1/8 | 1-1/2 | | | 52431 | 50.60 | | |
| .039 | **.117** (3x) | 1/8 | 1-1/2 | | | 51439 | 39.80 | | |
| .040 | **.120** (3x) | 1/8 | 1-1/2 | | | 51440 | 39.80 | | |
| 3/64 | **9/64** (3x) | 1/8 | 1-1/2 | | | 51447 | 36.60 | 51447-C4 | 51.60 |
| 3/64 | **1/4** (5x) | 1/8 | 1-1/2 | | | 52447 | 42.60 | | |

| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 1 FL | USD$ | 1 FL | USD$ | 1 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|
| 1/16 | **3/16** (3x) | 1/8 | 1-1/2 | 51162 | 30.00 | 51462 | 30.00 | 51462-C4 | 44.90 |
| 1/16 | **1/4** (4x) | 1/8 | 1-1/2 | 878262 | 30.00 | 897362 | 30.00 | | |
| 1/16* | **1/4** (4x) | 1/4* | 2 | 14104-20 | 42.80 | 14204-20 | 42.80 | | |
| 1/16 | **5/16** (5x) | 1/8 | 2 | 51862 | 35.50 | 52462 | 35.50 | 52462-C4 | 54.50 |
| 1/16 | **1/2** (8x) | 1/8 | 2 | | | 722762 | 38.00 | | |
| 5/64 | **15/64** (3x) | 1/8 | 1-1/2 | 51178 | 30.50 | 51478 | 30.00 | 51478-C4 | 44.90 |
| 5/64* | **5/16** (4x) | 1/4* | 2 | 14105-20 | 43.70 | 14205-20 | 43.70 | | |
| 5/64 | **13/32** (5x) | 1/8 | 2 | 51878 | 35.50 | 52478 | 36.10 | 52478-C4 | 51.10 |
| 3/32 | **9/32** (3x) | 1/8 | 1-1/2 | 51193 | 30.00 | 51493 | 30.00 | 51493-C4 | 44.90 |
| 3/32 | **3/8** (4x) | 1/8 | 1-1/2 | 878293 | 30.00 | 897393 | 30.00 | | |
| 3/32* | **3/8** (4x) | 1/4* | 2 | 14106-20 | 42.80 | 14206-20 | 42.80 | | |
| 3/32 | **1/2** (5x) | 1/8 | 2 | 51893 | 35.50 | 52493 | 35.50 | 52493-C4 | 50.40 |
| 3/32 | **3/4** (8x) | 1/8 | 2 | | | 722793 | 38.00 | | |
| .118 | **.354** (3x) | 1/4 | 2 | 51205 | 40.70 | 51505 | 40.70 | | |
| 1/8* | **1/4** (2x) | 1/4* | 2 | 14108-10 | 40.70 | 14208-10 | 40.70 | 892026-C4 | 58.90 |
| 1/8 | **3/8** (3x) | 1/8 | 1-1/2 | 51208 | 30.00 | 51508 | 30.00 | 51508-C4 | 44.90 |
| 1/8 | **1/2** (4x) | 1/8 | 2 | 878308 | 30.00 | 897408 | 30.00 | | |
| 1/8* | **1/2** (4x) | 1/4* | 2 | 14108-20 | 40.70 | 14208-20 | 40.70 | 892028-C4 | 58.90 |
| 1/8 | **5/8** (5x) | 1/8 | 2 | 51908 | 35.50 | 52508 | 35.50 | 52508-C4 | 51.70 |
| 1/8 | **1** (8x) | 1/8 | 2 | | | 722808 | 38.00 | | |

*Cutter diameter tolerance is +.000"/-.004". Tools are ground on oversized, router-style shank.

continued on next page

# END MILLS FOR PLASTICS

## Square Upcut – Single Flute (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | SOFT PLASTICS | | HARD PLASTICS | | HARD PLASTICS AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $D_2$ | $L_1$ | 1 FL | USD$ | 1 FL | USD$ | 1 FL | USD$ |
| 9/64 | **.422** (3x) | 1/4 | 2 | 51209 | 40.70 | 51509 | 40.70 | | |
| 5/32* | **5/8** (4x) | 1/4* | 2 | 14110-20 | 40.70 | 14210-20 | 40.70 | | |
| 5/32 | **3/4** (5x) | 3/16 | 3 | 51910 | 47.50 | 52510 | 47.50 | | |
| 3/16* | **3/8** (2x) | 1/4* | 2 | 14112-10 | 40.70 | 14212-10 | 40.70 | | |
| 3/16 | **9/16** (3x) | 3/16 | 2 | 51212 | 38.50 | 51512 | 38.50 | 51512-C4 | 56.10 |
| 3/16* | **5/8** (3x) | 1/4* | 2 | 14112-20 | 40.70 | 14212-20 | 40.70 | 892012-C4 | 60.70 |
| 3/16 | **1** (5x) | 3/16 | 3 | 51912 | 47.50 | 52512 | 47.50 | 52512-C4 | 68.10 |
| 1/4 | **3/8** (1.5x) | 1/4 | 2-1/2 | 883116 | 40.70 | 883816 | 40.70 | | |
| 1/4 | **3/4** (3x) | 1/4 | 2-1/2 | 51216 | 40.70 | 51516 | 40.70 | 51516-C4 | 62.10 |
| 1/4 | **1** (4x) | 1/4 | 3 | 878316 | 52.70 | 897416 | 52.70 | | |
| 1/4 | **1-1/4** (5x) | 1/4 | 3 | 51916 | 52.70 | 52516 | 52.70 | 52516-C4 | 74.10 |
| 1/4 | **2** (8x) | 1/4 | 4 | | | 722816 | 58.30 | | |
| 5/16 | **1** (3x) | 5/16 | 2-1/2 | | | 51520 | 67.80 | | |
| 3/8 | **9/16** (1.5x) | 3/8 | 2-1/2 | 883124 | 83.00 | 883824 | 83.00 | | |
| 3/8 | **1-1/8** (3x) | 3/8 | 2-1/2 | 51224 | 83.00 | 51524 | 83.00 | 51524-C4 | 112.60 |
| 3/8 | **1-1/2** (4x) | 3/8 | 4 | 878324 | 93.70 | 897424 | 93.70 | | |
| 3/8 | **2** (5x) | 3/8 | 4 | 51924 | 92.00 | 52524 | 92.00 | | |
| 1/2 | **3/4** (1.5x) | 1/2 | 3 | 883132 | 141.50 | 883832 | 141.50 | | |
| 1/2 | **1-1/2** (3x) | 1/2 | 3 | 51232 | 141.50 | 51532 | 141.50 | 51532-C4 | 177.50 |
| 1/2 | **2-5/8** (5x) | 1/2 | 5 | 51932 | 233.80 | 52532 | 233.80 | | |

*Cutter diameter tolerance is +.000"/-.004". Tools are ground on oversized, router-style shank.

**Please See Speeds & Feeds On Page 273**

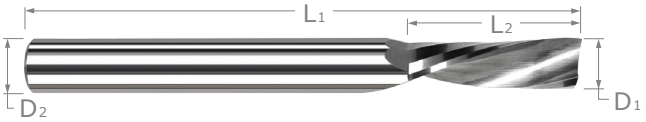


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# END MILLS FOR PLASTICS

## Square Downcut – Single Flute




**Prevents Fraying, Chip-Out, and Lifting**

- **Prevents fraying and chip-out of top edge of work piece**
- Prevents lifting on vacuum tables
- Left hand spiral, right hand cut
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Resists chip welding • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | SOFT PLASTICS | | HARD PLASTICS | | HARD PLASTICS AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 1 FL | USD$ | 1 FL | USD$ | 1 FL | USD$ |
| 1/32 | **3/32** (3x) | 1/8 | 1-1/2 | | | 929731 | 42.90 | | |
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $D_2$ | $L_1$ | 1 FL | USD$ | 1 FL | USD$ | 1 FL | USD$ |
| 1/16 | **3/16** (3x) | 1/8 | 1-1/2 | | | 929762 | 42.90 | | |
| 1/16 | **1/4** (4x) | 1/4 | 2 | 855862 | 46.00 | 44862 | 45.10 | | |
| 1/16 | **5/16** (5x) | 1/8 | 2 | | | 935362 | 44.00 | | |
| 5/64 | **5/16** (4x) | 1/4 | 2 | | | 44878 | 45.10 | | |
| 3/32 | **9/32** (3x) | 1/8 | 1/2 | | | 929793 | 46.00 | | |
| 3/32 | **3/8** (4x) | 1/4 | 2 | 855893 | 46.00 | 44893 | 45.10 | 44893-C4 | 64.40 |
| 3/32 | **1/2** (5x) | 1/8 | 2 | | | 935393 | 46.00 | | |
| 1/8 | **3/8** (3x) | 1/8 | 1-1/2 | | | 929808 | 41.00 | | |
| 1/8 | **1/2** (4x) | 1/4 | 2 | 855908 | 43.10 | 44908 | 43.10 | 44908-C4 | 65.75 |
| 1/8 | **5/8** (5x) | 1/8 | 2 | | | 935408 | 42.30 | | |
| 5/32 | **5/8** (4x) | 1/4 | 2 | | | 44910 | 43.10 | | |
| 3/16 | **9/16** (3x) | 3/16 | 2 | | | 929812 | 41.00 | | |
| 3/16 | **5/8** (3x) | 1/4 | 2 | | | 44912 | 43.10 | 44912-C4 | 65.75 |
| 3/16 | **3/4** (4x) | 1/4 | 2.5 | 855912 | 43.10 | | | | |
| 3/16 | **1** (5x) | 3/16 | 3 | | | 935412 | 43.10 | | |
| 1/4 | **3/4** (3x) | 1/4 | 2-1/2 | 855916 | 43.10 | 44916 | 43.10 | 44916-C4 | 63.70 |
| 1/4 | **1-1/4** (5x) | 1/4 | 3 | | | 935416 | 79.10 | | |
| 3/8 | **1-1/8** (3x) | 3/8 | 3 | | | 44924 | 74.20 | | |
| 3/8 | **1-1/8** (4x) | 3/8 | 4 | 855924 | 88.40 | | | | |
| 3/8 | **2** (5x) | 3/8 | 4 | | | 935424 | 129.50 | | |
| 1/2 | **1-1/2** (3x) | 1/2 | 4 | | | 44932 | 174.50 | | |
| 1/2 | **2-5/8** (5x) | 1/2 | 5 | | | 935432 | 273.20 | | |

**Please See Speeds & Feeds On Page 273**

# END MILLS FOR PLASTICS

## Ball Upcut – Single Flute




- Design allows for maximum stock removal while maintaining excellent finish
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Large flute valley creates room for the chip and aids in chip evacuation
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- High flute finish resists chip welding
- Will ramp or plunge if required
- Right hand spiral, right hand cut
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | |
|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 1 FL | USD$ |
| 1/16 | **.186** (3x) | 1/8 | 1-1/2 | 869562 | 36.10 |
| 1/16 | **5/16** (5x) | 1/8 | 2 | 842262 | 44.10 |
| 3/32 | **.279** (3x) | 1/8 | 1-1/2 | 869593 | 36.10 |
| 3/32 | **1/2** (5x) | 1/8 | 2 | 842293 | 44.10 |
| 1/8 | **3/8** (3x) | 1/8 | 1-1/2 | 869608 | 36.10 |
| 1/8 | **5/8** (5x) | 1/8 | 2 | 842308 | 44.10 |
| 3/16 | **.570** (3x) | 3/16 | 2 | 869612 | 46.60 |
| 1/4 | **3/4** (3x) | 1/4 | 2-1/2 | 869616 | 51.10 |
| 1/4 | **1-1/4** (5x) | 1/4 | 3 | 842316 | 62.60 |
| 3/8 | **1-1/8** (3x) | 3/8 | 2-1/2 | 869624 | 96.80 |
| 3/8 | **2** (5x) | 3/8 | 4 | 842324 | 107.20 |
| 1/2 | **1-1/2** (3x) | 1/2 | 3 | 869632 | 155.00 |



## SPEEDS & FEEDS (Single Flute Plastic Cutting End Mills)

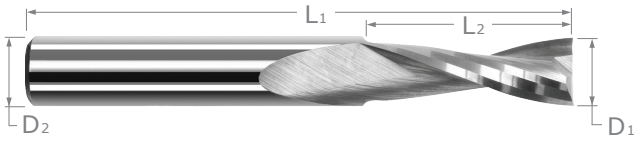
**Important Note:** Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 115%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce 95%, for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

| Material Type | | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | .625 | .750 | Radial | Axial |
| Unfilled | Unfilled | 800-1200 | Slot - Rough | .0006 | .0013 | .0020 | .0027 | .0033 | .0040 | .0054 | .0080 | .0107 | .0114 | .0137 | .0182 | .0228 | .0273 | 1 x Dia | 1 x Dia |
| | | | Profile | .0007 | .0015 | .0023 | .0031 | .0038 | .0046 | .0062 | .0092 | .0123 | .0131 | .0157 | .0210 | .0262 | .0315 | .35 x Dia | 1 x Dia |
| Filled Plastics | Carbon/ Glass Filled 5% < 20% | 600-800 | Slot - Rough | .0006 | .0013 | .0020 | .0027 | .0033 | .0040 | .0054 | .0080 | .0107 | .0114 | .0137 | .0182 | .0228 | .0273 | 1 x Dia | 1 x Dia |
| | | | Profile | .0007 | .0015 | .0023 | .0031 | .0038 | .0046 | .0062 | .0092 | .0123 | .0131 | .0157 | .0210 | .0262 | .0315 | .35 x Dia | 1 x Dia |
| | Carbon/ Glass Filled 21% < 40% | 500-700 | Slot - Rough | .0005 | .0011 | .0016 | .0022 | .0027 | .0033 | .0044 | .0066 | .0088 | .0093 | .0112 | .0149 | .0186 | .0224 | 1 x Dia | 1 x Dia |
| | | | Profile | .0006 | .0013 | .0019 | .0025 | .0031 | .0038 | .0050 | .0075 | .0101 | .0107 | .0129 | .0172 | .0214 | .0257 | .35 x Dia | 1 x Dia |
| Fiber Reinforced | Carbon/ Glass Fiber 5% < 20% | 500-700 | Slot - Rough | .0006 | .0013 | .0020 | .0027 | .0033 | .0040 | .0054 | .0080 | .0107 | .0114 | .0137 | .0182 | .0228 | .0273 | 1 x Dia | 1 x Dia |
| | | | Profile | .0007 | .0015 | .0023 | .0031 | .0038 | .0046 | .0062 | .0092 | .0123 | .0131 | .0157 | .0210 | .0262 | .0315 | .35 x Dia | 1 x Dia |
| | Carbon/ Glass Fiber 21% < 40% | 300-400 | Slot - Rough | .0005 | .0011 | .0016 | .0022 | .0027 | .0033 | .0044 | .0066 | .0088 | .0093 | .0112 | .0149 | .0186 | .0224 | 1 x Dia | 1 x Dia |
| | | | Profile | .0006 | .0013 | .0019 | .0025 | .0031 | .0038 | .0050 | .0075 | .0101 | .0107 | .0129 | .0172 | .0214 | .0257 | .35 x Dia | 1 x Dia |

NEW SIZES!

# END MILLS FOR PLASTICS

## Square Upcut – 2 Flute (Slow Helix)




**2 Flute Design Improves Bottom Finish and Accuracy**

- High rake, high relief design with large flute valley maximizes chip removal and performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting design improves plunging and ramping • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | decimal equivalent | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| .008 | .0080 | **.024** (3x) | 1/8 | 1-1/2 | 48608 | 74.60 | | |
| .008 | .0080 | **.040** (5x) | 1/8 | 1-1/2 | 49808 | 76.70 | | |
| .010 | .0010 | **.030** (3x) | 1/8 | 1-1/2 | 48610 | 71.10 | | |
| .010 | .0010 | **.050** (5x) | 1/8 | 1-1/2 | 49810 | 81.00 | | |
| 1/64 | .0156 | **.023** (1.5x) | 1/8 | 1-1/2 | 957615 | 60.80 | | |
| 1/64 | .0156 | **3/64** (3x) | 1/8 | 1-1/2 | 48615 | 60.80 | | |
| 1/64 | .0156 | **5/64** (5x) | 1/8 | 1-1/2 | 49815 | 72.00 | | |
| 1/64 | .0156 | **1/8** (8x) | 1/8 | 1-1/2 | 60215 | 79.40 | | |
| .020 | .0200 | **.030** (1.5x) | 1/8 | 1-1/2 | 957620 | 46.40 | | |
| .020 | .0200 | **.060** (3x) | 1/8 | 1-1/2 | 48620 | 46.40 | 48620-C4 | 61.30 |
| .020 | .0200 | **.100** (5x) | 1/8 | 1-1/2 | 49820 | 56.40 | | |
| .020 | .0200 | **.160** (8x) | 1/8 | 1-1/2 | 60220 | 66.30 | | |
| .020 | .0200 | **.200** (10x) | 1/8 | 1-1/2 | 938920 | 66.30 | | |
| .025 | .0250 | **.038** (1.5x) | 1/8 | 1-1/2 | 957625 | 47.20 | | |
| .025 | .0250 | **.075** (3x) | 1/8 | 1-1/2 | 48625 | 46.40 | | |
| .025 | .0250 | **1/8** (5x) | 1/8 | 1-1/2 | 49825 | 56.10 | 49825-C4 | 71.00 |
| .025 | .0250 | **13/64** (8x) | 1/8 | 1-1/2 | 60225 | 65.10 | | |
| .030 | .0300 | **.090** (3x) | 1/8 | 1-1/2 | 48630 | 46.40 | | |
| .030 | .0300 | **.156** (5x) | 1/8 | 1-1/2 | 49830 | 57.50 | | |
| 1/32 | .0312 | **3/64** (1.5x) | 1/8 | 1-1/2 | 957631 | 46.10 | | |
| 1/32 | .0312 | **3/32** (3x) | 1/8 | 1-1/2 | 48631 | 46.10 | 48631-C4 | 61.00 |
| 1/32 | .0312 | **3/32** (3x) | 1/4 | 2 | 878731 | 57.10 | | |
| 1/32 | .0312 | **5/32** (5x) | 1/8 | 1-1/2 | 49831 | 56.10 | 49831-C4 | 71.00 |
| 1/32 | .0312 | **1/4** (8x) | 1/8 | 1-1/2 | 60231 | 64.30 | 60231-C4 | 79.20 |
| 1/32 | .0312 | **5/16** (10x) | 1/8 | 1-1/2 | 938931 | 64.30 | | |
| .035 | .0350 | **.105** (3x) | 1/8 | 1-1/2 | 48635 | 46.40 | | |
| .039 (1 mm) | .0394 | **.118** (3x) | 1/8 | 1-1/2 | 48639 | 46.60 | | |
| .039 (1 mm) | .0394 | **13/64** (5x) | 1/8 | 1-1/2 | 49839 | 46.60 | | |
| .040 | .0400 | **.060** (1.5x) | 1/8 | 1-1/2 | 957640 | 47.20 | | |
| .040 | .0400 | **.120** (3x) | 1/8 | 1-1/2 | 48640 | 46.40 | | |
| .040 | .0400 | **13/64** (5x) | 1/8 | 1-1/2 | 49840 | 56.40 | | |
| .040 | .0400 | **.325** (8x) | 1/8 | 2 | 60240 | 65.10 | | |
| .045 | .0450 | **.135** (3x) | 1/8 | 1-1/2 | 48645 | 46.40 | | |
| 3/64 | .0469 | **.071** (1.5x) | 1/8 | 1-1/2 | 957647 | 38.90 | | |
| 3/64 | .0469 | **9/64** (3x) | 1/8 | 1-1/2 | 48647 | 38.90 | 48647-C4 | 53.90 |
| 3/64 | .0469 | **1/4** (5x) | 1/8 | 1-1/2 | 49847 | 45.30 | 49847-C4 | 60.20 |
| 3/64 | .0469 | **3/8** (8x) | 1/8 | 2 | 60247 | 54.50 | | |
| .050 | .0500 | **.150** (3x) | 1/8 | 1-1/2 | 48650 | 39.30 | | |
| .050 | .0500 | **.250** (5x) | 1/8 | 1-1/2 | 49850 | 45.60 | | |
| .055 | .0550 | **.165** (3x) | 1/8 | 1-1/2 | 48655 | 40.10 | | |
| .060 | .0600 | **.180** (3x) | 1/8 | 1-1/2 | 48660 | 39.30 | | |
| .060 | .0600 | **5/16** (5x) | 1/8 | 1-1/2 | 49860 | 45.60 | | |

continued on next page

# END MILLS FOR PLASTICS

## Square Upcut – 2 Flute (Slow Helix) (cont.)

continued from previous page

| | CUTTER DIAMETER | | | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.002″ | +.00mm −.05mm | decimal equivalent | $L_2$ +.030″ −.000″ +.75mm −.00mm | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| | 1/16 | | .0625 | **3/32** (1.5x) | 1/8 | 1-1/2 | 957662 | 33.60 | | |
| | 1/16 | | .0625 | **3/16** (3x) | 1/8 | 1-1/2 | 48662 | 33.60 | 48662-C4 | 48.60 |
| NEW | 1/16 | | .0625 | **3/16** (3x) | 1/4 | 2 | 878762 | 44.50 | 878762-C4 | 64.60 |
| | 1/16 | | .0625 | **1/4** (4x) | 1/8 | 2 | 874862 | 39.80 | | |
| | 1/16 | | .0625 | **5/16** (5x) | 1/8 | 2 | 49862 | 39.80 | 49862-C4 | 56.00 |
| | 1/16 | | .0625 | **3/8** (6x) | 1/8 | 2 | 745662 | 43.70 | | |
| | 1/16 | | .0625 | **1/2** (8x) | 1/8 | 2 | 60262 | 49.00 | 60262-C4 | 63.90 |
| | 1/16 | | .0625 | **5/8** (10x) | 1/8 | 2 | 938962 | 49.00 | 938962-C4 | 67.40 |
| | 5/64 | | .0781 | **.117** (1.5x) | 1/8 | 1-1/2 | 957678 | 33.60 | | |
| | 5/64 | | .0781 | **15/64** (3x) | 1/8 | 1-1/2 | 48678 | 33.60 | 48678-C4 | 48.60 |
| | 5/64 | | .0781 | **13/32** (5x) | 1/8 | 2 | 49878 | 39.80 | 49878-C4 | 54.70 |
| | 5/64 | | .0781 | **5/8** (8x) | 1/8 | 2 | 60278 | 49.00 | | |
| | 5/64 | | .0781 | **.800** (10x) | 1/8 | 2 | 938978 | 49.00 | | |
| | 3/32 | | .0937 | **9/64** (1.5x) | 1/8 | 1-1/2 | 957693 | 33.60 | 957693-C4 | 48.60 |
| | 3/32 | | .0937 | **9/32** (3x) | 1/8 | 1-1/2 | 48693 | 33.60 | 48693-C4 | 48.60 |
| | 3/32 | | .0937 | **9/32** (3x) | 1/4 | 2 | 878793 | 44.50 | | |
| | 3/32 | | .0937 | **3/8** (4x) | 1/8 | 2 | 874893 | 39.80 | | |
| | 3/32 | | .0937 | **1/2** (5x) | 1/8 | 2 | 49893 | 39.80 | 49893-C4 | 56.00 |
| | 3/32 | | .0937 | **9/16** (6x) | 1/8 | 2 | 745693 | 43.70 | | |
| | 3/32 | | .0937 | **3/4** (8x) | 1/8 | 2 | 60293 | 49.00 | 60293-C4 | 63.90 |
| | 3/32 | | .0937 | **.950** (10x) | 1/8 | 2 | 938993 | 49.00 | | |
| | .100 | | .1000 | **.150** (1.5x) | 1/8 | 1-1/2 | 957700 | 34.30 | | |
| | .100 | | .1000 | **.300** (3x) | 1/8 | 1-1/2 | 48700 | 35.00 | | |
| | .100 | | .1000 | **1/2** (5x) | 1/8 | 2 | 49900 | 40.90 | | |
| | .100 | | .1000 | **.800** (8x) | 1/8 | 2-1/2 | 60300 | 51.40 | | |
| | 7/64 | | .1090 | **21/64** (3x) | 1/8 | 1-1/2 | 48707 | 34.30 | | |
| | .118 (3 mm) | | .1181 | **.177** (1.5x) | 1/8 | 1-1/2 | 957706 | 35.00 | | |
| | .118 (3 mm) | | .1181 | **.354** (3x) | 1/8 | 1-1/2 | 48706 | 34.30 | | |
| | .118 (3 mm) | | .1181 | **.625** (5x) | 1/8 | 2 | 49906 | 41.80 | | |
| | .118 (3 mm) | | .1181 | **.950** (8x) | 1/8 | 2-1/2 | 60306 | 51.40 | | |
| | 1/8 | | .1250 | **.100** (0.8x) | 1/8 | 1-1/2 | 793208 | 34.40 | | |
| | 1/8 | | .1250 | **3/16** (1.5x) | 1/8 | 1-1/2 | 957708 | 33.60 | 957708-C4 | 48.60 |
| | 1/8 | | .1250 | **3/8** (3x) | 1/8 | 1-1/2 | 48708 | 33.60 | 48708-C4 | 48.60 |
| | 1/8 | | .1250 | **3/8** (3x) | 1/4 | 2 | 878808 | 44.50 | | |
| NEW | 1/8 | | .1250 | **1/2** (4x) | 1/8 | 2 | 874908 | 39.80 | 874908-C4 | 54.70 |
| | 1/8 | | .1250 | **5/8** (5x) | 1/8 | 2 | 49908 | 39.80 | 49908-C4 | 56.00 |
| | 1/8 | | .1250 | **3/4** (6x) | 1/8 | 2-1/2 | 745708 | 43.70 | | |
| | 1/8 | | .1250 | **1** (8x) | 1/8 | 2-1/2 | 60308 | 49.00 | 60308-C4 | 64.10 |
| | 1/8 | | .1250 | **1-1/4** (10x) | 1/8 | 2-1/2 | 939008 | 49.00 | 939008-C4 | 64.10 |
| | 9/64 | | .1406 | **27/64** (3x) | 3/16 | 2 | 48709 | 45.30 | | |
| | 9/64 | | .1406 | **3/4** (5x) | 3/16 | 3 | 49909 | 45.20 | | |
| | 5/32 | | .1562 | **15/64** (1.5x) | 3/16 | 2 | 957710 | 44.50 | | |
| | 5/32 | | .1562 | **15/32** (3x) | 3/16 | 2 | 48710 | 44.50 | 48710-C4 | 61.80 |
| | 5/32 | | .1562 | **3/4** (5x) | 3/16 | 3 | 49910 | 54.80 | 49910-C4 | 75.60 |
| | 5/32 | | .1562 | **1-1/4** (8x) | 3/16 | 3 | 60310 | 60.30 | | |
| | 3/16 | | .1875 | **9/32** (1.5x) | 3/16 | 2 | 957712 | 44.50 | 957712-C4 | 61.20 |
| | 3/16 | | .1875 | **9/16** (3x) | 3/16 | 2 | 48712 | 44.50 | 48712-C4 | 61.80 |
| | 3/16 | | .1875 | **9/16** (3x) | 1/4 | 2 | 878812 | 55.30 | | |

continued on next page

NEW SIZES!

# END MILLS FOR PLASTICS

## Square Upcut – 2 Flute (Slow Helix) (cont.)

continued from previous page

| CUTTER DIAMETER $D_1$ +.000″ −.002″ | +.00mm −.05mm | | LENGTH OF CUT $L_2$ +.030″ −.000″ +.75mm −.00mm | | SHANK DIAMETER $D_2$ | OVERALL LENGTH $L_1$ | UNCOATED 2 FL | USD$ | AMORPHOUS DIAMOND 2 FL | USD$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/16 | | .1875 | **3/4** | (4x) | 3/16 | 3 | 874912 | 54.80 | | | |
| 3/16 | | .1875 | **1** | (5x) | 3/16 | 3 | 49912 | 54.80 | 49912-C4 | 75.60 | |
| 3/16 | | .1875 | **1-1/2** | (8x) | 3/16 | 3 | 60312 | 60.30 | | | |
| 3/16 | | .1875 | **1-7/8** | (10x) | 3/16 | 3 | 939012 | 60.30 | | | |
| | 6.0 mm | .2362 | **18.00 mm** | (3x) | 6 mm | 63 mm | 886566 | 91.10 | | | |
| 1/4 | | .2500 | **.200** | (0.8x) | 1/4 | 2-1/2 | 793216 | 54.80 | | | |
| 1/4 | | .2500 | **3/8** | (1.5x) | 1/4 | 2-1/2 | 957716 | 54.80 | 957716-C4 | 76.20 | |
| 1/4 | | .2500 | **3/4** | (3x) | 1/4 | 2-1/2 | 48716 | 54.80 | 48716-C4 | 76.20 | |
| 1/4 | | .2500 | **1** | (4x) | 1/4 | 3 | 874916 | 62.90 | 874916-C4 | 84.30 | |
| 1/4 | | .2500 | **1-1/4** | (5x) | 1/4 | 3 | 49916 | 62.90 | 49916-C4 | 86.40 | |
| 1/4 | | .2500 | **2** | (8x) | 1/4 | 4 | 60316 | 78.70 | 60316-C4 | 101.50 | |
| 1/4 | | .2500 | **2-1/2** | (10x) | 1/4 | 4 | 939016 | 78.70 | | | |
| 5/16 | | .3125 | **15/32** | (1.5x) | 5/16 | 2-1/2 | 957720 | 81.70 | | | |
| 5/16 | | .3125 | **1** | (3x) | 5/16 | 2-1/2 | 48720 | 81.70 | | | |
| 5/16 | | .3125 | **1-5/8** | (5x) | 5/16 | 4 | 49920 | 105.70 | | | |
| | 8.0 mm | .3149 | **24.00 mm** | (3x) | 8 mm | 63 mm | 886570 | 122.20 | | | |
| 3/8 | | .3750 | **9/16** | (1.5x) | 3/8 | 3 | 957724 | 94.40 | 957724-C4 | 124.00 | |
| 3/8 | | .3750 | **1-1/8** | (3x) | 3/8 | 3 | 48724 | 94.40 | 48724-C4 | 124.00 | |
| 3/8 | | .3750 | **1-1/2** | (4x) | 3/8 | 4 | 874924 | 108.90 | 874924-C4 | 141.60 | NEW |
| 3/8 | | .3750 | **2** | (5x) | 3/8 | 4 | 49924 | 108.90 | | | |
| 3/8 | | .3750 | **3** | (8x) | 3/8 | 6 | 60324 | 122.90 | | | |
| | 10.0 mm | .3937 | **30.00 mm** | (3x) | 10 mm | 75 mm | 886573 | 109.40 | | | |
| | 12.0 mm | .4724 | **36.00 mm** | (3x) | 12 mm | 100 mm | 886576 | 113.80 | | | |
| 1/2 | | .5000 | **3/4** | (1.5x) | 1/2 | 4 | 957732 | 166.30 | 957732-C4 | 202.50 | |
| 1/2 | | .5000 | **1-1/2** | (3x) | 1/2 | 4 | 48732 | 166.30 | 48732-C4 | 202.50 | |
| 1/2 | | .5000 | **2** | (4x) | 1/2 | 4 | 874932 | 179.90 | | | |
| 1/2 | | .5000 | **2-5/8** | (5x) | 1/2 | 5 | 49932 | 198.10 | 49932-C4 | 235.10 | |
| 1/2 | | .5000 | **4** | (8x) | 1/2 | 7 | 60332 | 227.90 | | | |
| 5/8 | | .6250 | **15/16** | (1.5x) | 5/8 | 4 | 957740 | 245.00 | | | |
| 3/4 | | .7500 | **1-1/8** | (1.5x) | 3/4 | 4 | 957748 | 313.00 | 957748-C4 | 374.30 | |
| 3/4 | | .7500 | **2-1/4** | (3x) | 3/4 | 4 | 48748 | 313.00 | | | |



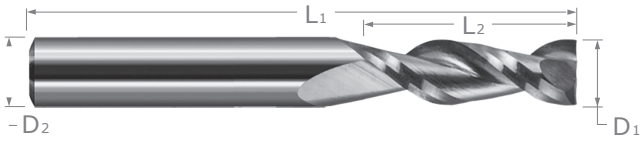
## SPEEDS & FEEDS (2 Flute Plastic Cutting End Mills - Slow Helix)

**Important Note:** Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase 120%,for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 4x, reduce to 95%; for 5x, reduce to 90%; for 6x, reduce to 80%; for 8x, reduce to 54%; for 10x, reduce to 40%).

| Material Type | | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | .625 | .750 | Depth of Cut Radial | Axial |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unfilled | Unfilled | 800-1200 | Slot - Rough | .0005 | .0010 | .0015 | .0020 | .0025 | .0030 | .0040 | .0060 | .0080 | .0085 | .0103 | .0137 | .0171 | .0205 | 1 x Dia | 1 x Dia |
| | | | Profile | .0006 | .0011 | .0017 | .0023 | .0029 | .0034 | .0046 | .0069 | .0093 | .0098 | .0118 | .0157 | .0197 | .0236 | .35 x Dia | 1 x Dia |
| Filled Plastics | Carbon/Glass Filled 5% < 20% | 600-800 | Slot - Rough | .0005 | .0010 | .0015 | .0020 | .0025 | .0030 | .0040 | .0060 | .0080 | .0085 | .0103 | .0137 | .0171 | .0205 | 1 x Dia | 1 x Dia |
| | | | Profile | .0006 | .0011 | .0017 | .0023 | .0029 | .0034 | .0046 | .0069 | .0093 | .0098 | .0118 | .0157 | .0197 | .0236 | .35 x Dia | 1 x Dia |
| | Carbon/Glass Filled 21% < 40% | 500-700 | Slot - Rough | .0004 | .0008 | .0012 | .0016 | .0021 | .0024 | .0033 | .0049 | .0066 | .0070 | .0084 | .0112 | .0140 | .0168 | 1 x Dia | 1 x Dia |
| | | | Profile | .0005 | .0009 | .0014 | .0019 | .0024 | .0028 | .0038 | .0057 | .0076 | .0080 | .0096 | .0129 | .0161 | .0193 | .35 x Dia | 1 x Dia |
| Fiber Reinforced | Carbon/Glass Fiber 5% < 20% | 500-700 | Slot - Rough | .0005 | .0010 | .0015 | .0020 | .0025 | .0030 | .0040 | .0060 | .0080 | .0085 | .0103 | .0137 | .0171 | .0205 | 1 x Dia | 1 x Dia |
| | | | Profile | .0006 | .0011 | .0017 | .0023 | .0029 | .0034 | .0046 | .0069 | .0093 | .0098 | .0118 | .0157 | .0197 | .0236 | .35 x Dia | 1 x Dia |
| | Carbon/Glass Fiber 21% < 40% | 300-400 | Slot - Rough | .0004 | .0008 | .0012 | .0016 | .0021 | .0024 | .0033 | .0049 | .0066 | .0070 | .0084 | .0112 | .0140 | .0168 | 1 x Dia | 1 x Dia |
| | | | Profile | .0005 | .0009 | .0014 | .0019 | .0024 | .0028 | .0038 | .0057 | .0076 | .0080 | .0096 | .0129 | .0161 | .0193 | .35 x Dia | 1 x Dia |

# END MILLS FOR PLASTICS

## Square Upcut – 2 Flute (High Helix)




**2 Flute Design Improves Bottom Finish and Accuracy**

- High rake, high relief design with large flute valley maximizes chip removal performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Higher helix (approx. 40°) for faster chip removal and better finish
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/32 | **3/32** (3x) | 1/8 | 1-1/2 | 898131 | 60.10 | | |
| 3/64 | **9/64** (3x) | 1/8 | 1-1/2 | 898147 | 43.80 | | |
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/16 | **3/32** (1.5x) | 1/8 | 1-1/2 | 827662 | 44.10 | | |
| 1/16 | **3/16** (3x) | 1/8 | 1-1/2 | 898162 | 43.80 | 898162-C4 | 58.80 |
| 1/16 | **5/16** (5x) | 1/8 | 2 | 866262 | 46.60 | 866262-C4 | 61.60 |
| 1/16 | **1/2** (8x) | 1/8 | 2 | 732362 | 47.70 | | |
| 5/64 | **15/64** (3x) | 1/8 | 1-1/2 | 898178 | 44.10 | 898178-C4 | 59.10 |
| 3/32 | **9/32** (3x) | 1/8 | 1-1/2 | 898193 | 43.80 | 898193-C4 | 58.80 |
| 1/8 | **3/16** (1.5x) | 1/8 | 1-1/2 | 827708 | 44.10 | | |
| 1/8 | **3/8** (3x) | 1/8 | 1-1/2 | 898208 | 43.80 | 898208-C4 | 58.80 |
| 1/8 | **5/8** (5x) | 1/8 | 2 | 866308 | 46.60 | 866308-C4 | 61.60 |
| 1/8 | **1** (8x) | 1/8 | 2-1/2 | 732408 | 49.30 | | |
| 5/32 | **15/32** (3x) | 3/16 | 2 | 898210 | 62.60 | 898210-C4 | 79.30 |
| 3/16 | **9/16** (3x) | 3/16 | 2 | 898212 | 60.20 | 898212-C4 | 76.90 |
| 3/16 | **1** (5x) | 3/16 | 3 | 866312 | 64.50 | | |
| 1/4 | **3/8** (1.5x) | 1/4 | 2-1/2 | 827716 | 67.90 | | |
| 1/4 | **3/4** (3x) | 1/4 | 2-1/2 | 898216 | 67.90 | 898216-C4 | 91.80 |
| 1/4 | **1-1/4** (5x) | 1/4 | 3 | 866316 | 72.30 | | |
| 3/8 | **9/16** (1.5x) | 3/8 | 3 | 827724 | 103.70 | | |
| 3/8 | **1-1/8** (3x) | 3/8 | 3 | 898224 | 102.90 | 898224-C4 | 133.30 |
| 3/8 | **2** (5x) | 3/8 | 4 | 866324 | 110.00 | | |
| 1/2 | **3/4** (1.5x) | 1/2 | 4 | 827732 | 179.20 | | |
| 1/2 | **1-1/2** (3x) | 1/2 | 4 | 898232 | 177.50 | 898232-C4 | 221.90 |
| 1/2 | **2-5/8** (5x) | 1/2 | 5 | 866332 | 191.40 | | |

## SPEEDS & FEEDS (2 Flute Plastic Cutting End Mills - High Helix)

**Important Note:** Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

| Material Type | | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | .625 | .750 | Radial | Axial |
| Unfilled | Unfilled | 800-1200 | Slot - Rough | .0006 | .0013 | .0020 | .0027 | .0033 | .0040 | .0054 | .0080 | .0107 | .0114 | .0137 | .0182 | .0228 | .0273 | 1 x Dia | 1 x Dia |
| | | | Profile | .0007 | .0015 | .0023 | .0031 | .0038 | .0046 | .0062 | .0092 | .0123 | .0131 | .0157 | .0210 | .0262 | .0315 | .35 x Dia | 1 x Dia |
| Filled Plastics | Carbon/Glass Filled 5% < 20% | 600-800 | Slot - Rough | .0006 | .0013 | .0020 | .0027 | .0033 | .0040 | .0054 | .0080 | .0107 | .0114 | .0137 | .0182 | .0228 | .0273 | 1 x Dia | 1 x Dia |
| | | | Profile | .0007 | .0015 | .0023 | .0031 | .0038 | .0046 | .0062 | .0092 | .0123 | .0131 | .0157 | .0210 | .0262 | .0315 | .35 x Dia | 1 x Dia |
| | Carbon/Glass Filled 21% < 40% | 500-700 | Slot - Rough | .0005 | .0011 | .0016 | .0022 | .0027 | .0033 | .0044 | .0066 | .0088 | .0093 | .0112 | .0149 | .0186 | .0224 | 1 x Dia | 1 x Dia |
| | | | Profile | .0006 | .0013 | .0019 | .0025 | .0031 | .0038 | .0050 | .0075 | .0101 | .0107 | .0129 | .0172 | .0214 | .0257 | .35 x Dia | 1 x Dia |
| Fiber Reinforced | Carbon/Glass Fiber 5% < 20% | 500-700 | Slot - Rough | .0006 | .0013 | .0020 | .0027 | .0033 | .0040 | .0054 | .0080 | .0107 | .0114 | .0137 | .0182 | .0228 | .0273 | 1 x Dia | 1 x Dia |
| | | | Profile | .0007 | .0015 | .0023 | .0031 | .0038 | .0046 | .0062 | .0092 | .0123 | .0131 | .0157 | .0210 | .0262 | .0315 | .35 x Dia | 1 x Dia |
| | Carbon/Glass Fiber 21% < 40% | 300-400 | Slot - Rough | .0005 | .0011 | .0016 | .0022 | .0027 | .0033 | .0044 | .0066 | .0088 | .0093 | .0112 | .0149 | .0186 | .0224 | 1 x Dia | 1 x Dia |
| | | | Profile | .0006 | .0013 | .0019 | .0025 | .0031 | .0038 | .0050 | .0075 | .0101 | .0107 | .0129 | .0172 | .0214 | .0257 | .35 x Dia | 1 x Dia |

# END MILLS FOR PLASTICS

## Square Downcut – 2 Flute (Slow Helix)




- **Prevents fraying and chip-out on the top of the workpiece**
- Prevents lifting on vacuum tables
- 2 left hand spiral, right hand cut flutes
- High rake, high relief design with large flute valley maximizes chip removal and performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| .010 | **.030** (3x) | 1/8 | 1-1/2 | 998510 | 74.50 | | |
| 1/64 | **.023** (1.5x) | 1/8 | 1-1/2 | 966215 | 68.10 | | |
| 1/64 | **3/64** (3x) | 1/8 | 1-1/2 | 998515 | 68.10 | 998515-C4 | 83.00 |
| 1/64 | **5/64** (5x) | 1/8 | 1-1/2 | 999815 | 78.80 | | |
| .020 | **.030** (1.5x) | 1/8 | 1-1/2 | 966220 | 53.60 | | |
| .020 | **.060** (3x) | 1/8 | 1-1/2 | 998520 | 53.00 | 998520-C4 | 68.00 |
| .025 | **.075** (3x) | 1/8 | 1-1/2 | 998525 | 53.00 | | |
| 1/32 | **3/64** (1.5x) | 1/8 | 1-1/2 | 966231 | 53.00 | | |
| 1/32 | **3/32** (3x) | 1/8 | 1-1/2 | 998531 | 53.00 | 998531-C4 | 68.00 |
| 1/32 | **5/32** (5x) | 1/8 | 1-1/2 | 999831 | 63.80 | | |
| .040 | **.120** (3x) | 1/8 | 1-1/2 | 998540 | 53.00 | 998540-C4 | 68.00 |
| .040 | **.203** (5x) | 1/8 | 1-1/2 | 999840 | 63.80 | | |
| 3/64 | **.071** (1.5x) | 1/8 | 1-1/2 | 966247 | 46.20 | | |
| 3/64 | **9/64** (3x) | 1/8 | 1-1/2 | 998547 | 45.60 | | |
| 3/64 | **1/4** (5x) | 1/8 | 1-1/2 | 999847 | 53.00 | | |
| .050 | **.150** (3x) | 1/8 | 1-1/2 | 998550 | 53.60 | | |
| .060 | **.180** (3x) | 1/8 | 1-1/2 | 998560 | 53.60 | | |
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/16 | **3/32** (1.5x) | 1/8 | 1-1/2 | 966262 | 40.90 | 966262-C4 | 55.80 |
| 1/16 | **3/16** (3x) | 1/8 | 1-1/2 | 998562 | 40.90 | 998562-C4 | 55.80 |
| 1/16 | **1/4** (4x) | 1/8 | 2 | 827462 | 54.80 | | |
| 1/16 | **5/16** (5x) | 1/8 | 2 | 999862 | 54.80 | 999862-C4 | 69.80 |
| 1/16 | **1/2** (8x) | 1/8 | 2 | 978962 | 91.70 | | |
| 5/64 | **.117** (1.5x) | 1/8 | 1-1/2 | 966278 | 40.90 | | |
| 5/64 | **15/64** (3x) | 1/8 | 1-1/2 | 998578 | 40.90 | | |
| 5/64 | **13/32** (5x) | 1/8 | 2 | 999878 | 54.80 | | |
| 5/64 | **5/8** (8x) | 1/8 | 2 | 978978 | 91.70 | | |

continued on next page



**Check Out All of Our Plastic Cutting Solutions!**

# END MILLS FOR PLASTICS

## Square Downcut – 2 Flute (Slow Helix) (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 3/32 | **9/64** (1.5x) | 1/8 | 1-1/2 | 966293 | 40.90 | | |
| 3/32 | **9/32** (3x) | 1/8 | 1-1/2 | 998593 | 40.90 | 998593-C4 | 55.80 |
| 3/32 | **3/8** (4x) | 1/8 | 2 | 827493 | 55.30 | | |
| 3/32 | **1/2** (5x) | 1/8 | 2 | 999893 | 54.80 | | |
| 3/32 | **3/4** (8x) | 1/8 | 2 | 978993 | 92.60 | | |
| .118 (3 mm) | **.354** (3x) | 1/8 | 1-1/2 | 998606 | 40.90 | | |
| 1/8 | **3/16** (1.5x) | 1/8 | 1-1/2 | 966308 | 40.90 | 966308-C4 | 55.80 |
| 1/8 | **3/8** (3x) | 1/8 | 1-1/2 | 998608 | 40.90 | 998608-C4 | 55.80 |
| 1/8 | **1/2** (4x) | 1/8 | 2 | 827508 | 54.80 | | |
| 1/8 | **5/8** (5x) | 1/8 | 2 | 999908 | 54.80 | | |
| 1/8 | **1** (8x) | 1/8 | 2-1/2 | 979008 | 91.70 | | |
| 9/64 | **.425** (3x) | 3/16 | 2 | 998609 | 56.20 | | |
| 5/32 | **15/64** (1.5x) | 3/16 | 2 | 966310 | 56.20 | | |
| 5/32 | **15/32** (3x) | 3/16 | 2 | 998610 | 55.60 | 998610-C4 | 76.80 |
| 5/32 | **3/4** (5x) | 3/16 | 3 | 999910 | 66.10 | | |
| 3/16 | **9/32** (1.5x) | 3/16 | 2 | 966312 | 55.60 | 966312-C4 | 72.30 |
| 3/16 | **9/16** (3x) | 3/16 | 2 | 998612 | 55.60 | 998612-C4 | 76.80 |
| 3/16 | **1** (5x) | 3/16 | 3 | 999912 | 66.10 | | |
| 3/16 | **1-1/2** (8x) | 3/16 | 3 | 979012 | 98.30 | | |
| 1/4 | **3/8** (1.5x) | 1/4 | 2-1/2 | 966316 | 66.10 | 966316-C4 | 90.00 |
| 1/4 | **3/4** (3x) | 1/4 | 2-1/2 | 998616 | 66.10 | 998616-C4 | 90.00 |
| 1/4 | **1** (4x) | 1/4 | 3 | 827516 | 72.10 | | |
| 1/4 | **1-1/4** (5x) | 1/4 | 3 | 999916 | 72.10 | 999916-C4 | 93.50 |
| 1/4 | **2** (8x) | 1/4 | 4 | 979016 | 106.30 | | |
| 5/16 | **1** (3x) | 5/16 | 2-1/2 | 998620 | 98.80 | | |
| 3/8 | **9/16** (1.5x) | 3/8 | 3 | 966324 | 112.40 | | |
| 3/8 | **1-1/8** (3x) | 3/8 | 3 | 998624 | 112.40 | 998624-C4 | 142.20 |
| 3/8 | **2** (5x) | 3/8 | 4 | 999924 | 131.80 | | |
| 1/2 | **3/4** (1.5x) | 1/2 | 4 | 966332 | 202.70 | 966332-C4 | 247.10 |
| 1/2 | **1-1/2** (3x) | 1/2 | 4 | 998632 | 202.70 | 998632-C4 | 238.90 |
| 1/2 | **2-5/8** (5x) | 1/2 | 5 | 999932 | 224.60 | | |

**Please See Speeds & Feeds On Page 276**

## Plastic Cutting End Mills vs. Metal Cutting End Mills

**Improved Finish** - Sharper edge provides for cleaner cut and less plowing action. Chips curl faster, transferring heat to the chip, not the part.

**Increased Stock Removal** - Large flute opening gives more chip clearance, avoids chip welding, and improves chip evacuation.

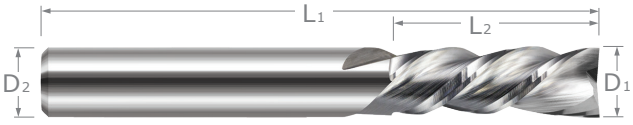
| Feature | Typical Metal Working End Mills | Plastic Cutting End Mills |
|---|---|---|
| Flute Rake | 8° – 12° | 25° – 32° |
| Axial/End Gash Rake | 2° – 4° | 8° – 12° |
| OD Primary Relief | 12° – 18° | 18° – 26° |
| OD Secondary Relief | 18° – 26° | 35° – 45° |
| Core Diameter | 56% – 60% | 40% – 44% |
| Typical Cross Section |  2 FLUTE STANDARD |  SINGLE FLUTE  2 FLUTE  2 STRAIGHT FLUTE |

Data presented is intended to be general guidelines for understanding how plastic end mill geometry compares to metal working tools. Actual values will change based on diameter, application and specific tool.

NEW SIZES!

# END MILLS FOR PLASTICS

## Square Downcut – 2 Flute (High Helix)




- **Prevents fraying and chip-out on the top of the workpiece**
- Prevents lifing on vacuum tables
- 2 left hand spiral, right hand cut flutes
- High rake, high relief design with large flute valley maximizes chip removal and performance
- Higher helix (approx. 40°) for faster chip removal and better finish
- Solid carbide
- CNC ground in the USA

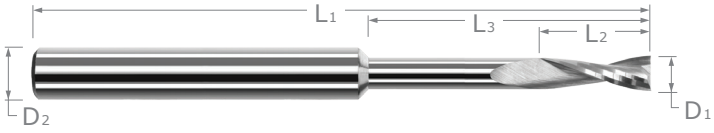
| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | |
| 1/32 | **3/32** (3x) | 1/8 | 1-1/2 | 775831 | 51.60 | | | |
| 1/32 | **5/32** (5x) | 1/8 | 1-1/2 | 826331 | 52.80 | | | |
| 3/64 | **9/64** (3x) | 1/8 | 1-1/2 | 775847 | 53.00 | | | |
| 3/64 | **1/4** (5x) | 1/8 | 1-1/2 | 826347 | 54.10 | | | |

| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | |
|---|---|---|---|---|---|---|---|---|
| 1/16 | **.186** (3x) | 1/8 | 1-1/2 | 775862 | 49.00 | | | |
| 1/16 | **5/16** (5x) | 1/8 | 2 | 826362 | 54.80 | 826362-C4 | 69.80 | NEW |
| 5/64 | **15/64** (3x) | 1/8 | 1-1/2 | 775878 | 49.00 | | | |
| 5/64 | **13/32** (5x) | 1/8 | 2 | 826378 | 54.80 | | | |
| 3/32 | **.273** (3x) | 1/8 | 1-1/2 | 775893 | 49.00 | | | |
| 3/32 | **1/2** (5x) | 1/8 | 2 | 826393 | 54.80 | | | |
| 1/8 | **3/16** (1.5x) | 1/8 | 1-1/2 | 694808 | 49.00 | | | NEW |
| 1/8 | **3/8** (3x) | 1/8 | 1-1/2 | 775908 | 49.00 | 775908-C4 | 63.90 | NEW |
| 1/8 | **5/8** (5x) | 1/8 | 2 | 826408 | 54.80 | | | |
| 5/32 | **.470** (3x) | 3/16 | 2 | 775910 | 59.20 | | | |
| 5/32 | **3/4** (5x) | 3/16 | 3 | 826410 | 66.10 | | | |
| 3/16 | **.570** (3x) | 3/16 | 2 | 775912 | 59.20 | | | |
| 3/16 | **1** (5x) | 3/16 | 3 | 826412 | 66.10 | | | |
| 1/4 | **3/8** (1.5x) | 1/4 | 2-1/2 | 694816 | 65.10 | | | NEW |
| 1/4 | **3/4** (3x) | 1/4 | 2-1/2 | 775916 | 65.10 | 775916-C4 | 80.50 | NEW |
| 1/4 | **1-1/4** (5x) | 1/4 | 3 | 826416 | 72.10 | | | |
| 3/8 | **1-1/8** (3x) | 3/8 | 3 | 775924 | 120.10 | 775924-C4 | 150.50 | NEW |
| 3/8 | **2** (5x) | 3/8 | 4 | 826424 | 133.20 | | | |
| 1/2 | **1-1/2** (3x) | 1/2 | 4 | 775932 | 204.40 | 775932-C4 | 248.80 | NEW |
| 1/2 | **2-5/8** (5x) | 1/2 | 5 | 826432 | 224.60 | | | |

**Please See Speeds & Feeds On Page 277**

# END MILLS FOR PLASTICS

## Square Upcut – Long Reach – 2 Flute



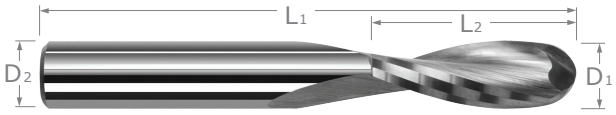

- High rake, high relief design with large flute valley maximizes chip removal and performance
- Center cutting design improves plunging and ramping
- Reduced neck diameter to avoid heeling
- Length of cut = 3x diameter
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/64 | 3/64 | **1/8** (8x) | 1/8 | 1-1/2 | 989015 | 79.10 | | |
| 1/64 | 3/64 | **3/16** (12x) | 1/8 | 1-1/2 | 994115 | 83.10 | | |
| .020 | .060 | **.160** (8x) | 1/8 | 1-1/2 | 989020 | 64.10 | | |
| .020 | .060 | **1/4** (12x) | 1/8 | 1-1/2 | 994120 | 67.90 | | |
| 1/32 | 3/32 | **5/32** (5x) | 1/8 | 1-1/2 | 961531 | 62.30 | | |
| 1/32 | 3/32 | **1/4** (8x) | 1/8 | 1-1/2 | 989031 | 64.10 | | |
| 1/32 | 3/32 | **3/8** (12x) | 1/8 | 1-1/2 | 994131 | 67.90 | | |
| 1/32 | 3/32 | **.470** (15x) | 1/8 | 1-1/2 | 979731 | 71.90 | | |
| .040 | .120 | **.325** (8x) | 1/8 | 1-1/2 | 989040 | 64.10 | | |
| .040 | .120 | **.480** (12x) | 1/8 | 1-1/2 | 994140 | 67.90 | | |
| 3/64 | 9/64 | **3/8** (8x) | 1/8 | 1-1/2 | 989047 | 57.00 | | |
| 3/64 | 9/64 | **.570** (12x) | 1/8 | 1-1/2 | 994147 | 60.60 | | |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/16 | 3/16 | **5/16** (5x) | 1/8 | 1-1/2 | 961562 | 51.00 | | |
| 1/16 | 3/16 | **1/2** (8x) | 1/8 | 1-1/2 | 989062 | 52.30 | 989062-C4 | 67.30 |
| 1/16 | 3/16 | **5/8** (10x) | 1/8 | 2 | 748162 | 54.60 | | |
| 1/16 | 3/16 | **3/4** (12x) | 1/8 | 2 | 994162 | 55.90 | | |
| 1/16 | 3/16 | **15/16** (15x) | 1/8 | 2 | 979762 | 60.00 | | |
| 5/64 | 15/64 | **5/8** (8x) | 1/8 | 2 | 989078 | 52.70 | | |
| 5/64 | 15/64 | **15/16** (12x) | 1/8 | 2 | 994178 | 56.40 | | |
| 3/32 | 9/32 | **1/2** (5x) | 1/8 | 1-1/2 | 961593 | 51.00 | | |
| 3/32 | 9/32 | **3/4** (8x) | 1/8 | 2 | 989093 | 52.30 | | |
| 3/32 | 9/32 | **15/16** (10x) | 1/8 | 2 | 748193 | 54.60 | | |
| 3/32 | 9/32 | **1-1/8** (12x) | 1/8 | 2 | 994193 | 55.90 | | |
| 3/32 | 9/32 | **1-13/32** (15x) | 1/8 | 2-1/2 | 979793 | 60.00 | | |
| 1/8 | 3/8 | **5/8** (5x) | 1/8 | 1-1/2 | 961608 | 51.00 | | |
| 1/8 | 3/8 | **1** (8x) | 1/8 | 2 | 989108 | 52.30 | 989108-C4 | 67.30 |
| 1/8 | 3/8 | **1-1/4** (10x) | 1/8 | 3 | 748108 | 54.60 | | |
| 1/8 | 3/8 | **1-1/2** (12x) | 1/8 | 2-1/2 | 994208 | 55.90 | | |
| 1/8 | 3/8 | **1-7/8** (15x) | 1/8 | 3 | 979808 | 60.00 | | |
| 5/32 | 15/32 | **1-1/4** (8x) | 3/16 | 2-1/2 | 989110 | 63.00 | | |
| 5/32 | 15/32 | **1-7/8** (12x) | 3/16 | 4 | 994210 | 73.50 | | |
| 3/16 | 9/16 | **1-1/2** (8x) | 3/16 | 2-1/2 | 989112 | 63.00 | | |
| 3/16 | 9/16 | **2-1/4** (12x) | 3/16 | 4 | 994212 | 73.50 | | |
| 1/4 | 3/4 | **2** (8x) | 1/4 | 4 | 989116 | 74.80 | 989116-C4 | 97.70 |
| 1/4 | 3/4 | **3** (12x) | 1/4 | 6 | 994216 | 89.50 | | |
| 3/8 | 1-1/8 | **3** (8x) | 3/8 | 6 | 989124 | 137.80 | | |
| 1/2 | 1-1/2 | **4** (8x) | 1/2 | 7 | 989132 | 251.10 | | |

**Please See Speeds & Feeds On Page 284**

# END MILLS FOR PLASTICS

## Ball Upcut – 2 Flute




- Ball end for profiling complex shapes
- Ball end has increased rake and relief for improved cutting action at tip of ball
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/64 | **3/64** (3x) | 1/8 | 1-1/2 | 49515 | 68.80 | | |
| 1/64 | **5/64** (5x) | 1/8 | 1-1/2 | 71315 | 81.20 | | |
| .020 | **.060** (3x) | 1/8 | 1-1/2 | 49520 | 54.00 | | |
| .020 | **.100** (5x) | 1/8 | 1-1/2 | 71320 | 66.10 | | |
| .025 | **.075** (3x) | 1/8 | 1-1/2 | 49525 | 54.50 | | |
| .025 | **1/8** (5x) | 1/8 | 1-1/2 | 71325 | 66.10 | | |
| 1/32 | **3/64** (1.5x) | 1/8 | 1-1/2 | 962331 | 54.00 | | |
| 1/32 | **3/32** (3x) | 1/8 | 1-1/2 | 49531 | 54.00 | 49531-C4 | 68.90 |
| 1/32 | **5/32** (5x) | 1/8 | 1-1/2 | 71331 | 65.10 | 71331-C4 | 80.00 |
| 1/32 | **1/4** (8x) | 1/8 | 1-1/2 | 955731 | 77.30 | | |
| .039 (1 mm) | **.118** (3x) | 1/8 | 1-1/2 | 49539 | 54.60 | | |
| 3/64 | **9/64** (3x) | 1/8 | 1-1/2 | 49547 | 46.20 | | |
| 3/64 | **1/4** (5x) | 1/8 | 1-1/2 | 71347 | 56.80 | | |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/16 | **3/32** (1.5x) | 1/8 | 1-1/2 | 962362 | 39.80 | | |
| 1/16 | **3/16** (3x) | 1/8 | 1-1/2 | 49562 | 39.80 | 49562-C4 | 54.70 |
| 1/16 | **1/4** (4x) | 1/8 | 1-1/2 | 784662 | 44.00 | | |
| 1/16 | **5/16** (5x) | 1/8 | 2 | 71362 | 48.50 | 71362-C4 | 67.10 |
| 1/16 | **1/2** (8x) | 1/8 | 2 | 955762 | 72.50 | | |
| 5/64 | **15/64** (3x) | 1/8 | 1-1/2 | 49578 | 39.80 | | |
| 5/64 | **13/32** (5x) | 1/8 | 2 | 71378 | 48.50 | | |
| 3/32 | **9/32** (3x) | 1/8 | 1-1/2 | 49593 | 39.80 | 49593-C4 | 54.70 |
| 3/32 | **1/2** (5x) | 1/8 | 2 | 71393 | 48.50 | | |
| .118 (3 mm) | **.354** (3x) | 1/8 | 1-1/2 | 49605 | 40.10 | | |
| 1/8 | **3/16** (1.5x) | 1/8 | 1-1/2 | 962408 | 39.80 | | |
| 1/8 | **3/8** (3x) | 1/8 | 1-1/2 | 49608 | 39.80 | 49608-C4 | 54.70 |
| 1/8 | **1/2** (4x) | 1/8 | 2 | 784708 | 44.00 | | |
| 1/8 | **5/8** (5x) | 1/8 | 2 | 71408 | 48.50 | 71408-C4 | 67.10 |
| 1/8 | **1** (8x) | 1/8 | 2-1/2 | 955808 | 72.50 | | |
| 9/64 | **.425** (3x) | 3/16 | 2 | 49609 | 53.00 | | |
| 5/32 | **15/32** (3x) | 3/16 | 2 | 49610 | 52.40 | | |
| 5/32 | **3/4** (5x) | 3/16 | 3 | 71410 | 64.50 | | |
| 3/16 | **9/32** (1.5x) | 3/16 | 2 | 962412 | 52.40 | | |
| 3/16 | **9/16** (3x) | 3/16 | 2 | 49612 | 52.40 | 49612-C4 | 69.50 |
| 3/16 | **1** (5x) | 3/16 | 3 | 71412 | 64.80 | | |

continued on next page

# END MILLS FOR PLASTICS

## Ball Upcut – 2 Flute (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/4 | **3/8** (1.5x) | 1/4 | 2-1/2 | 962416 | 67.10 | | |
| 1/4 | **3/4** (3x) | 1/4 | 2-1/2 | 49616 | 67.10 | 49616-C4 | 90.90 |
| 1/4 | **1-1/4** (5x) | 1/4 | 3 | 71416 | 76.80 | 71416-C4 | 98.20 |
| 3/8 | **9/16** (1.5x) | 3/8 | 3 | 962424 | 107.50 | | |
| 3/8 | **1-1/8** (3x) | 3/8 | 3 | 49624 | 107.50 | 49624-C4 | 138.00 |
| 3/8 | **2** (5x) | 3/8 | 4 | 71424 | 122.60 | | |
| 1/2 | **3/4** (1.5x) | 1/2 | 4 | 962432 | 185.50 | | |
| 1/2 | **1-1/2** (3x) | 1/2 | 4 | 49632 | 185.50 | 49632-C4 | 222.40 |
| 1/2 | **2-5/8** (5x) | 1/2 | 5 | 71432 | 224.30 | | |

**Please See Speeds & Feeds On Page 276**

In The Loupe TV

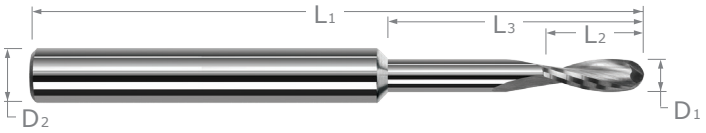
**Check Out Our New CNC Show!**

Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

youtube.com/intheloupetv

# END MILLS FOR PLASTICS

## Ball Upcut – Long Reach – 2 Flute




- Ball end has increased rake and relief for improved cutting action at tip of ball
- Reduced neck diameter to avoid heeling
- Ball end for profiling complex shapes
- Length of cut = 3x diameter
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | |
|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ |
| 1/32 | 3/32 | **5/32** (5x) | 1/8 | 1-1/2 | 964531 | 69.00 |
| 1/32 | 3/32 | **1/4** (8x) | 1/8 | 1-1/2 | 976231 | 71.30 |
| 3/64 | 9/64 | **1/4** (5x) | 1/8 | 1-1/2 | 964547 | 61.30 |
| 3/64 | 9/64 | **3/8** (8x) | 1/8 | 1-1/2 | 976247 | 62.70 |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ |
| 1/16 | 3/16 | **5/16** (5x) | 1/8 | 1-1/2 | 964562 | 55.60 |
| 1/16 | 3/16 | **1/2** (8x) | 1/8 | 1-1/2 | 976262 | 57.70 |
| 5/64 | 15/64 | **13/32** (5x) | 1/8 | 1-1/2 | 964578 | 56.20 |
| 5/64 | 15/64 | **5/8** (8x) | 1/8 | 2 | 976278 | 57.70 |
| 3/32 | 9/32 | **1/2** (5x) | 1/8 | 1-1/2 | 964593 | 56.20 |
| 3/32 | 9/32 | **3/4** (8x) | 1/8 | 2 | 976293 | 57.70 |
| 1/8 | 3/8 | **5/8** (5x) | 1/8 | 1-1/2 | 964608 | 55.60 |
| 1/8 | 3/8 | **1** (8x) | 1/8 | 2 | 976308 | 57.70 |
| 3/16 | 9/16 | **1** (5x) | 3/16 | 2 | 964612 | 68.70 |
| 1/4 | 3/4 | **1-1/4** (5x) | 1/4 | 2-1/2 | 964616 | 83.40 |



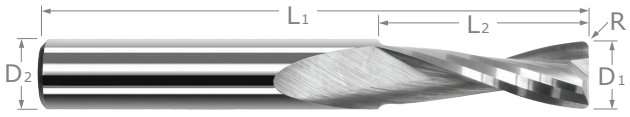
## SPEEDS & FEEDS (Square & Ball – Long Reach Plastic Cutting End Mills)

**Important Note:** Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 5x, increase to 130%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 89%; for 12x, reduce to 80%; for 15x, reduce to 67%). For complete speed and feed charts, please see www.harveytool.com

| Material Type | | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | .625 | .750 | Radial | Axial |
| Unfilled | Unfilled | 800-1200 | Slot - Rough | .0003 | .0006 | .0010 | .0013 | .0016 | .0019 | .0026 | .0039 | .0051 | .0055 | .0066 | .0088 | .0109 | .0131 | 1 x Dia | 1 x Dia |
| | | | Profile | .0004 | .0007 | .0011 | .0015 | .0018 | .0022 | .0030 | .0044 | .0059 | .0063 | .0075 | .0101 | .0126 | .0151 | .35 x Dia | 1 x Dia |
| Filled Plastics | Carbon/Glass Filled 5% < 20% | 600-800 | Slot - Rough | .0003 | .0006 | .0010 | .0013 | .0016 | .0019 | .0026 | .0039 | .0051 | .0055 | .0066 | .0088 | .0109 | .0131 | 1 x Dia | 1 x Dia |
| | | | Profile | .0004 | .0007 | .0011 | .0015 | .0018 | .0022 | .0030 | .0044 | .0059 | .0063 | .0075 | .0101 | .0126 | .0151 | .35 x Dia | 1 x Dia |
| | Carbon/Glass Filled 21% < 40% | 500-700 | Slot - Rough | .0003 | .0005 | .0008 | .0010 | .0013 | .0016 | .0021 | .0032 | .0042 | .0045 | .0054 | .0072 | .0090 | .0107 | 1 x Dia | 1 x Dia |
| | | | Profile | .0003 | .0006 | .0009 | .0012 | .0015 | .0018 | .0024 | .0036 | .0048 | .0051 | .0062 | .0082 | .0103 | .0124 | .35 x Dia | 1 x Dia |
| Fiber Reinforced | Carbon/Glass Fiber 5% < 20% | 500-700 | Slot - Rough | .0003 | .0006 | .0010 | .0013 | .0016 | .0019 | .0026 | .0039 | .0051 | .0055 | .0066 | .0088 | .0109 | .0131 | 1 x Dia | 1 x Dia |
| | | | Profile | .0004 | .0007 | .0011 | .0015 | .0018 | .0022 | .0030 | .0044 | .0059 | .0063 | .0075 | .0101 | .0126 | .0151 | .35 x Dia | 1 x Dia |
| | Carbon/Glass Fiber 21% < 40% | 300-400 | Slot - Rough | .0003 | .0005 | .0008 | .0010 | .0013 | .0016 | .0021 | .0032 | .0042 | .0045 | .0054 | .0072 | .0090 | .0107 | 1 x Dia | 1 x Dia |
| | | | Profile | .0003 | .0006 | .0009 | .0012 | .0015 | .0018 | .0024 | .0036 | .0048 | .0051 | .0062 | .0082 | .0103 | .0124 | .35 x Dia | 1 x Dia |

# END MILLS FOR PLASTICS

## Corner Radius Upcut – 2 Flute




- High rake, high relief design with large flute valley maximizes chip removal and performance
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

| | CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.001″ | R +.001″ −.001″ | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| | 1/32 | .005 | **3/32** (3x) | 1/8 | 1-1/2 | 54031 | 40.40 | | |
| | $D_1$ +.000″ −.002″ | R +.001″ −.001″ | $L_2$ +.030″ −.000″ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| | 1/16 | .005 | **3/16** (3x) | 1/8 | 1-1/2 | 54062 | 39.80 | | |
| | 1/16 | .010 | **3/16** (3x) | 1/8 | 1-1/2 | 55462 | 39.80 | | |
| | 1/16 | .010 | **5/16** (5x) | 1/8 | 2 | 861862 | 49.50 | | |
| | 1/16 | .015 | **3/16** (3x) | 1/8 | 1-1/2 | 69362 | 39.80 | | |
| NEW | 1/16 | .015 | **5/16** (5x) | 1/8 | 2 | 862462 | 49.50 | 862462-C4 | 64.50 |
| | 3/32 | .005 | **9/32** (3x) | 1/8 | 1-1/2 | 54093 | 39.80 | | |
| | 3/32 | .010 | **9/32** (3x) | 1/8 | 1-1/2 | 55493 | 39.80 | | |
| | 3/32 | .010 | **1/2** (5x) | 1/8 | 2 | 861893 | 49.50 | | |
| | 3/32 | .015 | **9/32** (3x) | 1/8 | 1-1/2 | 69393 | 40.40 | | |
| | 3/32 | .015 | **1/2** (5x) | 1/8 | 2 | 862493 | 50.10 | | |
| | 3/32 | .020 | **9/32** (3x) | 1/8 | 1-1/2 | 69893 | 39.80 | | |
| | 3/32 | .030 | **9/32** (3x) | 1/8 | 1-1/2 | 70693 | 39.80 | | |
| | 1/8 | .005 | **3/16** (1.5x) | 1/8 | 1-1/2 | 767508 | 40.40 | | |
| NEW | 1/8 | .005 | **3/8** (3x) | 1/8 | 1-1/2 | 54108 | 39.80 | 54108-C4 | 54.70 |
| | 1/8 | .005 | **5/8** (5x) | 1/8 | 2 | 768908 | 49.70 | | |
| | 1/8 | .010 | **3/8** (3x) | 1/8 | 1-1/2 | 55508 | 39.80 | | |
| | 1/8 | .010 | **5/8** (5x) | 1/8 | 2 | 861908 | 50.10 | | |
| | 1/8 | .015 | **3/8** (3x) | 1/8 | 1-1/2 | 56408 | 39.80 | | |
| NEW | 1/8 | .015 | **5/8** (5x) | 1/8 | 2 | 862508 | 49.50 | 862508-C4 | 64.50 |
| | 1/8 | .020 | **3/8** (3x) | 1/8 | 1-1/2 | 69908 | 39.80 | | |
| | 1/8 | .030 | **3/16** (1.5x) | 1/8 | 1-1/2 | 768708 | 40.40 | | |
| NEW | 1/8 | .030 | **3/8** (3x) | 1/8 | 1-1/2 | 70708 | 39.80 | 70708-C4 | 54.70 |
| | 1/8 | .030 | **5/8** (5x) | 1/8 | 2 | 863108 | 49.50 | | |
| | 3/16 | .005 | **9/16** (3x) | 3/16 | 2 | 54112 | 52.40 | | |
| | 3/16 | .010 | **9/16** (3x) | 3/16 | 2 | 55512 | 52.40 | | |
| | 3/16 | .015 | **9/16** (3x) | 3/16 | 2 | 56412 | 53.40 | | |
| | 3/16 | .020 | **9/16** (3x) | 3/16 | 2 | 69912 | 52.40 | | |
| | 3/16 | .030 | **9/16** (3x) | 3/16 | 2 | 70712 | 53.40 | | |
| | 3/16 | .030 | **1** (5x) | 3/16 | 3 | 863112 | 65.70 | | |

continued on next page

NEW SIZES!

# END MILLS FOR PLASTICS

## Corner Radius Upcut – 2 Flute (cont.)

continued from previous page

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | |
| 1/4 | .010 | **3/4** (3x) | 1/4 | 2-1/2 | 55516 | 67.10 | | | |
| 1/4 | .015 | **3/4** (3x) | 1/4 | 2-1/2 | 56416 | 67.10 | 56416-C4 | 88.40 | NEW |
| 1/4 | .020 | **3/8** (1.5x) | 1/4 | 2-1/2 | 767116 | 67.10 | | | |
| 1/4 | .020 | **3/4** (3x) | 1/4 | 2-1/2 | 69916 | 67.10 | | | |
| 1/4 | .020 | **1-1/4** (5x) | 1/4 | 4 | 767716 | 79.10 | | | |
| 1/4 | .030 | **3/4** (3x) | 1/4 | 2-1/2 | 70716 | 67.10 | | | |
| 1/4 | .030 | **1-1/4** (5x) | 1/4 | 4 | 863116 | 78.30 | | | |
| 3/8 | .015 | **1-1/8** (3x) | 3/8 | 3 | 56424 | 105.50 | 56424-C4 | 135.90 | NEW |
| 3/8 | .030 | **1-1/8** (3x) | 3/8 | 3 | 70724 | 105.50 | | | |
| 3/8 | .060 | **1-1/8** (3x) | 3/8 | 3 | 739124 | 107.00 | | | |
| 1/2 | .015 | **1-1/2** (3x) | 1/2 | 4 | 56432 | 182.30 | | | |
| 1/2 | .030 | **1-1/2** (3x) | 1/2 | 4 | 70732 | 182.30 | | | |
| 1/2 | .060 | **1-1/2** (3x) | 1/2 | 4 | 739132 | 184.90 | | | |

**Please See Speeds & Feeds On Page 276**

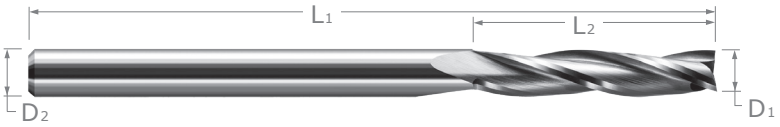


**Access Simulation Files in DXF Format for Every Harvey Tool Product**

harveytool.com/resources/simulation-files

# END MILLS FOR PLASTICS

## Finishers – Square Upcut – 3 Flute (Slow Helix)




**Wiper Flat Option for an Improved Finish**

- 3 flute design strengthens rigidity and improves wall finish
- Choose from two types:
  - Without Wiper Flat (Type I): Standard end geometry designed with a dish angle to a sharp corner
  - With Wiper Flat (Type II): Wiper flat end geometry that enhances bottom finish by reducing traditional circular marks; with a slight chamfer to protect corners
- Slower helix (approx. 22°) reduces lifting forces for fiber-reinforced applications and vacuum table setups
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | TYPE | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| 1/32 | **3/32** (3x) | II | 1/8 | 1-1/2 | 915631 | 60.70 | | |
| 1/32 | **5/32** (5x) | II | 1/8 | 1-1/2 | 986431 | 60.20 | | |
| 1/32 | **1/4** (8x) | II | 1/8 | 1-1/2 | 992331 | 66.40 | | |
| 3/64 | **1/4** (5x) | II | 1/8 | 1-1/2 | 986447 | 46.40 | | |
| 3/64 | **3/8** (8x) | II | 1/8 | 2 | 992347 | 51.30 | | |
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| 1/16 | **3/16** (3x) | I | 1/8 | 1-1/2 | 770262 | 38.30 | | |
| 1/16 | **3/16** (3x) | II | 1/8 | 1-1/2 | 915662 | 38.30 | | |
| 1/16 | **5/16** (5x) | I | 1/8 | 2 | 769662 | 45.00 | | |
| 1/16 | **5/16** (5x) | II | 1/8 | 2 | 986462 | 44.60 | 986462-C4 | 59.60 |
| 1/16 | **1/2** (8x) | II | 1/8 | 2 | 992362 | 49.70 | | |
| 1/16 | **5/8** (10x) | II | 1/8 | 2 | 871662 | 63.00 | | |
| 5/64 | **13/32** (5x) | II | 1/8 | 2 | 986478 | 45.00 | | |
| 5/64 | **5/8** (8x) | II | 1/8 | 2 | 992378 | 49.70 | | |
| 3/32 | **9/32** (3x) | I | 1/8 | 1-1/2 | 770293 | 38.30 | | |
| 3/32 | **9/32** (3x) | II | 1/8 | 1-1/2 | 915693 | 38.00 | | |
| 3/32 | **1/2** (5x) | I | 1/8 | 2 | 769693 | 45.00 | | |
| 3/32 | **1/2** (5x) | II | 1/8 | 2 | 986493 | 44.60 | 986493-C4 | 63.30 |
| 3/32 | **3/4** (8x) | II | 1/8 | 2 | 992393 | 49.70 | | |
| 1/8 | **3/8** (3x) | I | 1/8 | 1-1/2 | 770308 | 38.30 | | |
| 1/8 | **3/8** (3x) | II | 1/8 | 1-1/2 | 915708 | 38.00 | | |
| 1/8 | **5/8** (5x) | I | 1/8 | 2 | 769708 | 45.00 | | |
| 1/8 | **5/8** (5x) | II | 1/8 | 2 | 986508 | 44.60 | 986508-C4 | 59.60 |
| 1/8 | **1** (8x) | II | 1/8 | 2 | 992408 | 49.70 | | |
| 1/8 | **1-1/4** (10x) | II | 1/8 | 2-1/2 | 871708 | 63.00 | | |

continued on next page

**TYPE I - WITHOUT WIPER**



**TYPE II - WITH WIPER FLAT**



# END MILLS FOR PLASTICS

## Finishers – Square Upcut – 3 Flute (Slow Helix) (cont.)

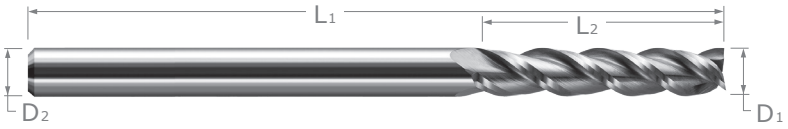
continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | TYPE | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| 5/32 | **15/32** (3x) | II | 3/16 | 2 | 915710 | 59.70 | | |
| 5/32 | **3/4** (5x) | II | 3/16 | 3 | 986510 | 61.80 | | |
| 3/16 | **9/16** (3x) | I | 3/16 | 2 | 770312 | 59.70 | | |
| 3/16 | **9/16** (3x) | II | 3/16 | 2 | 915712 | 59.10 | | |
| 3/16 | **1** (5x) | I | 3/16 | 3 | 769712 | 62.30 | | |
| 3/16 | **1** (5x) | II | 3/16 | 3 | 986512 | 61.80 | 986512-C4 | 79.60 |
| 3/16 | **1-1/2** (8x) | II | 3/16 | 3 | 992412 | 74.90 | | |
| 1/4 | **3/8** (1.5x) | II | 1/4 | 2-1/2 | 869316 | 59.00 | | |
| 1/4 | **3/4** (3x) | I | 1/4 | 2-1/2 | 770316 | 62.30 | | |
| 1/4 | **3/4** (3x) | II | 1/4 | 2-1/2 | 915716 | 61.80 | | |
| 1/4 | **1-1/4** (5x) | I | 1/4 | 3 | 769716 | 70.50 | | |
| 1/4 | **1-1/4** (5x) | II | 1/4 | 3 | 986516 | 69.90 | 986516-C4 | 93.80 |
| 1/4 | **2** (8x) | II | 1/4 | 4 | 992416 | 93.20 | | |
| 3/8 | **9/16** (1.5x) | II | 3/8 | 3 | 869324 | 100.40 | | |
| 3/8 | **1-1/8** (3x) | II | 3/8 | 3 | 915724 | 103.10 | | |
| 3/8 | **2** (5x) | II | 3/8 | 4 | 986524 | 111.50 | | |
| 1/2 | **3/4** (1.5x) | II | 1/2 | 4 | 869332 | 172.60 | | |
| 1/2 | **1-1/2** (3x) | II | 1/2 | 4 | 915732 | 179.20 | | |
| 1/2 | **2-5/8** (5x) | II | 1/2 | 5 | 986532 | 189.20 | | |

**Please See Speeds & Feeds On Page 291**

# END MILLS FOR PLASTICS

## Finishers – Square Upcut – 3 Flute (High Helix)




**Wiper Flat Option for an Improved Finish**

- 3 flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- Choose from two types:
  - Without Wiper Flat (Type I): Standard end geometry designed with a dish angle to a sharp corner
  - With Wiper Flat (Type II): Wiper flat end geometry that enhances bottom finish by reducing traditional circular marks; with a slight chamfer to protect corners
- Design is ideally suited for thin-walled applications and tightly secured workpieces
- Center cutting
- Solid carbide
- CNC ground in the USA

| | CUTTER DIAMETER | LENGTH OF CUT | TYPE | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| | 1/32 | **3/32** (3x) | II | 1/8 | 1-1/2 | 902131 | 59.70 | | |
| | 1/32 | **5/32** (5x) | II | 1/8 | 1-1/2 | 941231 | 62.10 | | |
| | 1/32 | **1/4** (8x) | II | 1/8 | 1-1/2 | 900731 | 68.40 | | |
| | 3/64 | **1/4** (5x) | II | 1/8 | 1-1/2 | 941247 | 48.20 | | |
| | $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| | 1/16 | **3/16** (3x) | I | 1/8 | 1-1/2 | 736762 | 44.40 | | |
| NEW | 1/16 | **3/16** (3x) | II | 1/8 | 1-1/2 | 902162 | 44.00 | 902162-C4 | 59.00 |
| | 1/16 | **5/16** (5x) | I | 1/8 | 2 | 769862 | 46.70 | | |
| | 1/16 | **5/16** (5x) | II | 1/8 | 2 | 941262 | 46.40 | 941262-C4 | 64.90 |
| | 1/16 | **1/2** (8x) | II | 1/8 | 2 | 900762 | 51.30 | | |
| | 1/16 | **5/8** (10x) | II | 1/8 | 2 | 854662 | 54.30 | | |
| | 5/64 | **13/32** (5x) | II | 1/8 | 2 | 941278 | 46.40 | | |
| | 3/32 | **9/32** (3x) | I | 1/8 | 1-1/2 | 736793 | 44.40 | | |
| | 3/32 | **9/32** (3x) | II | 1/8 | 1-1/2 | 902193 | 44.00 | | |
| | 3/32 | **1/2** (5x) | I | 1/8 | 2 | 769893 | 46.70 | | |
| | 3/32 | **1/2** (5x) | II | 1/8 | 2 | 941293 | 46.40 | 941293-C4 | 64.90 |
| | 3/32 | **3/4** (8x) | II | 1/8 | 2 | 900793 | 51.30 | | |
| | 1/8 | **3/8** (3x) | I | 1/8 | 1-1/2 | 736808 | 44.40 | | |
| | 1/8 | **3/8** (3x) | II | 1/8 | 1-1/2 | 902208 | 44.00 | | |
| | 1/8 | **5/8** (5x) | I | 1/8 | 2 | 769908 | 46.40 | | |
| | 1/8 | **5/8** (5x) | II | 1/8 | 2 | 941308 | 46.40 | 941308-C4 | 64.90 |
| | 1/8 | **1** (8x) | II | 1/8 | 2 | 900808 | 51.30 | | |
| NEW | 1/8 | **1-1/4** (10x) | II | 1/8 | 2-1/2 | 854708 | 54.30 | 854708-C4 | 70.10 |

continued on next page

**TYPE I - WITHOUT WIPER**



**TYPE II - WITH WIPER FLAT**



NEW SIZES!

# END MILLS FOR PLASTICS

## Finishers – Square Upcut – 3 Flute (High Helix) (cont.)

continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | | TYPE | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | |
| 5/32 | **15/32** | (3x) | II | 3/16 | 2 | 902210 | 59.40 | | | |
| 5/32 | **3/4** | (5x) | II | 3/16 | 3 | 941310 | 61.80 | | | |
| 3/16 | **9/16** | (3x) | I | 3/16 | 2 | 736812 | 60.00 | | | |
| 3/16 | **9/16** | (3x) | II | 3/16 | 2 | 902212 | 59.40 | | | |
| 3/16 | **1** | (5x) | I | 3/16 | 3 | 769912 | 62.30 | | | |
| 3/16 | **1** | (5x) | II | 3/16 | 3 | 941312 | 61.80 | 941312-C4 | 79.60 | |
| 3/16 | **1-1/2** | (8x) | II | 3/16 | 3 | 900812 | 68.10 | 900812-C4 | 85.90 | NEW |
| 1/4 | **3/8** | (1.5x) | II | 1/4 | 2-1/2 | 852016 | 65.10 | | | |
| 1/4 | **3/4** | (3x) | I | 1/4 | 2-1/2 | 736816 | 68.40 | | | |
| 1/4 | **3/4** | (3x) | II | 1/4 | 2-1/2 | 902216 | 67.90 | 902216-C4 | 89.30 | NEW |
| 1/4 | **1-1/4** | (5x) | I | 1/4 | 3 | 769916 | 70.50 | | | |
| 1/4 | **1-1/4** | (5x) | II | 1/4 | 3 | 941316 | 69.90 | 941316-C4 | 93.80 | |
| 1/4 | **2** | (8x) | II | 1/4 | 4 | 900816 | 93.20 | | | |
| 3/8 | **9/16** | (1.5x) | II | 3/8 | 3 | 852024 | 100.60 | | | |
| 3/8 | **1-1/8** | (3x) | II | 3/8 | 3 | 902224 | 103.10 | | | |
| 3/8 | **2** | (5x) | II | 3/8 | 4 | 941324 | 112.50 | | | |
| 1/2 | **3/4** | (1.5x) | II | 1/2 | 4 | 852032 | 171.20 | | | |
| 1/2 | **1-1/2** | (3x) | II | 1/2 | 4 | 902232 | 177.60 | | | |
| 1/2 | **2-5/8** | (5x) | II | 1/2 | 5 | 941332 | 187.60 | | | |

**Please See Speeds & Feeds On Page 292**

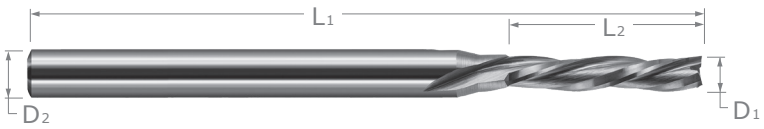


**Download Speeds & Feeds Charts For Every Harvey Tool End Mill**

harveytool.com/resources/speeds-feeds

# END MILLS FOR PLASTICS

## Finishers – Square Downcut – 3 Flute (Slow Helix)




- 3 left hand spiral, right hand cut flute design strengthens rigidity and improves wall finish
- Slower helix (approx. 22°) ideal for overhung, less secure parts
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | |
|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 3 FL | USD$ |
| 1/32 | **5/32** (5x) | 1/8 | 1-1/2 | 880431 | 60.70 |

| $D_1$ $^{+.000''}_{-.002''}$ | $D_1$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 3 FL | USD$ |
|---|---|---|---|---|---|
| 1/16 | **5/16** (5x) | 1/8 | 2 | 880462 | 48.70 |
| 3/32 | **1/2** (5x) | 1/8 | 2 | 880493 | 48.70 |
| 1/8 | **5/8** (5x) | 1/8 | 2 | 880508 | 48.70 |
| 3/16 | **1** (5x) | 3/16 | 3 | 880512 | 64.00 |
| 1/4 | **1-1/4** (5x) | 1/4 | 3 | 880516 | 72.20 |
| 3/8 | **1-1/8** (3x) | 3/8 | 3 | 878124 | 105.50 |
| 1/2 | **1-1/2** (3x) | 1/2 | 4 | 878132 | 178.70 |

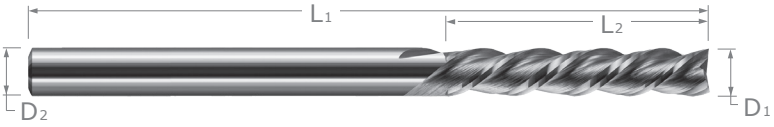
## SPEEDS & FEEDS (3 Flute Plastic Finisher – Slow Helix)

**Important Note:** Values in table are in inches and are based on standard (5x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 120%; for 3x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 8x, reduce to 66%; for 10x, reduce to 55%). For complete speeds and feeds charts, please see www.harveytool.com

| Material Type | | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | .625 | .750 | Radial | Axial |
| Unfilled | Unfilled | 800-1200 | Semi-Roughing | .00041 | .00084 | .00128 | .00168 | .00212 | .00253 | .00340 | .00508 | .00679 | .00721 | .00866 | .01155 | .01444 | .01732 | .35 x Dia | 1 x Dia |
| | | | Finishing | .00013 | .00028 | .00042 | .00055 | .00070 | .00083 | .00112 | .00167 | .00223 | .00237 | .00285 | .00379 | .00474 | .00569 | .10 x Dia | 5 x Dia |
| Filled Plastics | Carbon/Glass Filled 5% < 20% | 600-800 | Semi-Roughing | .00041 | .00084 | .00128 | .00168 | .00212 | .00253 | .00340 | .00508 | .00679 | .00721 | .00866 | .01155 | .01444 | .01732 | .35 x Dia | 1 x Dia |
| | | | Finishing | .00013 | .00028 | .00042 | .00055 | .00070 | .00083 | .00112 | .00167 | .00223 | .00237 | .00285 | .00379 | .00474 | .00569 | .10 x Dia | 5 x Dia |
| | Carbon/Glass Filled 21% < 40% | 500-700 | Semi-Roughing | .00033 | .00069 | .00104 | .00138 | .00173 | .00207 | .00278 | .00416 | .00556 | .00590 | .00709 | .00945 | .01181 | .01417 | .35 x Dia | 1 x Dia |
| | | | Finishing | .00011 | .00023 | .00034 | .00045 | .00057 | .00068 | .00091 | .00137 | .00183 | .00194 | .00233 | .00310 | .00388 | .00466 | .10 x Dia | 5 x Dia |
| Fiber Reinforced | Carbon/Glass Fiber 5% < 20% | 500-700 | Semi-Roughing | .00041 | .00084 | .00128 | .00168 | .00212 | .00253 | .00340 | .00508 | .00679 | .00721 | .00866 | .01155 | .01444 | .01732 | .35 x Dia | 1 x Dia |
| | | | Finishing | .00013 | .00028 | .00042 | .00055 | .00070 | .00083 | .00112 | .00167 | .00223 | .00237 | .00285 | .00379 | .00474 | .00569 | .10 x Dia | 5 x Dia |
| | Carbon/Glass Fiber 21% < 40% | 300-400 | Semi-Roughing | .00033 | .00069 | .00104 | .00138 | .00173 | .00207 | .00278 | .00416 | .00556 | .00590 | .00709 | .00945 | .01181 | .01417 | .35 x Dia | 1 x Dia |
| | | | Finishing | .00011 | .00023 | .00034 | .00045 | .00057 | .00068 | .00091 | .00137 | .00183 | .00194 | .00233 | .00310 | .00388 | .00466 | .10 x Dia | 5 x Dia |

# END MILLS FOR PLASTICS

## Finishers – Square Downcut – 3 Flute (High Helix)




- 3 left hand spiral, right hand cut flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- Design is ideally suited for thin-walled applications
- Solid carbide
- Center cutting
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | |
|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $D_1$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 3 FL | USD$ |
| 1/32 | **5/32** (5x) | 1/8 | 1-1/2 | 864331 | 68.10 |
| $D_1$ $^{+.000''}_{-.002''}$ | $D_1$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 3 FL | USD$ |
| 1/16 | **5/16** (5x) | 1/8 | 2 | 864362 | 55.10 |
| 3/32 | **9/32** (3x) | 1/8 | 1-1/2 | 873793 | 50.80 |
| 3/32 | **1/2** (5x) | 1/8 | 2 | 864393 | 53.40 |
| 3/32 | **3/4** (8x) | 1/8 | 2 | 722593 | 55.60 |
| 1/8 | **3/8** (3x) | 1/8 | 1-1/2 | 873808 | 42.60 |
| 1/8 | **5/8** (5x) | 1/8 | 2 | 864408 | 46.90 |
| 1/8 | **1** (8x) | 1/8 | 2 | 722608 | 49.20 |
| 3/16 | **9/16** (3x) | 3/16 | 2 | 873812 | 57.40 |
| 3/16 | **1** (5x) | 3/16 | 3 | 864412 | 64.60 |
| 1/4 | **3/4** (3x) | 1/4 | 2-1/2 | 873816 | 65.50 |
| 1/4 | **1-1/4** (5x) | 1/4 | 3 | 864416 | 72.20 |
| 1/4 | **2** (8x) | 1/4 | 4 | 722616 | 95.10 |
| 3/8 | **1-1/8** (3x) | 3/8 | 3 | 873824 | 105.50 |
| 1/2 | **1-1/2** (3x) | 1/2 | 4 | 873832 | 180.10 |



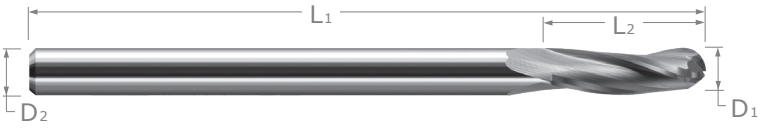
## SPEEDS & FEEDS (3 Flute Plastic Finisher – High Helix)

**Important Note:** Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

| Material Type | | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | .625 | .750 | Radial | Axial |
| Unfilled | Unfilled | 800-1200 | Semi-Roughing | .00043 | .00089 | .00135 | .00178 | .00224 | .00267 | .00359 | .00536 | .00717 | .00761 | .00914 | .01219 | .01524 | .01829 | .35 x Dia | 1 x Dia |
| | | | Finishing | .00024 | .00049 | .00074 | .00097 | .00123 | .00146 | .00196 | .00294 | .00393 | .00417 | .00501 | .00668 | .00835 | .01002 | .10 x Dia | 3 x Dia |
| Filled Plastics | Carbon/Glass Filled 5% < 20% | 600-800 | Semi-Roughing | .00043 | .00089 | .00135 | .00178 | .00224 | .00267 | .00359 | .00536 | .00717 | .00761 | .00914 | .01219 | .01524 | .01829 | .35 x Dia | 1 x Dia |
| | | | Finishing | .00024 | .00049 | .00074 | .00097 | .00123 | .00146 | .00196 | .00294 | .00393 | .00417 | .00501 | .00668 | .00835 | .01002 | .10 x Dia | 3 x Dia |
| | Carbon/Glass Filled 21% < 40% | 500-700 | Semi-Roughing | .00035 | .00073 | .00110 | .00146 | .00183 | .00218 | .00293 | .00439 | .00587 | .00622 | .00748 | .00997 | .01247 | .01496 | .35 x Dia | 1 x Dia |
| | | | Finishing | .00019 | .00040 | .00060 | .00080 | .00100 | .00120 | .00161 | .00240 | .00321 | .00341 | .00410 | .00546 | .00683 | .00820 | .10 x Dia | 3 x Dia |
| Fiber Reinforced | Carbon/Glass Fiber 5% < 20% | 500-700 | Semi-Roughing | .00043 | .00089 | .00135 | .00178 | .00224 | .00267 | .00359 | .00536 | .00717 | .00761 | .00914 | .01219 | .01524 | .01829 | .35 x Dia | 1 x Dia |
| | | | Finishing | .00024 | .00049 | .00074 | .00097 | .00123 | .00146 | .00196 | .00294 | .00393 | .00417 | .00501 | .00668 | .00835 | .01002 | .10 x Dia | 3 x Dia |
| | Carbon/Glass Fiber 21% < 40% | 300-400 | Semi-Roughing | .00035 | .00073 | .00110 | .00146 | .00183 | .00218 | .00293 | .00439 | .00587 | .00622 | .00748 | .00997 | .01247 | .01496 | .35 x Dia | 1 x Dia |
| | | | Finishing | .00019 | .00040 | .00060 | .00080 | .00100 | .00120 | .00161 | .00240 | .00321 | .00341 | .00410 | .00546 | .00683 | .00820 | .10 x Dia | 3 x Dia |

# END MILLS FOR PLASTICS

## Finishers – Ball Upcut – 3 Flute (Slow Helix)



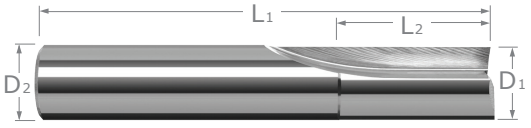

- Ball end has increased rake and relief for improved cutting action at the tip
- 3 flute design strengthens rigidity and improves wall finish
- Slower helix reduces lifting forces for fiber-reinforced applications and vacuum table set ups
- Center cutting
- Ultrafine grain carbide to create a sharp cutting edge
- CNC ground in the USA

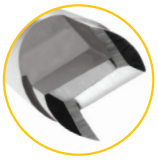
| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | |
|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 3 FL | USD$ |
| 1/16 | **.186** (3x) | 1/8 | 1-1/2 | 808762 | 44.00 |
| 3/32 | **.279** (3x) | 1/8 | 1-1/2 | 808793 | 44.00 |
| 1/8 | **3/8** (3x) | 1/8 | 1-1/2 | 808808 | 43.70 |
| 3/16 | **.570** (3x) | 3/16 | 2 | 808812 | 67.00 |
| 1/4 | **3/4** (3x) | 1/4 | 2-1/2 | 808816 | 70.50 |
| 3/8 | **1-1/8** (3x) | 3/8 | 3 | 808824 | 112.30 |
| 1/2 | **1-1/2** (3x) | 1/2 | 4 | 808832 | 191.40 |

**Please See Speeds & Feeds On Page 291**

# END MILLS FOR COMPOSITES

## Square – 2 Straight Flutes



2 Straight Flutes
(End View)

- Designed to mill abrasive, glass-filled plastics with reinforcing fiber and other additives
- Straight flute design improves finish and minimizes fraying of fiber-reinforced and layered materials by not "pulling" fibers
- Behind center design with high positive rake for smoother cuts
- Eccentric relief for improved edge life
- Allows shallow ramping, not suited for plunge cutting
- Select sizes available with oversized, router-style shanks
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/32 | **3/32** (3x) | 1/8 | 1-1/2 | 69531 | 61.10 | 69531-C4 | 76.10 |
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/16 | **3/32** (1.5x) | 1/8 | 1-1/2 | 825162 | 41.00 | 825162-C4 | 55.90 |
| 1/16 | **1/8** (2x) | 1/4* | 2 | 14604 | 45.60 | 14604-C4 | 69.50 |
| 1/16 | **3/16** (3x) | 1/8 | 1-1/2 | 69562 | 40.80 | 69562-C4 | 55.70 |
| 1/16 | **5/16** (5x) | 1/8 | 2 | 70462 | 47.00 | 70462-C4 | 63.80 |
| 5/64* | **5/32** (2x) | 1/4* | 2 | 14605 | 46.50 | 14605-C4 | 66.50 |
| 5/64 | **1/4** (3x) | 1/8 | 1-1/2 | 69578 | 41.20 | 69578-C4 | 56.20 |
| 5/64 | **13/32** (5x) | 1/8 | 2 | 70478 | 47.40 | 70478-C4 | 62.40 |
| 3/32 | **9/64** (1.5x) | 1/8 | 1-1/2 | 825193 | 41.00 | 825193-C4 | 55.90 |
| 3/32* | **3/16** (2x) | 1/4* | 2 | 14606 | 45.60 | 14606-C4 | 65.60 |
| 3/32 | **5/16** (3x) | 1/8 | 1-1/2 | 69593 | 40.80 | 69593-C4 | 55.70 |
| 3/32 | **1/2** (5x) | 1/8 | 2 | 70493 | 47.00 | 70493-C4 | 63.80 |
| 1/8 | **3/16** (1.5x) | 1/8 | 1-1/2 | 825208 | 40.30 | 825208-C4 | 55.20 |
| 1/8* | **1/4** (2x) | 1/4* | 2 | 14608 | 45.60 | 14608-C4 | 69.50 |
| 1/8 | **3/8** (3x) | 1/8 | 1-1/2 | 69608 | 40.80 | 69608-C4 | 55.70 |
| 1/8 | **5/8** (5x) | 1/8 | 2 | 70508 | 47.00 | 70508-C4 | 63.80 |
| 5/32 | **1/2** (3x) | 3/16 | 2 | 69610 | 43.30 | 69610-C4 | 60.00 |
| 3/16 | **5/8** (3x) | 3/16 | 2 | 69612 | 43.30 | 69612-C4 | 60.80 |
| 3/16* | **5/8** (3x) | 1/4* | 2 | 14612 | 45.60 | 14612-C4 | 65.60 |
| 3/16 | **1** (5x) | 3/16 | 3 | 70512 | 51.20 | 70512-C4 | 69.00 |
| 1/4 | **3/8** (1.5x) | 1/4 | 2-1/2 | 825216 | 42.40 | 825216-C4 | 66.20 |
| 1/4* | **3/4** (3x) | 1/4 | 2-1/2 | 14616 | 41.50 | 14616-C4 | 65.30 |
| 1/4 | **1-1/4** (5x) | 1/4 | 3 | 70516 | 57.80 | 70516-C4 | 81.60 |
| 5/16 | **5/8** (2x) | 5/16 | 2-1/2 | 14620 | 79.70 | 14620-C4 | 105.30 |
| 3/8* | **7/8** (2x) | 3/8 | 2-1/2 | 14624 | 79.00 | 14624-C4 | 108.40 |
| 3/8 | **2** (5x) | 3/8 | 4 | 70524 | 97.20 | 70524-C4 | 126.80 |
| 1/2* | **1** (2x) | 1/2 | 3 | 14632 | 125.40 | 14632-C4 | 161.10 |
| 1/2 | **2-1/2** (5x) | 1/2 | 4 | 70532 | 154.80 | | |

*Cutter diameter tolerance is +.000/-.004". Tools are ground on oversized, router-style shank.

## SPEEDS & FEEDS (2 Straight Flutes)

**Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For longer lengths of cut, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com**

| Material Type | | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | .625 | .750 | Radial | Axial |
| Filled Plastics | Carbon/Glass Filled 5% < 20% | 600-800 | Slot - Rough | .0004 | .0008 | .0012 | .0016 | .0020 | .0024 | .0032 | .0048 | .0064 | .0068 | .0082 | .0109 | .0137 | .0164 | 1 x Dia | 1 x Dia |
| | | | Profile | .0004 | .0009 | .0014 | .0018 | .0023 | .0028 | .0037 | .0055 | .0074 | .0079 | .0094 | .0126 | .0157 | .0189 | .35 x Dia | 1 x Dia |
| | Carbon/Glass Filled 21% < 40% | 500-700 | Slot - Rough | .0003 | .0007 | .0010 | .0013 | .0016 | .0020 | .0026 | .0039 | .0053 | .0056 | .0067 | .0090 | .0112 | .0134 | 1 x Dia | 1 x Dia |
| | | | Profile | .0004 | .0008 | .0011 | .0015 | .0019 | .0023 | .0030 | .0045 | .0061 | .0064 | .0077 | .0103 | .0129 | .0154 | .35 x Dia | 1 x Dia |
| Fiber Reinforced | Carbon/Glass Fiber 5% < 20% | 500-700 | Slot - Rough | .0004 | .0008 | .0012 | .0016 | .0020 | .0024 | .0032 | .0048 | .0064 | .0068 | .0082 | .0109 | .0137 | .0164 | 1 x Dia | 1 x Dia |
| | | | Profile | .0004 | .0009 | .0014 | .0018 | .0023 | .0028 | .0037 | .0055 | .0074 | .0079 | .0094 | .0126 | .0157 | .0189 | .35 x Dia | 1 x Dia |
| | Carbon/Glass Fiber 21% < 40% | 300-400 | Slot - Rough | .0003 | .0007 | .0010 | .0013 | .0016 | .0020 | .0026 | .0039 | .0053 | .0056 | .0067 | .0090 | .0112 | .0134 | 1 x Dia | 1 x Dia |
| | | | Profile | .0004 | .0008 | .0011 | .0015 | .0019 | .0023 | .0030 | .0045 | .0061 | .0064 | .0077 | .0103 | .0129 | .0154 | .35 x Dia | 1 x Dia |

# END MILLS FOR COMPOSITES

## Compression Cutter




**Prevents Burrs & Delamination!**

- Counteracting flute geometries compress material inwardly to avoid burrs, tear out, and delamination
- Produces enhanced edge finish on top and bottom of workpiece
- Offered in two diamond coatings for increased tool life in a variety of abrasive composite materials
- Stocked in 2, 4, and 6 flute configurations for rough and finish machining
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | OVERLAP CENTER | OVERLAP LENGTH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AMORPHOUS DIAMOND | | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.030″}_{-.000″}$ | $L_3$ $^{+.001″}_{-.001″}$ | $L_4$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/32 | 3/32 | **1/32** | .006 | 2 | 1/8 | 1-1/2 | 994331 | 64.70 | 994331-C4 | 79.30 | 995031 | 146.60 |
| 3/64 | 9/64 | **3/64** | .009 | 2 | 1/8 | 1-1/2 | 994347 | 64.70 | 994347-C4 | 80.00 | 995047 | 145.10 |
| 1/16 | 3/16 | **1/16** | .013 | 2 | 1/8 | 1-1/2 | 994362 | 61.60 | 994362-C4 | 76.30 | 995062 | 141.80 |
| 5/64 | 1/4 | **5/64** | .016 | 2 | 1/8 | 1-1/2 | 994378 | 61.60 | 994378-C4 | 77.00 | 995078 | 143.00 |
| 3/32 | 9/32 | **3/32** | .019 | 2 | 1/8 | 1-1/2 | 994393 | 61.60 | 994393-C4 | 76.30 | 995093 | 143.00 |
| 1/8 | 3/8 | **1/8** | .025 | 2 | 1/8 | 1-1/2 | 994408 | 59.20 | 994408-C4 | 74.30 | 995108 | 138.50 |
| 1/8 | 3/8 | **1/8** | .028 | 4 | 1/8 | 1-1/2 | 993708 | 62.90 | 993708-C4 | 78.20 | 997708 | 144.70 |
| 3/16 | 9/16 | **3/16** | .038 | 2 | 3/16 | 2 | 994412 | 65.90 | 994412-C4 | 86.90 | 995112 | 161.00 |
| 3/16 | 9/16 | **3/16** | .041 | 4 | 3/16 | 2 | 993712 | 70.70 | 993712-C4 | 91.60 | 997712 | 169.70 |
| 1/4 | 3/4 | **1/4** | .050 | 2 | 1/4 | 2-1/2 | 994416 | 78.90 | 994416-C4 | 102.60 | 995116 | 190.50 |
| 1/4 | 3/4 | **1/4** | .055 | 4 | 1/4 | 2-1/2 | 993716 | 84.00 | 993716-C4 | 107.60 | 997716 | 199.00 |
| 5/16 | 1 | **5/16** | .075 | 6 | 5/16 | 2-1/2 | 920120 | 101.30 | 920120-C4 | 130.40 | 918820 | 233.30 |
| 3/8 | 1-1/8 | **3/8** | .090 | 6 | 3/8 | 2-1/2 | 920124 | 125.40 | 920124-C4 | 154.00 | 918824 | 309.00 |
| 1/2 | 1-1/2 | **1/2** | .120 | 6 | 1/2 | 3 | 920132 | 226.50 | 920132-C4 | 259.10 | 918832 | 445.60 |

### Choosing the Right Diamond

**AMORPHOUS DIAMOND**

A PVD amorphous diamond coating which improves lubricity and wear resistance. Coating is thin relative to CVD diamond, preventing edge rounding. Sharp edges improve results (performance and finish) over CVD in certain abrasive materials.

Thin coating maintains sharper edge.

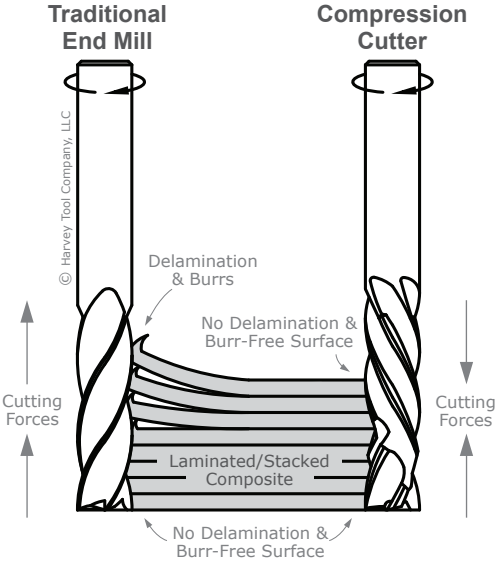


**CVD DIAMOND**

True Crystalline CVD diamond is grown directly into a carbide end mill. This dramatically improves hardness, which improves abrasion resistance and extends tool life up to 50x, allowing higher feed rates than uncoated carbide. Ideal for machining abrasive composite materials with high fiber or fill concentration (G10, FR4, etc.) Diamond layer is approximately 5 times thicker than Amorphous Diamond, improving wear resistance. Well suited for high production environments.

Thicker diamond layer for increased wear resistance.





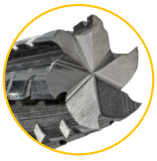

**Traditional End Mills:** Upward lifting force causes burrs and delamination at the top of the part.

**Compression Cutters:** Counteracting cutting forces compress the material and stabilize the workpiece, creating a superior finish on the top and bottom of the part.

# END MILLS FOR COMPOSITES

## Chipbreaker Cutter



Type I
Bur-Style End



Type II
Center Cutting

- Optimized geometry with chipbreakers efficiently shears fibers and shortens chips for improved chip removal
- Suited for roughing and profiling in composite materials with high fiber or fill concentration (G10, FR4, etc.)
- Choose from two types:
  - -Type I: Bur-style end allows for shallow ramping (not suited for plunge cutting)
  - -Type II: Center cutting end allows for plunge cutting, reduced flute count prevents chip packing, designed specifically for CFRP
- Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | TYPE | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/32 | **3/32** (3x) | 4 | I | 1/8 | 1-1/2 | 969231 | 62.20 | 969231-C4 | 77.10 | | |
| 3/64 | **9/64** (3x) | 4 | I | 1/8 | 1-1/2 | 969247 | 61.70 | 969247-C4 | 76.60 | | |
| 1/16 | **.186** (3x) | 3 | II | 1/8 | 1-1/2 | 801962 | 61.60 | | | 803762 | 141.80 |
| 1/16 | **.186** (3x) | 4 | I | 1/8 | 1-1/2 | 969262 | 59.20 | 969262-C4 | 74.10 | | |
| 5/64 | **15/64** (3x) | 4 | I | 1/8 | 1-1/2 | 969278 | 59.70 | 969278-C4 | 74.60 | | |
| 3/32 | **.279** (3x) | 3 | II | 1/8 | 1-1/2 | 801993 | 61.60 | | | 803793 | 141.80 |
| 3/32 | **.279** (3x) | 4 | I | 1/8 | 1-1/2 | 969293 | 59.20 | 969293-C4 | 74.10 | 791593 | 143.00 |
| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/8 | **3/8** (3x) | 5 | II | 1/8 | 1-1/2 | 802008 | 58.60 | 802008-C4 | 73.60 | 803808 | 138.20 |
| 1/8 | **3/8** (3x) | 6 | I | 1/8 | 1-1/2 | 969308 | 57.00 | 969308-C4 | 71.90 | 791608 | 139.60 |
| 1/8 | **5/8** (5x) | 5 | II | 1/8 | 1-1/2 | 818508 | 62.90 | 818508-C4 | 77.90 | 803008 | 141.80 |
| 1/8 | **5/8** (5x) | 6 | I | 1/8 | 1-1/2 | 884908 | 61.10 | 884908-C4 | 76.10 | | |
| 3/16 | **9/16** (3x) | 5 | II | 3/16 | 2 | 802012 | 65.60 | | | 803812 | 160.00 |
| 3/16 | **9/16** (3x) | 6 | I | 3/16 | 2 | 969312 | 62.90 | 969312-C4 | 84.10 | | |
| 3/16 | **1** (3x) | 5 | II | 3/16 | 2 | 818512 | 68.90 | | | 803012 | 165.00 |
| 3/16 | **1** (5x) | 6 | I | 3/16 | 2 | 884912 | 67.00 | 884912-C4 | 88.10 | | |
| 1/4 | **3/4** (3x) | 5 | II | 1/4 | 2-1/2 | 802016 | 77.60 | 802016-C4 | 101.80 | 803816 | 189.30 |
| 1/4 | **3/4** (3x) | 6 | I | 1/4 | 2-1/2 | 969316 | 75.50 | 969316-C4 | 99.60 | 791616 | 189.30 |
| 1/4 | **1-1/4** (5x) | 5 | II | 1/4 | 2-1/2 | 818516 | 82.20 | 818516-C4 | 103.60 | 803016 | 198.50 |
| 1/4 | **1-1/4** (5x) | 6 | I | 1/4 | 2-1/2 | 884916 | 79.80 | 884916-C4 | 104.00 | | |
| 3/8 | **1-1/8** (3x) | 5 | II | 3/8 | 3 | 802024 | 128.90 | | | 803824 | 308.40 |
| 3/8 | **1-1/8** (3x) | 8 | I | 3/8 | 3 | 969324 | 123.80 | 969324-C4 | 153.10 | 791624 | 311.30 |
| 1/2 | **1-1/2** (3x) | 5 | II | 1/2 | 4 | 802032 | 225.20 | | | 803832 | 442.10 |
| 1/2 | **1-1/2** (3x) | 8 | I | 1/2 | 4 | 969332 | 218.60 | 969332-C4 | 253.70 | | |

# END MILLS FOR COMPOSITES

## Diamond Cut – Bur Style






Bur-Style End

- Diamond cut style and high flute count allows for effective deburring with the outer diameter in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Total flute count on the bur-style end is equal to the amount of right hand teeth
- Downcut geometry on the OD
- Solid carbide
- CNC ground in the USA

| | CUTTER DIAMETER | LENGTH OF CUT | RIGHT HAND TEETH | LEFT HAND TEETH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.020''}_{-.000''}$ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .062 (1/16) | **.186** (3x) | 6 | 8 | 1/8 | 1-1/2 | 798462 | 49.50 | 798462-C4 | 64.50 |
| | .078 (5/64) | **.234** (3x) | 7 | 9 | 1/8 | 1-1/2 | 798478 | 49.50 | 798478-C4 | 64.50 |
| | .093 (3/32) | **.279** (3x) | 7 | 9 | 1/8 | 1-1/2 | 798493 | 49.50 | 798493-C4 | 64.50 |
| | $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .125 (1/8) | **.375** (3x) | 8 | 10 | 1/8 | 1-1/2 | 798508 | 49.50 | 798508-C4 | 64.50 |
| | .187 (3/16) | **.563** (3x) | 9 | 11 | 3/16 | 2 | 798512 | 59.20 | 798512-C4 | 80.30 |
| | .250 (1/4) | **.750** (3x) | 10 | 12 | 1/4 | 2-1/2 | 798516 | 81.70 | 798516-C4 | 105.70 |
| NEW | .375 (3/8) | **1.125** (3x) | 11 | 13 | 3/8 | 2-1/2 | 798524 | 128.40 | 798524-C4 | 158.80 |
| NEW | .500 (1/2) | **1.500** (3x) | 12 | 14 | 1/2 | 3 | 798532 | 217.70 | 798532-C4 | 259.10 |

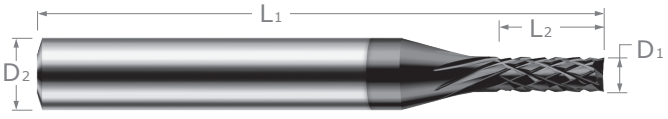
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NEW SIZES!

# END MILLS FOR COMPOSITES

## Diamond Cut – End Mill Style






End Mill Style

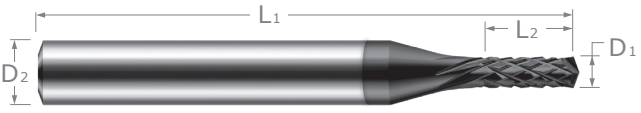
- Diamond cut style and high flute count allows for effective roughing and profiling in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Center cutting (two flutes to center) on end with downcut geometry on OD
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | RIGHT HAND TEETH | LEFT HAND TEETH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | | CVD DIAMOND (4 µm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000″}_{-.001″}$ | $L_2$ $^{+.020″}_{-.000″}$ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| .062 (1/16) | **.186** (3x) | 6 | 8 | 1/8 | 1-1/2 | 920962 | 49.50 | 920962-C4 | 64.50 | 799062 | 141.80 | NEW |
| .078 (5/64) | **.234** (3x) | 7 | 9 | 1/8 | 1-1/2 | 920978 | 49.50 | 920978-C4 | 64.50 | | | |
| .093 (3/32) | **.279** (3x) | 7 | 9 | 1/8 | 1-1/2 | 920993 | 49.50 | 920993-C4 | 64.50 | 799093 | 141.80 | NEW |
| .109 (7/64) | **.327** (3x) | 8 | 10 | 1/8 | 1-1/2 | 921002 | 53.60 | 921002-C4 | 68.50 | | | |

| $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.030″}_{-.000″}$ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .125 (1/8) | **.187** (1.5x) | 8 | 10 | 1/8 | 1-1/2 | 716908 | 49.00 | 716908-C4 | 63.90 | | | |
| .125 (1/8) | **.375** (3x) | 8 | 10 | 1/8 | 1-1/2 | 921008 | 49.50 | 921008-C4 | 64.50 | 799008 | 110.30 | |
| .125 (1/8) | **.625** (5x) | 8 | 10 | 1/8 | 1-1/2 | 894508 | 53.60 | 894508-C4 | 68.50 | 737308 | 114.40 | |
| .125 (1/8) | **1.000** (8x) | 8 | 10 | 1/8 | 2-1/2 | 785208 | 56.50 | 785208-C4 | 71.90 | 698908 | 141.80 | NEW |
| .156 (5/32) | **.469** (3x) | 9 | 11 | 3/16 | 2 | 921010 | 59.20 | 921010-C4 | 80.30 | | | |
| .187 (3/16) | **.285** (1.5x) | 9 | 11 | 3/16 | 2 | 716912 | 58.50 | 716912-C4 | 75.30 | | | |
| .187 (3/16) | **.563** (3x) | 9 | 11 | 3/16 | 2 | 921012 | 59.20 | 921012-C4 | 80.30 | 799012 | 131.70 | |
| .187 (3/16) | **1.000** (5x) | 9 | 11 | 3/16 | 2 | 894512 | 64.50 | 894512-C4 | 85.60 | 737312 | 151.00 | NEW |
| .250 (1/4) | **.375** (1.5x) | 10 | 12 | 1/4 | 2-1/2 | 716916 | 81.20 | 716916-C4 | 102.60 | | | |
| .250 (1/4) | **.750** (3x) | 10 | 12 | 1/4 | 2-1/2 | 921016 | 81.70 | 921016-C4 | 105.70 | 799016 | 165.00 | |
| .250 (1/4) | **1.250** (5x) | 10 | 12 | 1/4 | 2-1/2 | 894516 | 88.70 | 894516-C4 | 112.90 | | | |
| .250 (1/4) | **2.000** (8x) | 10 | 12 | 1/4 | 4 | 785216 | 110.20 | 785216-C4 | 134.40 | | | |
| .312 (5/16) | **1.000** (3x) | 10 | 12 | 5/16 | 2-1/2 | 921020 | 106.00 | 921020-C4 | 131.50 | | | |
| .375 (3/8) | **1.125** (3x) | 11 | 13 | 3/8 | 2-1/2 | 921024 | 128.40 | 921024-C4 | 157.40 | | | |
| .375 (3/8) | **2.000** (5x) | 11 | 13 | 3/8 | 4 | 894524 | 147.10 | 894524-C4 | 176.10 | | | |
| .500 (1/2) | **1.500** (3x) | 12 | 14 | 1/2 | 3 | 921032 | 217.70 | 921032-C4 | 252.70 | 799132 | 444.00 | NEW |
| .500 (1/2) | **2.625** (5x) | 12 | 14 | 1/2 | 4 | 894532 | 242.10 | 894532-C4 | 276.80 | | | |

# END MILLS FOR COMPOSITES

## Diamond Cut – Drill Mill Style






Drill Point

- 140° point angle allows for efficient plunging through composite sheet material
- Diamond cut style and high flute count allows for effective roughing and profiling in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Downcut geometry on OD
- Solid carbide
- CNC ground in the USA

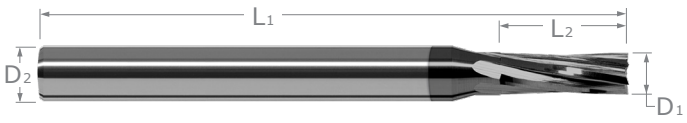
| | CUTTER DIAMETER | LENGTH OF CUT | | RIGHT HAND TEETH | LEFT HAND TEETH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | | CVD DIAMOND (4 µm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.001″ | $L_2$ +.020″ −.000″ | | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| NEW | .062 (1/16) | **.186** | (3x) | 6 | 8 | 1/8 | 1-1/2 | 908062 | 52.80 | 908062-C4 | 67.80 | 698662 | 141.80 |
| | .078 (5/64) | **.234** | (3x) | 7 | 9 | 1/8 | 1-1/2 | 908078 | 52.80 | 908078-C4 | 67.80 | | |
| | .093 (3/32) | **.279** | (3x) | 7 | 9 | 1/8 | 1-1/2 | 908093 | 52.80 | 908093-C4 | 67.80 | | |

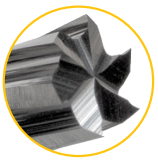
| | $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NEW | .125 (1/8) | **.375** | (3x) | 8 | 10 | 1/8 | 1-1/2 | 908108 | 52.80 | 908108-C4 | 67.80 | 698708 | 138.20 |
| | .187 (3/16) | **.563** | (3x) | 9 | 11 | 3/16 | 2 | 908112 | 62.30 | 908112-C4 | 83.50 | | |
| NEW | .250 (1/4) | **.750** | (3x) | 10 | 12 | 1/4 | 2-1/2 | 908116 | 85.80 | 908116-C4 | 109.90 | 698716 | 176.90 |
| | .375 (3/8) | **1.125** | (3x) | 11 | 13 | 3/8 | 2-1/2 | 908124 | 101.80 | 908124-C4 | 130.80 | | |
| | .500 (1/2) | **1.500** | (3x) | 12 | 14 | 1/2 | 3 | 908132 | 208.50 | 908132-C4 | 250.00 | | |

NEW SIZES!

# END MILLS FOR COMPOSITES

## Finisher



Type I
Bur-Style End



Type II
Center Cutting

- Optimized geometry and high flute count for finishing in composite materials with high fiber or fill concentration
- Slow helix improves finish and minimizes fraying of fiber-reinforced and layered materials by reducing vertical forces on the workpiece
- Choose from two types:
  - -Type I: Bur-style end allows for shallow ramping (not suited for plunge cutting)
  - -Type II: Center cutting end allows for plunge cutting, reduced flute count prevents chip packing, designed specifically for CFRP
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | | TYPE | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | | CVD DIAMOND (9 µm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| 1/32 | **3/32** | (3x) | I | 4 | 1/8 | 1-1/2 | 944731 | 62.30 | 944731-C4 | 77.20 | | | |
| 3/64 | **9/64** | (3x) | I | 4 | 1/8 | 1-1/2 | 944747 | 62.30 | 944747-C4 | 77.20 | | | |
| 1/16 | **.186** | (3x) | I | 6 | 1/8 | 1-1/2 | 944762 | 59.50 | 944762-C4 | 74.40 | 798862 | 141.80 | |
| 1/16 | **5/16** | (5x) | I | 6 | 1/8 | 1-1/2 | 889262 | 62.30 | 889262-C4 | 77.20 | | | |
| 5/64 | **15/64** | (3x) | I | 6 | 1/8 | 1-1/2 | 944778 | 59.50 | 944778-C4 | 74.40 | | | |
| 3/32 | **9/64** | (1.5x) | I | 6 | 1/8 | 1-1/2 | 794793 | 60.00 | 794793-C4 | 74.90 | | | |
| 3/32 | **.279** | (3x) | I | 6 | 1/8 | 1-1/2 | 944793 | 59.50 | 944793-C4 | 74.40 | 798893 | 141.80 | |
| 3/32 | **1/2** | (5x) | I | 6 | 1/8 | 1-1/2 | 889293 | 62.30 | 889293-C4 | 77.20 | | | |
| 3/32 | **3/4** | (8x) | I | 6 | 1/8 | 2 | 751693 | 67.10 | 751693-C4 | 82.00 | | | |

| $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/8 | **3/16** | (1.5x) | I | 8 | 1/8 | 1-1/2 | 794808 | 57.90 | 794808-C4 | 72.90 | | | |
| 1/8 | **3/8** | (3x) | I | 8 | 1/8 | 1-1/2 | 944808 | 57.40 | 944808-C4 | 72.30 | 798908 | 138.20 | |
| 1/8 | **3/8** | (3x) | II | 5 | 1/8 | 1-1/2 | 756808 | 54.00 | 756808-C4 | 68.90 | 731208 | 128.70 | NEW |
| 1/8 | **5/8** | (5x) | I | 8 | 1/8 | 2 | 889208 | 60.20 | 889208-C4 | 75.80 | | | |
| 1/8 | **1** | (8x) | I | 8 | 1/8 | 2-1/2 | 751708 | 63.80 | 751708-C4 | 79.40 | | | |
| 3/16 | **9/16** | (3x) | I | 8 | 3/16 | 2 | 944812 | 63.40 | 944812-C4 | 84.50 | 798912 | 159.60 | |
| 3/16 | **9/16** | (3x) | II | 5 | 3/16 | 2 | 756812 | 59.60 | 756812-C4 | 76.30 | 731212 | 148.80 | NEW |
| 3/16 | **1** | (5x) | I | 8 | 3/16 | 2-1/2 | 889212 | 66.40 | 889212-C4 | 87.60 | | | |
| 3/16 | **1-1/2** | (8x) | I | 8 | 3/16 | 3 | 751712 | 70.00 | 751712-C4 | 87.80 | | | |
| 1/4 | **3/8** | (1.5x) | I | 8 | 1/4 | 2-1/2 | 794816 | 76.00 | 794816-C4 | 100.10 | | | |
| 1/4 | **3/4** | (3x) | I | 8 | 1/4 | 2-1/2 | 944816 | 76.00 | 944816-C4 | 100.10 | 798916 | 176.90 | |
| 1/4 | **3/4** | (3x) | II | 5 | 1/4 | 2-1/2 | 756816 | 71.50 | 756816-C4 | 92.90 | 731216 | 164.70 | NEW |
| 1/4 | **1-1/4** | (5x) | I | 8 | 1/4 | 2-1/2 | 889216 | 92.60 | 889216-C4 | 116.60 | | | |
| 3/8 | **1-1/8** | (3x) | I | 10 | 3/8 | 3 | 944824 | 125.10 | 944824-C4 | 154.30 | | | |
| 3/8 | **1-1/8** | (3x) | II | 5 | 3/8 | 3 | 756824 | 117.40 | 756824-C4 | 147.80 | 731224 | 234.80 | NEW |
| 1/2 | **1-1/2** | (3x) | I | 10 | 1/2 | 4 | 944832 | 220.20 | 944832-C4 | 255.30 | 798932 | 444.00 | |
| 1/2 | **1-1/2** | (3x) | II | 5 | 1/2 | 4 | 756832 | 206.80 | 756832-C4 | 251.20 | 731232 | 413.40 | NEW |

# END MILLS FOR WOOD

## Square Upcut




**Outstanding in MDF and Plywood!**

- Designed for milling natural and engineered woods
- Wedge angle optimized for shearing wood fiber materials without causing tear-out or leaving a fuzzy grain finish
- 2-flute style with deep flute valleys to maximize space for chip evacuation
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/16 | **.186** (3x) | 1/4 | 2 | 809562 | 44.50 | 809562-C4 | 64.60 |
| 1/16 | **.312** (5x) | 1/4 | 2-1/2 | 809362 | 48.80 | 809362-C4 | 70.20 |
| 5/64 | **.234** (3x) | 1/4 | 2 | 809578 | 44.50 | 809578-C4 | 64.60 |
| 5/64 | **.406** (5x) | 1/4 | 2-1/2 | 809378 | 48.80 | 809378-C4 | 70.20 |
| 3/32 | **.279** (3x) | 1/4 | 2 | 809593 | 44.50 | 809593-C4 | 64.60 |
| 3/32 | **.500** (5x) | 1/4 | 2-1/2 | 809393 | 48.80 | 809393-C4 | 70.20 |
| 1/8 | **.375** (3x) | 1/4 | 2 | 809608 | 44.50 | 809608-C4 | 64.60 |
| 1/8 | **.625** (5x) | 1/4 | 2-1/2 | 809408 | 48.80 | 809408-C4 | 70.20 |
| 3/16 | **.563** (3x) | 1/4 | 2 | 809612 | 44.50 | 809612-C4 | 64.60 |
| 3/16 | **1.000** (5x) | 1/4 | 3 | 809412 | 52.50 | 809412-C4 | 73.90 |
| 1/4 | **.750** (3x) | 1/4 | 2-1/2 | 809616 | 54.80 | 809616-C4 | 76.20 |
| 1/4 | **1.250** (5x) | 1/4 | 3 | 809416 | 62.90 | 809416-C4 | 84.30 |
| 3/8 | **1.125** (3x) | 3/8 | 3 | 809624 | 94.40 | 809624-C4 | 124.00 |
| 3/8 | **1.875** (5x) | 3/8 | 4 | 809424 | 111.00 | 809424-C4 | 143.70 |
| 1/2 | **1.500** (3x) | 1/2 | 4 | 809632 | 169.50 | 809632-C4 | 205.70 |
| 1/2 | **2.500** (5x) | 1/2 | 5 | 809432 | 194.80 | 809432-C4 | 242.60 |

**Please See Speeds & Feeds On Page 302**

# END MILLS FOR WOOD

## Square Downcut




**Outstanding in MDF and Plywood!**

- Designed for milling natural and engineered woods
- Wedge angle optimized for shearing wood fiber materials without causing tear-out or leaving a fuzzy grain finish
- Prevents tear-outs and splintering on the top of the workpiece
- Prevents lifting on vacuum tables
- 2 left hand spiral, right hand cut flutes
- Deep flute valleys to maximize space for chip evacuation
- Center cutting
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 1/16 | **.186** (3x) | 1/4 | 2 | 809162 | 52.40 | 809162-C4 | 72.50 |
| 1/16 | **.312** (5x) | 1/4 | 2-1/2 | 808962 | 57.50 | 808962-C4 | 78.90 |
| 5/64 | **.234** (3x) | 1/4 | 2 | 809178 | 52.40 | 809178-C4 | 72.50 |
| 5/64 | **.406** (5x) | 1/4 | 2-1/2 | 808978 | 58.80 | 808978-C4 | 80.10 |
| 3/32 | **.279** (3x) | 1/4 | 2 | 809193 | 52.40 | 809193-C4 | 72.50 |
| 3/32 | **.500** (5x) | 1/4 | 2-1/2 | 808993 | 58.80 | 808993-C4 | 80.10 |
| 1/8 | **.375** (3x) | 1/4 | 2 | 809208 | 52.40 | 809208-C4 | 75.90 |
| 1/8 | **.625** (5x) | 1/4 | 2-1/2 | 809008 | 57.50 | 809008-C4 | 78.90 |
| 3/16 | **.563** (3x) | 1/4 | 2 | 809212 | 52.40 | 809212-C4 | 72.50 |
| 3/16 | **1.000** (5x) | 1/4 | 3 | 809012 | 62.00 | 809012-C4 | 83.40 |
| 1/4 | **.750** (3x) | 1/4 | 2-1/2 | 809216 | 64.10 | 809216-C4 | 85.50 |
| 1/4 | **1.250** (5x) | 1/4 | 3 | 809016 | 70.10 | 809016-C4 | 93.50 |
| 3/8 | **1.125** (3x) | 3/8 | 3 | 809224 | 109.30 | 809224-C4 | 139.00 |
| 3/8 | **1.875** (5x) | 3/8 | 4 | 809024 | 128.10 | 809024-C4 | 160.80 |
| 1/2 | **1.500** (3x) | 1/2 | 4 | 809232 | 196.90 | 809232-C4 | 233.40 |
| 1/2 | **2.500** (5x) | 1/2 | 5 | 809032 | 222.50 | 809032-C4 | 270.30 |

## SPEEDS & FEEDS (Square – End Mills for Wood)

**Important Note:** Values in table are in inches and are based on (3x Dia) length of cut end mills. For longer length of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

| Material | Janka Hardness | SFM | | Chip Load Per Tooth (IPT) By Cutter Diameter | | | | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .312 | .375 | .500 | .625 | .750 | 1.000 | Radial | Axial |
| **Softer Woods** White Pine, Sugar Pine, Western Red Cedar, Douglas Fir, Redwood | < 1200 | 400 - 2000 | Slot - Rough | .0007 | .0015 | .0022 | .0029 | .0037 | .0044 | .0059 | .0088 | .0118 | .0125 | .0150 | .0200 | .0250 | .0300 | .0400 | 1 x Dia | 1 x Dia |
| | | 800 - 2400 | Finishing | .0005 | .0011 | .0017 | .0022 | .0028 | .0033 | .0045 | .0067 | .0090 | .0097 | .0116 | .0155 | .0194 | .0233 | .0310 | .1 x Dia | 3 x Dia |
| **Harder Woods** Red Oak, Maple, Ash, Hickory, Black Walnut, Cherry, Beech | > 1200 | 400 - 2000 | Slot - Rough | .0006 | .0013 | .0020 | .0026 | .0033 | .0039 | .0053 | .0079 | .0106 | .0112 | .0135 | .0180 | .0225 | .0270 | .0360 | 1 x Dia | 1 x Dia |
| | | 800 - 2400 | Finishing | .0005 | .0010 | .0015 | .0020 | .0025 | .0030 | .0041 | .0061 | .0081 | .0087 | .0105 | .0140 | .0174 | .0209 | .0279 | .1 x Dia | 3 x Dia |
| **Engineered Woods** Medium Density Fiberboard (MDF), Particle Board, Laminated Board | Varies | 400 - 2000 | Slot - Rough | .0008 | .0016 | .0024 | .0032 | .0040 | .0048 | .0065 | .0097 | .0129 | .0137 | .0165 | .0220 | .0275 | .0330 | .0440 | 1 x Dia | 1 x Dia |
| | | 800 - 2400 | Finishing | .0006 | .0012 | .0019 | .0025 | .0031 | .0037 | .0050 | .0074 | .0099 | .0106 | .0128 | .0171 | .0213 | .0256 | .0341 | .1 x Dia | 3 x Dia |
| Phenolic Wood | Varies | 400 - 1200 | Slot - Rough | .0003 | .0006 | .0009 | .0012 | .0015 | .0017 | .0024 | .0035 | .0047 | .0050 | .0060 | .0080 | .0100 | .0120 | .0160 | 1 x Dia | 1 x Dia |
| | | 800 - 1600 | Finishing | .0002 | .0004 | .0007 | .0009 | .0011 | .0013 | .0018 | .0027 | .0036 | .0039 | .0047 | .0062 | .0078 | .0093 | .0124 | .1 x Dia | 3 x Dia |

# SPECIALTY PROFILES

At Harvey Tool, we know the details are critical to your machining processes. With that in mind, we offer a broad range of Specialty Profiles to help you make those difficult cuts. For printer-friendly **Speeds & Feeds** and downloadable **Simulation Files** for all products, visit **www.harveytool.com/technical**.


**Undercutting End Mills** New Sizes! . . . . . 304

**Drill/End Mills** New Sizes! . . . . . 321

**Chamfer Cutters** mm & in New Sizes! . . . . . 333

**Picatinny Form Cutters** . . . . . 355

**Runner Cutters** New Sizes! . . . . . 357

**Hexalobe Cutters** . . . . . 360

**Engraving Cutters** mm & in New Sizes! . . . . . 363

**Double Angle Shank Cutters** . . . . . 386

**Back Deburring Mills** . . . . . 396

**Keyseat Cutters** . . . . . 397

**Slitting Saws** mm & in New Style! . . . . . 428

**Concave Radius End Mills** . . . . . 433

**Corner Rounding End Mills** New Sizes! . . . . . 434

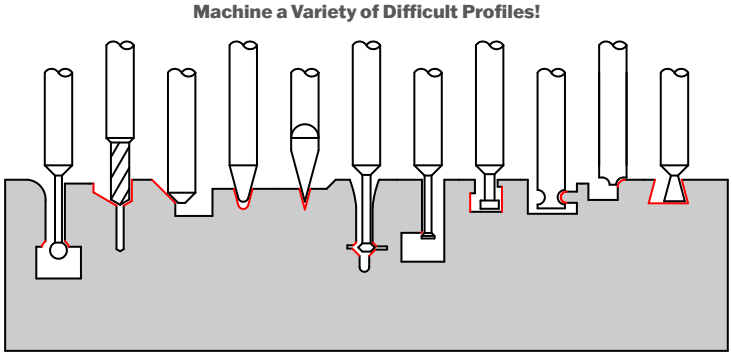
**Boring Bars** . . . . . 447

**BackDraft Cutters** . . . . . 448

**Dovetail Cutters** . . . . . 450

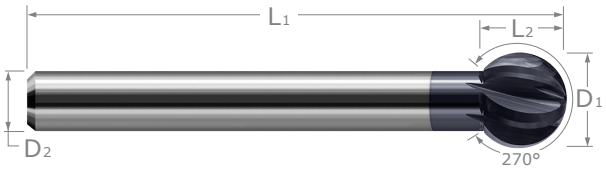
**Burs** . . . . . 462


**Machine a Variety of Difficult Profiles!**



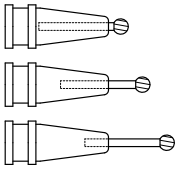
# UNDERCUTTING END MILLS

## 270° Reduced Shank




- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Reduced straight shank allows any chucking depth
- Center cutting
- Solid carbide construction for maximum rigidity
- 6 flutes
- CNC ground in the USA

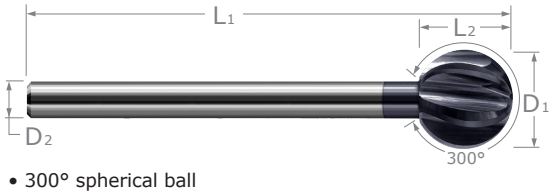
**Chuck at Any Depth!**



| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | | $D_2$ | $L_1$ | 6 FL | USD$ | 6 FL | USD$ |
| 1/4 | .217 | 6 | 4 mm | 3-1/2 | 956116 | 297.00 | 956116-C3 | 307.40 |
| 5/16 | .273 | 6 | 3/16 | 3-1/2 | 956120 | 302.70 | 956120-C3 | 313.10 |
| 3/8 | .324 | 6 | 6 mm | 3-1/2 | 956124 | 305.80 | 956124-C3 | 318.00 |
| 1/2 | .432 | 6 | 5/16 | 4 | 956132 | 321.40 | 956132-C3 | 339.10 |
| 5/8 | .546 | 6 | 3/8 | 4 | 956140 | 368.50 | 956140-C3 | 387.80 |
| 3/4 | .645 | 6 | 1/2 | 5 | 956148 | 530.10 | 956148-C3 | 539.60 |
| 1 | .873 | 6 | 5/8 | 5 | 956164 | 750.20 | 956164-C3 | 782.10 |

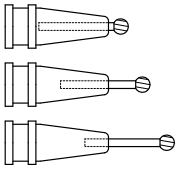
# UNDERCUTTING END MILLS

## 300° Reduced Shank




- 300° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Reduced straight shank allows any chucking depth
- Center cutting
- Solid carbide construction for maximum rigidity
- 6 flutes
- CNC ground in the USA

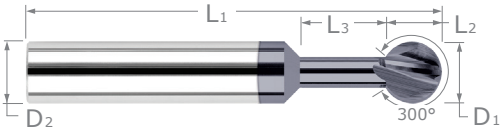
**Chuck at Any Depth!**



| CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | | $D_2$ | $L_1$ | 6 FL | USD$ | 6 FL | USD$ |
| 1/4 | .232 | 6 | 3 mm | 3-1/2 | 947416 | 318.30 | 947416-C3 | 328.70 |
| 5/16 | .293 | 6 | 9/64 | 3-1/2 | 947420 | 322.00 | 947420-C3 | 332.40 |
| 3/8 | .355 | 6 | 4 mm | 3-1/2 | 947424 | 325.80 | 947424-C3 | 338.10 |
| 1/2 | .472 | 6 | 3/16 | 4 | 947432 | 341.30 | 947432-C3 | 359.10 |
| 5/8 | .589 | 6 | 1/4 | 4 | 947440 | 388.30 | 947440-C3 | 407.60 |
| 3/4 | .706 | 6 | 5/16 | 5 | 947448 | 549.90 | 947448-C3 | 570.40 |
| 1 | .939 | 6 | 7/16 | 5 | 947464 | 769.00 | 947464-C3 | 800.80 |

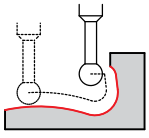
# UNDERCUTTING END MILLS

## 300°




- 300° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide
- CNC ground in the USA

Ideal for Undercutting, Deburring, and Profiling



Stocked in Multiple Reach Lengths





| | CUTTER DIAMETER | LENGTH OF CUT | NECK DIA. | NECK LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | ALTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | | $L_3$ +.020″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | 1/32 | .028 | .010 | **.031** | 2 | 1/8 | 1-1/2 | 983931 | 84.30 | 983931-C3 | 90.20 |
| | 1/32 | .028 | .010 | **.062** | 2 | 1/8 | 1-1/2 | 979131 | 84.30 | 979131-C3 | 90.20 |
| | .0394 (1 mm) | .036 | .014 | **.047** | 2 | 1/8 | 1-1/2 | 98391M | 84.30 | 98391M-C3 | 90.20 |
| | .0394 (1 mm) | .036 | .014 | **.078** | 2 | 1/8 | 1-1/2 | 97911M | 84.30 | 97911M-C3 | 90.20 |
| | 3/64 | .043 | .018 | **.062** | 2 | 1/8 | 1-1/2 | 983947 | 84.30 | 983947-C3 | 90.20 |
| | 3/64 | .043 | .018 | **.093** | 2 | 1/8 | 1-1/2 | 979147 | 84.30 | 979147-C3 | 90.20 |
| | 3/64 | .043 | .018 | **.125** | 2 | 1/8 | 1-1/2 | 940047 | 84.30 | 940047-C3 | 90.20 |
| | 3/64 | .043 | .018 | **.187** | 2 | 1/8 | 1-1/2 | 911803 | 84.30 | 911803-C3 | 90.20 |
| | 1/16 | .057 | .024 | **.031** | 2 | 1/8 | 1-1/2 | 989562 | 59.80 | 989562-C3 | 65.70 |
| | 1/16 | .057 | .024 | **.062** | 2 | 1/8 | 1-1/2 | 875762 | 59.80 | 875762-C3 | 65.70 |
| | 1/16 | .057 | .024 | **.078** | 2 | 1/8 | 1-1/2 | 983962 | 59.80 | 983962-C3 | 65.70 |
| | 1/16 | .057 | .024 | **.093** | 2 | 1/8 | 1-1/2 | 926862 | 59.80 | 926862-C3 | 65.70 |
| | 1/16 | .057 | .024 | **.125** | 2 | 1/8 | 1-1/2 | 979162 | 59.80 | 979162-C3 | 65.70 |
| | 1/16 | .057 | .024 | **.187** | 2 | 1/8 | 1-1/2 | 940062 | 59.80 | 940062-C3 | 65.70 |
| | 1/16 | .057 | .024 | **.250** | 2 | 1/8 | 1-1/2 | 767862 | 59.80 | 767862-C3 | 65.70 |
| | 1/16 | .057 | .024 | **.312** | 2 | 1/8 | 1-1/2 | 877804 | 59.80 | 877804-C3 | 65.70 |
| | 5/64 | .072 | .031 | **.047** | 2 | 1/8 | 1-1/2 | 989578 | 59.80 | 989578-C3 | 65.70 |
| | 5/64 | .072 | .031 | **.093** | 2 | 1/8 | 1-1/2 | 983978 | 59.80 | 983978-C3 | 65.70 |
| | 5/64 | .072 | .031 | **.125** | 2 | 1/8 | 1-1/2 | 926878 | 59.80 | 926878-C3 | 65.70 |
| | 5/64 | .072 | .031 | **.156** | 2 | 1/8 | 1-1/2 | 979178 | 59.80 | 979178-C3 | 65.70 |
| | 5/64 | .072 | .031 | **.218** | 2 | 1/8 | 1-1/2 | 940078 | 59.80 | 940078-C3 | 65.70 |
| NEW | 5/64 | .072 | .031 | **.250** | 2 | 1/8 | 1-1/2 | 738905 | 59.80 | 738905-C3 | 65.70 |
| | 3/32 | .086 | .038 | **.062** | 2 | 1/8 | 1-1/2 | 989593 | 59.80 | 989593-C3 | 65.70 |
| | 3/32 | .086 | .038 | **.093** | 2 | 1/8 | 1-1/2 | 875793 | 59.80 | 875793-C3 | 65.70 |
| | 3/32 | .086 | .038 | **.125** | 2 | 1/8 | 1-1/2 | 983993 | 59.80 | 983993-C3 | 65.70 |
| | 3/32 | .086 | .038 | **.156** | 2 | 1/8 | 1-1/2 | 926893 | 59.80 | 926893-C3 | 65.70 |
| | 3/32 | .086 | .038 | **.218** | 2 | 1/8 | 1-1/2 | 979193 | 59.80 | 979193-C3 | 65.70 |
| | 3/32 | .086 | .038 | **.250** | 2 | 1/8 | 1-1/2 | 794506 | 59.80 | 794506-C3 | 65.70 |
| | 3/32 | .086 | .038 | **.281** | 2 | 1/8 | 1-1/2 | 940093 | 59.80 | 940093-C3 | 65.70 |
| | 3/32 | .086 | .038 | **.375** | 2 | 1/8 | 1-1/2 | 766693 | 59.80 | 766693-C3 | 65.70 |
| NEW | 3/32 | .086 | .038 | **.500** | 2 | 1/8 | 2 | 877806 | 60.70 | 877806-C3 | 66.60 |
| | 7/64 | .101 | .047 | **.156** | 2 | 1/8 | 1-1/2 | 984007 | 60.40 | 984007-C3 | 66.30 |
| | 7/64 | .101 | .047 | **.250** | 2 | 1/8 | 1-1/2 | 979207 | 60.40 | 979207-C3 | 66.30 |
| | .1181 (3 mm) | .110 | .051 | **.078** | 2 | 1/8 | 1-1/2 | 98953M | 59.80 | 98953M-C3 | 65.70 |
| | .1181 (3 mm) | .110 | .051 | **.156** | 2 | 1/8 | 1-1/2 | 98393M | 59.80 | 98393M-C3 | 65.70 |
| | .1181 (3 mm) | .110 | .051 | **.218** | 2 | 1/8 | 1-1/2 | 92683M | 59.80 | 92683M-C3 | 65.70 |

continued on next page

NEW SIZES!

# UNDERCUTTING END MILLS

## 300° (cont.)



continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | NECK DIA. | NECK LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | | $L_3$ +.030″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/8 | .116 | .053 | **.047** | 4 | 1/8 | 1-1/2 | 943608 | 44.30 | 943608-C3 | 50.20 |
| 1/8 | .116 | .053 | **.062** | 4 | 1/8 | 1-1/2 | 716608 | 46.60 | 716608-C3 | 52.50 |
| 1/8 | .116 | .053 | **.093** | 4 | 1/8 | 1-1/2 | 990608 | 48.80 | 990608-C3 | 54.70 |
| 1/8 | .116 | .053 | **.125** | 4 | 1/8 | 1-1/2 | 933008 | 52.50 | 933008-C3 | 58.40 |
| 1/8 | .116 | .053 | **.156** | 4 | 1/8 | 1-1/2 | 875808 | 57.00 | 875808-C3 | 62.90 |
| 1/8 | .116 | .053 | **.187** | 4 | 1/8 | 1-1/2 | 984008 | 57.00 | 984008-C3 | 62.90 |
| 1/8 | .116 | .053 | **.250** | 4 | 1/8 | 1-1/2 | 843208 | 63.60 | 843208-C3 | 69.50 |
| 1/8 | .116 | .053 | **.281** | 4 | 1/8 | 1-1/2 | 979208 | 63.60 | 979208-C3 | 69.50 |
| 1/8 | .116 | .053 | **.312** | 4 | 1/8 | 1-1/2 | 794608 | 66.10 | 794608-C3 | 72.00 |
| 1/8 | .116 | .053 | **.375** | 4 | 1/8 | 1-1/2 | 940108 | 70.20 | 940108-C3 | 76.10 |
| 1/8 | .116 | .053 | **.437** | 4 | 1/8 | 1-1/2 | 739008 | 72.70 | 739008-C3 | 78.60 |
| 1/8 | .116 | .053 | **.500** | 4 | 1/8 | 1-1/2 | 952308 | 75.20 | 952308-C3 | 81.10 |
| 1/8 | .116 | .053 | **.625** | 4 | 1/8 | 2 | 911908 | 101.30 | 911908-C3 | 107.20 |
| 1/8 | .116 | .053 | **.750** | 4 | 1/8 | 3 | 877908 | 104.70 | 877908-C3 | 110.70 |
| 9/64 | .130 | .062 | **.125** | 4 | 3/16 | 2 | 933009 | 66.00 | 933009-C3 | 72.60 |
| 9/64 | .130 | .062 | **.218** | 4 | 3/16 | 2 | 984009 | 68.60 | 984009-C3 | 75.30 |
| 9/64 | .130 | .062 | **.312** | 4 | 3/16 | 2 | 979209 | 76.80 | 979209-C3 | 83.40 |
| 5/32 | .145 | .071 | **.047** | 4 | 3/16 | 2 | 943610 | 61.60 | 943610-C3 | 68.10 |
| 5/32 | .145 | .071 | **.125** | 4 | 3/16 | 2 | 990610 | 61.60 | 990610-C3 | 68.10 |
| 5/32 | .145 | .071 | **.187** | 4 | 3/16 | 2 | 738810 | 65.70 | 738810-C3 | 71.90 |
| 5/32 | .145 | .071 | **.250** | 4 | 3/16 | 2 | 984010 | 69.90 | 984010-C3 | 76.40 |
| 5/32 | .145 | .071 | **.375** | 4 | 3/16 | 2 | 979210 | 80.80 | 979210-C3 | 87.30 |
| 5/32 | .145 | .071 | **.500** | 4 | 3/16 | 2 | 940110 | 85.30 | 940110-C3 | 91.90 |
| 5/32 | .145 | .071 | **.625** | 4 | 3/16 | 2 | 952310 | 87.00 | 952310-C3 | 93.70 |
| 5/32 | .145 | .071 | **.750** | 4 | 3/16 | 2 | 911910 | 87.00 | 911910-C3 | 93.20 |
| 3/16 | .174 | .082 | **.062** | 4 | 3/16 | 2 | 943612 | 61.60 | 943612-C3 | 68.10 |
| 3/16 | .174 | .082 | **.125** | 4 | 3/16 | 2 | 990612 | 61.60 | 990612-C3 | 68.10 |
| 3/16 | .174 | .082 | **.187** | 4 | 3/16 | 2 | 933012 | 65.70 | 933012-C3 | 71.90 |
| 3/16 | .174 | .082 | **.250** | 4 | 3/16 | 2 | 984012 | 69.90 | 984012-C3 | 76.40 |
| 3/16 | .174 | .082 | **.281** | 4 | 3/16 | 2 | 738612 | 72.60 | 738612-C3 | 78.80 |
| 3/16 | .174 | .082 | **.312** | 4 | 3/16 | 2 | 926912 | 75.20 | 926912-C3 | 81.80 |
| 3/16 | .174 | .082 | **.375** | 4 | 3/16 | 2 | 843212 | 77.70 | 843212-C3 | 84.50 |
| 3/16 | .174 | .082 | **.437** | 4 | 3/16 | 2 | 979212 | 80.80 | 979212-C3 | 87.30 |
| 3/16 | .174 | .082 | **.500** | 4 | 3/16 | 2 | 794612 | 82.20 | 794612-C3 | 88.90 |
| 3/16 | .174 | .082 | **.625** | 4 | 3/16 | 2 | 940112 | 83.70 | 940112-C3 | 90.30 |
| 3/16 | .174 | .082 | **.750** | 4 | 3/16 | 2 | 952312 | 87.70 | 952312-C3 | 94.30 |
| 3/16 | .174 | .082 | **.875** | 4 | 3/16 | 2-1/2 | 834612 | 91.30 | 834612-C3 | 98.00 |
| 3/16 | .174 | .082 | **1.000** | 4 | 3/16 | 2-1/2 | 911912 | 93.20 | 911912-C3 | 100.00 |
| 3/16 | .174 | .082 | **1.250** | 4 | 3/16 | 3 | 877912 | 97.20 | 877912-C3 | 103.80 |
| .1969 (5 mm) | .182 | .086 | **.156** | 4 | 1/4 | 2-1/2 | 99065M | 85.20 | 99065M-C3 | 94.10 |
| .1969 (5 mm) | .182 | .086 | **.250** | 4 | 1/4 | 2-1/2 | 98405M | 89.20 | 98405M-C3 | 98.20 |
| 7/32 | .203 | .098 | **.156** | 4 | 1/4 | 2-1/2 | 990614 | 85.20 | 990614-C3 | 94.10 |
| 7/32 | .203 | .098 | **.312** | 4 | 1/4 | 2-1/2 | 984014 | 94.70 | 984014-C3 | 103.70 |
| .2362 (6 mm) | .220 | .106 | **.156** | 4 | 1/4 | 2-1/2 | 99066M | 84.00 | 99066M-C3 | 93.10 |
| .2362 (6 mm) | .220 | .106 | **.312** | 4 | 1/4 | 2-1/2 | 98406M | 94.70 | 98406M-C3 | 102.80 |
| .2362 (6 mm) | .220 | .106 | **.437** | 4 | 1/4 | 2-1/2 | 92696M | 97.90 | 92696M-C3 | 107.00 |
| .2362 (6 mm) | .220 | .106 | **.562** | 4 | 1/4 | 2-1/2 | 97926M | 103.20 | 97926M-C3 | 112.20 |

continued on next page

# UNDERCUTTING END MILLS

## 300° (cont.)



continued from previous page

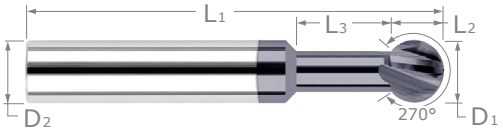
| | CUTTER DIAMETER | LENGTH OF CUT | NECK DIA. | NECK LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | | $L_3$ +.030″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | 1/4 | .233 | .112 | **.093** | 4 | 1/4 | 2-1/2 | 943616 | 82.40 | 943616-C3 | 91.50 |
| | 1/4 | .233 | .112 | **.187** | 4 | 1/4 | 2-1/2 | 990616 | 82.40 | 990616-C3 | 91.50 |
| | 1/4 | .233 | .112 | **.250** | 4 | 1/4 | 2-1/2 | 933016 | 87.00 | 933016-C3 | 96.00 |
| | 1/4 | .233 | .112 | **.375** | 4 | 1/4 | 2-1/2 | 984016 | 90.80 | 984016-C3 | 99.80 |
| | 1/4 | .233 | .112 | **.437** | 4 | 1/4 | 2-1/2 | 738616 | 95.60 | 738616-C3 | 103.70 |
| | 1/4 | .233 | .112 | **.500** | 4 | 1/4 | 2-1/2 | 926916 | 100.30 | 926916-C3 | 109.20 |
| | 1/4 | .233 | .112 | **.625** | 4 | 1/4 | 2-1/2 | 979216 | 110.00 | 979216-C3 | 119.10 |
| | 1/4 | .233 | .112 | **.750** | 4 | 1/4 | 2-1/2 | 940116 | 117.20 | 940116-C3 | 126.30 |
| | 1/4 | .233 | .112 | **1.000** | 4 | 1/4 | 2-1/2 | 952316 | 125.70 | 952316-C3 | 134.80 |
| | 1/4 | .233 | .112 | **1.250** | 4 | 1/4 | 3 | 911916 | 135.90 | 911916-C3 | 144.70 |
| | 1/4 | .233 | .112 | **1.500** | 4 | 1/4 | 4 | 877916 | 145.80 | 877916-C3 | 156.40 |
| | 9/32 | .262 | .127 | **.187** | 4 | 5/16 | 2-1/2 | 990618 | 116.50 | 990618-C3 | 126.10 |
| | 9/32 | .262 | .127 | **.375** | 4 | 5/16 | 2-1/2 | 984018 | 136.60 | 984018-C3 | 146.30 |
| | 5/16 | .291 | .143 | **.250** | 4 | 5/16 | 2-1/2 | 990620 | 112.50 | 990620-C3 | 123.10 |
| | 5/16 | .291 | .143 | **.437** | 4 | 5/16 | 2-1/2 | 984020 | 133.90 | 984020-C3 | 144.30 |
| | 5/16 | .291 | .143 | **.687** | 4 | 5/16 | 2-1/2 | 843220 | 133.90 | 843220-C3 | 143.60 |
| | 5/16 | .291 | .143 | **.750** | 4 | 5/16 | 2-1/2 | 979220 | 150.50 | 979220-C3 | 161.00 |
| | 5/16 | .291 | .143 | **1.000** | 4 | 5/16 | 2-1/2 | 940120 | 167.30 | 940120-C3 | 177.90 |
| | 5/16 | .291 | .143 | **1.250** | 4 | 5/16 | 3 | 952320 | 168.90 | 952320-C3 | 178.50 |
| | 3/8 | .349 | .172 | **.156** | 4 | 3/8 | 2-1/2 | 943624 | 118.20 | 943624-C3 | 129.60 |
| | 3/8 | .349 | .172 | **.250** | 4 | 3/8 | 2-1/2 | 990624 | 120.20 | 990624-C3 | 131.60 |
| | 3/8 | .349 | .172 | **.375** | 4 | 3/8 | 2-1/2 | 933024 | 130.60 | 933024-C3 | 142.00 |
| | 3/8 | .349 | .172 | **.500** | 4 | 3/8 | 2-1/2 | 984024 | 141.10 | 984024-C3 | 152.50 |
| | 3/8 | .349 | .172 | **.687** | 4 | 3/8 | 2-1/2 | 926924 | 152.30 | 926924-C3 | 163.70 |
| | 3/8 | .349 | .172 | **.750** | 4 | 3/8 | 2-1/2 | 843224 | 156.60 | 843224-C3 | 168.10 |
| | 3/8 | .349 | .172 | **1.000** | 4 | 3/8 | 3 | 979224 | 163.90 | 979224-C3 | 175.30 |
| | 3/8 | .349 | .172 | **1.250** | 4 | 3/8 | 3 | 940124 | 171.50 | 940124-C3 | 182.90 |
| | 3/8 | .349 | .172 | **1.500** | 4 | 3/8 | 4 | 952324 | 199.20 | 952324-C3 | 215.40 |
| NEW | 3/8 | .349 | .172 | **1.625** | 4 | 3/8 | 4 | 767924 | 199.20 | 767924-C3 | 211.40 |
| | .3937 (10 mm) | .366 | .181 | **.312** | 4 | 7/16 | 2-3/4 | 990625 | 148.30 | 990625-C3 | 161.60 |
| | .3937 (10 mm) | .366 | .181 | **.562** | 4 | 7/16 | 2-3/4 | 984025 | 176.40 | 984025-C3 | 189.60 |
| | 1/2 | .466 | .230 | **.187** | 4 | 1/2 | 3 | 943632 | 182.00 | 943632-C3 | 197.50 |
| | 1/2 | .466 | .230 | **.312** | 4 | 1/2 | 3 | 990632 | 183.40 | 990632-C3 | 201.10 |
| | 1/2 | .466 | .230 | **.750** | 4 | 1/2 | 3 | 984032 | 208.30 | 984032-C3 | 226.00 |
| | 1/2 | .466 | .230 | **1.000** | 4 | 1/2 | 3 | 926932 | 225.30 | 926932-C3 | 243.20 |
| | 1/2 | .466 | .230 | **1.250** | 4 | 1/2 | 4 | 979232 | 253.10 | 979232-C3 | 270.80 |
| | 1/2 | .466 | .230 | **1.625** | 4 | 1/2 | 4 | 940132 | 248.60 | 940132-C3 | 266.20 |
| | 1/2 | .466 | .230 | **2.000** | 4 | 1/2 | 4 | 952332 | 277.90 | 952332-C3 | 295.60 |
| | 5/8 | .583 | .292 | **1.000** | 4 | 5/8 | 3-1/2 | 984040 | 309.90 | 984040-C3 | 329.30 |
| | 5/8 | .583 | .292 | **1.625** | 4 | 5/8 | 4 | 979240 | 316.80 | 979240-C3 | 336.10 |
| | 3/4 | .699 | .355 | **1.500** | 4 | 3/4 | 4 | 926948 | 365.50 | 926948-C3 | 388.50 |
| | 3/4 | .699 | .355 | **2.000** | 4 | 3/4 | 6 | 979248 | 399.70 | 979248-C3 | 426.50 |
| NEW | 3/4 | .699 | .355 | **2.500** | 4 | 3/4 | 6 | 940148 | 403.80 | 940148-C3 | 430.60 |

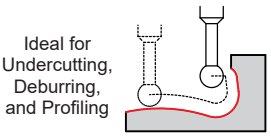
NEW SIZES!



# UNDERCUTTING END MILLS

## 270°





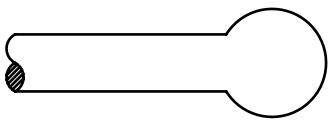


- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Choose from two types:
  - Type I: Straight neck
  - Type II: Tapered neck (1.5° per side)
- Solid carbide • CNC ground in the USA

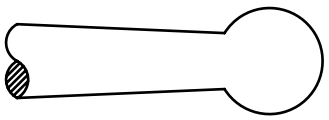
| CUTTER DIAMETER | LENGTH OF CUT | NECK DIAMETER | NECK LENGTH | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | | $L_3$ +.020″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| .0200 | .017 | .012 | **.016** | I | 2 | 1/8 | 1-1/2 | 974220 | 86.90 | 974220-C3 | 92.80 | | | |
| .0200 | .017 | .012 | **.031** | I | 2 | 1/8 | 1-1/2 | 52820 | 86.90 | 52820-C3 | 92.80 | | | |
| .0200 | .017 | .012 | **.047** | I | 2 | 1/8 | 1-1/2 | 23200 | 92.60 | 23200-C3 | 98.50 | | | |
| .0200 | .017 | .012 | **.062** | I | 2 | 1/8 | 1-1/2 | 54620 | 95.40 | 54620-C3 | 101.30 | | | |
| .0250 | .021 | .014 | **.031** | I | 2 | 1/8 | 1-1/2 | 974225 | 76.60 | 974225-C3 | 82.50 | | | |
| .0250 | .021 | .014 | **.047** | I | 2 | 1/8 | 1-1/2 | 52825 | 76.60 | 52825-C3 | 82.50 | | | |
| .0250 | .021 | .014 | **.062** | I | 2 | 1/8 | 1-1/2 | 23201 | 82.30 | 23201-C3 | 88.20 | | | |
| .0250 | .021 | .014 | **.078** | I | 2 | 1/8 | 1-1/2 | 54625 | 85.30 | 54625-C3 | 91.20 | | | |
| 1/32 | .027 | .016 | **.015** | I | 2 | 1/8 | 1-1/2 | 931502 | 70.30 | 931502-C3 | 76.20 | | | |
| 1/32 | .027 | .016 | **.031** | I | 2 | 1/8 | 1-1/2 | 23102 | 70.30 | 23102-C3 | 76.20 | | | |
| 1/32 | .027 | .016 | **.047** | I | 2 | 1/8 | 1-1/2 | 974231 | 70.30 | 974231-C3 | 76.20 | | | |
| 1/32 | .027 | .016 | **.047** | II | 2 | 1/8 | 1-1/2 | 758431 | 71.60 | 758431-C3 | 77.50 | | | |
| 1/32 | .027 | .016 | **.062** | I | 2 | 1/8 | 1-1/2 | 52831 | 70.30 | 52831-C3 | 76.20 | 52831-C4 | 85.20 | NEW |
| 1/32 | .027 | .016 | **.078** | I | 2 | 1/8 | 1-1/2 | 39731 | 70.30 | 39731-C3 | 76.20 | | | |
| 1/32 | .027 | .016 | **.093** | I | 2 | 1/8 | 1-1/2 | 23202 | 72.10 | 23202-C3 | 78.10 | | | |
| 1/32 | .027 | .016 | **.125** | I | 2 | 1/8 | 1-1/2 | 54631 | 82.30 | 54631-C3 | 88.20 | | | |
| 1/32 | .027 | .016 | **.187** | I | 2 | 1/8 | 1-1/2 | 55202 | 82.30 | 55202-C3 | 88.20 | | | |
| 1/32 | .027 | .016 | **.218** | I | 2 | 1/8 | 1-1/2 | 867731 | 70.30 | 867731-C3 | 76.20 | | | |
| .0394 (1 mm) | .033 | .024 | **.047** | I | 2 | 1/8 | 1-1/2 | 2311M | 70.30 | 2311M-C3 | 76.20 | | | |
| .0394 (1 mm) | .033 | .024 | **.062** | I | 2 | 1/8 | 1-1/2 | 97421M | 70.30 | 97421M-C3 | 76.20 | | | |
| .0394 (1 mm) | .033 | .024 | **.078** | I | 2 | 1/8 | 1-1/2 | 5281M | 70.80 | 5281M-C3 | 76.70 | | | |
| .0394 (1 mm) | .033 | .024 | **.093** | I | 2 | 1/8 | 1-1/2 | 3971M | 70.30 | 3971M-C3 | 76.20 | | | |
| .0394 (1 mm) | .033 | .024 | **.125** | I | 2 | 1/8 | 1-1/2 | 2321M | 80.20 | 2321M-C3 | 86.20 | | | |
| .0394 (1 mm) | .033 | .024 | **.187** | I | 2 | 1/8 | 1-1/2 | 54639 | 82.30 | 54639-C3 | 88.20 | | | |
| .0394 (1 mm) | .033 | .024 | **.250** | I | 2 | 1/8 | 1-1/2 | 5521M | 91.00 | 5521M-C3 | 96.90 | | | |
| .0394 (1 mm) | .033 | .024 | **.281** | I | 2 | 1/8 | 1-1/2 | 86771M | 91.00 | 86771M-C3 | 96.90 | | | NEW |
| .0400 | .034 | .024 | **.093** | I | 2 | 1/8 | 1-1/2 | 39771 | 70.30 | 39771-C3 | 76.20 | | | |
| .0400 | .034 | .024 | **.125** | I | 2 | 1/8 | 1-1/2 | 23271 | 70.80 | 23271-C3 | 76.70 | | | |
| 3/64 | .040 | .029 | **.047** | I | 2 | 1/8 | 1-1/2 | 23103 | 70.30 | 23103-C3 | 76.20 | | | |
| 3/64 | .040 | .029 | **.062** | I | 2 | 1/8 | 1-1/2 | 974247 | 70.30 | 974247-C3 | 76.20 | | | |
| 3/64 | .040 | .029 | **.062** | II | 2 | 1/8 | 1-1/2 | 758447 | 71.60 | 758447-C3 | 77.50 | | | |
| 3/64 | .040 | .029 | **.093** | I | 2 | 1/8 | 1-1/2 | 52847 | 70.30 | 52847-C3 | 76.20 | 52847-C4 | 85.20 | |

continued on next page

**Type I - Straight Neck**



**Type II - Tapered Neck**



# UNDERCUTTING END MILLS

## 270° (cont.)



continued from previous page

| | CUTTER DIAMETER | LENGTH OF CUT | NECK DIAMETER | NECK LENGTH | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000" −.001" | $L_2$ +.010" −.000" | | $L_3$ +.020" −.000" | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| | 3/64 | .040 | .029 | **.125** | I | 2 | 1/8 | 1-1/2 | 39703 | 70.30 | 39703-C3 | 76.20 | | |
| | 3/64 | .040 | .029 | **.156** | I | 2 | 1/8 | 1-1/2 | 23203 | 82.30 | 23203-C3 | 88.20 | 23203-C4 | 97.30 |
| | 3/64 | .040 | .029 | **.187** | I | 2 | 1/8 | 1-1/2 | 41303 | 82.30 | 41303-C3 | 88.20 | | |
| | 3/64 | .040 | .029 | **.250** | I | 2 | 1/8 | 1-1/2 | 54647 | 82.30 | 54647-C3 | 88.20 | | |
| | 3/64 | .040 | .029 | **.312** | I | 2 | 1/8 | 1-1/2 | 909047 | 87.40 | 909047-C3 | 93.30 | | |
| | 3/64 | .040 | .029 | **.375** | I | 2 | 1/8 | 1-1/2 | 55203 | 86.60 | 55203-C3 | 92.50 | | |
| | 3/64 | .040 | .029 | **.437** | I | 2 | 1/8 | 2 | 867747 | 95.20 | 867747-C3 | 101.10 | | |
| | .0500 | .042 | .030 | **.093** | I | 2 | 1/8 | 1-1/2 | 52850 | 58.40 | 52850-C3 | 64.40 | | |
| | .0500 | .042 | .030 | **.125** | I | 2 | 1/8 | 1-1/2 | 39750 | 58.40 | 39750-C3 | 64.40 | | |
| | .0500 | .042 | .030 | **.156** | I | 2 | 1/8 | 1-1/2 | 23250 | 70.60 | 23250-C3 | 76.50 | | |
| | 1/16 | .053 | .037 | **.031** | I | 2 | 1/8 | 1-1/2 | 931504 | 46.70 | 931504-C3 | 52.60 | | |
| | 1/16 | .053 | .037 | **.047** | I | 2 | 1/8 | 1-1/2 | 774262 | 47.10 | 774262-C3 | 53.00 | | |
| | 1/16 | .053 | .037 | **.062** | I | 2 | 1/8 | 1-1/2 | 23104 | 46.70 | 23104-C3 | 52.60 | | |
| | 1/16 | .053 | .037 | **.078** | I | 2 | 1/8 | 1-1/2 | 974262 | 47.10 | 974262-C3 | 53.00 | | |
| | 1/16 | .053 | .037 | **.078** | II | 2 | 1/8 | 1-1/2 | 758462 | 47.50 | 758462-C3 | 53.50 | | |
| | 1/16 | .053 | .037 | **.093** | I | 2 | 1/8 | 1-1/2 | 52862 | 46.70 | 52862-C3 | 52.60 | 52862-C4 | 61.70 |
| | 1/16 | .053 | .037 | **.125** | I | 2 | 1/8 | 1-1/2 | 39704 | 48.70 | 39704-C3 | 54.60 | | |
| | 1/16 | .053 | .037 | **.156** | I | 2 | 1/8 | 1-1/2 | 794362 | 48.70 | 794362-C3 | 54.60 | | |
| | 1/16 | .053 | .037 | **.187** | I | 2 | 1/8 | 1-1/2 | 23204 | 48.70 | 23204-C3 | 54.60 | 23204-C4 | 63.60 |
| | 1/16 | .053 | .037 | **.218** | I | 2 | 1/8 | 1-1/2 | 41304 | 55.30 | 41304-C3 | 61.20 | | |
| | 1/16 | .053 | .037 | **.250** | I | 2 | 1/8 | 1-1/2 | 54662 | 60.10 | 54662-C3 | 66.00 | | |
| | 1/16 | .053 | .037 | **.312** | I | 2 | 1/8 | 1-1/2 | 909062 | 60.10 | 909062-C3 | 66.00 | | |
| | 1/16 | .053 | .037 | **.375** | I | 2 | 1/8 | 1-1/2 | 55204 | 60.10 | 55204-C3 | 66.00 | | |
| | 1/16 | .053 | .037 | **.437** | I | 2 | 1/8 | 2 | 867762 | 68.80 | 867762-C3 | 74.70 | | |
| | 1/16 | .053 | .037 | **.500** | I | 2 | 1/8 | 2 | 775462 | 68.80 | 775462-C3 | 74.70 | | |
| | 5/64 | .067 | .045 | **.031** | I | 2 | 1/8 | 1-1/2 | 931505 | 48.00 | 931505-C3 | 53.90 | | |
| | 5/64 | .067 | .045 | **.062** | I | 2 | 1/8 | 1-1/2 | 23105 | 47.40 | 23105-C3 | 53.40 | | |
| | 5/64 | .067 | .045 | **.093** | I | 2 | 1/8 | 1-1/2 | 974278 | 48.00 | 974278-C3 | 53.90 | | |
| | 5/64 | .067 | .045 | **.093** | II | 2 | 1/8 | 1-1/2 | 758478 | 48.60 | 758478-C3 | 54.50 | | |
| | 5/64 | .067 | .045 | **.125** | I | 2 | 1/8 | 1-1/2 | 52878 | 47.40 | 52878-C3 | 53.40 | 52878-C4 | 62.40 |
| | 5/64 | .067 | .045 | **.187** | I | 2 | 1/8 | 1-1/2 | 39705 | 50.20 | 39705-C3 | 56.20 | | |
| | 5/64 | .067 | .045 | **.250** | I | 2 | 1/8 | 1-1/2 | 23205 | 51.10 | 23205-C3 | 57.00 | 23205-C4 | 66.00 |
| | 5/64 | .067 | .045 | **.312** | I | 2 | 1/8 | 1-1/2 | 41305 | 51.10 | 41305-C3 | 57.00 | | |
| | 5/64 | .067 | .045 | **.375** | I | 2 | 1/8 | 2 | 54678 | 61.10 | 54678-C3 | 67.10 | | |
| | 5/64 | .067 | .045 | **.500** | I | 2 | 1/8 | 2 | 55205 | 61.10 | 55205-C3 | 67.10 | | |
| | 5/64 | .067 | .045 | **.625** | I | 2 | 1/8 | 2 | 867778 | 61.10 | 867778-C3 | 67.10 | | |
| | 3/32 | .079 | .054 | **.031** | I | 2 | 1/8 | 1-1/2 | 931506 | 47.40 | 931506-C3 | 53.40 | | |
| NEW | 3/32 | .079 | .054 | **.062** | I | 2 | 1/8 | 1-1/2 | 23106 | 47.40 | 23106-C3 | 53.40 | 23106-C4 | 62.40 |
| | 3/32 | .079 | .054 | **.093** | I | 2 | 1/8 | 1-1/2 | 789893 | 48.00 | 789893-C3 | 53.90 | | |
| | 3/32 | .079 | .054 | **.125** | I | 2 | 1/8 | 1-1/2 | 974293 | 47.40 | 974293-C3 | 53.40 | | |
| | 3/32 | .079 | .054 | **.125** | II | 2 | 1/8 | 1-1/2 | 758493 | 48.60 | 758493-C3 | 54.50 | | |
| | 3/32 | .079 | .054 | **.187** | I | 2 | 1/8 | 1-1/2 | 905106 | 47.40 | 905106-C3 | 53.40 | | |
| | 3/32 | .079 | .054 | **.250** | I | 2 | 1/8 | 1-1/2 | 52893 | 47.40 | 52893-C3 | 53.40 | 52893-C4 | 62.40 |
| | 3/32 | .079 | .054 | **.312** | I | 2 | 1/8 | 1-1/2 | 39706 | 52.40 | 39706-C3 | 58.30 | | |
| | 3/32 | .079 | .054 | **.375** | I | 2 | 1/8 | 1-1/2 | 23206 | 51.90 | 23206-C3 | 57.80 | 23206-C4 | 66.80 |
| | 3/32 | .079 | .054 | **.437** | I | 2 | 1/8 | 2 | 41306 | 61.10 | 41306-C3 | 67.10 | | |
| | 3/32 | .079 | .054 | **.500** | I | 2 | 1/8 | 2 | 54693 | 61.10 | 54693-C3 | 67.10 | | |
| | 3/32 | .079 | .054 | **.625** | I | 2 | 1/8 | 2 | 55206 | 70.30 | 55206-C3 | 76.20 | | |
| | 3/32 | .079 | .054 | **.750** | I | 2 | 1/8 | 2 | 867793 | 70.80 | 867793-C3 | 76.70 | | |
| | .1000 | .085 | .060 | **.312** | I | 2 | 1/8 | 1-1/2 | 39783 | 52.40 | 39783-C3 | 58.30 | | |
| | .1000 | .085 | .060 | **.375** | I | 2 | 1/8 | 1-1/2 | 23283 | 52.40 | 23283-C3 | 58.30 | | |

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NEW SIZES!

# UNDERCUTTING END MILLS

## 270° (cont.)



continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | NECK DIAMETER | NECK LENGTH | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | | $L_3$ +.020″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| 7/64 | .093 | .064 | **.187** | I | 2 | 1/8 | 1-1/2 | 905107 | 47.10 | 905107-C3 | 53.00 | | | |
| 7/64 | .093 | .064 | **.250** | I | 2 | 1/8 | 1-1/2 | 52907 | 47.10 | 52907-C3 | 53.00 | | | |
| 7/64 | .093 | .064 | **.375** | I | 2 | 1/8 | 1-1/2 | 39707 | 51.50 | 39707-C3 | 57.40 | | | |
| 7/64 | .093 | .064 | **.500** | I | 2 | 1/8 | 2 | 23207 | 60.10 | 23207-C3 | 66.00 | | | |
| 7/64 | .093 | .064 | **1.000** | I | 2 | 1/8 | 3 | 29507 | 68.80 | 29507-C3 | 74.70 | | | |
| .1181 (3 mm) | .100 | .070 | **.093** | I | 2 | 1/8 | 1-1/2 | 2313M | 47.10 | 2313M-C3 | 53.00 | | | |
| .1181 (3 mm) | .100 | .070 | **.156** | II | 2 | 1/8 | 1-1/2 | 75843M | 47.50 | 75843M-C3 | 53.50 | | | |
| .1181 (3 mm) | .100 | .070 | **.187** | I | 2 | 1/8 | 1-1/2 | 90513M | 47.10 | 90513M-C3 | 53.00 | | | |
| .1181 (3 mm) | .100 | .070 | **.250** | I | 2 | 1/8 | 1-1/2 | 5283M | 47.10 | 5283M-C3 | 53.00 | | | |
| .1181 (3 mm) | .100 | .070 | **.375** | I | 2 | 1/8 | 1-1/2 | 3973M | 51.50 | 3973M-C3 | 57.40 | | | |
| .1181 (3 mm) | .100 | .070 | **.500** | I | 2 | 1/8 | 2 | 2323M | 60.10 | 2323M-C3 | 66.00 | | | |
| $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | | $L_3$ +.030″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| 1/8 | .107 | .076 | **.062** | I | 4 | 1/8 | 1-1/2 | 931508 | 41.10 | 931508-C3 | 47.00 | | | |
| 1/8 | .107 | .076 | **.093** | I | 4 | 1/8 | 1-1/2 | 787908 | 41.50 | 787908-C3 | 47.40 | | | |
| 1/8 | .107 | .076 | **.125** | I | 4 | 1/8 | 1-1/2 | 23108 | 41.10 | 23108-C3 | 47.00 | 23108-C4 | 56.10 | NEW |
| 1/8 | .107 | .076 | **.187** | I | 4 | 1/8 | 1-1/2 | 974308 | 42.10 | 974308-C3 | 48.10 | | | |
| 1/8 | .107 | .076 | **.187** | II | 4 | 1/8 | 1-1/2 | 758508 | 43.00 | 758508-C3 | 48.90 | | | |
| 1/8 | .107 | .076 | **.250** | I | 4 | 1/8 | 1-1/2 | 52908 | 43.60 | 52908-C3 | 49.50 | 52908-C4 | 58.50 | |
| 1/8 | .107 | .076 | **.312** | I | 4 | 1/8 | 1-1/2 | 828408 | 44.00 | 828408-C3 | 49.90 | | | |
| 1/8 | .107 | .076 | **.375** | I | 4 | 1/8 | 1-1/2 | 39708 | 44.40 | 39708-C3 | 50.30 | | | |
| 1/8 | .107 | .076 | **.437** | I | 4 | 1/8 | 1-1/2 | 794408 | 48.00 | 794408-C3 | 53.90 | | | |
| 1/8 | .107 | .076 | **.500** | I | 4 | 1/8 | 1-1/2 | 23208 | 47.40 | 23208-C3 | 53.40 | 23208-C4 | 62.40 | |
| 1/8 | .107 | .076 | **.625** | I | 4 | 1/8 | 2 | 922908 | 50.90 | 922908-C3 | 56.80 | | | |
| 1/8 | .107 | .076 | **.750** | I | 4 | 1/8 | 2 | 41308 | 50.90 | 41308-C3 | 56.80 | 41308-C4 | 65.80 | NEW |
| 1/8 | .107 | .076 | **.875** | I | 4 | 1/8 | 3 | 846608 | 52.90 | 846608-C3 | 58.90 | | | |
| 1/8 | .107 | .076 | **1.000** | I | 4 | 1/8 | 3 | 29508 | 55.10 | 29508-C3 | 61.00 | | | |
| 1/8 | .107 | .076 | **1.125** | I | 4 | 1/8 | 3 | 769508 | 57.70 | 769508-C3 | 63.60 | | | |
| 1/8 | .107 | .076 | **1.250** | I | 4 | 1/8 | 3 | 960608 | 59.10 | 960608-C3 | 65.00 | | | |
| 1/8 | .107 | .076 | **1.500** | I | 4 | 1/8 | 3 | 55208 | 62.90 | 55208-C3 | 68.80 | | | |
| 1/8 | .107 | .076 | **1.750** | I | 4 | 1/8 | 3 | 929608 | 66.20 | 929608-C3 | 72.10 | | | |
| 9/64 | .119 | .084 | **.125** | I | 4 | 3/16 | 2 | 23109 | 49.00 | 23109-C3 | 55.60 | | | |
| 9/64 | .119 | .084 | **.250** | I | 4 | 3/16 | 2 | 52909 | 53.00 | 52909-C3 | 59.30 | | | |
| 9/64 | .119 | .084 | **.375** | I | 4 | 3/16 | 2 | 39709 | 57.10 | 39709-C3 | 63.30 | | | |
| 9/64 | .119 | .084 | **.500** | I | 4 | 3/16 | 2 | 23209 | 59.90 | 23209-C3 | 66.50 | | | |
| 9/64 | .119 | .084 | **.750** | I | 4 | 3/16 | 2 | 41309 | 64.30 | 41309-C3 | 70.90 | | | |
| 5/32 | .133 | .098 | **.078** | I | 4 | 3/16 | 2 | 931510 | 49.00 | 931510-C3 | 55.60 | | | |
| 5/32 | .133 | .098 | **.125** | I | 4 | 3/16 | 2 | 23110 | 49.00 | 23110-C3 | 55.60 | | | |
| 5/32 | .133 | .098 | **.187** | I | 4 | 3/16 | 2 | 974310 | 49.80 | 974310-C3 | 56.10 | | | |
| 5/32 | .133 | .098 | **.250** | I | 4 | 3/16 | 2 | 52910 | 53.00 | 52910-C3 | 59.60 | | | |
| 5/32 | .133 | .098 | **.375** | I | 4 | 3/16 | 2 | 39710 | 55.90 | 39710-C3 | 62.50 | | | |
| 5/32 | .133 | .098 | **.500** | I | 4 | 3/16 | 2 | 23210 | 59.90 | 23210-C3 | 66.50 | | | |
| 5/32 | .133 | .098 | **.750** | I | 4 | 3/16 | 2 | 41310 | 64.30 | 41310-C3 | 70.90 | | | |
| 5/32 | .133 | .098 | **1.000** | I | 4 | 3/16 | 3 | 29510 | 69.40 | 29510-C3 | 76.10 | | | |
| 5/32 | .133 | .098 | **1.500** | I | 4 | 3/16 | 3 | 55210 | 73.00 | 55210-C3 | 79.60 | | | |

continued on next page

# UNDERCUTTING END MILLS

270° (cont.)



continued from previous page

| | CUTTER DIAMETER | LENGTH OF CUT | NECK DIAMETER | NECK LENGTH | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | | $L_3$ +.030″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| | 3/16 | .160 | .117 | **.078** | I | 4 | 3/16 | 2 | 931512 | 49.00 | 931512-C3 | 55.20 | | |
| | 3/16 | .160 | .117 | **.093** | I | 4 | 3/16 | 2 | 787912 | 49.40 | 787912-C3 | 55.60 | | |
| | 3/16 | .160 | .117 | **.125** | I | 4 | 3/16 | 2 | 23112 | 49.00 | 23112-C3 | 55.60 | | |
| | 3/16 | .160 | .117 | **.187** | I | 4 | 3/16 | 2 | 974312 | 53.00 | 974312-C3 | 59.30 | | |
| | 3/16 | .160 | .117 | **.187** | II | 4 | 3/16 | 2 | 758512 | 54.20 | 758512-C3 | 60.40 | | |
| | 3/16 | .160 | .117 | **.250** | I | 4 | 3/16 | 2 | 52912 | 53.00 | 52912-C3 | 59.60 | 52912-C4 | 69.80 |
| | 3/16 | .160 | .117 | **.375** | I | 4 | 3/16 | 2 | 39712 | 55.90 | 39712-C3 | 62.50 | | |
| | 3/16 | .160 | .117 | **.437** | I | 4 | 3/16 | 2 | 794412 | 58.40 | 794412-C3 | 64.70 | | |
| | 3/16 | .160 | .117 | **.500** | I | 4 | 3/16 | 2 | 23212 | 57.90 | 23212-C3 | 64.50 | 23212-C4 | 74.60 |
| | 3/16 | .160 | .117 | **.625** | I | 4 | 3/16 | 2 | 922912 | 61.20 | 922912-C3 | 67.80 | | |
| | 3/16 | .160 | .117 | **.750** | I | 4 | 3/16 | 2 | 41312 | 64.30 | 41312-C3 | 70.90 | | |
| | 3/16 | .160 | .117 | **.875** | I | 4 | 3/16 | 3 | 846612 | 66.80 | 846612-C3 | 73.50 | | |
| NEW | 3/16 | .160 | .117 | **1.000** | I | 4 | 3/16 | 3 | 29512 | 69.40 | 29512-C3 | 76.10 | 29512-C4 | 87.30 |
| | 3/16 | .160 | .117 | **1.250** | I | 4 | 3/16 | 3 | 960612 | 72.20 | 960612-C3 | 78.90 | | |
| | 3/16 | .160 | .117 | **1.500** | I | 4 | 3/16 | 3 | 55212 | 74.80 | 55212-C3 | 81.50 | | |
| | 3/16 | .160 | .117 | **1.750** | I | 4 | 3/16 | 3 | 929612 | 88.50 | 929612-C3 | 95.20 | | |
| | .1969 (5 mm) | .167 | .119 | **.250** | I | 4 | 1/4 | 2-1/2 | 5295M | 68.60 | 5295M-C3 | 77.60 | | |
| | .1969 (5 mm) | .167 | .119 | **.500** | I | 4 | 1/4 | 2-1/2 | 2325M | 70.30 | 2325M-C3 | 79.10 | | |
| | .1969 (5 mm) | .167 | .119 | **1.000** | I | 4 | 1/4 | 4 | 2955M | 80.40 | 2955M-C3 | 91.00 | | |
| | 7/32 | .186 | .138 | **.250** | I | 4 | 1/4 | 2-1/2 | 52914 | 73.70 | 52914-C3 | 82.70 | | |
| | 7/32 | .186 | .138 | **.500** | I | 4 | 1/4 | 2-1/2 | 23214 | 76.60 | 23214-C3 | 85.50 | | |
| | 7/32 | .186 | .138 | **.750** | I | 4 | 1/4 | 2-1/2 | 41314 | 80.90 | 41314-C3 | 89.70 | | |
| | .2362 (6 mm) | .201 | .148 | **.250** | I | 4 | 1/4 | 2-1/2 | 97436M | 68.10 | 97436M-C3 | 76.20 | | |
| | .2362 (6 mm) | .201 | .148 | **.375** | I | 4 | 1/4 | 2-1/2 | 5296M | 68.10 | 5296M-C3 | 76.20 | | |
| | .2362 (6 mm) | .201 | .148 | **.500** | I | 4 | 1/4 | 2-1/2 | 3976M | 71.60 | 3976M-C3 | 80.60 | | |
| | .2362 (6 mm) | .201 | .148 | **.750** | I | 4 | 1/4 | 2-1/2 | 2326M | 76.00 | 2326M-C3 | 85.00 | | |
| | .2362 (6 mm) | .201 | .148 | **1.250** | I | 4 | 1/4 | 4 | 2956M | 86.60 | 2956M-C3 | 96.90 | | |
| | .2362 (6 mm) | .201 | .148 | **2.000** | I | 4 | 1/4 | 4 | 96066M | 101.00 | 96066M-C3 | 109.60 | | |
| | 1/4 | .213 | .158 | **.078** | I | 4 | 1/4 | 2-1/2 | 931516 | 66.00 | 931516-C3 | 74.10 | | |
| | 1/4 | .213 | .158 | **.125** | I | 4 | 1/4 | 2-1/2 | 23116 | 65.50 | 23116-C3 | 74.40 | | |
| | 1/4 | .213 | .158 | **.187** | I | 4 | 1/4 | 2-1/2 | 789916 | 66.00 | 789916-C3 | 74.10 | | |
| | 1/4 | .213 | .158 | **.250** | I | 4 | 1/4 | 2-1/2 | 974316 | 68.60 | 974316-C3 | 77.60 | | |
| | 1/4 | .213 | .158 | **.250** | II | 4 | 1/4 | 2-1/2 | 758516 | 70.60 | 758516-C3 | 78.70 | | |
| | 1/4 | .213 | .158 | **.312** | I | 4 | 1/4 | 2-1/2 | 905116 | 69.30 | 905116-C3 | 78.30 | | |
| | 1/4 | .213 | .158 | **.375** | I | 4 | 1/4 | 2-1/2 | 52916 | 69.40 | 52916-C3 | 78.40 | 52916-C4 | 90.80 |
| | 1/4 | .213 | .158 | **.437** | I | 4 | 1/4 | 2-1/2 | 828416 | 70.80 | 828416-C3 | 79.80 | | |
| | 1/4 | .213 | .158 | **.500** | I | 4 | 1/4 | 2-1/2 | 39716 | 71.60 | 39716-C3 | 80.60 | | |
| | 1/4 | .213 | .158 | **.625** | I | 4 | 1/4 | 2-1/2 | 927616 | 72.20 | 927616-C3 | 81.10 | | |
| | 1/4 | .213 | .158 | **.750** | I | 4 | 1/4 | 2-1/2 | 23216 | 76.00 | 23216-C3 | 85.00 | 23216-C4 | 97.40 |
| | 1/4 | .213 | .158 | **.875** | I | 4 | 1/4 | 2-1/2 | 786916 | 76.70 | 786916-C3 | 85.60 | | |
| | 1/4 | .213 | .158 | **1.000** | I | 4 | 1/4 | 2-1/2 | 922916 | 77.10 | 922916-C3 | 86.00 | | |
| | 1/4 | .213 | .158 | **1.125** | I | 4 | 1/4 | 2-1/2 | 41316 | 80.00 | 41316-C3 | 89.00 | | |
| | 1/4 | .213 | .158 | **1.250** | I | 4 | 1/4 | 4 | 846616 | 85.90 | 846616-C3 | 96.40 | | |
| NEW | 1/4 | .213 | .158 | **1.500** | I | 4 | 1/4 | 4 | 29516 | 88.00 | 29516-C3 | 98.50 | 29516-C4 | 110.90 |
| | 1/4 | .213 | .158 | **2.000** | I | 4 | 1/4 | 4 | 960616 | 93.40 | 960616-C3 | 104.00 | | |
| | 1/4 | .213 | .158 | **2.250** | I | 4 | 1/4 | 4 | 55216 | 99.10 | 55216-C3 | 109.60 | | |
| | 1/4 | .213 | .158 | **2.500** | I | 4 | 1/4 | 4 | 929616 | 130.50 | 929616-C3 | 141.00 | | |

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NEW SIZES!

# UNDERCUTTING END MILLS

## 270° (cont.)

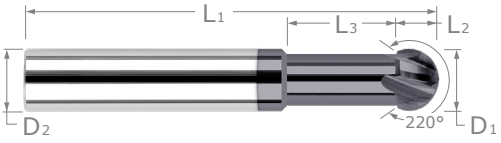


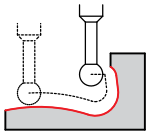
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| CUTTER DIAMETER | LENGTH OF CUT | NECK DIAMETER | NECK LENGTH | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | | $L_3$ +.030″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| 9/32 | .240 | .180 | **.375** | I | 4 | 5/16 | 2-1/2 | 52918 | 92.60 | 52918-C3 | 102.90 | | | |
| 9/32 | .240 | .180 | **.750** | I | 4 | 5/16 | 2-1/2 | 23218 | 95.20 | 23218-C3 | 104.80 | | | |
| 5/16 | .266 | .201 | **.187** | I | 4 | 5/16 | 2-1/2 | 23120 | 87.60 | 23120-C3 | 98.00 | | | |
| 5/16 | .266 | .201 | **.375** | I | 4 | 5/16 | 2-1/2 | 52920 | 91.00 | 52920-C3 | 101.60 | | | |
| 5/16 | .266 | .201 | **.500** | I | 4 | 5/16 | 2-1/2 | 39720 | 93.20 | 39720-C3 | 103.70 | | | |
| 5/16 | .266 | .201 | **.750** | I | 4 | 5/16 | 2-1/2 | 23220 | 98.30 | 23220-C3 | 108.60 | 23220-C4 | 123.80 | NEW |
| 5/16 | .266 | .201 | **1.125** | I | 4 | 5/16 | 4 | 41320 | 111.50 | 41320-C3 | 124.00 | | | |
| 5/16 | .266 | .201 | **1.500** | I | 4 | 5/16 | 4 | 29520 | 119.20 | 29520-C3 | 131.70 | | | |
| 5/16 | .266 | .201 | **2.000** | I | 4 | 5/16 | 4 | 960620 | 126.50 | 960620-C3 | 139.00 | | | |
| 5/16 | .266 | .201 | **2.250** | I | 4 | 5/16 | 4 | 55220 | 128.60 | 55220-C3 | 139.00 | | | |
| 5/16 | .266 | .201 | **2.500** | I | 4 | 5/16 | 4 | 929620 | 128.60 | 929620-C3 | 141.10 | | | |
| 3/8 | .320 | .241 | **.093** | I | 4 | 3/8 | 2-1/2 | 931524 | 94.60 | 931524-C3 | 106.00 | | | |
| 3/8 | .320 | .241 | **.187** | I | 4 | 3/8 | 2-1/2 | 23124 | 94.60 | 23124-C3 | 106.00 | | | |
| 3/8 | .320 | .241 | **.250** | II | 4 | 3/8 | 2-1/2 | 758524 | 96.40 | 758524-C3 | 107.80 | | | |
| 3/8 | .320 | .241 | **.375** | I | 4 | 3/8 | 2-1/2 | 52924 | 96.70 | 52924-C3 | 108.20 | 52924-C4 | 126.40 | |
| 3/8 | .320 | .241 | **.500** | I | 4 | 3/8 | 2-1/2 | 39724 | 96.70 | 39724-C3 | 108.20 | | | |
| 3/8 | .320 | .241 | **.750** | I | 4 | 3/8 | 2-1/2 | 23224 | 98.30 | 23224-C3 | 109.70 | 23224-C4 | 128.70 | |
| 3/8 | .320 | .241 | **1.000** | I | 4 | 3/8 | 2-1/2 | 922924 | 111.00 | 922924-C3 | 122.40 | | | |
| 3/8 | .320 | .241 | **1.125** | I | 4 | 3/8 | 4 | 41324 | 121.70 | 41324-C3 | 137.80 | | | |
| 3/8 | .320 | .241 | **1.500** | I | 4 | 3/8 | 4 | 29524 | 125.00 | 29524-C3 | 141.10 | | | |
| 3/8 | .320 | .241 | **2.000** | I | 4 | 3/8 | 4 | 960624 | 129.40 | 960624-C3 | 145.60 | | | |
| 3/8 | .320 | .241 | **2.250** | I | 4 | 3/8 | 4 | 55224 | 134.10 | 55224-C3 | 150.30 | | | |
| 3/8 | .320 | .241 | **2.500** | I | 4 | 3/8 | 4 | 929624 | 138.40 | 929624-C3 | 154.50 | | | |
| 3/8 | .320 | .241 | **2.750** | I | 4 | 3/8 | 6 | 775524 | 143.80 | 775524-C3 | 158.10 | | | NEW |
| .3937 (10 mm) | .335 | .252 | **.375** | I | 4 | 7/16 | 2-3/4 | 52925 | 136.70 | 52925-C3 | 150.00 | | | |
| .3937 (10 mm) | .335 | .252 | **.750** | I | 4 | 7/16 | 2-3/4 | 23225 | 137.10 | 23225-C3 | 151.90 | | | |
| 7/16 | .373 | .285 | **.500** | I | 4 | 7/16 | 2-3/4 | 52928 | 132.60 | 52928-C3 | 147.40 | | | |
| 7/16 | .373 | .285 | **1.000** | I | 4 | 7/16 | 2-3/4 | 23228 | 137.10 | 23228-C3 | 151.90 | | | |
| .4724 (12 mm) | .403 | .308 | **.500** | I | 4 | 1/2 | 3 | 52931 | 172.70 | 52931-C3 | 190.30 | | | |
| .4724 (12 mm) | .403 | .308 | **1.000** | I | 4 | 1/2 | 3 | 23231 | 182.50 | 23231-C3 | 198.10 | | | |
| 1/2 | .427 | .323 | **.187** | I | 4 | 1/2 | 3 | 23132 | 135.70 | 23132-C3 | 151.20 | | | |
| 1/2 | .427 | .323 | **.312** | II | 4 | 1/2 | 3 | 758532 | 138.30 | 758532-C3 | 153.80 | | | |
| 1/2 | .427 | .323 | **.500** | I | 4 | 1/2 | 3 | 52932 | 136.90 | 52932-C3 | 154.50 | 52932-C4 | 178.30 | |
| 1/2 | .427 | .323 | **.750** | I | 4 | 1/2 | 3 | 39732 | 140.50 | 39732-C3 | 158.10 | | | |
| 1/2 | .427 | .323 | **1.000** | I | 4 | 1/2 | 3 | 23232 | 141.40 | 23232-C3 | 159.10 | 23232-C4 | 182.80 | |
| 1/2 | .427 | .323 | **1.250** | I | 4 | 1/2 | 3 | 922932 | 147.10 | 922932-C3 | 162.70 | | | |
| 1/2 | .427 | .323 | **1.500** | I | 4 | 1/2 | 6 | 41332 | 240.90 | 41332-C3 | 258.50 | | | |
| 1/2 | .427 | .323 | **2.000** | I | 4 | 1/2 | 6 | 29532 | 246.30 | 29532-C3 | 263.90 | | | |
| 1/2 | .427 | .323 | **2.500** | I | 4 | 1/2 | 6 | 960632 | 246.60 | 960632-C3 | 264.10 | | | |
| 1/2 | .427 | .323 | **3.000** | I | 4 | 1/2 | 6 | 55232 | 263.20 | 55232-C3 | 280.90 | | | |
| 1/2 | .427 | .323 | **3.500** | I | 4 | 1/2 | 6 | 929632 | 277.40 | 929632-C3 | 294.80 | | | |
| 5/8 | .533 | .412 | **1.000** | I | 4 | 5/8 | 3-1/2 | 39740 | 284.30 | 39740-C3 | 302.00 | | | |
| 5/8 | .533 | .412 | **1.500** | I | 4 | 5/8 | 3-1/2 | 23240 | 284.30 | 23240-C3 | 303.60 | | | |
| 3/4 | .640 | .500 | **1.000** | I | 4 | 3/4 | 4 | 39748 | 290.00 | 39748-C3 | 313.10 | | | |
| 3/4 | .640 | .500 | **1.500** | I | 4 | 3/4 | 4 | 23248 | 391.50 | 23248-C3 | 414.60 | | | |

# UNDERCUTTING END MILLS

## 220°







- 220° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | LENGTH OF CUT | NECK DIAMETER | NECK LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | | $L_3$ +.020″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .0200 | .013 | .016 | **.031** | 2 | 1/8 | 1-1/2 | 722467 | 70.90 | 722467-C3 | 76.80 |
| 1/32 | .021 | .023 | **.093** | 2 | 1/8 | 1-1/2 | 22802 | 70.90 | 22802-C3 | 76.80 |
| NEW 1/32 | .021 | .023 | **.187** | 2 | 1/8 | 1-1/2 | 971602 | 73.00 | 971602-C3 | 78.90 |
| .0394 (1 mm) | .026 | .030 | **.093** | 2 | 1/8 | 1-1/2 | 785839 | 71.60 | 785839-C3 | 77.50 |
| .0394 (1 mm) | .026 | .030 | **.125** | 2 | 1/8 | 1-1/2 | 2281M | 79.30 | 2281M-C3 | 85.20 |
| 3/64 | .031 | .035 | **.156** | 2 | 1/8 | 1-1/2 | 22803 | 70.90 | 22803-C3 | 76.80 |
| 1/16 | .042 | .047 | **.062** | 2 | 1/8 | 1-1/2 | 22704 | 48.30 | 22704-C3 | 54.20 |
| 1/16 | .042 | .047 | **.125** | 2 | 1/8 | 1-1/2 | 785862 | 50.30 | 785862-C3 | 56.30 |
| 1/16 | .042 | .047 | **.187** | 2 | 1/8 | 1-1/2 | 22804 | 50.30 | 22804-C3 | 56.30 |
| 1/16 | .042 | .047 | **.250** | 2 | 1/8 | 1-1/2 | 22904 | 50.30 | 22904-C3 | 56.30 |
| 5/64 | .052 | .059 | **.062** | 2 | 1/8 | 1-1/2 | 22705 | 48.30 | 22705-C3 | 54.20 |
| 5/64 | .052 | .059 | **.250** | 2 | 1/8 | 1-1/2 | 22805 | 50.30 | 22805-C3 | 56.30 |
| .0930 | .062 | .070 | **.250** | 2 | 1/8 | 1-1/2 | 722406 | 48.30 | 722406-C3 | 54.20 |
| .0930 | .062 | .070 | **.500** | 2 | 1/8 | 2 | 22905 | 52.40 | 22905-C3 | 58.30 |
| 3/32 | .063 | .070 | **.062** | 2 | 1/8 | 1-1/2 | 22706 | 48.30 | 22706-C3 | 54.20 |
| 3/32 | .063 | .070 | **.375** | 2 | 1/8 | 1-1/2 | 22806 | 51.10 | 22806-C3 | 57.00 |
| .1181 (3 mm) | .079 | .090 | **.500** | 2 | 1/8 | 2 | 2283M | 52.40 | 2283M-C3 | 58.30 |

| $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | | $L_3$ +.030″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/8 | .084 | .094 | **.125** | 4 | 1/8 | 1-1/2 | 22708 | 41.60 | 22708-C3 | 47.50 |
| 1/8 | .084 | .094 | **.250** | 4 | 1/8 | 1-1/2 | 826708 | 43.60 | 826708-C3 | 49.50 |
| 1/8 | .084 | .094 | **.500** | 4 | 1/8 | 1-1/2 | 22808 | 46.90 | 22808-C3 | 52.80 |
| 1/8 | .084 | .094 | **.750** | 4 | 1/8 | 2 | 833808 | 50.60 | 833808-C3 | 56.50 |
| 1/8 | .084 | .094 | **1.000** | 4 | 1/8 | 3 | 22908 | 54.20 | 22908-C3 | 60.10 |
| 1/8 | .084 | .094 | **1.500** | 4 | 1/8 | 3 | 971608 | 66.70 | 971608-C3 | 72.70 |
| 5/32 | .105 | .125 | **.500** | 4 | 3/16 | 2 | 22810 | 58.90 | 22810-C3 | 65.40 |
| 3/16 | .126 | .141 | **.125** | 4 | 3/16 | 2 | 22712 | 49.40 | 22712-C3 | 56.10 |
| 3/16 | .126 | .141 | **.250** | 4 | 3/16 | 2 | 826712 | 52.50 | 826712-C3 | 59.10 |
| 3/16 | .126 | .141 | **.500** | 4 | 3/16 | 2 | 22812 | 58.90 | 22812-C3 | 65.40 |
| 3/16 | .126 | .141 | **.750** | 4 | 3/16 | 2 | 833812 | 63.30 | 833812-C3 | 69.90 |
| 3/16 | .126 | .141 | **1.000** | 4 | 3/16 | 3 | 22912 | 68.10 | 22912-C3 | 74.70 |
| NEW 3/16 | .126 | .141 | **1.500** | 4 | 3/16 | 3 | 971612 | 72.60 | 971612-C3 | 79.20 |
| .2362 (6 mm) | .158 | .172 | **.750** | 4 | 1/4 | 2-1/2 | 2286M | 74.40 | 2286M-C3 | 83.30 |

continued on next page



**Check Out All of Our Undercutting Solutions!**

NEW SIZES!

# UNDERCUTTING END MILLS

## 220° (cont.)



continued from previous page

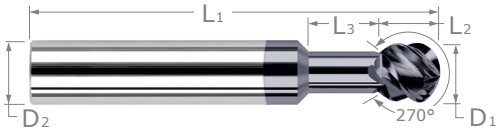
| CUTTER DIAMETER | LENGTH OF CUT | NECK DIAMETER | NECK LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | ALTiN COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | | $L_3$ +.030″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | |
| 1/4 | .168 | .188 | **.125** | 4 | 1/4 | 2-1/2 | 22716 | 66.40 | 22716-C3 | 75.40 | |
| 1/4 | .168 | .188 | **.375** | 4 | 1/4 | 2-1/2 | 826716 | 68.90 | 826716-C3 | 77.90 | |
| 1/4 | .168 | .188 | **.750** | 4 | 1/4 | 2-1/2 | 22816 | 74.40 | 22816-C3 | 83.30 | |
| 1/4 | .168 | .188 | **1.000** | 4 | 1/4 | 2-1/2 | 833816 | 78.50 | 833816-C3 | 87.30 | |
| 1/4 | .168 | .188 | **1.500** | 4 | 1/4 | 4 | 22916 | 86.60 | 22916-C3 | 96.90 | |
| 1/4 | .168 | .188 | **2.250** | 4 | 1/4 | 4 | 971616 | 112.90 | 971616-C3 | 123.50 | |
| 5/16 | .210 | .235 | **.187** | 4 | 5/16 | 2-1/2 | 22720 | 88.50 | 22720-C3 | 98.20 | |
| 5/16 | .210 | .235 | **.750** | 4 | 5/16 | 2-1/2 | 22820 | 96.70 | 22820-C3 | 107.20 | |
| 5/16 | .210 | .235 | **1.500** | 4 | 5/16 | 4 | 22920 | 116.80 | 22920-C3 | 129.30 | |
| 3/8 | .252 | .281 | **.187** | 4 | 3/8 | 2-1/2 | 22724 | 95.20 | 22724-C3 | 106.60 | |
| 3/8 | .252 | .281 | **.750** | 4 | 3/8 | 2-1/2 | 22824 | 101.30 | 22824-C3 | 112.70 | |
| 3/8 | .252 | .281 | **1.500** | 4 | 3/8 | 4 | 22924 | 122.70 | 22924-C3 | 138.80 | |
| 3/8 | .252 | .281 | **2.250** | 4 | 3/8 | 4 | 971624 | 170.30 | 971624-C3 | 182.60 | |
| 1/2 | .336 | .375 | **.187** | 4 | 1/2 | 3 | 22732 | 137.50 | 22732-C3 | 153.10 | |
| 1/2 | .336 | .375 | **1.000** | 4 | 1/2 | 3 | 22832 | 146.20 | 22832-C3 | 163.70 | |
| 1/2 | .336 | .375 | **2.000** | 4 | 1/2 | 6 | 22932 | 242.20 | 22932-C3 | 259.80 | |
| 3/4 | .503 | .625 | **1.000** | 4 | 3/4 | 4 | 785948 | 293.20 | 785948-C3 | 316.30 | NEW |
| 3/4 | .503 | .625 | **1.500** | 4 | 3/4 | 4 | 694648 | 303.60 | 694648-C3 | 326.70 | NEW |

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# UNDERCUTTING END MILLS

## 270° High Helix




**High Helix for Improved Performance!**



270° Spherical Ball

- 45° helix for faster chip removal and better finish
- 270° spherical ball • Center cutting
- Designed for undercutting, deburring, and multi-axis machining
- Solid carbide • CNC ground in the USA

| CUTTER DIA. | LENGTH OF CUT | NECK DIA. | NECK LENGTH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | | $L_3$ +.020″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/32 | .027 | .016 | **.062** | 2 | 1/8 | 1-1/2 | 951131 | 81.60 | 951131-C3 | 87.50 | | |
| 1/32 | .027 | .016 | **.093** | 2 | 1/8 | 1-1/2 | 966531 | 81.60 | 966531-C3 | 87.50 | | |
| .0394 (1 mm) | .033 | .024 | **.078** | 2 | 1/8 | 1-1/2 | 95111M | 81.60 | 95111M-C3 | 87.50 | | |
| .0394 (1 mm) | .033 | .024 | **.125** | 2 | 1/8 | 1-1/2 | 96651M | 81.60 | 96651M-C3 | 87.50 | | |
| 3/64 | .040 | .029 | **.093** | 2 | 1/8 | 1-1/2 | 951147 | 81.60 | 951147-C3 | 87.50 | | |
| 3/64 | .040 | .029 | **.156** | 2 | 1/8 | 1-1/2 | 966547 | 81.60 | 966547-C3 | 87.50 | | |
| 1/16 | .053 | .037 | **.093** | 2 | 1/8 | 1-1/2 | 951162 | 59.10 | 951162-C3 | 65.00 | 951162-C8 | 66.70 |
| 1/16 | .053 | .037 | **.125** | 2 | 1/8 | 1-1/2 | 773762 | 61.00 | 773762-C3 | 67.00 | | |
| 1/16 | .053 | .037 | **.187** | 2 | 1/8 | 1-1/2 | 966562 | 61.00 | 966562-C3 | 67.00 | 966562-C8 | 68.70 |
| 1/16 | .053 | .037 | **.250** | 2 | 1/8 | 1-1/2 | 970462 | 74.60 | 970462-C3 | 80.50 | 970462-C8 | 82.30 |
| 1/16 | .053 | .037 | **.375** | 2 | 1/8 | 1-1/2 | 722304 | 80.10 | 722304-C3 | 86.10 | | |
| 5/64 | .067 | .045 | **.125** | 2 | 1/8 | 1-1/2 | 951178 | 59.10 | 951178-C3 | 65.00 | 951178-C8 | 66.70 |
| 5/64 | .067 | .045 | **.250** | 2 | 1/8 | 1-1/2 | 966578 | 61.00 | 966578-C3 | 67.00 | 966578-C8 | 68.70 |
| 5/64 | .067 | .045 | **.375** | 2 | 1/8 | 2 | 970478 | 74.60 | 970478-C3 | 80.50 | 970478-C8 | 83.50 |
| 3/32 | .079 | .054 | **.062** | 2 | 1/8 | 1-1/2 | 774493 | 56.30 | 774493-C3 | 62.20 | | |
| 3/32 | .079 | .054 | **.125** | 2 | 1/8 | 1-1/2 | 837393 | 56.30 | 837393-C3 | 62.20 | 837393-C8 | 63.90 |
| 3/32 | .079 | .054 | **.250** | 2 | 1/8 | 1-1/2 | 951193 | 59.10 | 951193-C3 | 65.00 | 951193-C8 | 66.70 |
| 3/32 | .079 | .054 | **.375** | 2 | 1/8 | 1-1/2 | 966593 | 64.60 | 966593-C3 | 70.50 | 966593-C8 | 72.20 |
| 3/32 | .079 | .054 | **.500** | 2 | 1/8 | 2 | 970493 | 74.60 | 970493-C3 | 80.50 | 970493-C8 | 82.30 |
| $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | | $L_3$ +.030″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/8 | .107 | .076 | **.125** | 4 | 1/8 | 1-1/2 | 934108 | 51.60 | 934108-C3 | 57.50 | 934108-C8 | 59.30 |
| 1/8 | .107 | .076 | **.187** | 4 | 1/8 | 1-1/2 | 808608 | 52.70 | 808608-C3 | 58.60 | 808608-C8 | 60.40 |
| 1/8 | .107 | .076 | **.250** | 4 | 1/8 | 1-1/2 | 951208 | 53.90 | 951208-C3 | 59.80 | 951208-C8 | 62.90 |
| 1/8 | .107 | .076 | **.375** | 4 | 1/8 | 1-1/2 | 863708 | 56.50 | 863708-C3 | 62.40 | 863708-C8 | 64.10 |
| 1/8 | .107 | .076 | **.500** | 4 | 1/8 | 1-1/2 | 994708 | 59.10 | 994708-C3 | 65.00 | 994708-C8 | 67.90 |
| 1/8 | .107 | .076 | **.750** | 4 | 1/8 | 2 | 897708 | 66.70 | 897708-C3 | 72.70 | | |
| 1/8 | .107 | .076 | **1.000** | 4 | 1/8 | 3 | 997108 | 66.70 | 997108-C3 | 72.70 | 997108-C8 | 75.80 |
| 1/8 | .107 | .076 | **1.500** | 4 | 1/8 | 3 | 928808 | 71.20 | 928808-C3 | 77.10 | 928808-C8 | 79.40 |
| 5/32 | .133 | .098 | **.250** | 4 | 3/16 | 2 | 951210 | 70.00 | 951210-C3 | 76.60 | 951210-C8 | 78.60 |
| 5/32 | .133 | .098 | **.500** | 4 | 3/16 | 2 | 994710 | 75.20 | 994710-C3 | 81.80 | 994710-C8 | 83.80 |
| 5/32 | .133 | .098 | **1.000** | 4 | 3/16 | 3 | 997110 | 85.80 | 997110-C3 | 92.50 | 997110-C8 | 95.10 |
| 3/16 | .160 | .117 | **.125** | 4 | 3/16 | 2 | 934112 | 64.60 | 934112-C3 | 71.30 | 934112-C8 | 73.20 |
| 3/16 | .160 | .117 | **.250** | 4 | 3/16 | 2 | 951212 | 66.40 | 951212-C3 | 73.00 | 951212-C8 | 75.00 |
| 3/16 | .160 | .117 | **.500** | 4 | 3/16 | 2 | 994712 | 71.90 | 994712-C3 | 78.50 | 994712-C8 | 80.50 |
| 3/16 | .160 | .117 | **.750** | 4 | 3/16 | 2 | 897712 | 75.20 | 897712-C3 | 81.80 | 897712-C8 | 83.80 |

continued on next page

# UNDERCUTTING END MILLS

## 270° High Helix (cont.)



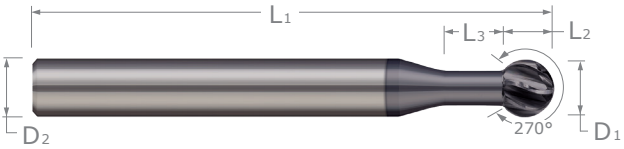
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| CUTTER DIA. | LENGTH OF CUT | NECK DIA. | NECK LENGTH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.020''}_{-.000''}$ | | $L_3$ $^{+.030''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 3/16 | .160 | .117 | **1.000** | 4 | 3/16 | 3 | 997112 | 85.80 | 997112-C3 | 92.50 | 997112-C8 | 95.10 |
| 3/16 | .160 | .117 | **1.250** | 4 | 3/16 | 3 | 893512 | 90.40 | 893512-C3 | 97.10 | 893512-C8 | 99.60 |
| 1/4 | .213 | .158 | **.125** | 4 | 1/4 | 2-1/2 | 934116 | 92.50 | 934116-C3 | 101.50 | 934116-C8 | 102.20 |
| 1/4 | .213 | .158 | **.250** | 4 | 1/4 | 2-1/2 | 808616 | 94.60 | 808616-C3 | 102.70 | 808616-C8 | 105.70 |
| 1/4 | .213 | .158 | **.375** | 4 | 1/4 | 2-1/2 | 951216 | 96.70 | 951216-C3 | 105.70 | 951216-C8 | 107.80 |
| 1/4 | .213 | .158 | **.500** | 4 | 1/4 | 2-1/2 | 863716 | 99.80 | 863716-C3 | 108.80 | 863716-C8 | 109.50 |
| 1/4 | .213 | .158 | **.750** | 4 | 1/4 | 2-1/2 | 994716 | 106.00 | 994716-C3 | 115.00 | 994716-C8 | 115.70 |
| 1/4 | .213 | .158 | **1.000** | 4 | 1/4 | 2-1/2 | 808516 | 107.60 | 808516-C3 | 116.50 | 808516-C8 | 118.70 |
| 1/4 | .213 | .158 | **1.125** | 4 | 1/4 | 2-1/2 | 897716 | 109.10 | 897716-C3 | 118.10 | 897716-C8 | 120.20 |
| 1/4 | .213 | .158 | **1.500** | 4 | 1/4 | 4 | 997116 | 116.70 | 997116-C3 | 127.10 | 997116-C8 | 127.40 |
| 1/4 | .213 | .158 | **2.250** | 4 | 1/4 | 4 | 928816 | 129.10 | 928816-C3 | 139.60 | 928816-C8 | 141.00 |
| 5/16 | .266 | .201 | **.750** | 4 | 5/16 | 2-1/2 | 994720 | 123.30 | 994720-C3 | 133.70 | 994720-C8 | 143.70 |
| 5/16 | .266 | .201 | **1.500** | 4 | 5/16 | 4 | 997120 | 146.50 | 997120-C3 | 159.10 | 997120-C8 | 160.70 |
| 3/8 | .320 | .241 | **.375** | 4 | 3/8 | 2-1/2 | 951224 | 138.30 | 951224-C3 | 149.70 | 951224-C8 | 163.00 |
| 3/8 | .320 | .241 | **.750** | 4 | 3/8 | 2-1/2 | 994724 | 139.90 | 994724-C3 | 151.30 | 994724-C8 | 164.70 |
| 3/8 | .320 | .241 | **1.125** | 4 | 3/8 | 4 | 897724 | 150.20 | 897724-C3 | 166.40 | 897724-C8 | 167.20 |
| 3/8 | .320 | .241 | **1.500** | 4 | 3/8 | 4 | 997124 | 154.00 | 997124-C3 | 170.30 | 997124-C8 | 183.10 |
| 1/2 | .427 | .323 | **.500** | 4 | 1/2 | 3 | 951232 | 197.40 | 951232-C3 | 215.20 | 951232-C8 | 215.80 |
| 1/2 | .427 | .323 | **1.000** | 4 | 1/2 | 3 | 994732 | 202.40 | 994732-C3 | 220.20 | 994732-C8 | 220.80 |
| 1/2 | .427 | .323 | **1.500** | 4 | 1/2 | 6 | 897732 | 291.30 | 897732-C3 | 309.10 | 897732-C8 | 314.10 |
| 1/2 | .427 | .323 | **2.000** | 4 | 1/2 | 6 | 997132 | 299.20 | 997132-C3 | 316.80 | 997132-C8 | 322.00 |
| 1/2 | .427 | .323 | **3.000** | 4 | 1/2 | 6 | 928832 | 333.70 | 928832-C3 | 351.30 | 928832-C8 | 356.60 |

# UNDERCUTTING END MILLS

## 270° for Hardened Steels






- Optimized for hardened steels 45-68 Rc
- Increased flute count for added strength and tool life
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide • CNC ground in the USA

Stocked in Multiple Reach Lengths



| | CUTTER DIAMETER | LENGTH OF CUT | NECK DIA. | NECK LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.001″ | $L_2$ +.010″ −.000″ | | $L_3$ +.020″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ |
| | 1/32 | .027 | .016 | **.062** | 4 | 1/8 | 1-1/2 | 823231-C6 | 79.90 |
| | 1/32 | .027 | .016 | **.078** | 4 | 1/8 | 1-1/2 | 819831-C6 | 79.90 |
| | 1/32 | .027 | .016 | **.125** | 4 | 1/8 | 1-1/2 | 745431-C6 | 80.70 |
| | 3/64 | .040 | .029 | **.093** | 4 | 1/8 | 1-1/2 | 823247-C6 | 79.90 |
| | 3/64 | .040 | .029 | **.125** | 4 | 1/8 | 1-1/2 | 819847-C6 | 79.90 |
| NEW | 1/16 | .053 | .037 | **.031** | 4 | 1/8 | 1-1/2 | 694304-C6 | 55.00 |
| | 1/16 | .053 | .037 | **.062** | 4 | 1/8 | 1-1/2 | 831562-C6 | 55.00 |
| | 1/16 | .053 | .037 | **.093** | 4 | 1/8 | 1-1/2 | 823262-C6 | 55.00 |
| | 1/16 | .053 | .037 | **.125** | 4 | 1/8 | 1-1/2 | 819862-C6 | 57.20 |
| | 1/16 | .053 | .037 | **.250** | 4 | 1/8 | 1-1/2 | 745462-C6 | 57.80 |
| NEW | 1/16 | .053 | .037 | **.312** | 4 | 1/8 | 1-1/2 | 694104-C6 | 57.80 |
| NEW | 5/64 | .067 | .045 | **.093** | 4 | 1/8 | 1-1/2 | 746405-C6 | 56.20 |
| | 5/64 | .067 | .045 | **.125** | 4 | 1/8 | 1-1/2 | 823278-C6 | 56.20 |
| | 5/64 | .067 | .045 | **.187** | 4 | 1/8 | 1-1/2 | 819878-C6 | 58.20 |
| | 5/64 | .067 | .045 | **.250** | 4 | 1/8 | 1-1/2 | 748878-C6 | 60.30 |
| | 3/32 | .080 | .054 | **.062** | 4 | 1/8 | 1-1/2 | 831593-C6 | 56.20 |
| | 3/32 | .080 | .054 | **.125** | 4 | 1/8 | 1-1/2 | 746493-C6 | 56.70 |
| | 3/32 | .080 | .054 | **.187** | 4 | 1/8 | 1-1/2 | 704506-C6 | 58.50 |
| | 3/32 | .080 | .054 | **.250** | 4 | 1/8 | 1-1/2 | 823293-C6 | 56.20 |
| | 3/32 | .080 | .054 | **.312** | 4 | 1/8 | 1-1/2 | 819893-C6 | 60.60 |
| | 3/32 | .080 | .054 | **.375** | 4 | 1/8 | 1-1/2 | 748893-C6 | 61.20 |

continued on next page

NEW SIZES!

# UNDERCUTTING END MILLS

## 270° for Hardened Steels (cont.)



continued from previous page

| CUTTER DIAMETER | LENGTH OF CUT | NECK DIA. | NECK LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | | $L_3$ $^{+.020''}_{-.000''}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | |
| 1/8 | .107 | .076 | **.062** | 6 | 1/8 | 1-1/2 | 694408-C6 | 48.70 | NEW |
| 1/8 | .107 | .076 | **.125** | 6 | 1/8 | 1-1/2 | 831608-C6 | 49.20 | |
| 1/8 | .107 | .076 | **.250** | 6 | 1/8 | 1-1/2 | 823308-C6 | 51.70 | |
| 1/8 | .107 | .076 | **.375** | 6 | 1/8 | 1-1/2 | 819908-C6 | 52.70 | |
| 1/8 | .107 | .076 | **.500** | 6 | 1/8 | 2 | 748908-C6 | 55.30 | |
| 1/8 | .107 | .076 | **.750** | 6 | 1/8 | 2 | 725708-C6 | 56.30 | |
| 1/8 | .107 | .076 | **1.000** | 6 | 1/8 | 3 | 704608-C6 | 57.30 | |
| 5/32 | .133 | .098 | **.250** | 6 | 3/16 | 2 | 823310-C6 | 62.40 | |
| 3/16 | .160 | .117 | **.125** | 6 | 3/16 | 2 | 831612-C6 | 58.10 | |
| 3/16 | .160 | .117 | **.187** | 6 | 3/16 | 2 | 746512-C6 | 50.40 | NEW |
| 3/16 | .160 | .117 | **.250** | 6 | 3/16 | 2 | 823312-C6 | 62.40 | |
| 3/16 | .160 | .117 | **.375** | 6 | 3/16 | 2 | 819912-C6 | 65.50 | |
| 3/16 | .160 | .117 | **.500** | 6 | 3/16 | 2 | 748912-C6 | 68.60 | |
| 1/4 | .213 | .158 | **.125** | 8 | 1/4 | 2-1/2 | 831616-C6 | 77.90 | |
| 1/4 | .213 | .158 | **.375** | 6 | 1/4 | 2-1/2 | 823316-C6 | 82.90 | |
| 1/4 | .213 | .158 | **.500** | 6 | 1/4 | 2-1/2 | 819916-C6 | 84.30 | |
| 1/4 | .213 | .158 | **.750** | 6 | 1/4 | 2-1/2 | 748916-C6 | 87.90 | |
| 1/4 | .213 | .158 | **1.125** | 6 | 1/4 | 3 | 725716-C6 | 88.70 | NEW |
| 3/8 | .320 | .241 | **.250** | 8 | 3/8 | 2-1/2 | 746524-C6 | 112.30 | NEW |
| 3/8 | .320 | .241 | **.375** | 8 | 3/8 | 2-1/2 | 823324-C6 | 113.70 | |
| 3/8 | .320 | .241 | **.500** | 8 | 3/8 | 2-1/2 | 819924-C6 | 113.70 | |
| 1/2 | .427 | .323 | **.500** | 8 | 1/2 | 3 | 823332-C6 | 161.70 | |
| 1/2 | .427 | .323 | **.750** | 8 | 1/2 | 3 | 819932-C6 | 165.80 | |

**Your Free Guide to Increasing Shop Productivity With High Efficiency Milling**

Download our HEM Guidebook on harveytool.com

# UNDERCUTTING END MILLS

## 270° Deburring Undercut






High Number of Flutes

Stocked in Multiple Reach Lengths



- 270° spherical ball is ideal for deburring complex shapes and multi-axis machining
- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling-type cutters
- Double cut style flute pattern • Center cutting
- Solid carbide • CNC ground in the USA

| | CUTTER DIA. | LOC | NECK DIA. | NECK LENGTH | RIGHT HAND TEETH | LEFT HAND TEETH | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ | $L_2$ +.010″ −.000″ | | $L_3$ +.020″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .031 (1/32) | .026 | .014 | **.031** | 12 | 10 | 1/8 | 1-1/2 | 899631 | 83.10 | 899631-C3 | 89.10 |
| | .031 (1/32) | .026 | .014 | **.062** | 12 | 10 | 1/8 | 1-1/2 | 980531 | 82.30 | 980531-C3 | 88.20 |
| | .031 (1/32) | .026 | .014 | **.093** | 12 | 10 | 1/8 | 1-1/2 | 926431 | 85.00 | 926431-C3 | 90.90 |
| | .031 (1/32) | .026 | .014 | **.125** | 12 | 10 | 1/8 | 1-1/2 | 883231 | 87.70 | 883231-C3 | 93.60 |
| | .039 (1 mm) | .033 | .019 | **.047** | 12 | 10 | 1/8 | 1-1/2 | 89961M | 82.30 | 89961M-C3 | 88.20 |
| | .039 (1 mm) | .033 | .019 | **.125** | 12 | 10 | 1/8 | 1/1/2 | 92641M | 87.70 | 92641M-C3 | 93.60 |
| | .047 (3/64) | .040 | .024 | **.062** | 12 | 10 | 1/8 | 1-1/2 | 895347 | 80.00 | 895347-C3 | 85.90 |
| | .047 (3/64) | .040 | .024 | **.093** | 12 | 10 | 1/8 | 1-1/2 | 980547 | 82.30 | 980547-C3 | 88.20 |
| | .047 (3/64) | .040 | .024 | **.125** | 12 | 10 | 1/8 | 1-1/2 | 890847 | 85.00 | 890847-C3 | 90.90 |
| | .047 (3/64) | .040 | .024 | **.156** | 12 | 10 | 1/8 | 1-1/2 | 926447 | 85.00 | 926447-C3 | 90.90 |
| | .047 (3/64) | .040 | .024 | **.250** | 12 | 10 | 1/8 | 1-1/2 | 883247 | 87.70 | 883247-C3 | 93.60 |
| NEW | .062 (1/16) | .053 | .032 | **.031** | 15 | 12 | 1/8 | 1-1/2 | 693904 | 61.90 | 693904-C3 | 67.80 |
| | .062 (1/16) | .053 | .032 | **.062** | 15 | 12 | 1/8 | 1-1/2 | 899662 | 61.90 | 899662-C3 | 67.80 |
| | .062 (1/16) | .053 | .032 | **.093** | 15 | 12 | 1/8 | 1-1/2 | 980562 | 61.90 | 980562-C3 | 67.80 |
| | .062 (1/16) | .053 | .032 | **.125** | 15 | 12 | 1/8 | 1-1/2 | 890862 | 63.90 | 890862-C3 | 69.90 |
| | .062 (1/16) | .053 | .032 | **.187** | 15 | 12 | 1/8 | 1-1/2 | 926462 | 63.90 | 926462-C3 | 69.90 |
| | .062 (1/16) | .053 | .032 | **.250** | 15 | 12 | 1/8 | 1-1/2 | 883262 | 66.20 | 883262-C3 | 72.10 |
| | .062 (1/16) | .053 | .032 | **.312** | 15 | 12 | 1/8 | 1-1/2 | 808362 | 66.20 | 808362-C3 | 72.10 |
| NEW | .062 (1/16) | .053 | .032 | **.375** | 15 | 12 | 1/8 | 1-1/2 | 693704 | 66.20 | 693704-C3 | 72.10 |
| | .078 (5/64) | .067 | .035 | **.062** | 15 | 12 | 1/8 | 1-1/2 | 899678 | 61.90 | 899678-C3 | 67.80 |
| | .078 (5/64) | .067 | .035 | **.125** | 15 | 12 | 1/8 | 1-1/2 | 980578 | 61.90 | 980578-C3 | 67.80 |
| | .078 (5/64) | .067 | .035 | **.250** | 15 | 12 | 1/8 | 1-1/2 | 926478 | 63.90 | 926478-C3 | 69.90 |
| | .078 (5/64) | .067 | .035 | **.375** | 15 | 12 | 1/8 | 2 | 883278 | 64.80 | 883278-C3 | 70.70 |
| NEW | .078 (5/64) | .067 | .035 | **.500** | 15 | 12 | 1/8 | 2 | 693705 | 64.80 | 693705-C3 | 70.70 |
| | .093 (3/32) | .079 | .038 | **.062** | 15 | 12 | 1/8 | 1-1/2 | 899693 | 65.70 | 899693-C3 | 71.60 |
| | .093 (3/32) | .079 | .038 | **.125** | 15 | 12 | 1/8 | 1-1/2 | 895393 | 65.70 | 895393-C3 | 71.60 |
| | .093 (3/32) | .079 | .038 | **.187** | 15 | 12 | 1/8 | 1-1/2 | 809693 | 65.70 | 809693-C3 | 71.60 |
| | .093 (3/32) | .079 | .038 | **.250** | 15 | 12 | 1/8 | 1-1/2 | 980593 | 65.70 | 980593-C3 | 71.60 |
| | .093 (3/32) | .079 | .038 | **.312** | 15 | 12 | 1/8 | 1-1/2 | 890893 | 68.10 | 890893-C3 | 74.00 |
| | .093 (3/32) | .079 | .038 | **.375** | 15 | 12 | 1/8 | 1-1/2 | 926493 | 67.40 | 926493-C3 | 73.30 |
| | .093 (3/32) | .079 | .038 | **.500** | 15 | 12 | 1/8 | 2 | 883293 | 74.60 | 883293-C3 | 80.50 |
| NEW | .118 (3 mm) | .101 | .056 | **.187** | 15 | 12 | 1/8 | 1-1/2 | 80963M | 68.40 | 80963M-C3 | 74.30 |
| | .118 (3 mm) | .101 | .056 | **.250** | 15 | 12 | 1/8 | 1-1/2 | 98053M | 68.40 | 98053M-C3 | 74.30 |
| | .118 (3 mm) | .101 | .056 | **.375** | 15 | 12 | 1/8 | 1-1/2 | 89083M | 70.80 | 89083M-C3 | 76.70 |
| | .118 (3 mm) | .101 | .056 | **.500** | 15 | 12 | 1/8 | 2 | 92643M | 72.70 | 92643M-C3 | 78.60 |
| NEW | .118 (3 mm) | .101 | .056 | **.625** | 15 | 12 | 1/8 | 2 | 73263M | 72.70 | 73263M-C3 | 78.60 |

continued on next page

NEW SIZES!

# UNDERCUTTING END MILLS

## 270° Deburring Undercut (cont.)



continued from previous page

| CUTTER DIA. | LOC | NECK DIA. | NECK LENGTH | RIGHT HAND TEETH | LEFT HAND TEETH | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ | $L_2$ $^{+.020''}_{-.000''}$ | | $L_3$ $^{+.030''}_{-.000''}$ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .125 (1/8) | .107 | .059 | **.125** | 16 | 13 | 1/8 | 1-1/2 | 899708 | 63.30 | 899708-C3 | 69.20 |
| .125 (1/8) | .107 | .059 | **.187** | 16 | 13 | 1/8 | 1-1/2 | 809908 | 63.60 | 809908-C3 | 69.50 |
| .125 (1/8) | .107 | .059 | **.250** | 16 | 13 | 1/8 | 1-1/2 | 980608 | 65.70 | 980608-C3 | 71.60 |
| .125 (1/8) | .107 | .059 | **.375** | 16 | 13 | 1/8 | 1-1/2 | 890908 | 66.60 | 890908-C3 | 72.60 |
| .125 (1/8) | .107 | .059 | **.437** | 16 | 13 | 1/8 | 2 | 737108 | 67.40 | 737108-C3 | 73.30 |
| .125 (1/8) | .107 | .059 | **.500** | 16 | 13 | 1/8 | 2 | 926508 | 68.10 | 926508-C3 | 74.00 |
| .125 (1/8) | .107 | .059 | **.750** | 16 | 13 | 1/8 | 2 | 886108 | 71.30 | 886108-C3 | 77.20 |
| .125 (1/8) | .107 | .059 | **1.000** | 16 | 13 | 1/8 | 3 | 883308 | 75.50 | 883308-C3 | 81.40 |
| .156 (5/32) | .133 | .078 | **.250** | 16 | 13 | 3/16 | 2 | 980610 | 72.00 | 980610-C3 | 78.60 |
| .156 (5/32) | .133 | .078 | **.500** | 16 | 13 | 3/16 | 2 | 926510 | 77.50 | 926510-C3 | 84.20 |
| .187 (3/16) | .160 | .097 | **.125** | 16 | 13 | 3/16 | 2 | 899712 | 67.40 | 899712-C3 | 74.00 |
| .187 (3/16) | .160 | .097 | **.250** | 16 | 13 | 3/16 | 2 | 980612 | 71.30 | 980612-C3 | 77.90 |
| .187 (3/16) | .160 | .097 | **.375** | 16 | 13 | 3/16 | 2 | 890912 | 73.70 | 890912-C3 | 80.40 |
| .187 (3/16) | .160 | .097 | **.500** | 16 | 13 | 3/16 | 2 | 926512 | 77.50 | 926512-C3 | 84.20 |
| .187 (3/16) | .160 | .097 | **.625** | 16 | 13 | 3/16 | 2 | 732612 | 80.40 | 732612-C3 | 86.70 |
| .187 (3/16) | .160 | .097 | **.750** | 16 | 13 | 3/16 | 2 | 886112 | 83.70 | 886112-C3 | 90.30 |
| .187 (3/16) | .160 | .097 | **1.000** | 16 | 13 | 3/16 | 3 | 883312 | 88.00 | 883312-C3 | 94.70 |
| .250 (1/4) | .213 | .136 | **.125** | 16 | 13 | 1/4 | 2-1/2 | 899716 | 84.30 | 899716-C3 | 93.30 |
| .250 (1/4) | .213 | .136 | **.375** | 16 | 13 | 1/4 | 2-1/2 | 980616 | 85.30 | 980616-C3 | 94.20 |
| .250 (1/4) | .213 | .136 | **.500** | 16 | 13 | 1/4 | 2-1/2 | 890916 | 87.60 | 890916-C3 | 96.50 |
| .250 (1/4) | .213 | .136 | **.750** | 16 | 13 | 1/4 | 2-1/2 | 926516 | 91.70 | 926516-C3 | 100.50 |
| .250 (1/4) | .213 | .136 | **1.000** | 16 | 13 | 1/4 | 2-1/2 | 722216 | 93.10 | 722216-C3 | 101.20 |
| .250 (1/4) | .213 | .136 | **1.125** | 16 | 13 | 1/4 | 2-1/2 | 886116 | 94.70 | 886116-C3 | 103.60 |
| .375 (3/8) | .320 | .200 | **.375** | 16 | 13 | 3/8 | 2-1/2 | 980624 | 113.80 | 980624-C3 | 125.20 |
| .375 (3/8) | .320 | .200 | **.750** | 16 | 13 | 3/8 | 3 | 926524 | 120.40 | 926524-C3 | 131.80 |

# DRILL / END MILLS

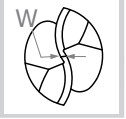
## Helical Tip – 2 Flute

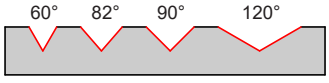



- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 2 flutes
- Specialized helically fluted tip design for superior performance, surface finish and chip evacuation
- Variable helix design on OD (approx. 35°) reduces chatter and harmonics and increases material removal rates
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials.
- $TiB_2$ coating for outstanding performance in non-ferrous materials due to its extremely low affinity to aluminum.
- h6 shank tolerance for high precision tool holders • Solid carbide • CNC ground in the USA

**HELICAL TIP**

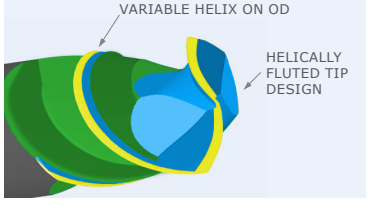
| Recommended For | |
|---|---|
| Chamfering | Yes |
| O.D. Milling | Yes |
| Drilling | No |
| Spotting | Light Duty |




Stocked in Four Included Angles!

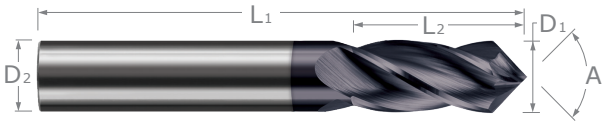
| INCLUDED ANGLE | CUTTER DIAMETER | LENGTH OF CUT | WEB THICKNESS | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|
| A +1° −1° | $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | W | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 60° | 1/32 | 3/32 | .003 | 1/8 | 1-1/2 | 872502-C6 | 61.30 | 872502-C8 | 58.50 |
| | 1/16 | 3/16 | .005 | 1/8 | 1-1/2 | 872504-C6 | 60.70 | 872504-C8 | 59.20 |
| | 1/8 | 1/2 | .008 | 1/8 | 1-1/2 | 872508-C6 | 60.70 | 872508-C8 | 61.30 |
| | 3/16 | 5/8 | .009 | 3/16 | 2 | 872512-C6 | 67.10 | 872512-C8 | 67.90 |
| | 1/4 | 3/4 | .009 | 1/4 | 2-1/2 | 872516-C6 | 85.50 | 872516-C8 | 86.30 |
| | 3/8 | 7/8 | .012 | 3/8 | 2-1/2 | 872524-C6 | 105.70 | 872524-C8 | 105.70 |
| | 1/2 | 1 | .012 | 1/2 | 3 | 872532-C6 | 136.40 | 872532-C8 | 136.40 |
| 82° | 1/8 | 1/2 | .008 | 1/8 | 1-1/2 | 738408-C6 | 64.00 | | |
| | 3/16 | 5/8 | .009 | 3/16 | 2 | 738412-C6 | 64.00 | | |
| | 1/4 | 3/4 | .009 | 1/4 | 2-1/2 | 738416-C6 | 64.00 | | |
| | 3/8 | 7/8 | .012 | 3/8 | 2-1/2 | 738424-C6 | 64.00 | | |
| 90° | 1/32 | 3/32 | .003 | 1/8 | 1-1/2 | 859602-C6 | 55.10 | 859602-C8 | 53.00 |
| | 3/64 | 9/64 | .004 | 1/8 | 1-1/2 | 859603-C6 | 55.10 | | |
| | 1/16 | 3/16 | .005 | 1/8 | 1-1/2 | 859604-C6 | 55.10 | 859604-C8 | 53.60 |
| | 5/64 | 1/4 | .006 | 1/8 | 1-1/2 | 859605-C6 | 57.80 | 859605-C8 | 56.20 |
| | 3/32 | 3/8 | .007 | 1/8 | 1-1/2 | 859606-C6 | 57.80 | 859606-C8 | 56.20 |
| | 1/8 | 1/2 | .008 | 1/8 | 1-1/2 | 859608-C6 | 60.70 | 859608-C8 | 60.70 |
| | 3/16 | 5/8 | .009 | 3/16 | 2 | 859612-C6 | 67.10 | 859612-C8 | 67.10 |
| | 1/4 | 3/4 | .009 | 1/4 | 2-1/2 | 859616-C6 | 85.50 | 859616-C8 | 85.50 |
| | 3/8 | 7/8 | .012 | 3/8 | 2-1/2 | 859624-C6 | 105.70 | 859624-C8 | 106.80 |
| | 1/2 | 1 | .012 | 1/2 | 3 | 859632-C6 | 135.30 | 859632-C8 | 136.40 |
| 120° | 1/8 | 1/2 | .008 | 1/8 | 1-1/2 | 847708-C6 | 61.30 | 847708-C8 | 61.30 |
| | 3/16 | 5/8 | .009 | 3/16 | 2 | 847712-C6 | 67.90 | 847712-C8 | 67.90 |
| | 1/4 | 3/4 | .009 | 1/4 | 2-1/2 | 847716-C6 | 85.50 | 847716-C8 | 86.30 |
| | 3/8 | 7/8 | .012 | 3/8 | 2-1/2 | 847724-C6 | 106.80 | 847724-C8 | 106.80 |
| | 1/2 | 1 | .012 | 1/2 | 3 | 847732-C6 | 136.40 | 847732-C8 | 136.40 |

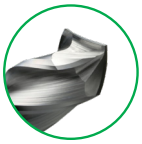


NEW SIZES!

# DRILL / END MILLS

## Helical Tip – 4 Flute



Specialized Helically Fluted Tip Design

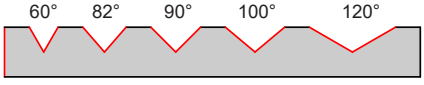


- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 4 flutes (two flutes to center, two flutes cut back)
- Specialized helically fluted tip design for superior performance, surface finish and chip evacuation
- Variable helix design on OD (approx. 35°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

**HELICAL TIP**

| Recommended For | |
|---|---|
| Chamfering | Yes |
| O.D. Milling | Yes |
| Drilling | No |
| Spotting | Light Duty |

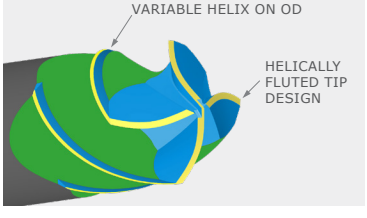



Stocked in Five Included Angles!

| INCLUDED ANGLE | CUTTER DIAMETER | LENGTH OF CUT | WEB THICKNESS | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| A +1° −1° | D1 +.000″ −.002″ | L2 +.030″ −.000″ | W | D2 (h6) | L1 | 4 FL | USD$ |
| 60° | 1/16 | 3/16 | .005 | 1/8 | 1-1/2 | 899204-C6 | 64.60 |
| | 3/32 | 3/8 | .007 | 1/8 | 1-1/2 | 899206-C6 | 64.60 |
| | 1/8 | 1/2 | .008 | 1/8 | 1-1/2 | 899208-C6 | 64.00 |
| | 3/16 | 5/8 | .009 | 3/16 | 2 | 899212-C6 | 70.80 |
| | 1/4 | 3/4 | .009 | 1/4 | 2-1/2 | 899216-C6 | 90.00 |
| | 5/16 | 13/16 | .010 | 5/16 | 2-1/2 | 899220-C6 | 100.30 |
| | 3/8 | 7/8 | .012 | 3/8 | 2-1/2 | 899224-C6 | 111.20 |
| | 1/2 | 1 | .012 | 1/2 | 3 | 899232-C6 | 142.20 |
| 82° | 1/8 | 1/2 | .008 | 1/8 | 1-1/2 | 788208-C6 | 64.00 |
| | 3/16 | 5/8 | .009 | 3/16 | 2 | 788212-C6 | 70.80 |
| | 1/4 | 3/4 | .009 | 1/4 | 2-1/2 | 788216-C6 | 90.00 |
| 90° | 1/32 | 3/32 | .003 | 1/8 | 1-1/2 | 881102-C6 | 58.40 |
| | .039 | 1/8 | .003 | 1/8 | 1-1/2 | 88111M-C6 | 59.00 |
| | 3/64 | 9/64 | .004 | 1/8 | 1-1/2 | 881103-C6 | 59.00 |
| | 1/16 | 3/16 | .005 | 1/8 | 1-1/2 | 881104-C6 | 58.40 |
| | 5/64 | 1/4 | .006 | 1/8 | 1-1/2 | 881105-C6 | 61.10 |
| | 3/32 | 3/8 | .007 | 1/8 | 1-1/2 | 881106-C6 | 61.10 |
| | .118 | 3/8 | .008 | 1/8 | 1-1/2 | 88113M-C6 | 64.00 |
| | 1/8 | 1/2 | .008 | 1/8 | 1-1/2 | 881108-C6 | 64.00 |
| | 9/64 | 9/16 | .009 | 3/16 | 2 | 881109-C6 | 71.50 |
| | 5/32 | 9/16 | .009 | 3/16 | 2 | 881110-C6 | 70.80 |
| | 3/16 | 5/8 | .009 | 3/16 | 2 | 881112-C6 | 70.80 |
| | 1/4 | 3/4 | .009 | 1/4 | 2-1/2 | 881116-C6 | 90.00 |
| | 5/16 | 13/16 | .010 | 5/16 | 2-1/2 | 881120-C6 | 99.10 |
| | 3/8 | 7/8 | .012 | 3/8 | 2-1/2 | 881124-C6 | 111.20 |
| | 1/2 | 1 | .012 | 1/2 | 3 | 881132-C6 | 142.20 |
| | 5/8 | 1-1/4 | .014 | 5/8 | 3-1/2 | 881140-C6 | 189.10 |
| | 3/4 | 1-1/2 | .015 | 3/4 | 4 | 881148-C6 | 236.40 |

continued on next page



# DRILL / END MILLS

## Helical Tip – 4 Flute (cont.)

continued from previous page

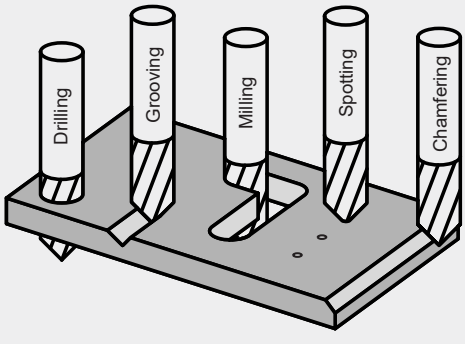
| | INCLUDED ANGLE | CUTTER DIAMETER | LENGTH OF CUT | WEB THICKNESS | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| | A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.030″}_{-.000″}$ | W | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| | 100° | 1/8 | 1/2 | .008 | 1/8 | 1-1/2 | 826208-C6 | 64.00 |
| | | 1/4 | 3/4 | .009 | 1/4 | 2-1/2 | 826216-C6 | 90.00 |
| | | 3/8 | 7/8 | .012 | 3/8 | 2-1/2 | 826224-C6 | 111.20 |
| | | 1/2 | 1 | .012 | 1/2 | 3 | 826232-C6 | 142.20 |
| NEW | 120° | 3/64 | 9/64 | .004 | 1/8 | 1-1/2 | 865403-C6 | 59.00 |
| NEW | | 1/16 | 3/16 | .005 | 1/8 | 1-1/2 | 865404-C6 | 58.40 |
| NEW | | 5/64 | 1/4 | .006 | 1/8 | 1-1/2 | 865405-C6 | 61.10 |
| NEW | | 3/32 | 3/8 | .007 | 1/8 | 1-1/2 | 865406-C6 | 61.10 |
| | | 1/8 | 1/2 | .008 | 1/8 | 1-1/2 | 865408-C6 | 64.00 |
| | | 3/16 | 5/8 | .009 | 3/16 | 2 | 865412-C6 | 70.80 |
| | | 1/4 | 3/4 | .009 | 1/4 | 2-1/2 | 865416-C6 | 90.00 |
| | | 3/8 | 7/8 | .012 | 3/8 | 2-1/2 | 865424-C6 | 111.20 |
| | | 1/2 | 1 | .012 | 1/2 | 3 | 865432-C6 | 142.20 |



## Drill / End Mills

Our extensive offering of Drill / End Mills are available in multiple point angles. They allow you to...

- Perform multiple operations with a single tool
- Free up space on your tool carousel
- Improve cycle time with fewer tool changes



# DRILL / END MILLS

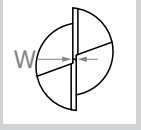
## Mill Style – 2 Flute



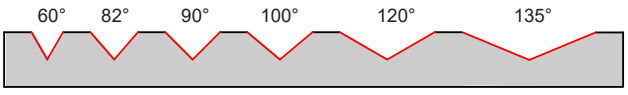

**MILL STYLE**

Flat relief with end mill style gash to thin web.

| Recommended For | Included Angle | |
|---|---|---|
| | 60° | 82°, 90°,100°, 120°, 135° |
| Chamfering | Yes | Yes |
| O.D. Milling | Yes | Yes |
| Drilling | No | Non-Ferrous Only |
| Spotting | No | Light Duty |




- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling steel
- 2 flutes • Solid carbide
- CNC ground in the USA




Stocked in Six Included Angles!

**Outstanding in Aluminum!**

| INCLUDED ANGLE | CUTTER DIAMETER | LENGTH OF CUT | WEB THICKNESS | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A +1° −1° | D1 +.000″ −.002″ | L2 +.030″ −.000″ | W | D2 | L1 | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| 60° | .020 | 1/16 | .0020 | 1/8 | 1-1/2 | 991767 | 37.50 | 991767-C3 | 43.40 | | |
| | 1/32 | 3/32 | .0030 | 1/8 | 1-1/2 | 991702 | 36.60 | 991702-C3 | 42.60 | | |
| | 3/64 | 9/64 | .0040 | 1/8 | 1-1/2 | 991703 | 37.50 | 991703-C3 | 43.40 | | |
| | 1/16 | 3/16 | .0050 | 1/8 | 1-1/2 | 991704 | 36.60 | 991704-C3 | 42.60 | | |
| | 5/64 | 1/4 | .0050 | 1/8 | 1-1/2 | 991705 | 37.50 | 991705-C3 | 43.40 | | |
| | 3/32 | 3/8 | .0050 | 1/8 | 1-1/2 | 991706 | 36.60 | 991706-C3 | 42.60 | | |
| | 1/8 | 1/2 | .0050 | 1/8 | 1-1/2 | 991708 | 36.60 | 991708-C3 | 42.60 | 991708-C8 | 45.50 |
| | 5/32 | 9/16 | .0060 | 3/16 | 2 | 991710 | 38.20 | 991710-C3 | 44.80 | | |
| | 3/16 | 5/8 | .0060 | 3/16 | 2 | 991712 | 38.20 | 991712-C3 | 44.80 | 991712-C8 | 46.80 |
| | 1/4 | 3/4 | .0060 | 1/4 | 2-1/2 | 991716 | 54.00 | 991716-C3 | 62.60 | 991716-C8 | 64.10 |
| | 5/16 | 13/16 | .0070 | 5/16 | 2-1/2 | 991720 | 56.80 | 991720-C3 | 67.10 | | |
| | 3/8 | 7/8 | .0080 | 3/8 | 2-1/2 | 991724 | 68.10 | 991724-C3 | 79.50 | 991724-C8 | 87.20 |
| | 1/2 | 1 | .0080 | 1/2 | 3 | 991732 | 107.80 | 991732-C3 | 125.10 | 991732-C8 | 126.20 |
| | 5/8 | 1-1/4 | .0090 | 5/8 | 3-1/2 | 991740 | 164.90 | 991740-C3 | 182.10 | | |
| | 3/4 | 1-1/2 | .0100 | 3/4 | 4 | 991748 | 250.10 | 991748-C3 | 271.80 | | |
| 82° | 1/16 | 3/16 | .0050 | 1/8 | 1-1/2 | 949404 | 40.20 | 949404-C3 | 46.10 | | |
| | 3/32 | 3/8 | .0050 | 1/8 | 1-1/2 | 949406 | 40.20 | 949406-C3 | 46.10 | | |
| | 1/8 | 1/2 | .0050 | 1/8 | 1-1/2 | 949408 | 40.20 | 949408-C3 | 46.10 | 949408-C8 | 47.90 |
| | 5/32 | 9/16 | .0060 | 3/16 | 2 | 949410 | 41.40 | 949410-C3 | 47.60 | | |
| | 3/16 | 5/8 | .0060 | 3/16 | 2 | 949412 | 41.40 | 949412-C3 | 48.00 | | |
| | 1/4 | 3/4 | .0060 | 1/4 | 2-1/2 | 949416 | 58.90 | 949416-C3 | 67.70 | 949416-C8 | 70.00 |
| | 5/16 | 13/16 | .0070 | 5/16 | 2-1/2 | 949420 | 62.00 | 949420-C3 | 72.40 | | |
| | 3/8 | 7/8 | .0080 | 3/8 | 2-1/2 | 949424 | 74.10 | 949424-C3 | 85.50 | | |
| | 1/2 | 1 | .0080 | 1/2 | 3 | 949432 | 118.30 | 949432-C3 | 135.90 | | |
| 90° | 1/64 | 3/64 | .0015 | 1/8 | 1-1/2 | 15301-2 | 36.60 | 72201-C3 | 42.60 | | |
| | .020 | 1/16 | .0020 | 1/8 | 1-1/2 | 15367-2 | 36.60 | 72220-C3 | 42.60 | | |
| | 1/32 | 3/32 | .0030 | 1/8 | 1-1/2 | 15302-2 | 36.60 | 72231-C3 | 42.60 | 72231-C8 | 44.30 |
| | 1 mm | 1/8 | .0030 | 1/8 | 1-1/2 | 1531M-2 | 36.60 | 72239-C3 | 42.60 | | |
| | .040 | 1/8 | .0030 | 1/8 | 1-1/2 | 15371-2 | 36.60 | 72240-C3 | 42.60 | | |
| | 3/64 | 9/64 | .0030 | 1/8 | 1-1/2 | 15303-2 | 36.60 | 72247-C3 | 42.60 | | |
| | 1/16 | 3/16 | .0050 | 1/8 | 1-1/2 | 15304-2 | 34.00 | 72262-C3 | 40.00 | 72262-C8 | 42.70 |

continued on next page

# DRILL / END MILLS

## Mill Style – 2 Flute (cont.)

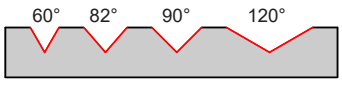
continued from previous page

| INCLUDED ANGLE | CUTTER DIAMETER | LENGTH OF CUT | WEB THICKNESS | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.030″}_{-.000″}$ | W | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| 90° | 5/64 | 1/4 | .0050 | 1/8 | 1-1/2 | 15305-2 | 34.00 | 72278-C3 | 40.00 | 72278-C8 | 41.70 |
| | 3/32 | 3/8 | .0050 | 1/8 | 1-1/2 | 15306-2 | 34.00 | 72293-C3 | 40.00 | 72293-C8 | 42.70 |
| | 7/64 | 3/8 | .0050 | 1/8 | 1-1/2 | 15307-2 | 36.60 | 72302-C3 | 42.60 | | |
| | 3 mm | 3/8 | .0050 | 1/8 | 1-1/2 | 1533M-2 | 36.60 | 72305-C3 | 42.60 | | |
| | 1/8 | 1/2 | .0050 | 1/8 | 1-1/2 | 15308-2 | 34.00 | 72308-C3 | 40.00 | 72308-C8 | 42.70 |
| | 9/64 | 9/16 | .0060 | 3/16 | 2 | 15309-2 | 38.20 | 72309-C3 | 44.40 | | |
| | 5/32 | 9/16 | .0060 | 3/16 | 2 | 15310-2 | 38.20 | 72310-C3 | 44.80 | | |
| | 3/16 | 5/8 | .0060 | 3/16 | 2 | 15312-2 | 35.30 | 72312-C3 | 41.80 | 72312-C8 | 43.90 |
| | 1/4 | 3/4 | .0060 | 1/4 | 2-1/2 | 15316-2 | 50.10 | 72316-C3 | 58.70 | 72316-C8 | 60.70 |
| | 5/16 | 13/16 | .0070 | 5/16 | 2-1/2 | 15320-2 | 52.40 | 72320-C3 | 62.50 | 72320-C8 | 65.70 |
| | 3/8 | 7/8 | .0080 | 3/8 | 2-1/2 | 15324-2 | 62.80 | 72324-C3 | 74.20 | 72324-C8 | 82.80 |
| | 1/2 | 1 | .0080 | 1/2 | 3 | 15332-2 | 99.90 | 72332-C3 | 116.80 | 72332-C8 | 122.10 |
| | 5/8 | 1-1/4 | .0090 | 5/8 | 3-1/2 | 15340-2 | 152.40 | 72340-C3 | 171.70 | | |
| | 3/4 | 1-1/2 | .0100 | 3/4 | 4 | 15348-2 | 231.40 | 72348-C3 | 249.80 | | |
| 100° | 1/16 | 3/16 | .0050 | 1/8 | 1-1/2 | 928562 | 38.10 | 928562-C3 | 44.00 | | |
| | 3/32 | 3/8 | .0050 | 1/8 | 1-1/2 | 928593 | 38.10 | 928593-C3 | 44.00 | | |
| | 1/8 | 1/2 | .0050 | 1/8 | 1-1/2 | 928508 | 40.20 | 928508-C3 | 46.10 | 928508-C8 | 47.90 |
| | 3/16 | 5/8 | .0060 | 3/16 | 2 | 928512 | 41.40 | 928512-C3 | 48.00 | | |
| | 1/4 | 3/4 | .0060 | 1/4 | 2-1/2 | 928516 | 58.90 | 928516-C3 | 67.70 | 928516-C8 | 69.00 |
| | 5/16 | 13/16 | .0070 | 5/16 | 2-1/2 | 928520 | 62.00 | 928520-C3 | 72.40 | | |
| | 3/8 | 7/8 | .0080 | 3/8 | 2-1/2 | 928524 | 74.70 | 928524-C3 | 86.20 | | |
| | 1/2 | 1 | .0080 | 1/2 | 3 | 928532 | 118.30 | 928532-C3 | 135.90 | | |
| 120° | 1/16 | 3/16 | .0050 | 1/8 | 1-1/2 | 985504 | 39.80 | 985504-C3 | 45.70 | | |
| | 3/32 | 3/8 | .0050 | 1/8 | 1-1/2 | 985506 | 39.10 | 985506-C3 | 45.00 | | |
| | 1/8 | 1/2 | .0050 | 1/8 | 1-1/2 | 985508 | 39.10 | 985508-C3 | 45.00 | 985508-C8 | 46.80 |
| | 5/32 | 9/16 | .0060 | 3/16 | 2 | 985510 | 41.00 | 985510-C3 | 47.50 | | |
| | 3/16 | 5/8 | .0060 | 3/16 | 2 | 985512 | 40.30 | 985512-C3 | 46.80 | | |
| | 1/4 | 3/4 | .0060 | 1/4 | 2-1/2 | 985516 | 56.60 | 985516-C3 | 65.30 | 985516-C8 | 67.70 |
| | 5/16 | 13/16 | .0070 | 5/16 | 2-1/2 | 985520 | 59.00 | 985520-C3 | 69.30 | | |
| | 3/8 | 7/8 | .0080 | 3/8 | 2-1/2 | 985524 | 70.20 | 985524-C3 | 81.60 | 985524-C8 | 89.30 |
| | 1/2 | 1 | .0080 | 1/2 | 3 | 985532 | 109.80 | 985532-C3 | 127.10 | | |
| 135° | 1/8 | 1/2 | .0050 | 1/8 | 1-1/2 | 756408 | 40.20 | 756408-C3 | 46.10 | | |
| | 3/16 | 5/8 | .0060 | 3/16 | 2 | 756412 | 41.40 | 756412-C3 | 47.60 | | |
| | 1/4 | 3/4 | .0060 | 1/4 | 2-1/2 | 756416 | 58.90 | 756416-C3 | 67.00 | | |
| | 3/8 | 7/8 | .0080 | 3/8 | 2-1/2 | 756424 | 74.70 | 756424-C3 | 86.20 | | |
| | 1/2 | 1 | .0080 | 1/2 | 3 | 756432 | 118.30 | 756432-C3 | 133.90 | | |

# DRILL / END MILLS

## Mill Style – 3 Flute




Stocked in Four Included Angles!



- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 3 flutes to center
- Solid carbide
- CNC ground in the USA

**MILL STYLE**

Flat relief with end mill style and 3 flutes to center.

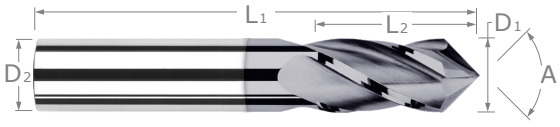
| Recommended For | Included Angle |
|---|---|
| | 60°, 82°, 90°, 120° |
| Chamfering | Yes |
| O.D. Milling | Yes |
| Drilling | No |
| Spotting | Light Duty |



| INCLUDED ANGLE | CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.030″}_{-.000″}$ | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| 60° | 1/8 | 1/2 | 1/8 | 1-1/2 | 784808 | 34.00 | 784808-C3 | 40.00 |
| | 3/16 | 5/8 | 3/16 | 2 | 784812 | 35.30 | 784812-C3 | 41.50 |
| | 1/4 | 3/4 | 1/4 | 2-1/2 | 784816 | 50.10 | 784816-C3 | 58.70 |
| | 3/8 | 7/8 | 3/8 | 2-1/2 | 784824 | 63.30 | 784824-C3 | 74.70 |
| | 1/2 | 1 | 1/2 | 3 | 784832 | 95.80 | 784832-C3 | 111.40 |
| 82° | 1/8 | 1/2 | 1/8 | 1-1/2 | 725508 | 34.00 | 725508-C3 | 40.00 |
| | 1/4 | 3/4 | 1/4 | 2-1/2 | 725516 | 50.10 | 725516-C3 | 58.20 |
| | 3/8 | 7/8 | 3/8 | 2-1/2 | 725524 | 62.80 | 725524-C3 | 74.20 |
| | 1/2 | 1 | 1/2 | 3 | 725532 | 95.80 | 725532-C3 | 111.40 |
| 90° | 1/16 | 3/16 | 1/8 | 1-1/2 | 823762 | 35.10 | 823762-C3 | 41.00 |
| | 3/32 | 3/8 | 1/8 | 1-1/2 | 823793 | 34.00 | 823793-C3 | 40.00 |
| | 1/8 | 1/2 | 1/8 | 1-1/2 | 823808 | 34.00 | 823808-C3 | 40.50 |
| | 5/32 | 9/16 | 3/16 | 2 | 823810 | 35.70 | 823810-C3 | 42.10 |
| | 3/16 | 5/8 | 3/16 | 2 | 823812 | 35.30 | 823812-C3 | 41.80 |
| | 1/4 | 3/4 | 1/4 | 2-1/2 | 823816 | 50.10 | 823816-C3 | 57.60 |
| | 5/16 | 13/16 | 5/16 | 2-1/2 | 823820 | 58.30 | 823820-C3 | 68.00 |
| | 3/8 | 7/8 | 3/8 | 2-1/2 | 823824 | 62.80 | 823824-C3 | 74.20 |
| | 1/2 | 1 | 1/2 | 3 | 823832 | 95.80 | 823832-C3 | 112.90 |
| 120° | 1/8 | 1/2 | 1/8 | 1-1/2 | 784508 | 34.00 | 784508-C3 | 40.00 |
| | 1/4 | 3/4 | 1/4 | 2-1/2 | 784516 | 50.10 | 784516-C3 | 58.70 |
| | 3/8 | 7/8 | 3/8 | 2-1/2 | 784524 | 64.70 | 784524-C3 | 76.10 |

# DRILL / END MILLS

## Mill Style – 4 Flute



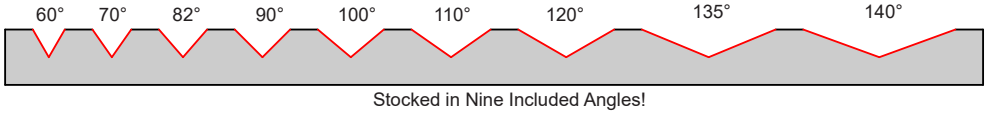

- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling steel
- 4 flutes (two flutes to center, two flutes cut back)
- Solid carbide • CNC ground in the USA

**MILL STYLE**

Flat relief with end mill style gash to thin web.

| Recommended For | Included Angle | |
|---|---|---|
| | 60°, 70° | 82°, 90°, 100°, 110°, 120°, 135°, 140° |
| Chamfering | Yes | Yes |
| O.D. Milling | Yes | Yes |
| Drilling | No | Non-Ferrous Only |
| Spotting | No | Light Duty |




Stocked in Nine Included Angles!

| INCLUDED ANGLE | CUTTER DIAMETER | LENGTH OF CUT | WEB THICKNESS | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | TiN COATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A +1° −1° | D1 +.000″ −.002″ | L2 +.030″ −.000″ | W | D2 | L1 | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
| 60° | 1/32 | 3/32 | .003 | 1/8 | 1-1/2 | 15402 | 36.60 | | | 15402-C3 | 42.60 |
| | 3/64 | 9/64 | .004 | 1/8 | 1-1/2 | 15403 | 36.60 | | | 15403-C3 | 42.60 |
| | 1/16 | 3/16 | .005 | 1/8 | 1-1/2 | 15404 | 36.60 | | | 15404-C3 | 42.60 |
| | 5/64 | 1/4 | .005 | 1/8 | 1-1/2 | 15405 | 36.60 | | | 15405-C3 | 42.60 |
| | 3/32 | 3/8 | .005 | 1/8 | 1-1/2 | 15406 | 36.60 | | | 15406-C3 | 42.60 |
| | 7/64 | 3/8 | .005 | 1/8 | 1-1/2 | 15407 | 38.80 | | | 15407-C3 | 44.70 |
| | 3 mm | 3/8 | .005 | 1/8 | 1-1/2 | 1543M | 39.80 | | | 1543M-C3 | 45.70 |
| | 1/8 | 1/2 | .005 | 1/8 | 1-1/2 | 15408 | 36.60 | | | 15408-C3 | 42.60 |
| | 9/64 | 9/16 | .006 | 3/16 | 2 | 15409 | 38.20 | | | 15409-C3 | 44.80 |
| | 5/32 | 9/16 | .006 | 3/16 | 2 | 15410 | 38.20 | | | 15410-C3 | 44.80 |
| | 3/16 | 5/8 | .006 | 3/16 | 2 | 15412 | 38.20 | | | 15412-C3 | 44.80 |
| | 1/4 | 3/4 | .006 | 1/4 | 2-1/2 | 15416 | 54.00 | | | 15416-C3 | 62.60 |
| | 5/16 | 13/16 | .007 | 5/16 | 2-1/2 | 15420 | 56.80 | | | 15420-C3 | 67.10 |
| | 3/8 | 7/8 | .008 | 3/8 | 2-1/2 | 15424 | 68.10 | | | 15424-C3 | 79.50 |
| | 7/16 | 1 | .008 | 7/16 | 2-3/4 | 15428 | 107.40 | | | 15428-C3 | 120.70 |
| | 1/2 | 1 | .008 | 1/2 | 3 | 15432 | 107.80 | | | 15432-C3 | 125.10 |
| | 5/8 | 1-1/4 | .009 | 5/8 | 3-1/2 | 15440 | 164.90 | | | 15440-C3 | 182.10 |
| | 3/4 | 1-1/2 | .010 | 3/4 | 4 | 15448 | 250.10 | | | 15448-C3 | 271.80 |
| | 1 | 2 | .010 | 1 | 4 | 15464 | 376.70 | | | 15464-C3 | 405.10 |
| 70° | 1/8 | 1/2 | .005 | 1/8 | 1-1/2 | 824608 | 42.40 | | | 824608-C3 | 48.30 |
| | 1/4 | 3/4 | .006 | 1/4 | 2-1/2 | 824616 | 61.20 | | | 824616-C3 | 70.10 |
| | 3/8 | 7/8 | .008 | 3/8 | 2-1/2 | 824624 | 76.50 | | | 824624-C3 | 87.90 |
| | 1/2 | 1 | .008 | 1/2 | 3 | 824632 | 120.70 | | | 824632-C3 | 136.30 |

continued on next page

# DRILL / END MILLS

## Mill Style – 4 Flute (cont.)

continued from previous page

| INCLUDED ANGLE | CUTTER DIAMETER | LENGTH OF CUT | WEB THICKNESS | SHANK DIAMETER | OVERALL LENGTH | | UNCOATED | | TiN COATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A +1° −1° | $D_1$ +.000″ −.002″ | $L_2$ +.030″ −.000″ | W | $D_2$ | $L_1$ | | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
| | 1/32 | 3/32 | .003 | 1/8 | 1-1/2 | | 26502 | 42.80 | | | 26502-C3 | 48.70 |
| | 1/16 | 3/16 | .005 | 1/8 | 1-1/2 | | 26504 | 42.40 | | | 26504-C3 | 48.30 |
| | 5/64 | 1/4 | .005 | 1/8 | 1-1/2 | | 26505 | 42.80 | | | 26505-C3 | 48.70 |
| | 3/32 | 3/8 | .005 | 1/8 | 1-1/2 | | 26506 | 42.40 | | | 26506-C3 | 48.30 |
| | 1/8 | 1/2 | .005 | 1/8 | 1-1/2 | | 26508 | 42.40 | | | 26508-C3 | 48.30 |
| | 5/32 | 9/16 | .006 | 3/16 | 2 | | 26510 | 43.90 | | | 26510-C3 | 50.10 |
| 82° | 3/16 | 5/8 | .006 | 3/16 | 2 | | 26512 | 43.90 | | | 26512-C3 | 50.50 |
| | 1/4 | 3/4 | .006 | 1/4 | 2-1/2 | | 26516 | 61.20 | | | 26516-C3 | 70.10 |
| | 5/16 | 13/16 | .007 | 5/16 | 2-1/2 | | 26520 | 63.90 | | | 26520-C3 | 74.40 |
| | 3/8 | 7/8 | .008 | 3/8 | 2-1/2 | | 26524 | 76.50 | | | 26524-C3 | 87.90 |
| | 1/2 | 1 | .008 | 1/2 | 3 | | 26532 | 119.60 | | | 26532-C3 | 137.20 |
| | 5/8 | 1-1/4 | .009 | 5/8 | 3-1/2 | | 26540 | 182.70 | | | 26540-C3 | 200.40 |
| | 3/4 | 1-1/2 | .010 | 3/4 | 4 | | 26548 | 276.40 | | | 26548-C3 | 297.30 |
| | 1/64 | 3/64 | .0015 | 1/8 | 1-1/2 | | 15301 | 36.60 | | | 15301-C3 | 42.60 |
| | .020 | 1/16 | .002 | 1/8 | 1-1/2 | | 15367 | 36.60 | | | 15367-C3 | 42.60 |
| | 1/32 | 3/32 | .003 | 1/8 | 1-1/2 | | 15302 | 36.60 | | | 15302-C3 | 42.60 |
| | 1 mm | 1/8 | .003 | 1/8 | 1-1/2 | | 1531M | 39.80 | | | 1531M-C3 | 45.70 |
| | 3/64 | 9/64 | .004 | 1/8 | 1-1/2 | | 15303 | 36.60 | | | 15303-C3 | 42.60 |
| | 1/16 | 3/16 | .005 | 1/8 | 1-1/2 | | 15304 | 34.00 | 15304-C1 | 38.00 | 15304-C3 | 40.00 |
| | 1/16 | 5/16 | .005 | 1/8 | 2-1/2 | | 823904 | 37.90 | | | 823904-C3 | 43.80 |
| | 5/64 | 1/4 | .005 | 1/8 | 1-1/2 | | 15305 | 34.00 | 15305-C1 | 38.00 | 15305-C3 | 40.00 |
| | 3/32 | 3/8 | .005 | 1/8 | 1-1/2 | | 15306 | 34.00 | 15306-C1 | 38.00 | 15306-C3 | 40.00 |
| | 3/32 | 1/2 | .005 | 1/8 | 2-1/2 | | 823993 | 37.90 | | | 823993-C3 | 43.80 |
| | 7/64 | 3/8 | .005 | 1/8 | 1-1/2 | | 15307 | 36.60 | | | 15307-C3 | 42.60 |
| | 3 mm | 3/8 | .005 | 1/8 | 1-1/2 | | 1533M | 36.60 | | | 1533M-C3 | 42.60 |
| | 1/8 | 1/2 | .005 | 1/8 | 1-1/2 | | 15308 | 34.00 | 15308-C1 | 38.00 | 15308-C3 | 40.00 |
| | 1/8 | 1/2 | .005 | 1/8 | 3 | LONG | 824208 | 39.20 | | | 824208-C3 | 45.40 |
| | 1/8 | 5/8 | .005 | 1/8 | 2-1/2 | | 824008 | 37.90 | | | 824008-C3 | 43.80 |
| | 9/64 | 9/16 | .006 | 3/16 | 2 | | 15309 | 38.20 | | | 15309-C3 | 44.80 |
| | 5/32 | 9/16 | .006 | 3/16 | 2 | | 15310 | 38.20 | | | 15310-C3 | 44.80 |
| | 11/64 | 5/8 | .006 | 3/16 | 2 | | 15311 | 38.20 | | | 15311-C3 | 44.80 |
| 90° | 3/16 | 5/8 | .006 | 3/16 | 2 | | 15312 | 35.30 | 15312-C1 | 39.80 | 15312-C3 | 41.80 |
| | 3/16 | 1 | .006 | 3/16 | 3 | | 824012 | 39.80 | | | 824012-C3 | 46.20 |
| | 13/64 | 3/4 | .006 | 1/4 | 2-1/2 | | 15313 | 56.40 | | | 15313-C3 | 65.10 |
| | 7/32 | 3/4 | .006 | 1/4 | 2-1/2 | | 15314 | 57.30 | | | 15314-C3 | 66.20 |
| | 6 mm | 3/4 | .006 | 1/4 | 2-1/2 | | 1536M | 57.00 | | | 1536M-C3 | 65.80 |
| | 1/4 | 3/4 | .006 | 1/4 | 2-1/2 | | 15316 | 50.10 | 15316-C1 | 54.80 | 15316-C3 | 58.70 |
| | 1/4 | 3/4 | .006 | 1/4 | 4 | | 824216 | 56.60 | | | 824216-C3 | 63.70 |
| | 1/4 | 1-1/4 | .006 | 1/4 | 4 | | 824016 | 59.30 | | | 824016-C3 | 69.60 |
| | 5/16 | 13/16 | .007 | 5/16 | 2-1/2 | | 15320 | 52.40 | 15320-C1 | 59.30 | 15320-C3 | 62.50 |
| | 3/8 | 7/8 | .008 | 3/8 | 2-1/2 | | 15324 | 62.80 | 15324-C1 | 69.70 | 15324-C3 | 74.20 |
| | 3/8 | 2 | .008 | 3/8 | 4 | | 824024 | 68.30 | | | 824024-C3 | 84.00 |
| | 7/16 | 1 | .008 | 7/16 | 2-3/4 | | 15328 | 105.40 | | | 15328-C3 | 119.70 |
| | 1/2 | 1 | .008 | 1/2 | 3 | | 15332 | 99.90 | 15332-C1 | 109.80 | 15332-C3 | 116.80 |
| | 1/2 | 1 | .008 | 1/2 | 6 | LONG | 824032 | 126.60 | | | 824032-C3 | 145.50 |
| | 1/2 | 2-5/8 | .008 | 1/2 | 4 | | 739332 | 112.30 | | | 739332-C3 | 128.90 |
| | 5/8 | 1-1/4 | .009 | 5/8 | 3-1/2 | | 15340 | 154.00 | 15340-C1 | 164.10 | 15340-C3 | 171.00 |
| | 3/4 | 1-1/2 | .010 | 3/4 | 4 | | 15348 | 233.70 | 15348-C1 | 245.10 | 15348-C3 | 252.00 |
| | 7/8 | 2 | .010 | 7/8 | 4 | | 15356 | 384.10 | | | 15356-C3 | 411.80 |
| | 1 | 2 | .010 | 1 | 4 | | 15364 | 376.70 | | | 15364-C3 | 405.10 |

continued on next page

# DRILL / END MILLS

## Mill Style – 4 Flute (cont.)

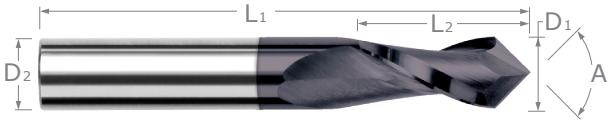
continued from previous page

| INCLUDED ANGLE | CUTTER DIAMETER | LENGTH OF CUT | WEB THICKNESS | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | TiN COATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.030″}_{-.000″}$ | W | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
| 100° | 1/32 | 3/32 | .003 | 1/8 | 1-1/2 | 27402 | 42.80 | | | 27402-C3 | 48.70 |
| | 1/16 | 3/16 | .005 | 1/8 | 1-1/2 | 27404 | 42.40 | | | 27404-C3 | 48.30 |
| | 5/64 | 1/4 | .005 | 1/8 | 1-1/2 | 27405 | 42.80 | | | 27405-C3 | 48.70 |
| | 3/32 | 3/8 | .005 | 1/8 | 1-1/2 | 27406 | 42.40 | | | 27406-C3 | 48.30 |
| | 1/8 | 1/2 | .005 | 1/8 | 1-1/2 | 27408 | 42.40 | | | 27408-C3 | 48.30 |
| | 5/32 | 9/16 | .006 | 3/16 | 2 | 27410 | 43.90 | | | 27410-C3 | 50.50 |
| | 3/16 | 5/8 | .006 | 3/16 | 2 | 27412 | 43.90 | | | 27412-C3 | 50.50 |
| | 1/4 | 3/4 | .006 | 1/4 | 2-1/2 | 27416 | 61.20 | | | 27416-C3 | 70.10 |
| | 5/16 | 13/16 | .007 | 5/16 | 2-1/2 | 27420 | 63.90 | | | 27420-C3 | 74.40 |
| | 3/8 | 7/8 | .008 | 3/8 | 2-1/2 | 27424 | 76.50 | | | 27424-C3 | 87.90 |
| | 1/2 | 1 | .008 | 1/2 | 3 | 27432 | 119.60 | | | 27432-C3 | 137.20 |
| | 5/8 | 1-1/4 | .009 | 5/8 | 3-1/2 | 27440 | 182.70 | | | 27440-C3 | 200.40 |
| | 3/4 | 1-1/2 | .010 | 3/4 | 4 | 27448 | 276.40 | | | 27448-C3 | 297.30 |
| 110° | 1/8 | 1/2 | .005 | 1/8 | 1-1/2 | 824408 | 42.40 | | | 824408-C3 | 48.30 |
| | 1/4 | 3/4 | .006 | 1/4 | 2-1/2 | 824416 | 61.20 | | | 824416-C3 | 70.10 |
| | 3/8 | 7/8 | .008 | 3/8 | 2-1/2 | 824424 | 76.50 | | | 824424-C3 | 87.90 |
| | 1/2 | 1 | .008 | 1/2 | 3 | 824432 | 119.60 | | | 824432-C3 | 137.20 |
| 120° | 1/32 | 3/32 | .003 | 1/8 | 1-1/2 | 988102 | 39.10 | | | 988102-C3 | 45.00 |
| | 1/16 | 3/16 | .005 | 1/8 | 1-1/2 | 988104 | 39.10 | | | 988104-C3 | 45.00 |
| | 3/32 | 3/8 | .005 | 1/8 | 1-1/2 | 988106 | 39.10 | | | 988106-C3 | 45.00 |
| | 7/64 | 3/8 | .005 | 1/8 | 1-1/2 | 988107 | 38.20 | | | 988107-C3 | 44.10 |
| | 3 mm | 3/8 | .005 | 1/8 | 1-1/2 | 98813M | 39.80 | | | 98813M-C3 | 45.70 |
| | 1/8 | 1/2 | .005 | 1/8 | 1-1/2 | 988108 | 39.10 | | | 988108-C3 | 45.00 |
| | 9/64 | 9/16 | .006 | 3/16 | 2 | 988109 | 41.00 | | | 988109-C3 | 47.20 |
| | 5/32 | 9/16 | .006 | 3/16 | 2 | 988110 | 40.30 | | | 988110-C3 | 46.80 |
| | 3/16 | 5/8 | .006 | 3/16 | 2 | 988112 | 40.30 | | | 988112-C3 | 46.80 |
| | 1/4 | 3/4 | .006 | 1/4 | 2-1/2 | 988116 | 56.60 | | | 988116-C3 | 65.30 |
| | 5/16 | 13/16 | .007 | 5/16 | 2-1/2 | 988120 | 59.00 | | | 988120-C3 | 69.30 |
| | 3/8 | 7/8 | .008 | 3/8 | 2-1/2 | 988124 | 70.20 | | | 988124-C3 | 81.60 |
| | 1/2 | 1 | .008 | 1/2 | 3 | 988132 | 109.80 | | | 988132-C3 | 127.10 |
| | 5/8 | 1-1/4 | .009 | 5/8 | 3-1/2 | 988140 | 166.60 | | | 988140-C3 | 183.90 |
| | 3/4 | 1-1/2 | .010 | 3/4 | 4 | 988148 | 251.90 | | | 988148-C3 | 273.60 |
| | 1 | 2 | .010 | 1 | 4 | 988164 | 378.70 | | | 988164-C3 | 406.90 |
| 135° | 1/8 | 1/2 | .005 | 1/8 | 1-1/2 | 870208 | 42.40 | | | 870208-C3 | 48.30 |
| | 3/16 | 5/8 | .006 | 3/16 | 2 | 870212 | 43.90 | | | 870212-C3 | 50.50 |
| | 1/4 | 3/4 | .006 | 1/4 | 2-1/2 | 870216 | 61.20 | | | 870216-C3 | 70.10 |
| | 3/8 | 7/8 | .008 | 3/8 | 2-1/2 | 870224 | 77.20 | | | 870224-C3 | 88.60 |
| | 1/2 | 1 | .008 | 1/2 | 3 | 870232 | 120.70 | | | 870232-C3 | 138.30 |
| 140° | 1/8 | 1/2 | .005 | 1/8 | 1-1/2 | 817208 | 42.40 | | | 817208-C3 | 48.30 |
| | 1/4 | 3/4 | .006 | 1/4 | 2-1/2 | 817216 | 61.20 | | | 817216-C3 | 70.10 |

NEW SIZES!

# DRILL / END MILLS

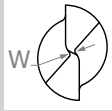
## Drill Style – 2 Flute



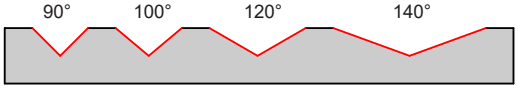

**DRILL STYLE**

Cammed relief with split point with "S" style gash to thin web.

| Recommended For | |
|---|---|
| Chamfering | Light Duty |
| O.D. Milling | Yes |
| Drilling | Yes |
| Spotting | Yes |




- Designed for drilling and milling applications
- 2 flutes
- Solid carbide
- CNC ground in the USA




Stocked in Four Included Angles!

| INCLUDED ANGLE | CUTTER DIAMETER | WIRE SIZE | LENGTH OF CUT | WEB THICKNESS | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A +1° −1° | $D_1$ +.000″ −.002″ | | $L_2$ +.030″ −.000″ | W | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ | |
| 90° | .020 | 76 | 1/16 | .002 | 1/8 | 1-1/2 | 46567 | 39.80 | 46567-C3 | 45.70 | | | NEW |
| | .025 | 74 | 5/64 | .002 | 1/8 | 1-1/2 | 46568 | 39.80 | 46568-C3 | 45.70 | | | NEW |
| | 1/32 | | 3/32 | .003 | 1/8 | 1-1/2 | 46502 | 39.80 | 46502-C3 | 45.70 | | | |
| | 1 mm | | 1/8 | .003 | 1/8 | 1-1/2 | 4651M | 42.80 | 4651M-C3 | 48.70 | | | |
| | .040 | 60 | 1/8 | .003 | 1/8 | 1-1/2 | 46571 | 39.80 | 46571-C3 | 45.70 | | | NEW |
| | 3/64 | | 9/64 | .004 | 1/8 | 1-1/2 | 46503 | 39.80 | 46503-C3 | 45.70 | 46503-C8 | 48.60 | |
| | .055 | 54 | 5/32 | .004 | 1/8 | 1-1/2 | 46574 | 39.80 | 46574-C3 | 45.70 | | | NEW |
| | 1/16 | | 3/16 | .005 | 1/8 | 1-1/2 | 46504 | 39.80 | 46504-C3 | 45.70 | | | |
| | .070 | 50 | 7/32 | .005 | 1/8 | 1-1/2 | 46577 | 39.80 | 46577-C3 | 45.70 | | | NEW |
| | 5/64 | | 1/4 | .005 | 1/8 | 1-1/2 | 46505 | 39.80 | 46505-C3 | 45.70 | | | |
| | 3/32 | | 3/8 | .005 | 1/8 | 1-1/2 | 46506 | 39.80 | 46506-C3 | 45.70 | | | |
| | 7/64 | | 3/8 | .005 | 1/8 | 1-1/2 | 46507 | 39.80 | 46507-C3 | 45.70 | | | |
| | 3 mm | | 3/8 | .005 | 1/8 | 1-1/2 | 4653M | 42.80 | 4653M-C3 | 48.70 | | | |
| | 1/8 | | 1/2 | .005 | 1/8 | 1-1/2 | 46508 | 39.80 | 46508-C3 | 45.70 | 46508-C8 | 48.60 | |
| | 9/64 | | 9/16a | .006 | 3/16 | 2 | 46509 | 40.30 | 46509-C3 | 46.80 | | | |
| | 5/32 | | 9/16 | .006 | 3/16 | 2 | 46510 | 40.30 | 46510-C3 | 46.80 | | | |
| | 3/16 | | 5/8 | .006 | 3/16 | 2 | 46512 | 40.30 | 46512-C3 | 46.80 | | | |
| | 7/32 | | 3/4 | .006 | 1/4 | 2-1/2 | 46514 | 56.60 | 46514-C3 | 65.30 | | | |
| | 1/4 | | 3/4 | .006 | 1/4 | 2-1/2 | 46516 | 56.60 | 46516-C3 | 65.30 | 46516-C8 | 66.80 | |
| | 5/16 | | 13/16 | .007 | 5/16 | 2-1/2 | 46520 | 59.00 | 46520-C3 | 69.30 | | | |
| | 3/8 | | 7/8 | .008 | 3/8 | 2-1/2 | 46524 | 70.20 | 46524-C3 | 81.60 | | | |
| | 7/16 | | 1 | .008 | 7/16 | 2-3/4 | 46528 | 107.60 | 46528-C3 | 122.00 | | | |
| | 1/2 | | 1 | .008 | 1/2 | 3 | 46532 | 109.80 | 46532-C3 | 127.10 | | | |
| | 5/8 | | 1-1/4 | .010 | 5/8 | 3-1/2 | 46540 | 166.60 | 46540-C3 | 185.90 | | | |
| | 3/4 | | 1-1/2 | .012 | 3/4 | 4 | 46548 | 251.90 | 46548-C3 | 273.60 | | | |
| | 1 | | 2 | .015 | 1 | 4 | 46564 | 373.00 | 46564-C3 | 406.20 | | | |
| 100° | 1/8 | | 1/2 | .005 | 1/8 | 1-1/2 | 849108 | 42.80 | 849108-C3 | 48.70 | | | |
| | 3/16 | | 5/8 | .006 | 3/16 | 2 | 849112 | 43.90 | 849112-C3 | 50.50 | | | |
| | 1/4 | | 3/4 | .006 | 1/4 | 2-1/2 | 849116 | 61.20 | 849116-C3 | 70.10 | | | |
| | 3/8 | | 7/8 | .008 | 3/8 | 2-1/2 | 849124 | 77.20 | 849124-C3 | 88.60 | | | |

continued on next page

# DRILL / END MILLS

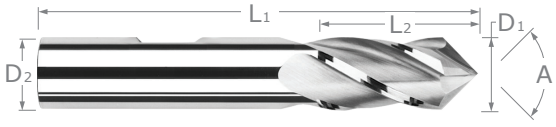
## Drill Style – 2 Flute (cont.)

continued from previous page

| | INCLUDED ANGLE | CUTTER DIAMETER | WIRE SIZE | LENGTH OF CUT | WEB THICKNESS | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | | $L_2$ $^{+.030″}_{-.000″}$ | W | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| NEW | | .020 | 76 | 1/16 | .002 | 1/8 | 1-1/2 | 12967 | 39.80 | 12967-C3 | 45.70 | | |
| NEW | | .025 | 74 | 5/64 | .002 | 1/8 | 1-1/2 | 12968 | 39.80 | 12968-C3 | 45.70 | | |
| | | 1/32 | | 3/32 | .003 | 1/8 | 1-1/2 | 12902 | 39.80 | 12902-C3 | 45.70 | | |
| | | 1 mm | | 1/8 | .003 | 1/8 | 1-1/2 | 1291M | 42.80 | 1291M-C3 | 48.70 | | |
| NEW | | .040 | 60 | 1/8 | .003 | 1/8 | 1-1/2 | 12971 | 39.80 | 12971-C3 | 45.70 | | |
| | | 3/64 | | 9/64 | .004 | 1/8 | 1-1/2 | 12903 | 39.80 | 12903-C3 | 45.70 | | |
| NEW | | .055 | 54 | 5/32 | .004 | 1/8 | 1-1/2 | 12974 | 39.80 | 12974-C3 | 45.70 | | |
| | | 1/16 | | 3/16 | .005 | 1/8 | 1-1/2 | 12904 | 36.70 | 12904-C3 | 42.70 | | |
| NEW | | .070 | 50 | 7/32 | .005 | 1/8 | 1-1/2 | 12977 | 36.70 | 12977-C3 | 42.70 | | |
| | | 5/64 | | 1/4 | .005 | 1/8 | 1-1/2 | 12905 | 36.70 | 12905-C3 | 42.70 | | |
| | | 3/32 | | 3/8 | .005 | 1/8 | 1-1/2 | 12906 | 36.70 | 12906-C3 | 42.70 | | |
| | | 3 mm | | 3/8 | .005 | 1/8 | 1-1/2 | 1293M | 42.80 | 1293M-C3 | 48.70 | | |
| | **120°** | 1/8 | | 1/2 | .005 | 1/8 | 1-1/2 | 12908 | 36.70 | 12908-C3 | 42.70 | 12908-C8 | 44.40 |
| | | 9/64 | | 9/16 | .006 | 3/16 | 2 | 12909 | 40.30 | 12909-C3 | 46.80 | | |
| | | 5/32 | | 9/16 | .006 | 3/16 | 2 | 12910 | 40.30 | 12910-C3 | 46.80 | | |
| | | 3/16 | | 5/8 | .006 | 3/16 | 2 | 12912 | 37.50 | 12912-C3 | 43.90 | | |
| | | 7/32 | | 3/4 | .006 | 1/4 | 2-1/2 | 12914 | 56.60 | 12914-C3 | 65.30 | | |
| | | 1/4 | | 3/4 | .006 | 1/4 | 2-1/2 | 12916 | 52.30 | 12916-C3 | 61.00 | 12916-C8 | 63.00 |
| | | 5/16 | | 13/16 | .007 | 5/16 | 2-1/2 | 12920 | 54.70 | 12920-C3 | 64.70 | | |
| | | 3/8 | | 7/8 | .008 | 3/8 | 2-1/2 | 12924 | 65.60 | 12924-C3 | 77.00 | 12924-C8 | 81.40 |
| | | 7/16 | | 1 | .008 | 7/16 | 2-3/4 | 12928 | 107.60 | 12928-C3 | 120.90 | | |
| | | 1/2 | | 1 | .008 | 1/2 | 3 | 12932 | 102.50 | 12932-C3 | 119.50 | | |
| | | 5/8 | | 1-1/4 | .010 | 5/8 | 3-1/2 | 12940 | 155.60 | 12940-C3 | 172.70 | | |
| | | 3/4 | | 1-1/2 | .012 | 3/4 | 4 | 12948 | 235.40 | 12948-C3 | 253.70 | | |
| | | 1 | | 2 | .015 | 1 | 4 | 12964 | 373.00 | 12964-C3 | 406.20 | | |
| | | 1/16 | | 3/16 | .005 | 1/8 | 1-1/2 | 950504 | 42.40 | 950504-C3 | 48.30 | | |
| | | 5/64 | | 1/4 | .005 | 1/8 | 1-1/2 | 950505 | 42.40 | 950505-C3 | 48.30 | | |
| | | 3/32 | | 3/8 | .005 | 1/8 | 1-1/2 | 950506 | 42.40 | 950506-C3 | 48.30 | | |
| | | 1/8 | | 1/2 | .005 | 1/8 | 1-1/2 | 950508 | 42.40 | 950508-C3 | 48.30 | | |
| | | 3/16 | | 5/8 | .006 | 3/16 | 2 | 950512 | 43.90 | 950512-C3 | 50.50 | | |
| | **140°** | 1/4 | | 3/4 | .006 | 1/4 | 2-1/2 | 950516 | 61.20 | 950516-C3 | 70.10 | | |
| | | 5/16 | | 13/16 | .007 | 5/16 | 2-1/2 | 950520 | 63.90 | 950520-C3 | 74.40 | | |
| | | 3/8 | | 7/8 | .008 | 3/8 | 2-1/2 | 950524 | 76.50 | 950524-C3 | 87.90 | | |
| | | 1/2 | | 1 | .008 | 1/2 | 3 | 950532 | 119.60 | 950532-C3 | 137.20 | | |
| | | 5/8 | | 1-1/4 | .010 | 5/8 | 3-1/2 | 950540 | 182.70 | 950540-C3 | 202.00 | | |
| | | 3/4 | | 1-1/2 | .012 | 3/4 | 4 | 950548 | 276.40 | 950548-C3 | 297.30 | | |

# DRILL / END MILLS

## Cobalt – Mill Style – 2 & 4 Flute




- M-42 steel (8% cobalt)
- 90º included angle point
- Weldon flat
- CNC ground in the USA

**MILL STYLE**

END VIEW:



Flat Relief with end mill style gash to thin web

| Recommended For | |
|---|---|
| Chamfering | Yes |
| O.D. Milling | Yes |
| Drilling | Non-Ferrous Only |
| Spotting | Light Duty |

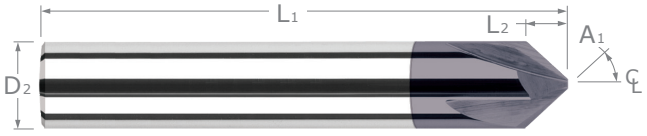


| INCLUDED ANGLE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES* | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | |
|---|---|---|---|---|---|---|---|
| A +1° −1° | D1 +.000″ −.002″ | L2 +.030″ −.000″ | | D2 | L1 | TOOL # | USD$ |
| 90° | 1/8 | 3/8 | 4 | 3/8 | 2-5/16 | 14308 | 79.30 |
| | 3/16 | 1/2 | 4 | 3/8 | 2-3/8 | 14312 | 79.30 |
| | 1/4 | 5/8 | 4 | 3/8 | 2-1/2 | 14316 | 79.30 |
| | 1/4 | 5/8 | 2 | 3/8 | 2-1/2 | 14316-2 | 79.30 |
| | 5/16 | 3/4 | 4 | 3/8 | 2-1/2 | 14320 | 79.30 |
| | 3/8 | 3/4 | 4 | 3/8 | 2-1/2 | 14324 | 79.30 |
| | 7/16 | 1 | 4 | 3/8 | 2-11/16 | 14328 | 93.70 |
| | 1/2 | 1-1/4 | 4 | 1/2 | 3-1/4 | 14332 | 93.70 |
| | 5/8 | 1-5/8 | 4 | 5/8 | 3 3/4 | 14340 | 136.90 |
| | 3/4 | 1-5/8 | 4 | 3/4 | 3-7/8 | 14348 | 161.00 |
| | 1 | 1-7/8 | 4 | 3/4 | 4-1/8 | 14364-A | 234.70 |
| | 1 | 2 | 4 | 1 | 4-1/2 | 14364 | 234.70 |

*2 flute style is two flutes to center. 4 flute style is two flutes to center and two flutes cut back.

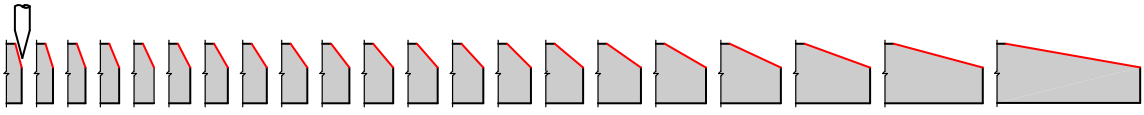
# CHAMFER CUTTERS

## Pointed & Flat End




**Available in 2, 3, 4 & 6 Flutes!**

- Choose from three types:
  - Pointed (Type I): Used for deburring and chamfering in narrow grooves, slots, and, small holes
  - Flat End (Type II): (non-cutting) multi-flute design improves tool life and finish for profiling and chamfering larger features
  - End Cutting (Type III): 4 flute center cutting geometry to blend the floor and a chamfered wall in a single pass
- Solid carbide • CNC ground in the USA

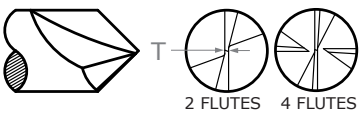


Stocked in 21 Angles Per Side, Ranging from 15°-80°!

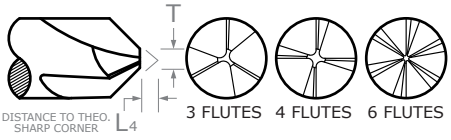
| ANGLE PER SIDE | DIA. | FLUTES | TIP | TYPE | LOC | | OAL | | UNCOATED | | ALTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_2$ | | $T_{(MAX.)}$ | | $L_2$ | $L_{4\ (MAX.)}$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 15° | 1/8 | 2 | .010 | I | .233 | | 1-1/2 | | 18715 | 21.40 | 18715-C3 | 27.30 | 18715-C8 | 29.10 |
| | 1/8 | 2 | .010 | I | .233 | | 3 | LONG! | 50615 | 29.00 | 50615-C3 | 34.90 | | |
| | 1/8 | 3 | .040 | II | .159 | .075 | 1-1/2 | | 968615 | 23.00 | 968615-C3 | 29.00 | | |
| | 1/8 | 4 | .040 | II | .159 | .075 | 1-1/2 | | 866115 | 24.20 | 866115-C3 | 30.10 | | |
| | 3/16 | 2 | .010 | I | .350 | | 2 | | 72415 | 30.00 | 72415-C3 | 36.60 | | |
| | 3/16 | 2 | .010 | I | .350 | | 4 | LONG! | 986915 | 46.50 | 986915-C3 | 55.50 | | |
| | 3/16 | 3 | .040 | II | .275 | .075 | 2 | | 978115 | 34.30 | 978115-C3 | 40.70 | | |
| | 3/16 | 4 | .040 | II | .275 | .075 | 2 | | 848715 | 35.90 | 848715-C3 | 42.50 | | |
| | 1/4 | 2 | .010 | I | .448 | | 2-1/2 | | 47615 | 43.10 | 47615-C3 | 51.80 | 47615-C8 | 53.10 |
| | 1/4 | 3 | .060 | II | .355 | .112 | 2-1/2 | | 18515 | 40.00 | 18515-C3 | 48.60 | | |
| | 1/4 | 3 | .060 | II | .355 | .112 | 4 | LONG! | 48515 | 57.80 | 48515-C3 | 63.60 | | |
| | 1/4 | 4 | .060 | II | .355 | .112 | 2-1/2 | | 876415 | 45.30 | 876415-C3 | 54.00 | | |
| | 1/4 | 4 | .040 | III | .391 | .075 | 2-1/2 | | 833115 | 49.40 | 833115-C3 | 58.40 | | |
| | 5/16 | 3 | .060 | II | .471 | .112 | 2-1/2 | | 977015 | 50.80 | 977015-C3 | 61.10 | | |
| | 3/8 | 2 | .010 | I | .700 | | 2-1/2 | | 72515 | 57.80 | 72515-C3 | 69.20 | | |
| | 3/8 | 3 | .060 | II | .588 | .112 | 2-1/2 | | 18415 | 53.70 | 18415-C3 | 65.10 | 18415-C8 | 74.10 |
| | 3/8 | 3 | .060 | II | .588 | .112 | 4 | LONG! | 981215 | 87.40 | 981215-C3 | 103.60 | | |
| | 3/8 | 4 | .060 | II | .588 | .112 | 2-1/2 | | 895115 | 60.70 | 895115-C3 | 72.10 | | |
| | 3/8 | 4 | .060 | III | .588 | .112 | 2-1/2 | | 827815 | 66.20 | 827815-C3 | 77.60 | | |
| | 1/2 | 2 | .010 | I | .933 | | 3 | | 960415 | 97.50 | 960415-C3 | 114.80 | | |
| | 1/2 | 4 | .080 | II | .784 | .149 | 3 | | 18315 | 79.60 | 18315-C3 | 96.60 | | |
| | 1/2 | 4 | .080 | III | .783 | .149 | 3 | | 820215 | 86.30 | 820215-C3 | 101.80 | | |
| | 1/2 | 6 | .080 | II | .784 | .149 | 3 | | 839215 | 90.30 | 839215-C3 | 107.60 | | |
| | 5/8 | 6 | .080 | II | 1.017 | .149 | 3-1/2 | | 952815 | 142.00 | 952815-C3 | 159.30 | | |
| | 3/4 | 6 | .100 | II | 1.213 | .187 | 4 | | 949315 | 212.80 | 949315-C3 | 234.00 | | |

continued on next page

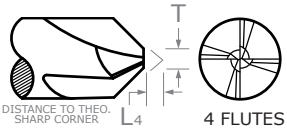
**TYPE I - POINTED**
Flat relief ground to center, yielding a web thickness at tip (T)




**TYPE II - FLAT END** Flat relief ground to a *non-end cutting* flat tip (T)




**TYPE III - END CUTTING**
Flat relief ground to an end cutting tip diameter (T), two flutes to center



NEW SIZES!

# CHAMFER CUTTERS

## Pointed & Flat End (cont.)

continued from previous page

| ANGLE PER SIDE | DIA. | FLUTES | TIP | TYPE | LOC | | OAL | | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_2$ | | $T_{(MAX.)}$ | | $L_2$ | $L_{4\ (MAX.)}$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| | 1/8 | 2 | .010 | I | .198 | | 1-1/2 | | 18718 | 26.50 | 18718-C3 | 32.40 | | |
| | 1/4 | 2 | .010 | I | .396 | | 2-1/2 | | 47618 | 48.30 | 47618-C3 | 57.20 | | |
| 17.5° | 1/4 | 3 | .060 | II | .301 | .095 | 2-1/2 | | 18518 | 48.30 | 18518-C3 | 57.20 | | |
| | 3/8 | 3 | .060 | II | .500 | .107 | 2-1/2 | | 18418 | 62.90 | 18418-C3 | 74.30 | | |
| | 1/2 | 4 | .080 | II | .666 | .127 | 3 | | 18318 | 96.50 | 18318-C3 | 114.20 | | |
| | 1/8 | 2 | .010 | I | .172 | | 1-1/2 | | 18720 | 21.40 | 18720-C3 | 27.30 | 18720-C8 | 29.10 |
| | 1/8 | 2 | .010 | I | .172 | | 3 | LONG! | 50620 | 29.00 | 50620-C3 | 34.90 | | |
| | 1/8 | 3 | .040 | II | .117 | .055 | 1-1/2 | | 968620 | 23.00 | 968620-C3 | 29.00 | | |
| | 1/8 | 4 | .040 | II | .117 | .055 | 1-1/2 | | 866120 | 24.20 | 866120-C3 | 30.10 | | |
| | 3/16 | 2 | .010 | I | .258 | | 2 | | 72420 | 30.00 | 72420-C3 | 36.60 | 72420-C8 | 38.60 |
| | 3/16 | 2 | .010 | I | .258 | | 4 | LONG! | 986920 | 46.50 | 986920-C3 | 53.70 | | |
| | 3/16 | 3 | .040 | II | .203 | .055 | 2 | | 978120 | 34.30 | 978120-C3 | 40.70 | | |
| | 3/16 | 4 | .040 | II | .203 | .055 | 2 | | 848720 | 35.90 | 848720-C3 | 42.50 | | |
| | 1/4 | 2 | .010 | I | .343 | | 2-1/2 | | 47620 | 43.10 | 47620-C3 | 51.80 | 47620-C8 | 53.10 |
| | 1/4 | 3 | .060 | II | .261 | .082 | 2-1/2 | | 18520 | 40.00 | 18520-C3 | 48.60 | 18520-C8 | 50.20 |
| | 1/4 | 3 | .060 | II | .261 | .082 | 4 | LONG! | 48520 | 57.80 | 48520-C3 | 66.40 | | |
| 20° | 1/4 | 4 | .060 | II | .261 | .082 | 2-1/2 | | 876420 | 50.40 | 876420-C3 | 59.30 | | |
| | 1/4 | 4 | .040 | III | .288 | .055 | 2-1/2 | | 833120 | 52.00 | 833120-C3 | 61.00 | | |
| | 5/16 | 3 | .060 | II | .347 | .082 | 2-1/2 | | 977020 | 57.80 | 977020-C3 | 68.00 | | |
| | 3/8 | 2 | .010 | I | .515 | | 2-1/2 | | 72520 | 57.80 | 72520-C3 | 69.20 | | |
| | 3/8 | 3 | .060 | II | .433 | .082 | 2-1/2 | | 18420 | 53.70 | 18420-C3 | 65.10 | | |
| | 3/8 | 3 | .060 | II | .433 | .082 | 4 | LONG! | 981220 | 87.40 | 981220-C3 | 103.60 | | |
| | 3/8 | 4 | .060 | II | .433 | .082 | 2-1/2 | | 895120 | 67.80 | 895120-C3 | 79.20 | | |
| | 1/2 | 2 | .010 | I | .687 | | 3 | | 960420 | 97.50 | 960420-C3 | 113.00 | | |
| | 1/2 | 4 | .080 | II | .577 | .110 | 3 | | 18320 | 79.60 | 18320-C3 | 96.60 | | |
| | 1/2 | 6 | .080 | II | .577 | .110 | 3 | | 839220 | 90.30 | 839220-C3 | 107.60 | | |
| | 1/2 | 4 | .080 | III | .576 | .110 | 3 | | 820220 | 86.30 | 820220-C3 | 101.80 | | |
| | 1/8 | 2 | .010 | I | .151 | | 1-1/2 | | 18723 | 25.50 | 18723-C3 | 31.50 | 18723-C8 | 33.20 |
| | 1/8 | 3 | .040 | II | .103 | .048 | 1-1/2 | | 968623 | 25.50 | 968623-C3 | 31.50 | | |
| | 3/16 | 2 | .010 | I | .226 | | 2 | | 72423 | 33.60 | 72423-C3 | 40.20 | | |
| | 3/16 | 3 | .040 | II | .178 | .048 | 2 | | 978123 | 33.60 | 978123-C3 | 40.20 | | |
| 22.5° | 1/4 | 2 | .010 | I | .302 | | 2-1/2 | | 47623 | 48.30 | 47623-C3 | 57.20 | | |
| | 1/4 | 3 | .060 | II | .229 | .072 | 2-1/2 | | 18523 | 48.30 | 18523-C3 | 57.20 | | |
| | 3/8 | 2 | .010 | I | .453 | | 2-1/2 | | 72523 | 64.90 | 72523-C3 | 76.30 | | |
| | 3/8 | 3 | .060 | II | .380 | .072 | 2-1/2 | | 18423 | 64.90 | 18423-C3 | 76.30 | | |
| | 1/2 | 2 | .010 | I | .604 | | 3 | | 960423 | 103.40 | 960423-C3 | 121.20 | | |
| | 1/2 | 4 | .080 | II | .507 | .097 | 3 | | 18323 | 91.30 | 18323-C3 | 109.10 | | |
| | 1/8 | 2 | .010 | I | .134 | | 1-1/2 | | 18725 | 25.50 | 18725-C3 | 31.50 | 18725-C8 | 33.20 |
| | 1/8 | 3 | .040 | II | .091 | .043 | 1-1/2 | | 968625 | 25.50 | 968625-C3 | 31.50 | | |
| | 3/16 | 2 | .010 | I | .201 | | 2 | | 72425 | 33.40 | 72425-C3 | 40.00 | | |
| | 3/16 | 3 | .040 | II | .158 | .043 | 2 | | 978125 | 33.40 | 978125-C3 | 40.00 | | |
| | 1/4 | 2 | .010 | I | .268 | | 2-1/2 | | 47625 | 48.30 | 47625-C3 | 57.20 | | |
| 25° | 1/4 | 3 | .060 | II | .204 | .064 | 2-1/2 | | 18525 | 48.10 | 18525-C3 | 57.00 | | |
| | 1/4 | 4 | .060 | II | .204 | .064 | 2-1/2 | | 876425 | 50.10 | 876425-C3 | 59.10 | | |
| | 3/8 | 2 | .010 | I | .402 | | 2-1/2 | | 72525 | 64.50 | 72525-C3 | 75.90 | | |
| | 3/8 | 3 | .060 | II | .338 | .064 | 2-1/2 | | 18425 | 64.50 | 18425-C3 | 75.90 | | |
| | 1/2 | 2 | .010 | I | .536 | | 3 | | 960425 | 102.50 | 960425-C3 | 120.00 | | |
| | 1/2 | 4 | .080 | II | .450 | .086 | 3 | | 18325 | 90.40 | 18325-C3 | 108.10 | | |

continued on next page

# CHAMFER CUTTERS

## Pointed & Flat End (cont.)

continued from previous page

| ANGLE PER SIDE | DIA. | FLUTES | TIP | TYPE | LOC | | OAL | | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_2$ | | $T_{(MAX.)}$ | | $L_2$ | $L_{4\ (MAX.)}$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| | 1/8 | 2 | .010 | I | .120 | | 1-1/2 | | 18728 | 26.50 | 18728-C3 | 32.40 | | |
| | 3/16 | 2 | .010 | I | .180 | | 2 | | 72428 | 34.30 | 72428-C3 | 40.50 | | |
| **27.5°** | 1/4 | 2 | .010 | I | .240 | | 2-1/2 | | 47628 | 48.30 | 47628-C3 | 56.40 | | |
| | 1/4 | 3 | .060 | II | .182 | .058 | 2-1/2 | | 18528 | 48.30 | 18528-C3 | 57.20 | | |
| | 1/2 | 4 | .080 | II | .403 | .077 | 3 | | 18328 | 91.30 | 18328-C3 | 109.10 | | |
| | 3 mm | 2 | .120 mm | I | 2.60 mm | | 38 mm | | 900230 | 24.20 | 900230-C3 | 30.10 | | |
| | 1/8 | 2 | .010 | I | .108 | | 1-1/2 | | 18730 | 21.40 | 18730-C3 | 27.30 | 18730-C8 | 29.10 |
| | 1/8 | 2 | .010 | I | .108 | | 3 | **LONG!** | 50630 | 29.00 | 50630-C3 | 34.90 | | |
| | 1/8 | 3 | .040 | II | .074 | .035 | 1-1/2 | | 968630 | 23.00 | 968630-C3 | 29.00 | | |
| NEW | 1/8 | 4 | .010 | I | .100 | | 1-1/2 | | 731908 | 21.40 | 731908-C3 | 27.30 | | |
| | 1/8 | 4 | .040 | II | .074 | .035 | 1-1/2 | | 866130 | 24.20 | 866130-C3 | 30.10 | | |
| | 1/8 | 4 | .040 | III | .074 | .035 | 1-1/2 | | 802830 | 27.60 | 802830-C3 | 33.50 | | |
| | 3/16 | 2 | .010 | I | .162 | | 2 | | 72430 | 30.00 | 72430-C3 | 36.60 | 72430-C8 | 38.60 |
| | 3/16 | 2 | .010 | I | .162 | | 4 | **LONG!** | 986930 | 46.50 | 986930-C3 | 55.50 | | |
| | 3/16 | 3 | .040 | II | .128 | .035 | 2 | | 978130 | 37.40 | 978130-C3 | 43.80 | | |
| NEW | 3/16 | 4 | .010 | I | .154 | | 2 | | 731912 | 30.00 | 731912-C3 | 36.20 | | |
| | 3/16 | 4 | .040 | II | .128 | .035 | 2 | | 848730 | 38.90 | 848730-C3 | 45.50 | | |
| | 1/4 | 2 | .010 | I | .217 | | 2-1/2 | | 47630 | 43.10 | 47630-C3 | 51.80 | 47630-C8 | 53.10 |
| | 1/4 | 3 | .060 | II | .165 | .052 | 2-1/2 | | 18530 | 40.00 | 18530-C3 | 48.60 | 18530-C8 | 50.20 |
| | 1/4 | 3 | .060 | II | .165 | .052 | 4 | **LONG!** | 48530 | 57.80 | 48530-C3 | 63.60 | | |
| NEW | 1/4 | 4 | .010 | I | .208 | | 2-1/2 | | 731916 | 43.10 | 731916-C3 | 51.20 | | |
| | 1/4 | 4 | .060 | II | .165 | .052 | 2-1/2 | | 876430 | 45.30 | 876430-C3 | 54.00 | | |
| **30°** | 1/4 | 4 | .040 | III | .181 | .035 | 2-1/2 | | 833130 | 49.10 | 833130-C3 | 58.10 | | |
| | 5/16 | 2 | .010 | I | .271 | | 2-1/2 | | 880330 | 52.20 | 880330-C3 | 62.30 | | |
| | 5/16 | 3 | .060 | II | .219 | .052 | 2-1/2 | | 977030 | 50.80 | 977030-C3 | 61.10 | | |
| | 5/16 | 4 | .060 | II | .219 | .052 | 2-1/2 | | 873230 | 54.10 | 873230-C3 | 64.30 | | |
| | 3/8 | 2 | .010 | I | .325 | | 2-1/2 | | 72530 | 57.80 | 72530-C3 | 69.20 | | |
| | 3/8 | 3 | .060 | II | .273 | .052 | 2-1/2 | | 18430 | 53.70 | 18430-C3 | 65.10 | 18430-C8 | 69.40 |
| | 3/8 | 3 | .060 | II | .273 | .052 | 4 | **LONG!** | 981230 | 87.40 | 981230-C3 | 103.60 | | |
| NEW | 3/8 | 4 | .010 | I | .316 | | 2-1/2 | | 731924 | 57.80 | 731924-C3 | 69.20 | | |
| | 3/8 | 4 | .060 | II | .273 | .052 | 2-1/2 | | 895130 | 60.70 | 895130-C3 | 72.10 | | |
| | 3/8 | 4 | .060 | III | .273 | .052 | 2-1/2 | | 827830 | 66.20 | 827830-C3 | 77.60 | | |
| | 1/2 | 2 | .010 | I | .433 | | 3 | | 960430 | 92.00 | 960430-C3 | 109.40 | | |
| | 1/2 | 3 | .080 | II | .364 | .069 | 3 | | 871830 | 90.60 | 871830-C3 | 107.80 | | |
| | 1/2 | 4 | .080 | II | .364 | .069 | 3 | | 18330 | 75.20 | 18330-C3 | 92.10 | 18330-C8 | 98.60 |
| | 1/2 | 4 | .080 | III | .364 | .069 | 3 | | 820230 | 86.30 | 820230-C3 | 104.00 | | |
| | 1/2 | 6 | .080 | II | .364 | .069 | 3 | | 839230 | 85.10 | 839230-C3 | 102.40 | | |
| | 5/8 | 6 | .080 | II | .472 | .069 | 3-1/2 | | 952830 | 142.00 | 952830-C3 | 159.30 | | |
| | 3/4 | 6 | .100 | II | .563 | .087 | 4 | | 949330 | 212.80 | 949330-C3 | 234.00 | | |
| | 1/8 | 2 | .010 | I | .098 | | 1-1/2 | | 18733 | 26.50 | 18733-C3 | 32.40 | | |
| **32.5°** | 1/4 | 3 | .060 | II | .149 | .047 | 2-1/2 | | 18533 | 48.30 | 18533-C3 | 57.20 | | |
| | 1/2 | 4 | .080 | II | .330 | .063 | 3 | | 18333 | 91.30 | 18333-C3 | 109.10 | | |

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NEW SIZES!

# CHAMFER CUTTERS

## Pointed & Flat End (cont.)

continued from previous page

| ANGLE PER SIDE | DIA. | FLUTES | TIP | TYPE | LOC | | OAL | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_2$ | | $T_{(MAX.)}$ | | $L_2$ | $L_{4\ (MAX.)}$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 35° | 1/8 | 2 | .010 | I | .089 | | 1-1/2 | 18735 | 24.40 | 18735-C3 | 30.30 | | |
| | 1/8 | 3 | .040 | II | .061 | .029 | 1-1/2 | 968635 | 24.60 | 968635-C3 | 30.50 | | |
| | 3/16 | 2 | .010 | I | .134 | | 2 | 72435 | 31.60 | 72435-C3 | 38.30 | | |
| | 3/16 | 3 | .040 | II | .105 | .029 | 2 | 978135 | 31.60 | 978135-C3 | 38.30 | | |
| | 1/4 | 2 | .010 | I | .179 | | 2-1/2 | 47635 | 57.70 | 47635-C3 | 66.70 | | |
| | 1/4 | 3 | .060 | II | .136 | .043 | 2-1/2 | 18535 | 45.30 | 18535-C3 | 54.20 | | |
| | 3/8 | 2 | .010 | I | .268 | | 2-1/2 | 72535 | 61.10 | 72535-C3 | 72.60 | | |
| | 3/8 | 3 | .060 | II | .225 | .043 | 2-1/2 | 18435 | 61.10 | 18435-C3 | 72.60 | | |
| | 1/2 | 2 | .010 | I | .357 | | 3 | 960435 | 97.10 | 960435-C3 | 114.80 | | |
| | 1/2 | 4 | .080 | II | .300 | .057 | 3 | 18335 | 85.50 | 18335-C3 | 103.10 | | |
| 37.5° | 1/8 | 2 | .010 | I | .081 | | 1-1/2 | 18738 | 26.50 | 18738-C3 | 32.40 | | |
| | 1/4 | 2 | .010 | I | .163 | | 2-1/2 | 47638 | 61.60 | 47638-C3 | 70.50 | | |
| | 1/4 | 3 | .060 | II | .124 | .039 | 2-1/2 | 18538 | 48.30 | 18538-C3 | 57.20 | | |
| | 1/2 | 4 | .080 | II | .274 | .052 | 3 | 18338 | 91.30 | 18338-C3 | 109.10 | | |
| 40° | 1/8 | 2 | .010 | I | .074 | | 1-1/2 | 18740 | 24.40 | 18740-C3 | 30.30 | | |
| | 1/8 | 3 | .040 | II | .051 | .024 | 1-1/2 | 968640 | 23.00 | 968640-C3 | 29.00 | | |
| | 1/8 | 4 | .040 | II | .051 | .024 | 1-1/2 | 866140 | 24.20 | 866140-C3 | 30.10 | | |
| | 3/16 | 2 | .010 | I | .112 | | 2 | 72440 | 31.60 | 72440-C3 | 38.30 | | |
| | 1/4 | 2 | .010 | I | .149 | | 2-1/2 | 47640 | 57.70 | 47640-C3 | 66.70 | | |
| | 1/4 | 3 | .060 | II | .113 | .036 | 2-1/2 | 18540 | 45.30 | 18540-C3 | 54.20 | | |
| | 1/4 | 4 | .040 | III | .125 | .024 | 2-1/2 | 833140 | 56.20 | 833140-C3 | 65.10 | | |
| | 1/4 | 4 | .060 | II | .113 | .036 | 2-1/2 | 876440 | 49.20 | 876440-C3 | 58.20 | | |
| | 3/8 | 3 | .060 | II | .188 | .036 | 2-1/2 | 18440 | 61.10 | 18440-C3 | 72.60 | | |
| | 1/2 | 4 | .080 | II | .25 | .048 | 3 | 18340 | 85.50 | 18340-C3 | 103.10 | | |
| 41° | 1/8 | 2 | .010 | I | .072 | | 1-1/2 | 18741 | 22.50 | 18741-C3 | 28.40 | 18741-C8 | 30.20 |
| | 1/8 | 3 | .040 | II | .049 | .023 | 1-1/2 | 968641 | 27.20 | 968641-C3 | 33.10 | | |
| | 3/16 | 2 | .010 | I | .108 | | 2 | 72441 | 35.30 | 72441-C3 | 41.90 | | |
| | 3/16 | 3 | .040 | II | .085 | .023 | 2 | 978141 | 33.30 | 978141-C3 | 39.90 | | |
| | 1/4 | 2 | .010 | I | .144 | | 2-1/2 | 47641 | 49.90 | 47641-C3 | 59.00 | | |
| | 1/4 | 3 | .060 | II | .109 | .035 | 2-1/2 | 18541 | 42.40 | 18541-C3 | 51.00 | | |
| | 3/8 | 2 | .010 | I | .216 | | 2-1/2 | 72541 | 68.40 | 72541-C3 | 79.80 | | |
| | 3/8 | 3 | .060 | II | .181 | .035 | 2-1/2 | 18441 | 68.40 | 18441-C3 | 79.80 | | |
| | 1/2 | 2 | .010 | I | .288 | | 3 | 960441 | 103.40 | 960441-C3 | 121.20 | | |
| | 1/2 | 4 | .080 | II | .242 | .046 | 3 | 18341 | 79.60 | 18341-C3 | 96.60 | | |
| | 1/2 | 4 | .080 | III | .241 | .046 | 3 | 820241 | 86.30 | 820241-C3 | 101.80 | | |
| 42.5° | 1/8 | 2 | .010 | I | .068 | | 1-1/2 | 18743 | 26.50 | 18743-C3 | 32.40 | | |
| | 1/4 | 3 | .060 | II | .104 | .033 | 2-1/2 | 18543 | 48.30 | 18543-C3 | 57.20 | | |
| | 1/2 | 4 | .080 | II | .229 | .044 | 3 | 18343 | 91.30 | 18343-C3 | 109.10 | | |

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# CHAMFER CUTTERS

## Pointed & Flat End (cont.)

continued from previous page

| ANGLE PER SIDE | DIA. | FLUTES | TIP | TYPE | LOC | | OAL | | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_2$ | | $T_{(MAX.)}$ | | $L_2$ | $L_{4\ (MAX.)}$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 45° | 3 mm | 2 | .25 mm | I | 1.50 mm | | 38 mm | | 900245 | 27.20 | 900245-C3 | 33.10 | | |
| | 3 mm | 3 | 1.00 mm | II | 1.00 mm | .500 mm | 38 mm | | 899545 | 27.20 | 899545-C3 | 33.10 | | |
| NEW | 3 mm | 4 | .25 mm | I | 1.38 mm | | 38 mm | | 693657 | 27.20 | 693657-C3 | 33.10 | | |
| | 3 mm | 4 | 1.00 mm | III | 1.00 mm | .500 mm | 38 mm | | 764845 | 29.20 | 764845-C3 | 35.10 | | |
| | 1/8 | 2 | .010 | I | .063 | | 1-1/2 | | 18745 | 21.40 | 18745-C3 | 27.30 | 18745-C8 | 29.10 |
| | 1/8 | 2 | .010 | I | .063 | | 3 | LONG! | 50645 | 29.00 | 50645-C3 | 34.90 | 50645-C8 | 37.90 |
| | 1/8 | 3 | .040 | II | .043 | .020 | 1-1/2 | | 968645 | 23.00 | 968645-C3 | 29.00 | 968645-C8 | 30.70 |
| | 1/8 | 3 | .040 | II | .043 | .020 | 3 | LONG! | 790245 | 29.30 | 790245-C3 | 35.20 | | |
| | 1/8 | 4 | .010 | I | .058 | | 1-1/2 | | 744445 | 24.20 | 744445-C3 | 30.10 | | |
| | 1/8 | 4 | .040 | II | .043 | .020 | 1-1/2 | | 866145 | 24.20 | 866145-C3 | 30.10 | 866145-C8 | 31.90 |
| | 1/8 | 4 | .040 | III | .042 | .020 | 1-1/2 | | 802845 | 26.10 | 802845-C3 | 32.00 | | |
| | 4 mm | 2 | .25 mm | I | 2.00 mm | | 50 mm | | 878445 | 34.70 | 878445-C3 | 41.30 | | |
| | 4 mm | 3 | 1.00 mm | II | 1.50 mm | .500 mm | 50 mm | | 863845 | 34.70 | 863845-C3 | 41.30 | | |
| | 3/16 | 2 | .010 | I | .094 | | 2 | | 72445 | 31.90 | 72445-C3 | 38.60 | 72445-C8 | 40.50 |
| | 3/16 | 2 | .010 | I | .094 | | 4 | LONG! | 986945 | 46.50 | 986945-C3 | 55.50 | | |
| | 3/16 | 3 | .040 | II | .074 | .020 | 2 | | 978145 | 37.40 | 978145-C3 | 43.80 | 978145-C8 | 46.00 |
| | 3/16 | 3 | .040 | II | .074 | .020 | 3 | LONG! | 790945 | 37.40 | 790945-C3 | 43.80 | | |
| | 3/16 | 4 | .010 | I | .089 | | 2 | | 743745 | 38.90 | 743745-C3 | 47.30 | | |
| | 3/16 | 4 | .040 | II | .074 | .020 | 2 | | 848745 | 38.90 | 848745-C3 | 45.50 | | |
| | 3/16 | 4 | .040 | III | .073 | .020 | 2 | | 809745 | 40.80 | 809745-C3 | 47.30 | | |
| | 6 mm | 2 | .25 mm | I | 3.00 mm | | 63 mm | | 840045 | 48.30 | 840045-C3 | 57.10 | 840045-C8 | 59.40 |
| | 6 mm | 3 | 1.50 mm | II | 2.25 mm | .750 mm | 63 mm | | 837745 | 48.30 | 837745-C3 | 57.10 | | |
| | 6 mm | 4 | 1.50 mm | II | 2.25 mm | .750 mm | 63 mm | | 777645 | 50.40 | 777645-C3 | 59.30 | | |
| | 6 mm | 4 | 1.50 mm | III | 2.25 mm | .750 mm | 63 mm | | 764545 | 54.30 | 764545-C3 | 63.30 | | |
| | 1/4 | 2 | .010 | I | .125 | | 2-1/2 | | 47645 | 43.10 | 47645-C3 | 51.80 | 47645-C8 | 53.10 |
| | 1/4 | 2 | .010 | I | .125 | | 4 | LONG! | 790345 | 56.40 | 790345-C3 | 66.90 | | |
| | 1/4 | 3 | .060 | II | .095 | .030 | 2-1/2 | | 18545 | 40.20 | 18545-C3 | 48.80 | 18545-C8 | 50.50 |
| | 1/4 | 3 | .060 | II | .095 | .030 | 4 | LONG! | 48545 | 57.80 | 48545-C3 | 63.60 | | |
| | 1/4 | 4 | .010 | I | .120 | | 2-1/2 | | 743145 | 50.80 | 743145-C3 | 59.50 | | |
| | 1/4 | 4 | .060 | II | .095 | .030 | 2-1/2 | | 876445 | 50.80 | 876445-C3 | 59.50 | 876445-C8 | 61.00 |
| | 1/4 | 4 | .060 | II | .095 | .030 | 4 | LONG! | 771545 | 67.30 | 771545-C3 | 77.90 | | |
| | 1/4 | 4 | .040 | III | .105 | .020 | 2-1/2 | | 833145 | 56.20 | 833145-C3 | 65.10 | 833145-C8 | 66.20 |
| | 1/4 | 4 | .060 | III | .095 | .030 | 2-1/2 | | 794145 | 56.20 | 794145-C3 | 65.10 | | |
| | 5/16 | 2 | .010 | I | .156 | | 2-1/2 | | 880345 | 50.80 | 880345-C3 | 61.10 | | |
| | 5/16 | 3 | .060 | II | .126 | .030 | 2-1/2 | | 977045 | 50.80 | 977045-C3 | 61.10 | | |
| | 5/16 | 4 | .060 | II | .126 | .030 | 2-1/2 | | 873245 | 54.10 | 873245-C3 | 64.30 | | |
| | 5/16 | 4 | .060 | III | .126 | .030 | 2-1/2 | | 777545 | 59.20 | 777545-C3 | 69.60 | | |
| | 8 mm | 3 | 1.50 mm | II | 3.25 mm | .750 mm | 63 mm | | 868845 | 63.90 | 868845-C3 | 74.80 | | |
| | 3/8 | 2 | .010 | I | .188 | | 2-1/2 | | 72545 | 61.10 | 72545-C3 | 72.60 | 72545-C8 | 76.90 |
| | 3/8 | 2 | .010 | I | .188 | | 4 | LONG! | 791745 | 89.00 | 791745-C3 | 105.20 | | |
| | 3/8 | 3 | .060 | II | .158 | .030 | 2-1/2 | | 18445 | 53.70 | 18445-C3 | 65.10 | 18445-C8 | 74.10 |
| | 3/8 | 3 | .060 | II | .158 | .030 | 4 | LONG! | 981245 | 87.40 | 981245-C3 | 103.60 | 981245-C8 | 104.40 |
| | 3/8 | 4 | .010 | I | .183 | | 2-1/2 | | 742745 | 63.10 | 742745-C3 | 74.50 | | |
| | 3/8 | 4 | .060 | II | .158 | .030 | 2-1/2 | | 895145 | 63.10 | 895145-C3 | 74.50 | | |
| | 3/8 | 4 | .040 | III | .167 | .020 | 2-1/2 | | 764245 | 68.90 | 764245-C3 | 80.30 | | |
| | 3/8 | 4 | .060 | III | .158 | .030 | 2-1/2 | | 827845 | 68.40 | 827845-C3 | 79.80 | | |

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NEW SIZES!

# CHAMFER CUTTERS

## Pointed & Flat End (cont.)

continued from previous page



| ANGLE PER SIDE | DIA. | FLUTES | TIP | TYPE | LOC | | OAL | | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_2$ | | T (MAX.) | | $L_2$ | $L_4$ (MAX.) | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | |
| 45° | 10 mm | 4 | 1.50 mm | II | 4.25 mm | .750 mm | 75 mm | | 871045 | 100.10 | 871045-C3 | 113.30 | | | |
| | 12 mm | 4 | 1.50 mm | II | 5.25 mm | .750 mm | 75 mm | | 881245 | 100.10 | 881245-C3 | 117.70 | | | |
| | 1/2 | 2 | .010 | I | .250 | | 3 | | 960445 | 92.00 | 960445-C3 | 109.40 | 960445-C8 | 110.30 | |
| | 1/2 | 3 | .080 | II | .210 | .040 | 3 | | 871845 | 90.60 | 871845-C3 | 107.80 | | | |
| | 1/2 | 4 | .010 | I | .245 | | 3 | | 742245 | 77.00 | 742245-C3 | 94.30 | | | |
| | 1/2 | 4 | .080 | II | .210 | .040 | 3 | | 18345 | 75.20 | 18345-C3 | 92.10 | 18345-C8 | 98.60 | |
| | 1/2 | 4 | .080 | II | .210 | .040 | 6 | LONG! | 982445 | 146.50 | 982445-C3 | 164.20 | | | |
| | 1/2 | 4 | .080 | III | .210 | .040 | 3 | | 820245 | 86.30 | 820245-C3 | 104.00 | | | |
| | 1/2 | 6 | .080 | II | .210 | .040 | 3 | | 839245 | 85.10 | 839245-C3 | 102.40 | | | |
| | 5/8 | 4 | .080 | II | .273 | .040 | 3-1/2 | | 763645 | 140.10 | 763645-C3 | 158.80 | | | |
| | 5/8 | 4 | .080 | III | .273 | .040 | 3-1/2 | | 765445 | 141.80 | 765445-C3 | 160.40 | | | |
| | 5/8 | 6 | .080 | II | .273 | .040 | 3-1/2 | | 952845 | 142.00 | 952845-C3 | 159.30 | | | |
| | 3/4 | 4 | .100 | II | .325 | .050 | 4 | | 764045 | 212.50 | 764045-C3 | 233.00 | | | |
| | 3/4 | 4 | .100 | III | .325 | .050 | 4 | | 765145 | 212.10 | 765145-C3 | 232.60 | | | |
| | 3/4 | 6 | .100 | II | .325 | .050 | 4 | | 949345 | 212.80 | 949345-C3 | 234.00 | | | |
| | 1 | 6 | .120 | II | .440 | .060 | 4 | | 884745 | 377.90 | 884745-C3 | 406.10 | | | |
| 50° | 1/8 | 2 | .010 | I | .052 | | 1-1/2 | | 18750 | 24.40 | 18750-C3 | 30.30 | 18750-C8 | 33.30 | |
| | 1/8 | 3 | .040 | II | .036 | .017 | 1-1/2 | | 968650 | 24.60 | 968650-C3 | 30.50 | | | |
| | 1/8 | 4 | .010 | I | .048 | | 1-1/2 | | 691608 | 24.40 | 691608-C3 | 30.30 | | | NEW |
| | 3/16 | 2 | .010 | I | .079 | | 2 | | 72450 | 31.60 | 72450-C3 | 38.30 | | | |
| | 3/16 | 3 | .040 | II | .062 | .017 | 2 | | 978150 | 39.20 | 978150-C3 | 45.80 | | | |
| | 1/4 | 2 | .010 | I | .105 | | 2-1/2 | | 47650 | 45.80 | 47650-C3 | 54.70 | | | |
| | 1/4 | 3 | .060 | II | .080 | .025 | 2-1/2 | | 18550 | 45.30 | 18550-C3 | 54.20 | | | |
| | 1/4 | 4 | .010 | I | .101 | | 2-1/2 | | 691616 | 45.80 | 691616-C3 | 53.90 | | | NEW |
| | 1/4 | 4 | .060 | II | .080 | .025 | 2-1/2 | | 876450 | 49.20 | 876450-C3 | 58.20 | | | |
| | 1/4 | 4 | .040 | III | .088 | .017 | 2-1/2 | | 833150 | 56.20 | 833150-C3 | 65.10 | | | |
| | 3/8 | 2 | .010 | I | .157 | | 2-1/2 | | 72550 | 61.10 | 72550-C3 | 72.60 | 72550-C8 | 76.90 | |
| | 3/8 | 3 | .060 | II | .132 | .025 | 2-1/2 | | 18450 | 61.10 | 18450-C3 | 72.60 | | | |
| | 3/8 | 4 | .060 | II | .132 | .025 | 2-1/2 | | 895150 | 64.80 | 895150-C3 | 76.20 | | | |
| | 1/2 | 2 | .010 | I | .210 | | 3 | | 960450 | 97.10 | 960450-C3 | 114.80 | | | |
| | 1/2 | 4 | .080 | II | .176 | .034 | 3 | | 18350 | 85.50 | 18350-C3 | 103.10 | | | |
| | 1/2 | 4 | .080 | III | .176 | .034 | 3 | | 820250 | 86.30 | 820250-C3 | 101.80 | | | |
| | 5/8 | 6 | .080 | II | .229 | .034 | 3-1/2 | | 952850 | 144.10 | 952850-C3 | 163.40 | | | |
| 55° | 1/8 | 2 | .010 | I | .044 | | 1-1/2 | | 18755 | 27.20 | 18755-C3 | 33.10 | | | |
| | 3/16 | 2 | .010 | I | .066 | | 2 | | 72455 | 33.60 | 72455-C3 | 40.20 | | | |
| | 1/4 | 2 | .010 | I | .088 | | 2-1/2 | | 47655 | 63.90 | 47655-C3 | 72.90 | | | |
| | 1/4 | 3 | .060 | II | .067 | .021 | 2-1/2 | | 18555 | 49.90 | 18555-C3 | 59.00 | | | |
| | 3/8 | 3 | .060 | II | .110 | .021 | 2-1/2 | | 18455 | 64.90 | 18455-C3 | 76.30 | | | |
| | 1/2 | 4 | .080 | II | .147 | .028 | 3 | | 18355 | 93.90 | 18355-C3 | 111.50 | | | |
| 60° | 3 mm | 2 | .120 mm | I | .87 mm | | 38 mm | | 900260 | 24.20 | 900260-C3 | 30.10 | | | |
| | 1/8 | 2 | .010 | I | .036 | | 1-1/2 | | 18760 | 21.40 | 18760-C3 | 27.30 | 18760-C8 | 29.10 | |
| | 1/8 | 2 | .010 | I | .036 | | 3 | LONG! | 50660 | 29.00 | 50660-C3 | 34.90 | | | |
| | 1/8 | 3 | .040 | II | .025 | .012 | 1-1/2 | | 968660 | 23.00 | 968660-C3 | 29.00 | | | |
| | 1/8 | 4 | .010 | I | .033 | | 1-1/2 | | 731808 | 21.40 | 731808-C3 | 27.30 | | | NEW |
| | 3/16 | 2 | .010 | I | .054 | | 2 | | 72460 | 30.00 | 72460-C3 | 36.60 | | | |
| | 3/16 | 3 | .040 | II | .043 | .012 | 2 | | 978160 | 37.40 | 978160-C3 | 43.80 | | | |
| | 3/16 | 4 | .010 | I | .051 | | 2 | | 731812 | 30.00 | 731812-C3 | 36.20 | | | NEW |

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# CHAMFER CUTTERS

## Pointed & Flat End (cont.)

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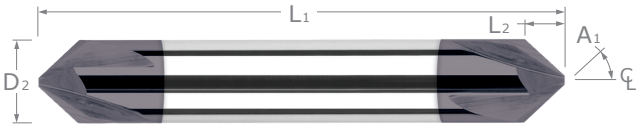
| | ANGLE PER SIDE | DIA. | FLUTES | TIP | TYPE | LOC | | OAL | | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $A_1$ $^{+0°30'}_{-0°30'}$ | $D_2$ | | $T_{(MAX.)}$ | | $L_2$ | $L_{4\ (MAX.)}$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| | 60° | 1/4 | 2 | .010 | I | .072 | | 2-1/2 | | 47660 | 43.10 | 47660-C3 | 51.80 | | |
| | | 1/4 | 3 | .060 | II | .055 | .017 | 2-1/2 | | 18560 | 40.00 | 18560-C3 | 48.60 | | |
| | | 1/4 | 3 | .060 | II | .055 | .017 | 4 | LONG! | 48560 | 57.80 | 48560-C3 | 63.60 | | |
| NEW | | 1/4 | 4 | .010 | I | .069 | | 2-1/2 | | 731816 | 43.10 | 731816-C3 | 51.20 | | |
| | | 1/4 | 4 | .060 | II | .055 | .017 | 2-1/2 | | 876460 | 45.30 | 876460-C3 | 54.00 | | |
| | | 1/4 | 4 | .040 | III | .060 | .012 | 2-1/2 | | 833160 | 47.20 | 833160-C3 | 56.00 | | |
| | | 5/16 | 3 | .060 | II | .073 | .017 | 2-1/2 | | 977060 | 50.80 | 977060-C3 | 61.10 | | |
| | | 3/8 | 2 | .010 | I | .108 | | 2-1/2 | | 72560 | 57.80 | 72560-C3 | 69.20 | | |
| | | 3/8 | 3 | .060 | II | .091 | .017 | 2-1/2 | | 18460 | 53.70 | 18460-C3 | 65.10 | 18460-C8 | 69.40 |
| NEW | | 3/8 | 4 | .010 | I | .105 | | 2-1/2 | | 731824 | 57.80 | 731824-C3 | 69.20 | | |
| | | 3/8 | 4 | .060 | II | .091 | .017 | 2-1/2 | | 895160 | 59.50 | 895160-C3 | 70.90 | | |
| | | 3/8 | 4 | .060 | III | .091 | .017 | 2-1/2 | | 827860 | 66.40 | 827860-C3 | 77.90 | | |
| | | 1/2 | 2 | .010 | I | .144 | | 3 | | 960460 | 92.00 | 960460-C3 | 109.40 | | |
| | | 1/2 | 4 | .080 | II | .121 | .023 | 3 | | 18360 | 75.20 | 18360-C3 | 92.10 | | |
| | | 1/2 | 4 | .080 | III | .121 | .023 | 3 | | 820260 | 81.70 | 820260-C3 | 99.00 | | |
| | | 5/8 | 6 | .080 | II | .157 | .023 | 3-1/2 | | 952860 | 142.00 | 952860-C3 | 159.30 | | |
| | | 3/4 | 6 | .100 | II | .188 | .029 | 4 | | 949360 | 212.80 | 949360-C3 | 234.00 | | |
| | 65° | 1/8 | 2 | .010 | I | .029 | | 1-1/2 | | 18765 | 25.50 | 18765-C3 | 31.50 | | |
| | | 3/16 | 2 | .010 | I | .044 | | 2 | | 72465 | 33.60 | 72465-C3 | 39.90 | | |
| | | 1/4 | 2 | .010 | I | .058 | | 2-1/2 | | 47665 | 61.60 | 47665-C3 | 69.60 | | |
| | | 1/4 | 3 | .060 | II | .044 | .014 | 2-1/2 | | 18565 | 48.30 | 18565-C3 | 57.20 | | |
| | | 3/8 | 3 | .060 | II | .073 | .014 | 2-1/2 | | 18465 | 64.90 | 18465-C3 | 76.30 | | |
| | | 1/2 | 4 | .080 | II | .098 | .019 | 3 | | 18365 | 91.30 | 18365-C3 | 109.10 | | |
| | 70° | 1/8 | 2 | .010 | I | .023 | | 1-1/2 | | 18770 | 24.40 | 18770-C3 | 30.30 | | |
| | | 3/16 | 2 | .010 | I | .034 | | 2 | | 72470 | 31.60 | 72470-C3 | 38.30 | | |
| | | 1/4 | 2 | .010 | I | .045 | | 2-1/2 | | 47670 | 57.70 | 47670-C3 | 66.70 | | |
| | | 1/4 | 3 | .060 | II | .035 | .011 | 2-1/2 | | 18570 | 45.30 | 18570-C3 | 54.20 | | |
| | | 3/8 | 3 | .060 | II | .057 | .011 | 2-1/2 | | 18470 | 65.90 | 18470-C3 | 77.30 | | |
| | | 1/2 | 4 | .080 | II | .076 | .015 | 3 | | 18370 | 85.50 | 18370-C3 | 103.10 | | |
| | 75° | 1/8 | 2 | .010 | I | .017 | | 1-1/2 | | 18775 | 27.20 | 18775-C3 | 33.10 | 18775-C8 | 34.90 |
| | | 1/8 | 3 | .040 | II | .011 | .005 | 1-1/2 | | 968675 | 27.20 | 968675-C3 | 33.10 | | |
| | | 3/16 | 2 | .010 | I | .025 | | 2 | | 72475 | 35.30 | 72475-C3 | 41.90 | | |
| | | 3/16 | 3 | .040 | II | .020 | .005 | 2 | | 978175 | 41.70 | 978175-C3 | 47.60 | | |
| | | 1/4 | 2 | .010 | I | .033 | | 2-1/2 | | 47675 | 49.90 | 47675-C3 | 59.00 | | |
| | | 1/4 | 3 | .060 | II | .025 | .008 | 2-1/2 | | 18575 | 50.90 | 18575-C3 | 59.70 | | |
| | | 1/4 | 4 | .060 | II | .025 | .008 | 2-1/2 | | 876475 | 54.80 | 876475-C3 | 63.80 | | |
| | | 3/8 | 2 | .010 | I | .050 | | 2-1/2 | | 72575 | 68.40 | 72575-C3 | 79.80 | | |
| | | 3/8 | 3 | .060 | II | .042 | .008 | 2-1/2 | | 18475 | 68.40 | 18475-C3 | 79.80 | | |
| | | 3/8 | 4 | .060 | III | .042 | .008 | 2-1/2 | | 827875 | 80.80 | 827875-C3 | 92.20 | | |
| | | 1/2 | 2 | .010 | I | .067 | | 3 | | 960475 | 108.50 | 960475-C3 | 126.30 | | |
| | | 1/2 | 4 | .080 | II | .056 | .011 | 3 | | 18375 | 95.90 | 18375-C3 | 113.50 | | |
| | 80° | 1/8 | 2 | .010 | I | .011 | | 1-1/2 | | 18780 | 26.80 | 18780-C3 | 32.70 | | |
| | | 1/4 | 3 | .060 | II | .017 | .005 | 2-1/2 | | 18580 | 35.90 | 18580-C3 | 44.90 | | |
| | | 1/2 | 4 | .080 | II | .037 | .007 | 3 | | 18380 | 111.80 | 18380-C3 | 129.30 | | |

NEW SIZES!

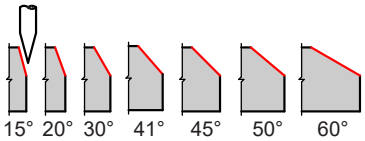
# CHAMFER CUTTERS

## Pointed & Flat End – Double-Ended



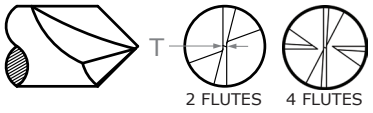



- Double-ended
- Choose from three types:
  - Pointed (Type I): 2 flute style for deburring and chamfering in narrow grooves, slots, and small holes
  - Flat End (Type II): (non-cutting) multi-flute design improves tool life and finish for profiling and chamfering larger features
  - End Cutting (Type III): 4 flute center cutting geometry to blend the floor and a chamfered wall in a single pass
- Solid carbide • CNC ground in the USA

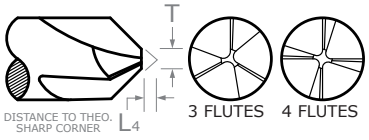



Stocked in Seven Angles Per Side!

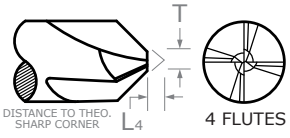
**TYPE I - POINTED** Flat relief ground to center, yielding a web thickness at tip (T)




**TYPE II - FLAT END** Flat relief ground to a *non-end cutting* flat tip (T)




**TYPE III - END CUTTING** Flat relief ground to an end cutting tip diameter (T), two flutes to center




| ANGLE PER SIDE | DIAMETER | FLUTES | TIP | TYPE | LENGTH OF CUT | | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_2$ | | $T_{(MAX.)}$ | | $L_2$ | $L_{4\ (MAX.)}$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 15° | 1/8 | 2 | .010 | I | .233 | | 1-1/2 | 988415 | 43.90 | 988415-C3 | 49.80 |
| | 1/4 | 2 | .010 | I | .467 | | 2-1/2 | 977615 | 64.60 | 977615-C3 | 76.10 |
| | 1/4 | 3 | .060 | II | .355 | .112 | 2-1/2 | 891015 | 71.70 | 891015-C3 | 83.30 |
| | 3/8 | 2 | .010 | I | .700 | | 3 | 998315 | 93.50 | 998315-C3 | 104.90 |
| | 3/8 | 3 | .060 | II | .588 | .112 | 2-1/2 | 934015 | 108.10 | 934015-C3 | 125.30 |
| | 1/2 | 4 | .080 | II | .784 | .149 | 3 | 18615 | 130.30 | 18615-C3 | 153.90 |
| 20° | 1/8 | 2 | .010 | I | .172 | | 1-1/2 | 988420 | 43.90 | 988420-C3 | 49.80 |
| | 1/4 | 2 | .010 | I | .343 | | 2-1/2 | 977620 | 64.60 | 977620-C3 | 76.10 |
| | 1/4 | 3 | .060 | II | .261 | .082 | 2-1/2 | 891020 | 71.70 | 891020-C3 | 83.30 |
| | 3/8 | 2 | .010 | I | .515 | | 2-1/2 | 998320 | 93.50 | 998320-C3 | 110.80 |
| | 3/8 | 3 | .060 | II | .433 | .082 | 2-1/2 | 934020 | 108.10 | 934020-C3 | 125.30 |
| | 1/2 | 4 | .080 | II | .577 | .110 | 3 | 18620 | 130.30 | 18620-C3 | 153.90 |
| 30° | 1/8 | 2 | .010 | I | .108 | | 1-1/2 | 988430 | 37.40 | 988430-C3 | 43.30 |
| | 3/16 | 2 | .010 | I | .162 | | 2 | 902330 | 37.40 | 902330-C3 | 46.00 |
| | 3/16 | 3 | .040 | II | .128 | .035 | 2 | 897130 | 50.00 | 897130-C3 | 58.70 |
| | 1/4 | 2 | .010 | I | .217 | | 2-1/2 | 977630 | 57.50 | 977630-C3 | 69.30 |
| | 1/4 | 3 | .060 | II | .165 | .052 | 2-1/2 | 891030 | 66.60 | 891030-C3 | 78.10 |
| | 3/8 | 2 | .010 | I | .325 | | 2-1/2 | 998330 | 86.80 | 998330-C3 | 98.60 |
| | 3/8 | 3 | .060 | II | .273 | .052 | 2-1/2 | 934030 | 93.60 | 934030-C3 | 105.90 |
| | 1/2 | 2 | .010 | I | .433 | | 3 | 905830 | 117.30 | 905830-C3 | 133.60 |
| | 1/2 | 4 | .080 | II | .364 | .069 | 3 | 18630 | 117.80 | 18630-C3 | 135.00 |

continued on next page

# CHAMFER CUTTERS

## Pointed & Flat End – Double-Ended (cont.)

continued from previous page

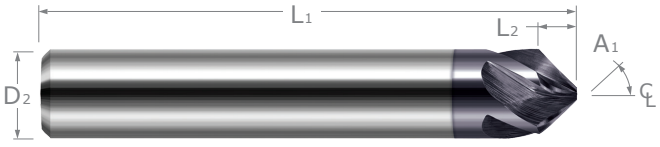
| | ANGLE PER SIDE | DIAMETER | FLUTES | TIP | TYPE | LENGTH OF CUT | | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $A_1$ $^{+0°30'}_{-0°30'}$ | $D_2$ | | $T_{(MAX.)}$ | | $L_2$ | $L_{4\ (MAX.)}$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | 41° | 1/4 | 4 | .060 | II | .109 | .035 | 2-1/2 | 842441 | 72.20 | 842441-C3 | 80.30 |
| | | 3/8 | 4 | .060 | II | .181 | .035 | 2-1/2 | 833641 | 101.10 | 833641-C3 | 112.50 |
| | | 1/2 | 4 | .080 | II | .242 | .046 | 3 | 18641 | 119.50 | 18641-C3 | 135.00 |
| | 45° | 1/8 | 2 | .010 | I | .063 | | 1-1/2 | 988445 | 37.40 | 988445-C3 | 43.30 |
| | | 1/8 | 3 | .040 | II | .043 | .020 | 1-1/2 | 873945 | 47.60 | 873945-C3 | 53.60 |
| NEW | | 1/8 | 4 | .010 | I | .058 | | 1-1/2 | 693545 | 39.20 | 693545-C3 | 45.20 |
| | | 1/8 | 4 | .040 | II | .043 | .020 | 1-1/2 | 808245 | 49.90 | 808245-C3 | 55.80 |
| | | 1/8 | 4 | .040 | III | .043 | .020 | 1-1/2 | 794245 | 53.60 | 794245-C3 | 61.00 |
| | | 3/16 | 2 | .010 | I | .094 | | 2 | 902345 | 37.40 | 902345-C3 | 46.00 |
| | | 3/16 | 3 | .040 | II | .074 | .020 | 2 | 897145 | 47.60 | 897145-C3 | 56.30 |
| NEW | | 3/16 | 4 | .010 | I | .089 | | 2 | 693445 | 39.20 | 693445-C3 | 45.50 |
| | | 3/16 | 4 | .040 | II | .074 | .020 | 2 | 808145 | 50.30 | 808145-C3 | 56.60 |
| | | 3/16 | 4 | .040 | III | .073 | .020 | 2 | 754545 | 53.70 | 754545-C3 | 59.90 |
| | | 1/4 | 2 | .010 | I | .125 | | 2-1/2 | 977645 | 57.50 | 977645-C3 | 69.30 |
| | | 1/4 | 3 | .060 | II | .095 | .030 | 2-1/2 | 891045 | 66.60 | 891045-C3 | 78.10 |
| NEW | | 1/4 | 4 | .010 | I | .120 | | 2-1/2 | 693345 | 59.40 | 693345-C3 | 67.50 |
| | | 1/4 | 4 | .060 | II | .095 | .030 | 2-1/2 | 842445 | 72.20 | 842445-C3 | 83.80 |
| | | 1/4 | 4 | .040 | III | .105 | .020 | 2-1/2 | 790045 | 73.90 | 790045-C3 | 85.50 |
| | | 5/16 | 3 | .060 | II | .126 | .030 | 2-1/2 | 966645 | 73.50 | 966645-C3 | 84.00 |
| | | 3/8 | 2 | .010 | I | .188 | | 2-1/2 | 998345 | 86.80 | 998345-C3 | 98.60 |
| | | 3/8 | 3 | .060 | II | .158 | .030 | 2-1/2 | 934045 | 93.60 | 934045-C3 | 105.90 |
| NEW | | 3/8 | 4 | .010 | I | .183 | | 2-1/2 | 693245 | 88.60 | 693245-C3 | 100.10 |
| | | 3/8 | 4 | .060 | II | .158 | .030 | 2-1/2 | 833645 | 101.10 | 833645-C3 | 118.40 |
| | | 3/8 | 4 | .040 | III | .167 | .030 | 2-1/2 | 752845 | 104.70 | 752845-C3 | 122.00 |
| | | 1/2 | 2 | .010 | I | .250 | | 3 | 905845 | 117.30 | 905845-C3 | 133.60 |
| NEW | | 1/2 | 4 | .010 | I | .245 | | 3 | 693145 | 119.20 | 693145-C3 | 134.70 |
| | | 1/2 | 4 | .080 | II | .210 | .040 | 3 | 18645 | 117.80 | 18645-C3 | 135.00 |
| | | 1/2 | 4 | .080 | III | .210 | .040 | 3 | 788045 | 125.10 | 788045-C3 | 141.00 |
| | | 5/8 | 4 | .080 | II | .273 | .040 | 3-1/2 | 976445 | 170.40 | 976445-C3 | 195.80 |
| | | 3/4 | 4 | .100 | II | .325 | .050 | 4 | 984645 | 216.60 | 984645-C3 | 239.70 |
| | 50° | 1/8 | 2 | .010 | I | .052 | | 1-1/2 | 988450 | 37.40 | 988450-C3 | 43.30 |
| | | 1/4 | 2 | .010 | I | .105 | | 2-1/2 | 977650 | 58.80 | 977650-C3 | 70.30 |
| | | 1/4 | 3 | .060 | II | .080 | .025 | 2-1/2 | 891050 | 70.10 | 891050-C3 | 81.70 |
| | | 3/8 | 2 | .010 | I | .157 | | 2-1/2 | 998350 | 88.30 | 998350-C3 | 100.20 |
| | | 3/8 | 3 | .060 | II | .132 | .025 | 2-1/2 | 934050 | 98.10 | 934050-C3 | 109.50 |
| | | 1/2 | 2 | .010 | I | .210 | | 3 | 905850 | 117.30 | 905850-C3 | 133.60 |
| | | 1/2 | 4 | .080 | II | .173 | .034 | 3 | 18650 | 123.70 | 18650-C3 | 139.60 |
| | 60° | 1/8 | 2 | .010 | I | .036 | | 1-1/2 | 988460 | 37.40 | 988460-C3 | 43.30 |
| | | 3/16 | 2 | .010 | I | .054 | | 2 | 902360 | 37.40 | 902360-C3 | 46.00 |
| | | 1/4 | 2 | .010 | I | .072 | | 2-1/2 | 977660 | 57.50 | 977660-C3 | 69.30 |
| | | 1/4 | 3 | .060 | II | .055 | .017 | 2-1/2 | 891060 | 66.60 | 891060-C3 | 78.10 |
| | | 3/8 | 2 | .010 | I | .108 | | 2-1/2 | 998360 | 86.80 | 998360-C3 | 98.60 |
| | | 3/8 | 3 | .060 | II | .091 | .017 | 2-1/2 | 934060 | 93.60 | 934060-C3 | 105.90 |
| | | 1/2 | 2 | .010 | I | .144 | | 3 | 905860 | 117.30 | 905860-C3 | 132.90 |
| | | 1/2 | 4 | .080 | II | .121 | .023 | 3 | 18660 | 117.80 | 18660-C3 | 135.00 |

NEW SIZES!

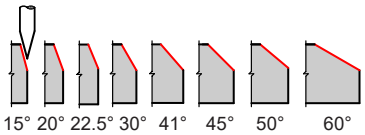
# CHAMFER CUTTERS

## Pointed & Flat End – Helical Flutes

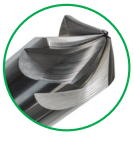





- **Specialized helical flute design for superior performance**
- Free cutting action provides excellent surface finish and chip evacuation
- Choose from three types:
  - Pointed (Type I): Used for deburring and chamfering in narrow grooves, slots and small holes
  - Flat End (Type II): (non-cutting) Improves tool life for profiling and chamfering larger features
  - End Cutting (Type III): Center cutting geometry to blend the floor and a chamfered wall in a single pass
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

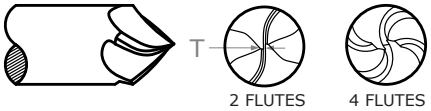



Stocked in Eight Angles Per Side!

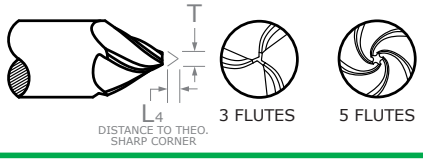


Free Cutting Action for Excellent Surface Finish

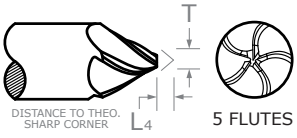
**TYPE I - POINTED** Flat relief ground to center, yielding a web thickness at tip (T)




**TYPE II - FLAT END** Flat relief ground to a *non-end cutting* flat tip (T)




**TYPE III - END CUTTING**
Flat relief ground to an end cutting tip diameter (T), one flute to center




| ANGLE PER SIDE | DIAMETER | FLUTES | TIP | TYPE | LENGTH OF CUT | OAL | | UNCOATED | | AlTiN COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°15'}_{-0°15'}$ | $D_2$ (h6) | | T* | | $L_2$ | $L_4$ (MAX.) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | |
| 15° | 1/8 | 3 | .040 | II | .159 | .078 | 1-1/2 | 831308 | 27.50 | 831308-C3 | 33.40 | |
| | 1/4 | 3 | .060 | II | .355 | .116 | 2-1/2 | 831316 | 47.00 | 831316-C3 | 54.90 | |
| | 1/4 | 5 | .060 | II | .355 | .116 | 2-1/2 LONG! | 832516 | 49.70 | 832516-C3 | 57.50 | |
| | 3/8 | 3 | .070 | II | .569 | .134 | 2-1/2 | 831324 | 64.10 | 831324-C3 | 73.50 | |
| | 3/8 | 5 | .070 | II | .569 | .134 | 2-1/2 | 832524 | 65.50 | 832524-C3 | 75.90 | |
| | 1/2 | 3 | .080 | II | .784 | .153 | 3 | 831332 | 90.00 | 831332-C3 | 102.70 | |
| | 1/2 | 5 | .080 | II | .784 | .153 | 3 | 832532 | 90.90 | 832532-C3 | 105.50 | |
| 20° | 1/8 | 3 | .040 | II | .117 | .085 | 1-1/2 | 844608 | 27.50 | 844608-C3 | 33.40 | |
| | 1/4 | 3 | .060 | II | .261 | .085 | 2-1/2 | 844616 | 47.00 | 844616-C3 | 54.90 | |
| | 1/4 | 5 | .060 | II | .261 | .085 | 2-1/2 | 851416 | 50.70 | 851416-C3 | 57.50 | |
| | 1/4 | 5 | .060 | III | .261 | .085 | 2-1/2 | 713916 | 49.80 | 713916-C3 | 57.90 | NEW |
| | 3/8 | 3 | .070 | II | .419 | .099 | 2-1/2 | 844624 | 62.90 | 844624-C3 | 73.50 | |
| | 3/8 | 5 | .070 | II | .419 | .099 | 2-1/2 | 851424 | 66.70 | 851424-C3 | 75.90 | |
| | 3/8 | 5 | .070 | III | .153 | .099 | 2-1/2 | 713924 | 68.90 | 713924-C3 | 80.30 | |
| | 1/2 | 3 | .080 | II | .577 | .113 | 3 | 844632 | 88.20 | 844632-C3 | 102.70 | |
| | 1/2 | 5 | .080 | II | .577 | .113 | 3 | 851432 | 90.90 | 851432-C3 | 105.50 | |

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

continued on next page

# CHAMFER CUTTERS

## Pointed & Flat End – Helical Flutes (cont.)

continued from previous page

| ANGLE PER SIDE | DIAMETER | FLUTES | TIP | TYPE | LENGTH OF CUT | OAL | | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°15'}_{-0°15'}$ | $D_2$ (h6) | | T* | | $L_2$ | $L_4$ (MAX.) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 22.5° | 1/8 | 3 | .040 | II | .103 | .051 | 1-1/2 | 700308 | 29.10 | 700308-C3 | 35.00 |
| | 1/4 | 3 | .060 | II | .229 | .075 | 2-1/2 | 700316 | 49.60 | 700316-C3 | 57.70 |
| | 1/4 | 5 | .060 | II | .229 | .075 | 2-1/2 | 700216 | 53.50 | 700216-C3 | 61.60 |
| | 3/8 | 3 | .070 | II | .368 | .087 | 2-1/2 | 700324 | 66.30 | 700324-C3 | 77.70 |
| | 3/8 | 5 | .070 | II | .368 | .087 | 2-1/2 | 700224 | 70.50 | 700224-C3 | 81.90 |
| | 1/2 | 3 | .080 | II | .507 | .099 | 3 | 700332 | 93.10 | 700332-C3 | 108.70 |
| | 1/2 | 5 | .080 | II | .507 | .099 | 3 | 700232 | 96.00 | 700232-C3 | 111.60 |
| 30° | 1/8 | 2 | .010 | I | .100 | | 1-1/2 | 900108 | 27.50 | 900108-C3 | 33.20 |
| | 1/8 | 3 | .040 | II | .074 | .036 | 1-1/2 | 916508 | 28.10 | 916508-C3 | 33.80 |
| | 1/8 | 4 | .010 | I | .100 | | 1-1/2 | 889708 | 30.30 | 889708-C3 | 36.20 |
| | 1/8 | 5 | .040 | II | .074 | .036 | 1-1/2 | 899008 | 30.30 | 899008-C3 | 35.80 |
| | 3/16 | 2 | .010 | I | .154 | | 2 | 900112 | 38.10 | 900112-C3 | 43.10 |
| | 3/16 | 3 | .050 | II | .119 | .045 | 2 | 916512 | 38.10 | 916512-C3 | 43.10 |
| | 3/16 | 4 | .010 | I | .154 | | 2 | 889712 | 39.80 | 889712-C3 | 45.70 |
| | 3/16 | 5 | .050 | II | .119 | .045 | 2 | 899012 | 40.60 | 899012-C3 | 45.70 |
| | 1/4 | 2 | .010 | I | .208 | | 2-1/2 | 900116 | 47.00 | 900116-C3 | 54.90 |
| | 1/4 | 3 | .060 | II | .164 | .054 | 2-1/2 | 916516 | 43.40 | 916516-C3 | 50.80 |
| | 1/4 | 4 | .010 | I | .208 | | 2-1/2 | 889716 | 49.70 | 889716-C3 | 57.50 |
| | 1/4 | 5 | .060 | II | .164 | .054 | 2-1/2 | 899016 | 47.40 | 899016-C3 | 53.10 |
| | 1/4 | 5 | .060 | III | .165 | .054 | 2-1/2 | 714016 | 49.80 | 714016-C3 | 55.70 |
| | 3/8 | 2 | .010 | I | .316 | | 2-1/2 | 900124 | 62.90 | 900124-C3 | 73.50 |
| | 3/8 | 3 | .070 | II | .264 | .062 | 2-1/2 | 916524 | 58.20 | 916524-C3 | 68.00 |
| | 3/8 | 4 | .010 | I | .316 | | 2-1/2 | 889724 | 62.90 | 889724-C3 | 73.50 |
| | 3/8 | 5 | .070 | II | .264 | .062 | 2-1/2 | 899024 | 58.20 | 899024-C3 | 68.00 |
| NEW | 3/8 | 5 | .070 | III | .264 | .062 | 2-1/2 | 714024 | 59.10 | 714024-C3 | 70.50 |
| | 1/2 | 2 | .010 | I | .424 | | 3 | 900132 | 88.20 | 900132-C3 | 102.70 |
| | 1/2 | 3 | .080 | II | .364 | .071 | 3 | 916532 | 81.60 | 916532-C3 | 95.10 |
| | 1/2 | 4 | .010 | I | .424 | | 3 | 889732 | 88.20 | 889732-C3 | 102.70 |
| | 1/2 | 5 | .080 | II | .364 | .071 | 3 | 899032 | 81.60 | 899032-C3 | 95.10 |
| | 5/8 | 3 | .090 | II | .463 | .080 | 3 | 916540 | 84.10 | 916540-C3 | 97.70 |
| | 5/8 | 5 | .090 | II | .463 | .080 | 3 | 899040 | 147.40 | 899040-C3 | 157.90 |
| | 3/4 | 3 | .100 | II | .562 | .088 | 3 | 916548 | 208.80 | 916548-C3 | 225.20 |
| | 3/4 | 4 | .015 | I | .637 | | 3 | 889748 | 219.40 | 889748-C3 | 241.10 |
| | 3/4 | 5 | .100 | II | .562 | .088 | 3 | 899048 | 211.60 | 899048-C3 | 221.50 |
| 41° | 1/4 | 5 | .060 | II | .109 | .036 | 2-1/2 | 738216 | 49.80 | 738216-C3 | 57.90 |
| | 3/8 | 5 | .070 | II | .153 | .041 | 2-1/2 | 738224 | 61.10 | 738224-C3 | 72.60 |
| | 1/2 | 5 | .080 | II | .210 | .047 | 3 | 738232 | 85.20 | 738232-C3 | 100.80 |

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

continued on next page

NEW SIZES!

# CHAMFER CUTTERS

## Pointed & Flat End – Helical Flutes (cont.)

continued from previous page



| ANGLE PER SIDE | DIAMETER | FLUTES | TIP | TYPE | LENGTH OF CUT | | OAL | | UNCOATED | | AlTiN COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°15'}_{-0°15'}$ | $D_2$ (h6) | | T* | | $L_2$ | $L_4$ (MAX.) | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | |
| 45° | 1/8 | 2 | .010 | I | .058 | | 1-1/2 | | 860508 | 27.50 | 860508-C3 | 30.70 | |
| | 1/8 | 3 | .040 | II | .043 | .021 | 1-1/2 | | 897208 | 27.50 | 897208-C3 | 33.20 | |
| | 1/8 | 4 | .010 | I | .058 | | 1-1/2 | | 859708 | 30.30 | 859708-C3 | 36.20 | |
| | 1/8 | 4 | .010 | I | .058 | | 3 | LONG! | 765008 | 33.50 | 765008-C3 | 39.40 | |
| | 1/8 | 5 | .040 | II | .043 | .021 | 1-1/2 | | 908408 | 30.30 | 908408-C3 | 35.80 | |
| | 1/8 | 5 | .040 | II | .043 | .021 | 3 | LONG! | 789008 | 33.50 | 789008-C3 | 39.40 | |
| | 1/8 | 5 | .040 | III | .043 | .021 | 1-1/2 | | 773608 | 30.30 | 773608-C3 | 36.20 | |
| | 3/16 | 2 | .010 | I | .089 | | 2 | | 860512 | 37.40 | 860512-C3 | 43.10 | |
| | 3/16 | 3 | .050 | II | .069 | .026 | 2 | | 897212 | 37.40 | 897212-C3 | 43.10 | |
| | 3/16 | 4 | .010 | I | .089 | | 2 | | 859712 | 39.80 | 859712-C3 | 45.70 | |
| | 3/16 | 5 | .050 | II | .069 | .026 | 2 | | 908412 | 39.80 | 908412-C3 | 45.70 | |
| | 3/16 | 5 | .050 | III | .069 | .026 | 2 | | 773612 | 39.80 | 773612-C3 | 46.00 | |
| | 1/4 | 2 | .010 | I | .120 | | 2-1/2 | | 860516 | 47.00 | 860516-C3 | 54.90 | |
| | 1/4 | 3 | .060 | II | .095 | .031 | 2-1/2 | | 897216 | 43.40 | 897216-C3 | 50.80 | |
| | 1/4 | 3 | .060 | II | .095 | .031 | 4 | LONG! | 765316 | 57.30 | 765316-C3 | 65.90 | |
| | 1/4 | 4 | .010 | I | .120 | | 2-1/2 | | 859716 | 49.70 | 859716-C3 | 57.50 | |
| | 1/4 | 4 | .010 | I | .120 | | 4 | LONG! | 765016 | 56.40 | 765016-C3 | 66.60 | |
| | 1/4 | 5 | .060 | II | .095 | .031 | 2-1/2 | | 908416 | 46.00 | 908416-C3 | 53.10 | |
| | 1/4 | 5 | .060 | II | .095 | .031 | 4 | LONG! | 789016 | 56.40 | 789016-C3 | 66.60 | |
| | 1/4 | 5 | .060 | III | .095 | .031 | 2-1/2 | | 773616 | 47.90 | 773616-C3 | 56.50 | |
| | 5/16 | 3 | .060 | II | .126 | .031 | 2-1/2 | | 897220 | 57.20 | 897220-C3 | 67.50 | |
| | 5/16 | 4 | .010 | I | .151 | | 2-1/2 | | 859720 | 62.90 | 859720-C3 | 72.60 | NEW |
| | 5/16 | 5 | .060 | II | .126 | .031 | 2-1/2 | | 908420 | 57.20 | 908420-C3 | 67.50 | |
| | 5/16 | 5 | .060 | III | .126 | .031 | 2-1/2 | | 773620 | 59.10 | 773620-C3 | 68.70 | NEW |
| | 3/8 | 2 | .010 | I | .183 | | 2-1/2 | | 860524 | 62.90 | 860524-C3 | 73.50 | |
| | 3/8 | 3 | .070 | II | .153 | .036 | 2-1/2 | | 897224 | 58.20 | 897224-C3 | 68.00 | |
| | 3/8 | 4 | .010 | I | .183 | | 2-1/2 | | 859724 | 62.90 | 859724-C3 | 73.50 | |
| | 3/8 | 5 | .070 | II | .153 | .036 | 2-1/2 | | 908424 | 58.20 | 908424-C3 | 68.00 | |
| | 3/8 | 5 | .070 | II | .153 | .036 | 4 | LONG! | 789024 | 56.40 | 789024-C3 | 72.10 | |
| | 3/8 | 5 | .070 | III | .153 | .036 | 2-1/2 | | 773624 | 59.10 | 773624-C3 | 70.50 | |
| | 1/2 | 2 | .010 | I | .245 | | 3 | | 860532 | 88.20 | 860532-C3 | 102.70 | |
| | 1/2 | 3 | .080 | II | .210 | .041 | 3 | | 897232 | 81.60 | 897232-C3 | 95.10 | |
| | 1/2 | 4 | .010 | I | .245 | | 3 | | 859732 | 88.20 | 859732-C3 | 102.70 | |
| | 1/2 | 5 | .080 | II | .210 | .041 | 3 | | 908432 | 81.60 | 908432-C3 | 95.10 | |
| | 1/2 | 5 | .080 | III | .210 | .041 | 3 | | 773632 | 84.80 | 773632-C3 | 102.10 | |
| | 5/8 | 3 | .090 | II | .268 | .046 | 3 | | 897240 | 144.70 | 897240-C3 | 155.20 | |
| | 5/8 | 5 | .090 | II | .268 | .046 | 3 | | 908440 | 143.20 | 908440-C3 | 157.90 | |
| | 3/4 | 3 | .100 | II | .325 | .051 | 3 | | 897248 | 202.80 | 897248-C3 | 225.20 | |
| | 3/4 | 4 | .015 | I | .368 | | 3 | | 859748 | 219.40 | 859748-C3 | 236.60 | |
| | 3/4 | 5 | .100 | II | .325 | .051 | 3 | | 908448 | 205.50 | 908448-C3 | 221.50 | |

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

continued on next page

# CHAMFER CUTTERS

## Pointed & Flat End – Helical Flutes (cont.)

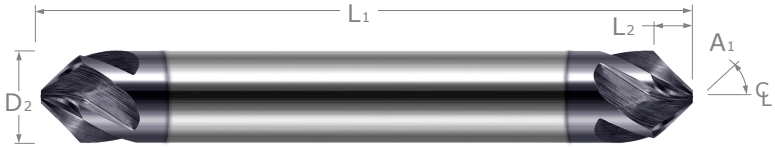
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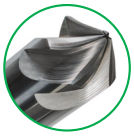
| ANGLE PER SIDE | DIAMETER | FLUTES | TIP | TYPE | LENGTH OF CUT | | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°15'}_{-0°15'}$ | $D_2$ (h6) | | T* | | $L_2$ | $L_4$ (MAX.) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 50° | 1/4 | 3 | .060 | II | .080 | .026 | 2-1/2 | 875016 | 47.00 | 875016-C3 | 54.90 |
| | 1/4 | 5 | .060 | II | .080 | .026 | 2-1/2 | 871116 | 50.70 | 871116-C3 | 57.50 |
| | 3/8 | 3 | .070 | II | .128 | .030 | 2-1/2 | 875024 | 62.90 | 875024-C3 | 73.50 |
| | 3/8 | 5 | .070 | II | .128 | .030 | 2-1/2 | 871124 | 65.50 | 871124-C3 | 75.90 |
| | 1/2 | 3 | .080 | II | .176 | .034 | 3 | 875032 | 88.20 | 875032-C3 | 102.70 |
| | 1/2 | 5 | .080 | II | .176 | .034 | 3 | 871132 | 92.80 | 871132-C3 | 105.50 |
| 60° | 1/8 | 2 | .010 | I | .033 | | 1-1/2 | 872108 | 30.30 | 872108-C3 | 35.80 |
| | 1/8 | 4 | .010 | I | .033 | | 1-1/2 | 888808 | 30.30 | 888808-C3 | 36.20 |
| | 1/8 | 5 | .040 | II | .025 | .012 | 1-1/2 | 867608 | 30.30 | 867608-C3 | 36.20 |
| | 3/16 | 2 | .010 | I | .051 | | 2 | 872112 | 38.10 | 872112-C3 | 44.00 |
| | 3/16 | 4 | .010 | I | .051 | | 2 | 888812 | 38.10 | 888812-C3 | 43.10 |
| | 1/4 | 2 | .010 | I | .069 | | 2-1/2 | 872116 | 47.00 | 872116-C3 | 56.20 |
| | 1/4 | 3 | .060 | II | .057 | .018 | 2-1/2 | 863416 | 44.60 | 863416-C3 | 50.80 |
| | 1/4 | 4 | .010 | I | .069 | | 2-1/2 | 888816 | 49.70 | 888816-C3 | 57.50 |
| | 1/4 | 5 | .060 | II | .057 | .018 | 2-1/2 | 867616 | 47.40 | 867616-C3 | 53.10 |
| NEW | 1/4 | 5 | .060 | III | .095 | .018 | 2-1/2 | 693016 | 47.90 | 693016-C3 | 55.90 |
| | 3/8 | 2 | .010 | I | .105 | | 2-1/2 | 872124 | 64.10 | 872124-C3 | 74.90 |
| | 3/8 | 3 | .070 | II | .091 | .021 | 2-1/2 | 863424 | 58.20 | 863424-C3 | 68.00 |
| | 3/8 | 4 | .010 | I | .105 | | 2-1/2 | 888824 | 66.70 | 888824-C3 | 75.90 |
| | 3/8 | 5 | .070 | II | .091 | .021 | 2-1/2 | 867624 | 62.40 | 867624-C3 | 70.40 |
| | 1/2 | 2 | .010 | I | .141 | | 3 | 872132 | 88.20 | 872132-C3 | 104.70 |
| | 1/2 | 3 | .080 | II | .126 | .024 | 3 | 863432 | 84.00 | 863432-C3 | 97.90 |
| | 1/2 | 4 | .010 | I | .141 | | 3 | 888832 | 88.20 | 888832-C3 | 102.70 |
| | 1/2 | 5 | .080 | II | .126 | .024 | 3 | 867632 | 86.60 | 867632-C3 | 97.70 |
| NEW | 1/2 | 5 | .080 | III | .210 | .024 | 3 | 693032 | 84.80 | 693032-C3 | 100.40 |
| | 5/8 | 3 | .090 | II | .157 | .027 | 3 | 863440 | 144.70 | 863440-C3 | 159.70 |
| | 5/8 | 5 | .090 | II | .157 | .027 | 3 | 867640 | 147.40 | 867640-C3 | 157.90 |
| | 3/4 | 3 | .100 | II | .195 | .029 | 3 | 863448 | 208.80 | 863448-C3 | 225.20 |
| | 3/4 | 4 | .015 | I | .212 | | 3 | 888848 | 223.60 | 888848-C3 | 236.60 |
| | 3/4 | 5 | .100 | II | .195 | .029 | 3 | 867648 | 211.60 | 867648-C3 | 227.80 |

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

# CHAMFER CUTTERS

## Pointed & Flat End – Helical Flutes – Double-Ended



Free Cutting Action for Excellent Surface Finish

- **Specialized helical flute design for superior performance**
- Double-ended
- Free cutting action provides excellent surface finish and chip evacuation
- Offered in Type I pointed and Type II flat end (non-cutting) styles
- 4 and 5 flute options
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



30° 45°
Stocked in Two Angles Per Side!



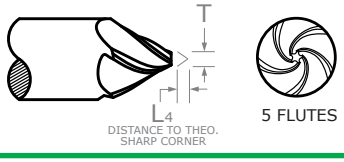
| ANGLE PER SIDE | DIAMETER | FLUTES | TIP | TYPE | LENGTH OF CUT | | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°15'}_{-0°15'}$ | $D_2$ (h6) | | T* | | $L_2$ | $L_4$ (MAX.) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 30° | 1/4 | 5 | .060 | II | .165 | .054 | 2-1/2 | 722116 | 65.40 | 722116-C3 | 73.50 |
| | 3/8 | 5 | .070 | II | .264 | .062 | 2-1/2 | 722124 | 80.00 | 722124-C3 | 91.40 |
| | 1/2 | 5 | .080 | II | .364 | .071 | 3 | 722132 | 112.40 | 722132-C3 | 128.00 |
| 45° | 1/8 | 4 | .010 | I | .058 | | 1-1/2 | 785008 | 47.00 | 785008-C3 | 52.90 |
| | 1/8 | 5 | .040 | II | .043 | .021 | 1-1/2 | 784908 | 44.30 | 784908-C3 | 50.20 |
| | 1/4 | 4 | .010 | I | .120 | | 2-1/2 | 785016 | 70.40 | 785016-C3 | 78.50 |
| | 1/4 | 5 | .060 | II | .095 | .031 | 2-1/2 | 784916 | 67.70 | 784916-C3 | 75.80 |
| | 3/8 | 4 | .010 | I | .183 | | 2-1/2 | 785024 | 86.70 | 785024-C3 | 98.50 |
| | 3/8 | 5 | .070 | II | .153 | .036 | 2-1/2 | 784924 | 80.00 | 784924-C3 | 92.80 |
| | 1/2 | 4 | .010 | I | .245 | | 3 | 785032 | 121.50 | 785032-C3 | 137.60 |
| | 1/2 | 5 | .080 | II | .210 | .041 | 3 | 784932 | 112.40 | 784932-C3 | 129.80 |

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

**TYPE I - POINTED** Flat relief ground to center, yielding a web thickness at tip (T)

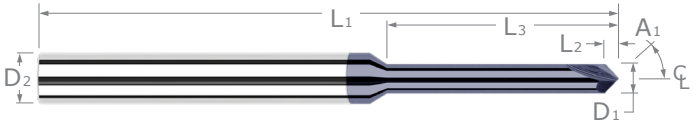


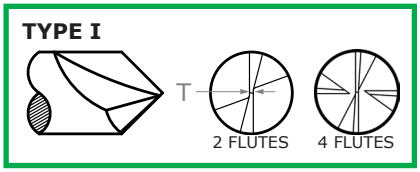

**TYPE II - FLAT END** Flat relief ground to a *non-end cutting* flat tip (T)

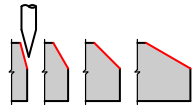


# CHAMFER CUTTERS

## Pointed – Long Reach




Stocked in Four Angles Per Side!

- **Reduced diameter for clearance along walls and in small features**
- Type I pointed style ground to a point, yielding web thickness at tip (T)
- Available in multiple reaches and reduced diameters
- 2 and 4 flutes
- Solid carbide
- CNC ground in the USA

| ANGLE PER SIDE | NECK DIAMETER | OVERALL REACH | LENGTH OF CUT | TIP | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | | AlTiN COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_1$ $^{+.000"}_{-.001"}$ | $L_3$ $^{+.010"}_{-.000"}$ | $L_2$ | T (MAX.) | $D_2$ | $L_1$ | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ |
| 15° | .031 (1/32) | .156 (5x) | .058 | .005 | 1/8 | 2-1/2 | 56815 | | 33.60 | 56815-C3 | | 39.50 |
| | .031 (1/32) | .250 (8x) | .058 | .005 | 1/8 | 2-1/2 | 57215 | | 36.50 | 57215-C3 | | 42.50 |
| | .062 (1/16) | .312 (5x) | .116 | .006 | 1/8 | 2-1/2 | 54715 | | 33.60 | 54715-C3 | | 39.50 |
| | .062 (1/16) | .500 (8x) | .116 | .006 | 1/8 | 2-1/2 | 55615 | | 36.50 | 55615-C3 | | 42.50 |
| | .093 (3/32) | .500 (5x) | .174 | .006 | 1/8 | 2-1/2 | 52115 | | 33.90 | 52115-C3 | | 39.90 |
| | .093 (3/32) | .750 (8x) | .174 | .006 | 1/8 | 2-1/2 | 53515 | | 36.80 | 53515-C3 | | 42.80 |
| 30° | .031 (1/32) | .093 (3x) | .027 | .005 | 1/8 | 1-1/2 | 994830 | | 31.60 | 994830-C3 | | 37.50 |
| | .031 (1/32) | .156 (5x) | .027 | .005 | 1/8 | 2-1/2 | 56830 | | 33.90 | 56830-C3 | | 39.90 |
| | .031 (1/32) | .250 (8x) | .027 | .005 | 1/8 | 2-1/2 | 57230 | | 36.50 | 57230-C3 | | 42.50 |
| | .047 (3/64) | .140 (3x) | .041 | .005 | 1/8 | 1-1/2 | 911030 | | 31.80 | 911030-C3 | | 37.70 |
| | .047 (3/64) | .250 (5x) | .041 | .005 | 1/8 | 2-1/2 | 996830 | | 33.30 | 996830-C3 | | 39.20 |
| | .047 (3/64) | .375 (8x) | .041 | .005 | 1/8 | 2-1/2 | 999230 | | 33.60 | 999230-C3 | | 39.50 |
| | .062 (1/16) | .187 (3x) | .054 | .006 | 1/8 | 1-1/2 | 998930 | | 31.60 | 998930-C3 | | 37.50 |
| | .062 (1/16) | .312 (5x) | .054 | .006 | 1/8 | 2-1/2 | 54730 | | 33.60 | 54730-C3 | | 39.50 |
| | .062 (1/16) | .500 (8x) | .054 | .006 | 1/8 | 2-1/2 | 55630 | | 36.50 | 55630-C3 | | 42.50 |
| | .078 (5/64) | .406 (5x) | .068 | .006 | 1/8 | 2-1/2 | 996930 | | 33.30 | 996930-C3 | | 39.20 |
| | .093 (3/32) | .279 (3x) | .081 | .006 | 1/8 | 1-1/2 | 995330 | | 31.80 | 995330-C3 | | 37.70 |
| | .093 (3/32) | .500 (5x) | .081 | .006 | 1/8 | 2-1/2 | 52130 | | 33.60 | 52130-C3 | | 39.50 |
| | .093 (3/32) | .750 (8x) | .081 | .006 | 1/8 | 2-1/2 | 53530 | | 36.80 | 53530-C3 | | 42.80 |
| 45° | .015 (1/64) | .078 (5x) | .008 | .003 | 1/8 | 2-1/2 | 997545 | | 38.40 | 997545-C3 | | 44.30 |
| | .015 (1/64) | .125 (8x) | .008 | .003 | 1/8 | 2-1/2 | 995945 | | 42.80 | 995945-C3 | | 48.70 |
| | .020 | .060 (3x) | .010 | .003 | 1/8 | 1-1/2 | 794045 | | 37.70 | 794045-C3 | | 43.60 |
| | .020 | .100 (5x) | .010 | .003 | 1/8 | 2-1/2 | 940245 | | 37.70 | 940245-C3 | | 43.60 |
| | .020 | .160 (8x) | .010 | .003 | 1/8 | 2-1/2 | 948545 | | 42.10 | 948545-C3 | | 48.10 |
| | .020 | .200 (10x) | .010 | .003 | 1/8 | 2-1/2 | 765545 | | 44.20 | 765545-C3 | | 50.10 |
| | .025 | .125 (5x) | .013 | .003 | 1/8 | 2-1/2 | 821945 | | 37.70 | 821945-C3 | | 43.60 |
| | .031 (1/32) | .093 (3x) | .016 | .005 | 1/8 | 1-1/2 | 994845 | | 32.00 | 994845-C3 | | 37.90 |
| | .031 (1/32) | .125 (4x) | .016 | .005 | 1/8 | 2-1/2 | 862745 | | 33.90 | 862745-C3 | | 39.90 |
| | .031 (1/32) | .156 (5x) | .016 | .005 | 1/8 | 2-1/2 | 56845 | | 33.60 | 56845-C3 | | 39.50 |
| | .031 (1/32) | .187 (6x) | .016 | .005 | 1/8 | 2-1/2 | 870845 | | 35.40 | 870845-C3 | | 41.30 |
| | .031 (1/32) | .218 (7x) | .016 | .005 | 1/8 | 2-1/2 | 855445 | | 35.40 | 855445-C3 | | 41.30 |
| | .031 (1/32) | .250 (8x) | .016 | .005 | 1/8 | 2-1/2 | 57245 | | 36.50 | 57245-C3 | | 42.50 |
| | .031 (1/32) | .312 (10x) | .016 | .005 | 1/8 | 2-1/2 | 838445 | | 38.50 | 838445-C3 | | 44.40 |
| | .031 (1/32) | .375 (12x) | .016 | .005 | 1/8 | 2-1/2 | 998245 | | 40.70 | 998245-C3 | | 46.60 |
| | .031 (1/32) | .470 (15x) | .016 | .005 | 1/8 | 2-1/2 | 918245 | | 43.90 | 918245-C3 | | 49.80 |
| | .039 | .203 (5x) | .020 | .005 | 1/8 | 2-1/2 | 788445 | | 33.80 | 788445-C3 | | 39.80 |
| | .039 | .325 (8x) | .020 | .005 | 1/8 | 2-1/2 | 725245 | | 36.50 | 725245-C3 | | 42.50 |

continued on next page

NEW SIZES!

# CHAMFER CUTTERS

## Pointed Long Reach (cont.)

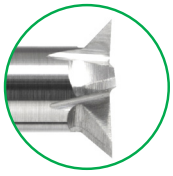
continued from previous page

| ANGLE PER SIDE | NECK DIAMETER | OVERALL REACH | LENGTH OF CUT | TIP | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | | AlTiN COATED | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $D_1$ $^{+.000"}_{-.001"}$ | $L_3$ $^{+.010"}_{-.000"}$ | $L_2$ | T (MAX.) | $D_2$ | $L_1$ | 2 FL | 4 FL | USD$ | 2 FL | 4 FL | USD$ | |
| 45° | .040 | .203 (5x) | .020 | .005 | 1/8 | 2-1/2 | 830645 | | 33.80 | 830645-C3 | | 39.80 | |
| | .047 (3/64) | .141 (3x) | .024 | .005 | 1/8 | 1-1/2 | 911045 | | 31.20 | 911045-C3 | | 37.20 | |
| | .047 (3/64) | .187 (4x) | .024 | .005 | 1/8 | 2-1/2 | 788745 | | 32.40 | 788745-C3 | | 38.30 | |
| | .047 (3/64) | .250 (5x) | .024 | .005 | 1/8 | 2-1/2 | 996845 | 692745 | 33.80 | 996845-C3 | 692745-C3 | 39.80 | NEW |
| | .047 (3/64) | .281 (6x) | .024 | .005 | 1/8 | 2-1/2 | 772545 | | 35.50 | 772545-C3 | | 41.40 | |
| | .047 (3/64) | .375 (8x) | .024 | .005 | 1/8 | 2-1/2 | 999245 | | 36.50 | 999245-C3 | | 42.50 | |
| | .047 (3/64) | .570 (12x) | .024 | .005 | 1/8 | 2-1/2 | 919045 | | 39.90 | 919045-C3 | | 45.80 | |
| | .047 (3/64) | .710 (15x) | .024 | .005 | 1/8 | 2-1/2 | 725345 | | 43.90 | 725345-C3 | | 49.80 | |
| | .050 | .250 (5x) | .025 | .005 | 1/8 | 2-1/2 | 788645 | | 33.60 | 788645-C3 | | 39.50 | |
| | .060 | .312 (5x) | .030 | .006 | 1/8 | 2-1/2 | 788545 | | 33.90 | 788545-C3 | | 39.90 | |
| | .062 (1/16) | .187 (3x) | .031 | .006 | 1/8 | 1-1/2 | 998945 | | 32.00 | 998945-C3 | | 37.90 | |
| | .062 (1/16) | .250 (4x) | .031 | .006 | 1/8 | 2-1/2 | 853945 | | 33.60 | 853945-C3 | | 39.50 | |
| | .062 (1/16) | .312 (5x) | .031 | .006 | 1/8 | 2-1/2 | 54745 | 692645 | 33.60 | 54745-C3 | 692645-C3 | 39.50 | NEW |
| | .062 (1/16) | .375 (6x) | .031 | .006 | 1/8 | 2-1/2 | 846045 | | 35.10 | 846045-C3 | | 41.00 | |
| | .062 (1/16) | .437 (7x) | .031 | .006 | 1/8 | 2-1/2 | 869745 | | 35.10 | 869745-C3 | | 41.00 | |
| | .062 (1/16) | .500 (8x) | .031 | .006 | 1/8 | 2-1/2 | 55645 | | 36.50 | 55645-C3 | | 42.50 | |
| | .062 (1/16) | .625 (10x) | .031 | .006 | 1/8 | 2-1/2 | 844145 | | 38.50 | 844145-C3 | | 44.40 | |
| | .062 (1/16) | .750 (12x) | .031 | .006 | 1/8 | 2-1/2 | 997245 | | 40.70 | 997245-C3 | | 46.60 | |
| | .062 (1/16) | .950 (15x) | .031 | .006 | 1/8 | 2-1/2 | 913345 | | 43.90 | 913345-C3 | | 49.80 | |
| | .078 (5/64) | .234 (3x) | .039 | .006 | 1/8 | 1-1/2 | 906645 | | 31.20 | 906645-C3 | | 37.20 | |
| | .078 (5/64) | .312 (4x) | .039 | .006 | 1/8 | 2-1/2 | 787045 | | 32.40 | 787045-C3 | | 38.30 | |
| | .078 (5/64) | .406 (5x) | .039 | .006 | 1/8 | 2-1/2 | 996945 | | 33.80 | 996945-C3 | | 39.80 | |
| | .078 (5/64) | .625 (8x) | .039 | .006 | 1/8 | 2-1/2 | 999545 | | 36.50 | 999545-C3 | | 42.50 | |
| | .078 (5/64) | .800 (10x) | .039 | .006 | 1/8 | 2-1/2 | 764145 | | 39.50 | 764145-C3 | | 45.50 | |
| | .078 (5/64) | .940 (12x) | .039 | .006 | 1/8 | 2-1/2 | 924045 | | 39.90 | 924045-C3 | | 45.80 | |
| | .093 (3/32) | .279 (3x) | .047 | .006 | 1/8 | 1-1/2 | 995345 | | 32.00 | 995345-C3 | | 37.90 | |
| | .093 (3/32) | .375 (4x) | .047 | .006 | 1/8 | 2-1/2 | 874345 | | 33.60 | 874345-C3 | | 39.50 | |
| | .093 (3/32) | .500 (5x) | .047 | .006 | 1/8 | 2-1/2 | 52145 | 692545 | 33.60 | 52145-C3 | 692545-C3 | 39.50 | NEW |
| | .093 (3/32) | .585 (6x) | .047 | .006 | 1/8 | 2-1/2 | 849445 | | 35.40 | 849445-C3 | | 41.30 | |
| | .093 (3/32) | .670 (7x) | .047 | .006 | 1/8 | 2-1/2 | 843045 | | 35.40 | 843045-C3 | | 41.30 | |
| | .093 (3/32) | .750 (8x) | .047 | .006 | 1/8 | 2-1/2 | 53545 | | 36.50 | 53545-C3 | | 42.50 | |
| | .093 (3/32) | .950 (10x) | .047 | .006 | 1/8 | 2-1/2 | 825645 | | 38.50 | 825645-C3 | | 44.40 | |
| | .093 (3/32) | 1.125 (12x) | .047 | .006 | 1/8 | 2-1/2 | 999645 | | 40.70 | 999645-C3 | | 46.60 | |
| | .093 (3/32) | 1.400 (15x) | .047 | .006 | 1/8 | 2-1/2 | 902845 | | 43.90 | 902845-C3 | | 49.80 | |
| | .118 | .591 (5x) | .059 | .006 | 1/8 | 2-1/2 | 788345 | | 33.90 | 788345-C3 | | 39.90 | |
| | .118 | .950 (8x) | .059 | .006 | 1/8 | 2-1/2 | 725145 | | 36.80 | 725145-C3 | | 42.80 | |
| 60° | .031 (1/32) | .156 (5x) | .009 | .005 | 1/8 | 2-1/2 | 56860 | | 33.90 | 56860-C3 | | 39.90 | |
| | .031 (1/32) | .250 (8x) | .009 | .005 | 1/8 | 2-1/2 | 57260 | | 36.50 | 57260-C3 | | 42.50 | |
| | .062 (1/16) | .312 (5x) | .018 | .006 | 1/8 | 2-1/2 | 54760 | | 33.90 | 54760-C3 | | 39.90 | |
| | .062 (1/16) | .500 (8x) | .018 | .006 | 1/8 | 2-1/2 | 55660 | | 36.80 | 55660-C3 | | 42.80 | |
| | .093 (3/32) | .500 (5x) | .027 | .006 | 1/8 | 2-1/2 | 52160 | | 33.90 | 52160-C3 | | 39.90 | |
| | .093 (3/32) | .750 (8x) | .027 | .006 | 1/8 | 2-1/2 | 53560 | | 36.50 | 53560-C3 | | 42.50 | |

# CHAMFER CUTTERS

## Back Chamfer Cutters



Left Hand Shear Flute & Right Hand Cut Evacuate Chips Away From Part

- Low profile design and greater radial projection ideal for generating chamfered features on the backside of small holes or slots
- Decrease costs by avoiding time-consuming changes to part set-ups
- Slightly undersized to fit in common hole sizes
- 60° and 90° included angle, cutting on angle only
- Left hand shear flute / right hand cut evacuates chip away from part
- Multiple flutes for improved finish • Solid carbide • CNC ground in the USA

| | ANGLE PER SIDE | HEAD DIAMETER | AXIAL LOC | NECK DIAMETER | NECK LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $D_1$ +.000" −.001" | $L_2$ | $D_3$ | $L_3$ +.010" −.000" | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| NEW | 30° | .115 | .038 | .068 | **.218** (3x) | 4 | 1/8 | 1-1/2 | 692410 | 76.50 | 692410-C3 | 82.40 |
| | 45° | .055 | .010 | .033 | **.093** (1.5x) | 4 | 1/8 | 1-1/2 | 943355 | 79.50 | 943355-C3 | 85.40 |
| | | .055 | .010 | .033 | **.156** (3x) | 4 | 1/8 | 1-1/2 | 938155 | 79.50 | 938155-C3 | 85.40 |
| | | .055 | .010 | .033 | **.250** (4.5x) | 4 | 1/8 | 1-1/2 | 910355 | 78.90 | 910355-C3 | 84.80 |
| | | .080 | .014 | .047 | **.070** (0.8x) | 4 | 1/8 | 1-1/2 | 906080 | 78.10 | 906080-C3 | 84.00 |
| | | .080 | .014 | .047 | **.140** (1.5x) | 4 | 1/8 | 1-1/2 | 943380 | 78.10 | 943380-C3 | 84.00 |
| | | .080 | .014 | .047 | **.250** (4x) | 4 | 1/8 | 1-1/2 | 938180 | 78.10 | 938180-C3 | 84.00 |
| | | .080 | .014 | .047 | **.375** (4.5x) | 4 | 1/8 | 1-1/2 | 910380 | 77.30 | 910380-C3 | 83.20 |
| | | .115 | .020 | .068 | **.109** (0.8x) | 4 | 1/8 | 1-1/2 | 906015 | 76.50 | 906015-C3 | 82.40 |
| | | .115 | .020 | .068 | **.218** (1.5x) | 4 | 1/8 | 1-1/2 | 943410 | 76.50 | 943410-C3 | 82.40 |
| | | .115 | .020 | .068 | **.312** (2.5x) | 4 | 1/8 | 1-1/2 | 772010 | 76.50 | 772010-C3 | 82.40 |
| | | .115 | .020 | .068 | **.375** (3x) | 4 | 1/8 | 1-1/2 | 938210 | 76.50 | 938210-C3 | 82.40 |
| | | .115 | .020 | .068 | **.562** (5x) | 4 | 1/8 | 2 | 910410 | 78.90 | 910410-C3 | 84.80 |

| | | $D_1$ +.000" −.002" | $L_2$ | $D_3$ | $L_3$ +.030" −.000" | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NEW | 30° | .165 | .053 | .101 | **.312** (3x) | 5 | 3/16 | 2 | 692430 | 88.70 | 692430-C3 | 95.00 |
| NEW | | .210 | .067 | .130 | **.375** (3x) | 5 | 1/4 | 2-1/2 | 692440 | 100.70 | 692440-C3 | 108.80 |
| NEW | | .250 | .079 | .156 | **.750** (5x) | 5 | 1/4 | 2-1/2 | 692216 | 100.70 | 692216-C3 | 108.80 |
| NEW | | .375 | .118 | .237 | **.750** (3x) | 6 | 3/8 | 2-1/2 | 692470 | 114.70 | 692470-C3 | 126.10 |
| NEW | | .500 | .156 | .317 | **1.000** (3x) | 6 | 1/2 | 3 | 692480 | 158.20 | 692480-C3 | 173.80 |
| | 45° | .125 | .022 | .075 | **.218** (3x) | 5 | 1/8 | 1-1/2 | 943415 | 77.70 | 943415-C3 | 83.70 |
| | | .125 | .022 | .075 | **.375** (5x) | 5 | 1/8 | 1-1/2 | 938215 | 80.40 | 938215-C3 | 86.40 |
| | | .135 | .024 | .081 | **.125** (0.8x) | 5 | 3/16 | 2 | 906119 | 88.70 | 906119-C3 | 95.40 |
| | | .135 | .024 | .081 | **.250** (1.5x) | 5 | 3/16 | 2 | 943420 | 88.70 | 943420-C3 | 95.40 |
| | | .135 | .024 | .081 | **.406** (3x) | 5 | 3/16 | 2 | 938220 | 88.70 | 938220-C3 | 95.40 |
| | | .135 | .024 | .081 | **.625** (5x) | 5 | 3/16 | 2 | 910420 | 87.90 | 910420-C3 | 94.50 |
| | | .165 | .029 | .101 | **.156** (0.8x) | 5 | 3/16 | 2 | 906130 | 88.70 | 906130-C3 | 95.40 |
| | | .165 | .029 | .101 | **.312** (2x) | 5 | 3/16 | 2 | 943430 | 88.70 | 943430-C3 | 95.40 |
| | | .165 | .029 | .101 | **.500** (3x) | 5 | 3/16 | 2 | 938230 | 88.70 | 938230-C3 | 95.40 |
| | | .165 | .029 | .101 | **.750** (4.5x) | 5 | 3/16 | 2 | 910430 | 87.90 | 910430-C3 | 94.50 |
| | | .187 | .033 | .115 | **.375** (3x) | 5 | 3/16 | 2 | 943435 | 90.10 | 943435-C3 | 96.80 |
| | | .187 | .033 | .115 | **.562** (5x) | 5 | 3/16 | 2 | 938235 | 89.50 | 938235-C3 | 96.10 |
| | | .210 | .037 | .130 | **.187** (0.8x) | 5 | 1/4 | 2-1/2 | 906140 | 100.70 | 906140-C3 | 108.80 |
| | | .210 | .037 | .130 | **.375** (1.5x) | 5 | 1/4 | 2-1/2 | 943440 | 100.70 | 943440-C3 | 109.60 |
| | | .210 | .037 | .130 | **.500** (2x) | 5 | 1/4 | 2-1/2 | 772140 | 100.70 | 772140-C3 | 109.60 |
| | | .210 | .037 | .130 | **.625** (3x) | 5 | 1/4 | 2-1/2 | 938240 | 100.70 | 938240-C3 | 109.60 |

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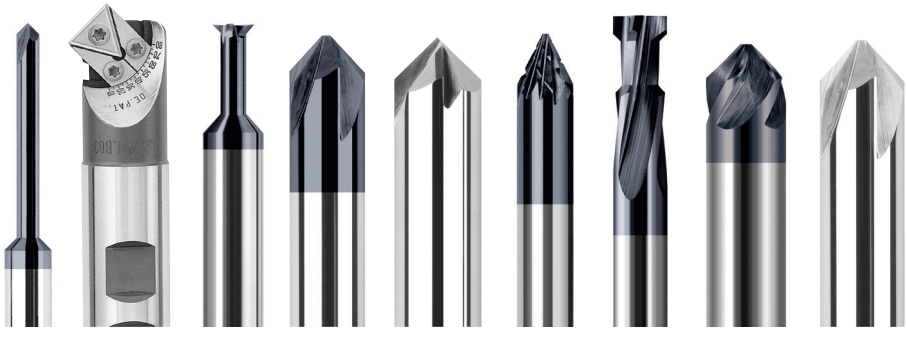
NEW SIZES!

# CHAMFER CUTTERS

## Back Chamfer Cutters (cont.)

continued from previous page

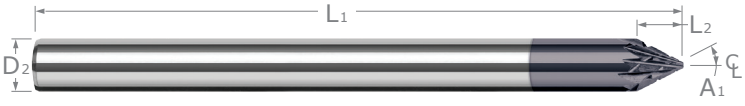
| ANGLE PER SIDE | HEAD DIAMETER | AXIAL LOC | NECK DIAMETER | NECK LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.000"}_{-.002"}$ | $L_2$ | $D_3$ | $L_3$ $^{+.030"}_{-.000"}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 45° | .210 | .037 | .130 | **1.000** (5x) | 5 | 1/4 | 2-1/2 | 910440 | 99.60 | 910440-C3 | 108.70 |
| | .250 | .044 | .156 | **.250** (1x) | 5 | 1/4 | 2-1/2 | 906116 | 100.70 | 906116-C3 | 109.60 |
| | .250 | .044 | .156 | **.437** (2x) | 5 | 1/4 | 2-1/2 | 943416 | 100.70 | 943416-C3 | 109.60 |
| | .250 | .044 | .156 | **.625** (2.5x) | 5 | 1/4 | 2-1/2 | 772116 | 100.70 | 772116-C3 | 109.60 |
| | .250 | .044 | .156 | **.750** (3x) | 5 | 1/4 | 2-1/2 | 938216 | 100.70 | 938216-C3 | 109.60 |
| | .250 | .044 | .156 | **1.250** (5x) | 5 | 1/4 | 3 | 910450 | 103.10 | 910450-C3 | 112.10 |
| | .312 | .055 | .196 | **.281** (0.8x) | 6 | 5/16 | 2-1/2 | 906120 | 106.30 | 906120-C3 | 116.80 |
| | .312 | .055 | .196 | **.562** (2x) | 6 | 5/16 | 2-1/2 | 943460 | 106.30 | 943460-C3 | 116.80 |
| | .312 | .055 | .196 | **1.000** (3x) | 6 | 5/16 | 2-1/2 | 938260 | 106.30 | 938260-C3 | 116.80 |
| | .312 | .055 | .196 | **1.500** (5x) | 6 | 5/16 | 3 | 910460 | 109.10 | 910460-C3 | 119.60 |
| | .375 | .066 | .237 | **.375** (1x) | 6 | 3/8 | 2-1/2 | 906124 | 114.70 | 906124-C3 | 126.10 |
| | .375 | .066 | .237 | **.750** (2x) | 6 | 3/8 | 2-1/2 | 943470 | 114.70 | 943470-C3 | 126.10 |
| | .375 | .066 | .237 | **1.125** (3x) | 6 | 3/8 | 2-1/2 | 938270 | 114.70 | 938270-C3 | 126.10 |
| | .375 | .066 | .237 | **1.870** (5x) | 6 | 3/8 | 4 | 910470 | 120.70 | 910470-C3 | 130.60 |
| | .500 | .088 | .317 | **.500** (1x) | 6 | 1/2 | 3 | 906132 | 158.20 | 906132-C3 | 175.90 |
| | .500 | .088 | .317 | **1.000** (2x) | 6 | 1/2 | 3 | 943480 | 158.20 | 943480-C3 | 175.90 |
| | .500 | .088 | .317 | **1.500** (3x) | 6 | 1/2 | 3 | 938280 | 158.20 | 938280-C3 | 175.90 |
| | .500 | .088 | .317 | **2.500** (5x) | 6 | 1/2 | 4 | 910480 | 163.70 | 910480-C3 | 181.30 |



**Check Out All of Our Chamfering Solutions!**

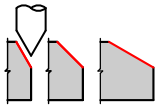
# CHAMFER CUTTERS

## Deburring Chamfer Cutters




**End Mill Tolerances with Bur-Style Geometry!**

- Deburr in your CNC machine with these high precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Tight end mill tolerances allow use of standard programming and tool paths
- Cone shaped burs are effective in removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Solid carbide
- CNC ground in the USA

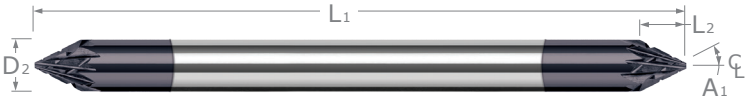


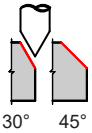

Stocked in Three Angles Per Side!



### Single-Ended

| ANGLE PER SIDE | LOC | RIGHT HAND TEETH | LEFT HAND TEETH | MINOR DIA. | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $L_2$ | | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| **30°** | .099 | 12 | 6 | .012 (Max.) | 1/8 | 2-1/2 | 58130 | 31.00 | 58130-C3 | 37.00 | | |
| | .207 | 12 | 6 | .012 (Max.) | 1/4 | 2-1/2 | 994030 | 44.10 | 994030-C3 | 52.20 | | |
| **45°** | .057 | 12 | 6 | .012 (Max.) | 1/8 | 2-1/2 | 58145 | 31.00 | 58145-C3 | 37.00 | 58145-C4 | 46.60 |
| | .088 | 12 | 6 | .012 (Max.) | 3/16 | 2-1/2 | 891145 | 38.80 | 891145-C3 | 45.50 | 891145-C4 | 59.80 |
| | .120 | 12 | 6 | .012 (Max.) | 1/4 | 2-1/2 | 994045 | 44.10 | 994045-C3 | 53.10 | 994045-C4 | 68.00 |
| | .181 | 14 | 7 | .013 (Max.) | 3/8 | 2-1/2 | 784445 | 62.50 | 784445-C3 | 73.90 | 784445-C4 | 91.90 |
| | .235 | 16 | 6 | .012 (Max.) | 1/2 | 2-1/2 | 722030 | 79.20 | 722030-C3 | 94.80 | | |
| **60°** | .033 | 12 | 6 | .012 (Max.) | 1/8 | 2-1/2 | 58160 | 31.30 | 58160-C3 | 37.30 | | |
| | .069 | 12 | 3 | .012 (Max.) | 1/4 | 2-1/2 | 994060 | 44.50 | 994060-C3 | 60.10 | | |



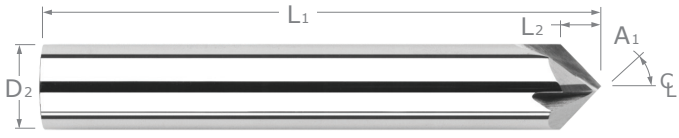

Stocked in Two Angles Per Side!

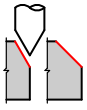
### Double-Ended

| ANGLE PER SIDE | LENGTH OF CUT | RIGHT HAND TEETH | LEFT HAND TEETH | MINOR DIAMETER | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $L_2$ | | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| **30°** | .099 | 12 | 6 | .012 (Max.) | 1/8 | 2-1/2 | 898330 | 46.70 | 898330-C3 | 54.20 |
| **45°** | .057 | 12 | 6 | .012 (Max.) | 1/8 | 2-1/2 | 898345 | 46.70 | 898345-C3 | 54.20 |
| | .088 | 12 | 6 | .012 (Max.) | 3/16 | 2-1/2 | 879745 | 56.20 | 879745-C3 | 65.10 |
| | .120 | 12 | 6 | .012 (Max.) | 1/4 | 2-1/2 | 867545 | 66.40 | 867545-C3 | 74.50 |
| | .181 | 14 | 7 | .013 (Max.) | 3/8 | 2-1/2 | 788145 | 85.60 | 788145-C3 | 97.40 |

# CHAMFER CUTTERS

## Cobalt – Pointed



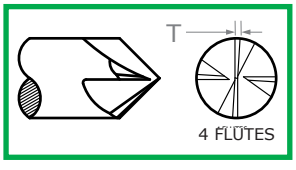




Stocked in Two Angles Per Side!



- 4 flutes (2 flutes to center)
- M-42 steel (8% cobalt)
- Type I pointed style ground to a point, yielding web thickness at tip (T)
- CNC ground in the USA

| ANGLE PER SIDE | LENGTH OF CUT | TIP | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | |
|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | $L_2$ | $T_{(MAX.)}$ | $D_2$ | $L_1$ | 4 FL | USD$ |
| 30° | .217 | .010 | 1/4 | 2 | 18116 | 47.90 |
| | .325 | .010 | 3/8 | 2-1/2 | 18124 | 58.80 |
| | .433 | .010 | 1/2 | 3 | 18132 | 74.40 |
| 45° | .125 | .010 | 1/4 | 2 | 18016 | 47.90 |
| | .188 | .010 | 3/8 | 2-1/2 | 18024 | 57.50 |
| | .250 | .010 | 1/2 | 3 | 18032 | 74.40 |



# CHAMFER CUTTERS

## Adjustable Chamfer Cutters



- **Mills any angle from 10° to 80°**
- Change chamfer angle with quick adjustment
- TPET-321 carbide insert (TiN coated) and wrench included
- TPET-321-AL carbide insert has polished face and upsharp relief for optimized performance in non-ferrous materials

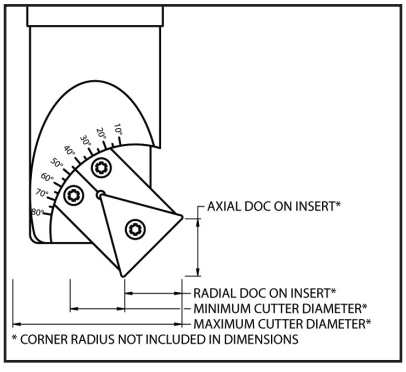
| SHANK DIAMETER | OVERALL LENGTH | TOOL # | USD$ |
|---|---|---|---|
| 3/4 | 3-3/4 | 81250 | 410.90 |
| 1 | 3-3/4 | 81260 | 410.90 |

| DESCRIPTION | TOOL # | USD$ | |
|---|---|---|---|
| TPET-321 Insert with TiN Coating | 60031 | 15.90 | (Box of 10) |
| TPET-321-AL Insert for Non-Ferrous Materials | 60038 | 17.50 | (Box of 10) |
| Clamp Plate (Replacement) | 81245 | 24.80 | (Each) |
| Screw (Replacement) | 81247 | 9.00 | (Each) |
| Seat Pocket (Replacement) | 81249 | 90.60 | (Each) |



### SPEEDS & FEEDS (Adjustable Chamfer Cutter)

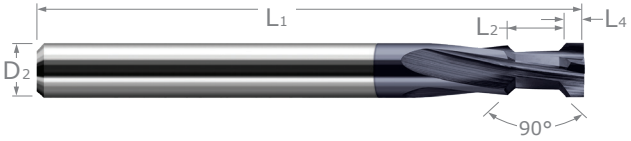
| MATERIAL | SPEED (RPM) | FEED (Inches/Min) | DEPTH (Inches) |
|---|---|---|---|
| STEEL | 600–2000 | 1″–4″ | 1/8″ MAX. |
| ALUMINUM | 1000–6000 MAX. | 3″–8″ | 1/8″ MAX. |

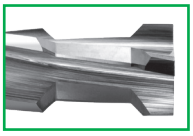



| Angle Setting on Tool | Minimum Diameter* | Maximum Diameter* | Radial DOC of Insert* | Axial DOC of Insert* |
|---|---|---|---|---|
| 10° | 0.0717 | 1.2466 | 0.587 | 0.104 |
| 15° | 0.1149 | 1.2672 | 0.576 | 0.154 |
| 20° | 0.1617 | 1.2828 | 0.561 | 0.204 |
| 25° | 0.2119 | 1.2931 | 0.541 | 0.252 |
| 30° | 0.2649 | 1.2981 | 0.517 | 0.298 |
| 35° | 0.3205 | 1.2977 | 0.489 | 0.342 |
| 40° | 0.3781 | 1.2920 | 0.457 | 0.383 |
| 45° | 0.4374 | 1.2810 | 0.422 | 0.422 |
| 50° | 0.4978 | 1.2647 | 0.383 | 0.457 |
| 55° | 0.5590 | 1.2433 | 0.342 | 0.489 |
| 60° | 0.6205 | 1.2170 | 0.298 | 0.517 |
| 65° | 0.6818 | 1.1860 | 0.252 | 0.541 |
| 70° | 0.7424 | 1.1504 | 0.204 | 0.561 |
| 75° | 0.8018 | 1.1106 | 0.154 | 0.576 |
| 80° | 0.8597 | 1.0669 | 0.104 | 0.587 |

# CHAMFER CUTTERS

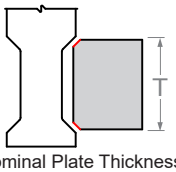
## Plate Chamfer Cutters



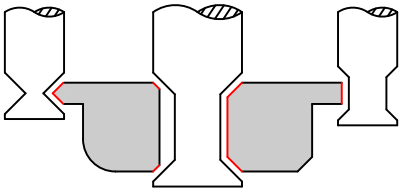



Cutting Along Entirety of Concave Form

- Tool designed to chamfer top and bottom in a single pass
- Cutting along entirety of concave form ($L_2$) only
- Minor diameter ($D_3$) relieved for light profiling and trimming edges
- 10° helix
- 4 flutes
- Solid carbide
- CNC ground in the USA




Nominal Plate Thickness

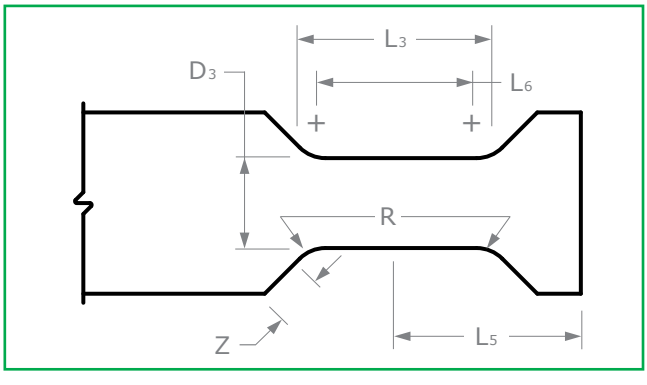


Capable of Performing Full Form Engagement, Light Profiling, & Edge Trimming

| MAX OPENING WIDTH | MIN OPENING WIDTH | CHAMFER LENGTH | MINOR DIA. | MINOR DIA. LENGTH | RADIUS | END LENGTH | END TO CENTER | NOMINAL PLATE THICKNESS* | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $L_2$ +.001" −.001" | $L_3$ | Z | $D_3$ +.000" −.002" | $L_6$ | R (MAX.) | $L_4$ | $L_5$ +.001" −.001" | T | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .037 | .010 | **.019** | .096 | .008 | .005 | .040 | .059 | .031 | 1/8 | 1-1/2 | 955202 | 67.30 | 955202-C3 | 73.20 |
| .068 | .037 | **.022** | .091 | .029 | .006 | .040 | .074 | .062 | 1/8 | 1-1/2 | 955204 | 67.30 | 955204-C3 | 73.20 |
| .074 | .012 | **.044** | .184 | .001 | .008 | .060 | .097 | .068 | 1/4 | 2-1/2 | 971104 | 74.60 | 971104-C3 | 82.70 |
| .099 | .037 | **.044** | .184 | .026 | .008 | .060 | .110 | .093 | 1/4 | 2-1/2 | 971106 | 74.60 | 971106-C3 | 83.50 |
| .135 | .104 | **.022** | .091 | .096 | .005 | .040 | .108 | .125 | 1/8 | 1-1/2 | 955208 | 67.30 | 955208-C3 | 73.20 |
| .135 | .073 | **.044** | .184 | .062 | .008 | .060 | .128 | .125 | 1/4 | 2-1/2 | 971108 | 74.60 | 971108-C3 | 83.50 |
| .197 | .135 | **.044** | .184 | .124 | .008 | .060 | .159 | .187 | 1/4 | 2-1/2 | 971112 | 74.60 | 971112-C3 | 83.50 |
| .197 | .105 | **.065** | .278 | .093 | .008 | .060 | .159 | .187 | 3/8 | 2-1/2 | 980812 | 93.20 | 980812-C3 | 104.60 |
| .260 | .198 | **.044** | .184 | .187 | .008 | .060 | .190 | .250 | 1/4 | 2-1/2 | 971116 | 74.60 | 971116-C3 | 83.50 |
| .260 | .137 | **.087** | .372 | .126 | .008 | .060 | .190 | .250 | 1/2 | 3 | 965916 | 142.30 | 965916-C3 | 159.90 |
| .385 | .293 | **.065** | .278 | .281 | .008 | .060 | .253 | .375 | 3/8 | 2-1/2 | 980824 | 93.20 | 980824-C3 | 104.60 |
| .385 | .262 | **.087** | .372 | .251 | .008 | .060 | .253 | .375 | 1/2 | 3 | 965924 | 142.30 | 965924-C3 | 159.90 |
| .510 | .387 | **.087** | .372 | .376 | .008 | .060 | .315 | .500 | 1/2 | 3 | 965932 | 142.30 | 965932-C3 | 159.90 |

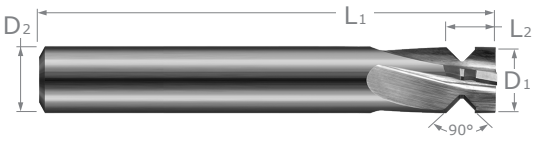
*Nominal Plate Thickness is ideal thickness of plate for chamfering top and bottom simultaneously.

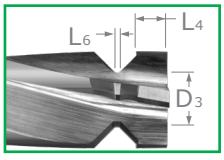
For additional tool dimensions, scan the QR code or visit harveytool.com/resources

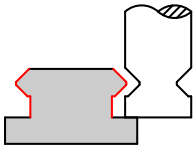


# PICATINNY FORM CUTTERS

## Picatinny Rail Form Cutters



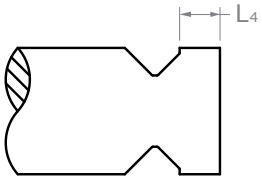



- Designed to the MIL-STD-1913 specifications
- Mill the entire Picatinny Rail in a single pass without tool changes
- Choose from two types:
  - Type I: Slight undercut at end of End Length ($L_4$)
  - Type II: .005" radius tangent to angle and End Length ($L_4$)
- Cutting on entirety of concave form and OD flat at end
- 4 helical flutes allow for better cutting action
- .005" max radii for all internal corners
- Solid carbide • CNC ground in the USA

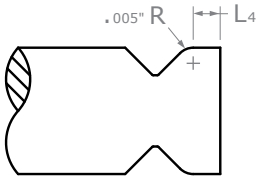
Outstanding in Aluminum!

| CUTTER DIAMETER | LENGTH OF CUT | MINOR DIAMETER | MINOR DIA. LENGTH (TSC) | END LENGTH | TYPE | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | TiB2 COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000"}_{-.002"}$ | $L_2$ $^{+.008"}_{-.000"}$ | $D_3$ $^{+.001"}_{-.001"}$ | $L_6$ | $L_4$ | | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .500 (1/2) | .377 | .282 | .021 | .160 | I | 1/2 | 3 | 875632 | 182.30 | 875632-C8 | 211.30 |
| .500 (1/2) | .377 | .282 | .021 | .137 | II | 1/2 | 3 | 830032 | 182.30 | 830032-C8 | 211.30 |
| .625 (5/8) | .377 | .407 | .021 | .160 | I | 5/8 | 3-1/2 | 875640 | 208.80 | 875640-C8 | 251.00 |
| .625 (5/8) | .377 | .407 | .021 | .137 | II | 5/8 | 3-1/2 | 830040 | 208.80 | 830040-C8 | 251.00 |

**Type I - Picatinny Rail Form 1995 Standard**

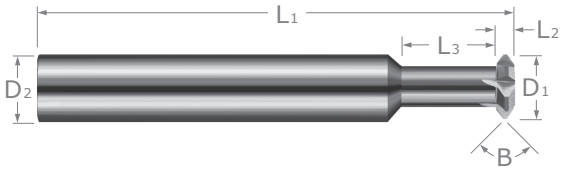


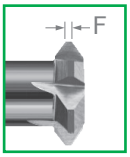

**Type II - Picatinny Rail Form 1999 Standard**



# PICATINNY FORM CUTTERS

## Picatinny Attachment Cutters




- Mill the inverse form for the Picatinny Rail used for attachments
- Cutting on entirety of angle and flat
- Short reaches for maximum strength
- 6 flutes • Solid carbide • CNC ground in the USA

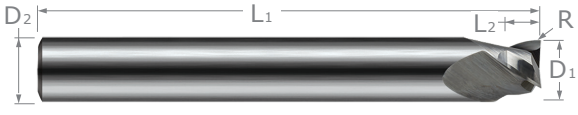
Outstanding in Aluminum!

| INCLUDED ANGLE | CUTTER DIAMETER | TIP FLAT | CUTTER WIDTH | NECK DIAMETER | NECK LENGTH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | TiB$_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B $^{+0.5°}_{-0.5°}$ | $D_1$ $^{+.000″}_{-.002″}$ | F | $L_2$ $^{+.002″}_{-.000″}$ | | $L_3$ $^{+.030″}_{-.000″}$ | $D_2$ | $L_1$ | 6 FL | USD$ | 6 FL | USD$ |
| 90° | .500 (1/2) | .021 | .2075 | 1/4 | .375 | 1/2 | 3 | 859232 | 163.70 | 859232-C8 | 192.60 |
| | .625 (5/8) | .021 | .2075 | 3/8 | .500 | 5/8 | 3-1/2 | 859240 | 213.00 | 859240-C8 | 255.20 |

PICATINNY FORM CUTTERS

# PICATINNY FORM CUTTERS

## Picatinny Recoil Groove End Mills



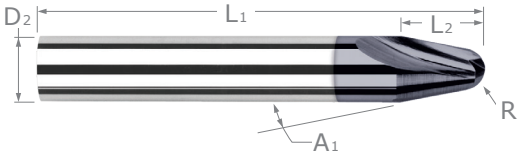

**Stocked in sharp corner, .005", or .010" corner radius**

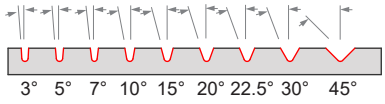
- Optimized for the grooves across the Picatinny Rail
- Diameter allows for a single pass to create the groove
- Stub flute length for improved strength
- Cutting on transition to allow for slight edge break at top of groove
- High helix and optimized geometry for improved performance
- 3 flutes • Center cutting
- Solid carbide • CNC ground in the USA

Outstanding in Aluminum!

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | TiB$_2$ COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.002″}_{-.000″}$ | R $^{+.001″}_{-.001″}$ | $L_2$ $^{+.008″}_{-.000″}$ | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| .206 | **SHARP!** | .118 | 1/4 | 2-1/2 | 864806 | 43.80 | 864806-C8 | 54.90 |
| .206 | .005 | .118 | 1/4 | 2-1/2 | 874406 | 48.10 | 874406-C8 | 57.70 |
| .206 | .010 | .118 | 1/4 | 2-1/2 | 862606 | 48.10 | 862606-C8 | 57.70 |
| .210 | **SHARP!** | .118 | 1/4 | 2-1/2 | 864810 | 43.80 | 864810-C8 | 53.50 |
| .210 | .005 | .118 | 1/4 | 2-1/2 | 874410 | 48.10 | 874410-C8 | 57.70 |
| .210 | .010 | .118 | 1/4 | 2-1/2 | 862610 | 48.10 | 862610-C8 | 57.70 |

# RUNNER CUTTERS




Stocked in Nine Angles Per Side!

- Designed to mill 3°, 5°, 7°, 10°, 15°, 20°, 22.5°, 30°, or 45° channels in molds
- 2 helical flutes (12° helix)
- AlTiN coating for increased performance in ferrous materials
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials
- Center cutting
- Solid carbide
- CNC ground in the USA

| | ANGLE PER SIDE | RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $A_1$ $^{+0°30'}_{-0°30'}$ | R $^{+.0005"}_{-.0005"}$ | $L_2$ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| | 3° | 1/64 | .921 | 1/8 | 1-1/2 | 843600 | 54.60 | 843600-C3 | 60.50 | | |
| | | 1/32 | .631 | 1/8 | 1-1/2 | 843602 | 54.60 | 843602-C3 | 60.50 | | |
| | | 1/16 | .666 | 3/16 | 2 | 843604 | 60.10 | 843604-C3 | 66.30 | | |
| | 5° | 1/64 | .557 | 1/8 | 1-1/2 | 936300 | 54.60 | 936300-C3 | 60.50 | | |
| | | 1/32 | .390 | 1/8 | 1-1/2 | 936302 | 54.60 | 936302-C3 | 60.50 | | |
| | | 3/64 | .579 | 3/16 | 2 | 936303 | 60.10 | 936303-C3 | 66.80 | | |
| | | 1/16 | .422 | 3/16 | 2 | 936304 | 60.10 | 936304-C3 | 66.80 | | |
| | | 3/32 | .812 | 5/16 | 2-1/2 | 936306 | 77.20 | 936306-C3 | 87.60 | | |
| | | 1/8 | .834 | 3/8 | 2-1/2 | 936308 | 86.70 | 936308-C3 | 98.10 | | |
| NEW | 7° | .010 | .437 | 1/8 | 1-1/2 | 764652 | 55.10 | 764652-C3 | 61.00 | | |
| | | 1/64 | .401 | 1/8 | 1-1/2 | 764600 | 55.10 | 764600-C3 | 61.00 | | |
| NEW | | .020 | .365 | 1/8 | 1-1/2 | 764601 | 55.10 | 764601-C3 | 61.00 | | |
| | | 1/32 | .286 | 1/8 | 1-1/2 | 764602 | 55.10 | 764602-C3 | 61.00 | | |
| | | 1/16 | .571 | 1/4 | 2-1/2 | 764604 | 60.10 | 764604-C3 | 69.10 | | |
| | 10° | .005 | .331 | 1/8 | 1-1/2 | 75050 | 47.70 | 75050-C3 | 53.70 | | |
| | | .010 | .307 | 1/8 | 1-1/2 | 75052 | 47.70 | 75052-C3 | 53.70 | 75052-C6 | 56.70 |
| | | 1/64 | .283 | 1/8 | 1-1/2 | 75000 | 47.70 | 75000-C3 | 53.70 | 75000-C6 | 56.70 |
| | | .020 | .259 | 1/8 | 1-1/2 | 75001 | 47.70 | 75001-C3 | 53.70 | 75001-C6 | 56.70 |
| | | .025 | .235 | 1/8 | 1-1/2 | 75054 | 47.70 | 75054-C3 | 53.70 | | |
| | | 1/32 | .384 | 3/16 | 2 | 75002 | 54.60 | 75002-C3 | 61.20 | 75002-C6 | 64.10 |
| | | .040 | .341 | 3/16 | 2 | 75062 | 60.10 | 75062-C3 | 66.80 | | |
| | | 3/64 | .308 | 3/16 | 2 | 75003 | 60.10 | 75003-C3 | 66.80 | | |
| | | 1/16 | .414 | 1/4 | 2-1/2 | 75004 | 67.40 | 75004-C3 | 76.30 | 75004-C6 | 77.10 |
| | | 5/64 | .338 | 1/4 | 2-1/2 | 75005 | 69.00 | 75005-C3 | 78.00 | | |
| | | 3/32 | .444 | 5/16 | 2-1/2 | 75006 | 77.20 | 75006-C3 | 87.60 | | |
| | | 7/64 | .367 | 5/16 | 2-1/2 | 75007 | 77.50 | 75007-C3 | 88.00 | | |
| | | 1/8 | .469 | 3/8 | 2-1/2 | 75008 | 86.70 | 75008-C3 | 98.10 | | |
| | | 5/32 | .675 | 1/2 | 3 | 75010 | 102.00 | 75010-C3 | 119.60 | | |

continued on next page

NEW SIZES!

# RUNNER CUTTERS

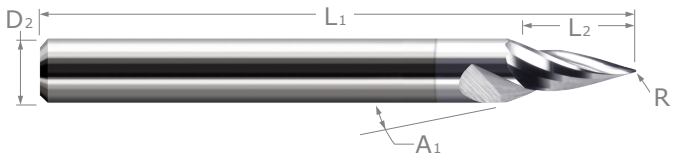
(cont.)

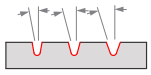
continued from previous page

| ANGLE PER SIDE | RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AlTiN NANO COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | R $^{+.0005"}_{-.0005"}$ | $L_2$ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ | |
| 15° | .005 | .219 | 1/8 | 1-1/2 | 75150 | 48.80 | 75150-C3 | 54.70 | | | |
| | .010 | .205 | 1/8 | 1-1/2 | 75152 | 47.70 | 75152-C3 | 53.70 | 75152-C6 | 56.70 | |
| | 1/64 | .190 | 1/8 | 1-1/2 | 75100 | 47.70 | 75100-C3 | 53.70 | 75100-C6 | 56.70 | |
| | .020 | .176 | 1/8 | 1-1/2 | 75101 | 47.70 | 75101-C3 | 53.70 | 75101-C6 | 56.70 | |
| | .025 | .162 | 1/8 | 1-1/2 | 75154 | 47.70 | 75154-C3 | 53.70 | 75154-C6 | 54.60 | |
| | 1/32 | .261 | 3/16 | 2 | 75102 | 54.60 | 75102-C3 | 61.20 | 75102-C6 | 64.10 | |
| | .039 | .238 | 3/16 | 2 | 75160 | 60.10 | 75160-C3 | 66.80 | | | |
| | .040 | .235 | 3/16 | 2 | 75162 | 60.10 | 75162-C3 | 66.80 | | | |
| | 3/64 | .215 | 3/16 | 2 | 75103 | 60.10 | 75103-C3 | 66.80 | | | |
| | .050 | .207 | 3/16 | 2 | 75066 | 60.10 | 75066-C3 | 66.30 | | | |
| | 1/16 | .289 | 1/4 | 2-1/2 | 75104 | 67.40 | 75104-C3 | 76.30 | 75104-C6 | 77.10 | |
| | 5/64 | .243 | 1/4 | 2-1/2 | 75105 | 69.00 | 75105-C3 | 78.00 | | | |
| | 3/32 | .317 | 5/16 | 2-1/2 | 75106 | 77.20 | 75106-C3 | 87.60 | | | |
| | 7/64 | .271 | 5/16 | 2-1/2 | 75107 | 77.50 | 75107-C3 | 88.00 | | | |
| | 1/8 | .342 | 3/8 | 2-1/2 | 75108 | 86.70 | 75108-C3 | 98.10 | | | |
| | 5/32 | .486 | 1/2 | 3 | 75110 | 102.00 | 75110-C3 | 119.60 | | | |
| | 3/16 | .398 | 1/2 | 3 | 75112 | 102.00 | 75112-C3 | 117.60 | | | |
| 20° | .005 | .162 | 1/8 | 1-1/2 | 979950 | 50.10 | 979950-C3 | 56.10 | | | |
| | .010 | .152 | 1/8 | 1-1/2 | 979952 | 50.10 | 979952-C3 | 56.10 | | | |
| | 1/64 | .143 | 1/8 | 1-1/2 | 979900 | 47.70 | 979900-C3 | 53.70 | 979900-C6 | 56.70 | |
| | .020 | .133 | 1/8 | 1-1/2 | 979901 | 51.50 | 979901-C3 | 57.40 | 979901-C6 | 58.30 | |
| | .025 | .124 | 1/8 | 1-1/2 | 979954 | 51.50 | 979954-C3 | 57.40 | | | |
| | 1/32 | .198 | 3/16 | 2 | 979902 | 54.60 | 979902-C3 | 61.20 | 979902-C6 | 62.30 | |
| | 3/64 | .167 | 3/16 | 2 | 979903 | 60.10 | 979903-C3 | 66.80 | | | |
| | 1/16 | .224 | 1/4 | 2-1/2 | 979904 | 67.40 | 979904-C3 | 76.30 | | | |
| | 5/64 | .193 | 1/4 | 2-1/2 | 979905 | 69.90 | 979905-C3 | 78.00 | | | |
| | 3/32 | .250 | 5/16 | 2-1/2 | 979906 | 77.20 | 979906-C3 | 87.60 | | | |
| | 1/8 | .275 | 3/8 | 2-1/2 | 979908 | 86.70 | 979908-C3 | 98.10 | | | |
| 22.5° | .010 | .135 | 1/8 | 1-1/2 | 867852 | 50.10 | 867852-C3 | 56.10 | | | |
| | 1/64 | .127 | 1/8 | 1-1/2 | 867800 | 47.70 | 867800-C3 | 53.70 | | | |
| | .020 | .194 | 3/16 | 2 | 867801 | 54.60 | 867801-C3 | 61.20 | | | |
| | 1/32 | .176 | 3/16 | 2 | 867802 | 54.60 | 867802-C3 | 61.20 | | | |
| | 1/16 | .277 | 5/16 | 2-1/2 | 867804 | 77.20 | 867804-C3 | 87.60 | | | |
| 30° | .005 | .157 | 3/16 | 2 | 934550 | 71.30 | 934550-C3 | 77.90 | | | |
| | .010 | .152 | 3/16 | 2 | 934552 | 71.30 | 934552-C3 | 77.90 | 934552-C6 | 79.00 | |
| | 1/64 | .147 | 3/16 | 2 | 934500 | 69.00 | 934500-C3 | 75.70 | 934500-C6 | 78.70 | |
| | .020 | .142 | 3/16 | 2 | 934501 | 69.00 | 934501-C3 | 75.70 | 934501-C6 | 76.70 | |
| | .025 | .192 | 1/4 | 2-1/2 | 934554 | 69.00 | 934554-C3 | 77.10 | | | |
| | 1/32 | .186 | 1/4 | 2-1/2 | 934502 | 69.00 | 934502-C3 | 78.00 | 934502-C6 | 78.80 | |
| | 3/64 | .224 | 5/16 | 2-1/2 | 934503 | 77.20 | 934503-C3 | 87.60 | | | |
| | 1/16 | .263 | 3/8 | 2-1/2 | 934504 | 86.70 | 934504-C3 | 98.10 | 934504-C6 | 100.60 | |
| 45° | .005 | .123 | 1/4 | 2-1/2 | 856550 | 72.70 | 856550-C3 | 80.80 | | | |
| | .010 | .121 | 1/4 | 2-1/2 | 856552 | 72.70 | 856552-C3 | 81.50 | 856552-C6 | 82.40 | |
| | 1/64 | .119 | 1/4 | 2-1/2 | 856500 | 70.50 | 856500-C3 | 79.40 | 856500-C6 | 82.40 | NEW |
| | .020 | .148 | 5/16 | 2-1/2 | 856501 | 70.50 | 856501-C3 | 80.90 | | | |
| | 1/32 | .143 | 5/16 | 2-1/2 | 856502 | 78.50 | 856502-C3 | 88.90 | 856502-C6 | 90.20 | NEW |
| | 3/64 | .168 | 3/8 | 2-1/2 | 856503 | 88.20 | 856503-C3 | 99.60 | 856503-C6 | 102.10 | NEW |
| | 1/16 | .224 | 1/2 | 3 | 856504 | 106.60 | 856504-C3 | 124.30 | | | |

# RUNNER CUTTERS

## For Non-Ferrous Materials




Stocked in Three Angles Per Side!

- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Designed to mill 10°, 15°, and 20° channels in molds
- 2 helical flutes (approx. 25° helix)
- Offered with $TiB_2$ coating to minimize galling
- Center cutting
- Solid carbide
- CNC ground in the USA

| ANGLE PER SIDE | RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|
| $A_1$ $^{+0°30'}_{-0°30'}$ | R $^{+.0005"}_{-.0005"}$ | $L_2$ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| **10°** | .010 | .307 | 1/8 | 1-1/2 | 773452 | 49.00 | 773452-C8 | 58.00 |
| | .015 | .283 | 1/8 | 1-1/2 | 773400 | 49.00 | 773400-C8 | 58.00 |
| | .031 | .384 | 3/16 | 2 | 773402 | 55.60 | 773402-C8 | 64.30 |
| **15°** | .005 | .219 | 1/8 | 1-1/2 | 772250 | 49.00 | 772250-C8 | 56.70 |
| | .010 | .205 | 1/8 | 1-1/2 | 772252 | 49.00 | 772252-C8 | 58.00 |
| | .015 | .190 | 1/8 | 1-1/2 | 772200 | 49.40 | 772200-C8 | 58.40 |
| | .031 | .261 | 3/16 | 2 | 772202 | 55.60 | 772202-C8 | 64.30 |
| | .047 | .215 | 3/16 | 2 | 772203 | 55.60 | 772203-C8 | 64.30 |
| **20°** | .010 | .152 | 1/8 | 1-1/2 | 771252 | 49.00 | 771252-C8 | 56.70 |
| | .015 | .143 | 1/8 | 1-1/2 | 771200 | 49.00 | 771200-C8 | 58.00 |
| | .031 | .198 | 3/16 | 2 | 771202 | 55.60 | 771202-C8 | 64.30 |

In The Loupe TV

**Check Out Our New CNC Show!**

Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

youtube.com/intheloupetv

# HEXALOBE CUTTERS

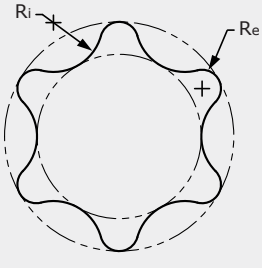



- Optimized for titanium alloys, Inconel, nickel alloys and other high temperature materials with outstanding performance in difficult-to-machine steels, stainless steels and tool steels
- Cutter diameters are slightly undersized common hexalobe sizes, created to contour the radii with ease and maximize the strength of the tool
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

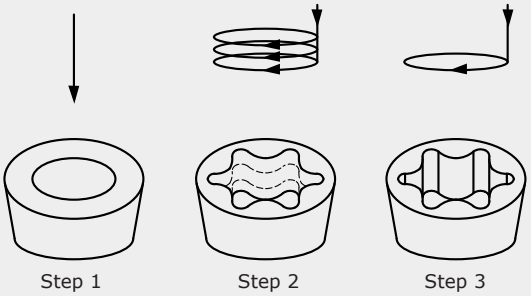


| HEXALOBULAR SOCKET NUMBER | CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| T6 | .010 | **.060** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 793310-C6 | 56.30 |
| T8 | .014 | **.084** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 793314-C6 | 56.30 |
| T10 | .017 | **.102** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 793317-C6 | 56.30 |
| T15 | .020 | **.120** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 793320-C6 | 56.30 |
| T20 | .022 | **.132** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 793322-C6 | 56.30 |
| T25 | .028 | **.168** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 793328-C6 | 56.30 |
| T30 | .032 | **.192** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 793332-C6 | 56.30 |
| T40 | .039 | **.240** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 793339-C6 | 56.30 |
| T45 | .040 | **.240** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 793340-C6 | 56.30 |
| T50 / T55 | .055 | **.330** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 793355-C6 | 56.30 |
| T60 | .075 | **.450** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 793375-C6 | 56.30 |

## Hexalobe Order of Operations




There are a few different approaches when machining a hexalobe pattern. In terms of milling, miniature tooling is required to properly contour the multiple radii surfaces to achieve the desired pattern and finish. Harvey Tool supplies multiple sizes to help create the shape and depth for the desired specification.




1. Pre-drill minor diameter and correct chamfer angle at the top of the hole with our compatible **Hexalobe Countersink** tools.
2. Select a **Long Reach Hexalobe Cutter** for either traditional roughing step downs or helical interpolation
(Diameters have undersized radii (Re) to allow for contouring)
3. Finish with a Hexalobe Cutter to remove any witness marks and achieve required finish

# HEXALOBE CUTTERS

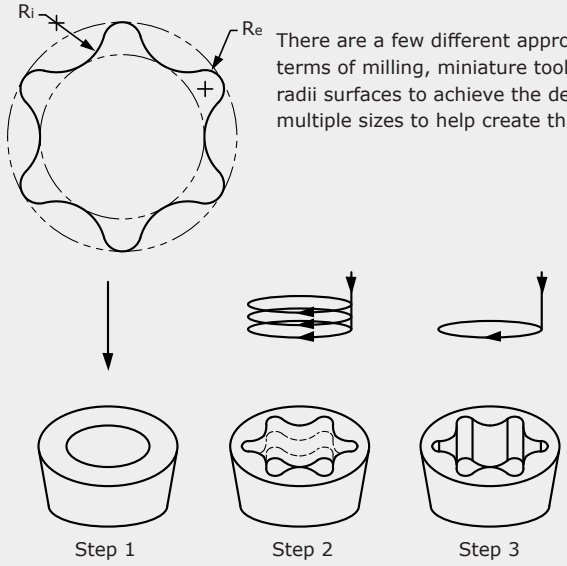
## Long Reach




- Optimized for titanium alloys, Inconel, nickel alloys and other high temperature materials with outstanding performance in difficult-to-machine steels, stainless steels and tool steels
- Cutter diameters are slightly undersized common hexalobe sizes, created to contour the radii with ease and maximize the strength of the tool
- Reduced neck diameter to avoid heeling
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

| HEXALOBULAR SOCKET NUMBER | CUTTER DIAMETER | LENGTH OF CUT | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ |
| T8 / T10 | **.014** | .023 | **.045** (3x) | .1575 (4 mm) | 1.575 (40 mm) | 792714-C6 | 59.30 |
| T8 / T10 | **.014** | .023 | **.084** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 791814-C6 | 63.20 |
| T15 / T20 | **.020** | .030 | **.060** (3x) | .1575 (4 mm) | 1.575 (40 mm) | 792720-C6 | 59.30 |
| T15 / T20 | **.020** | .030 | **.120** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 791820-C6 | 63.20 |
| T25 / T30 | **.028** | .042 | **.084** (3x) | .1575 (4 mm) | 1.575 (40 mm) | 792728-C6 | 59.30 |
| T25 / T30 | **.028** | .042 | **.168** (6x) | .1575 (4 mm) | 1.575 (40 mm) | 791828-C6 | 63.20 |

## Hexalobe Order of Operations



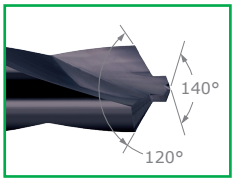

There are a few different approaches when machining a hexalobe pattern. In terms of milling, miniature tooling is required to properly contour the multiple radii surfaces to achieve the desired pattern and finish. Harvey Tool supplies multiple sizes to help create the shape and depth for the desired specification.

1. Pre-drill minor diameter and correct chamfer angle at the top of the hole with our compatible **Hexalobe Countersink** tools.
2. Select a **Long Reach Hexalobe Cutter** for either traditional roughing step downs or helical interpolation
   (Diameters have undersized radii (Re) to allow for contouring)
3. Finish with a Hexalobe Cutter to remove any witness marks and achieve required finish

# HEXALOBE CUTTERS

## Countersinks

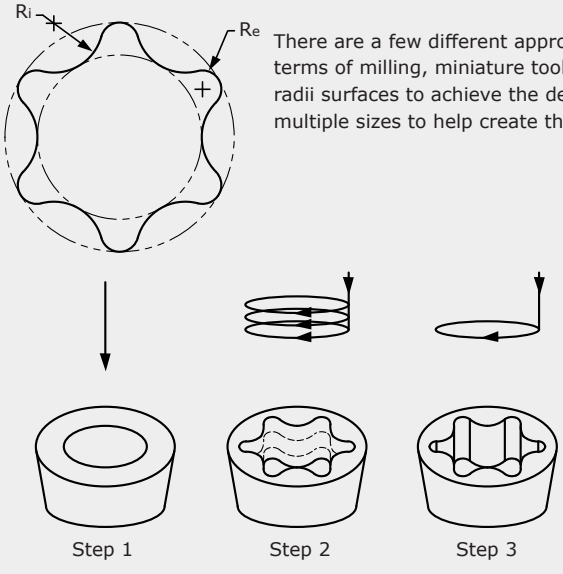



- Designed to be used before a Hexalobe cutter
- 140° included tip angle
- 120° included chamfer angle
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

| HEXALOBULAR SOCKET NUMBER | DRILL DIAMETER | PILOT LENGTH | PILOT FLUTE LENGTH | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| | $D_1$ +.0015″ −.0005″ | $L_4$ +.005″ −.000″ | $L_2$ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| T8 | **.0630** | .0450 | .057 | .1575 | 1.575 | 741108-C6 | 58.60 |
| T8 | **.0630** | .0840 | .096 | .1575 | 1.575 | 725008-C6 | 60.20 |
| T10 | **.0748** | .0510 | .065 | .1575 | 1.575 | 741110-C6 | 58.60 |
| T10 | **.0748** | .1020 | .116 | .1575 | 1.575 | 725010-C6 | 60.20 |
| T15 | **.0906** | .0600 | .077 | .1575 | 1.575 | 741115-C6 | 58.60 |
| T15 | **.0906** | .1200 | .137 | .1575 | 1.575 | 725015-C6 | 60.20 |
| T20 | **.1063** | .0660 | .085 | .2360 | 2.480 | 741120-C6 | 77.70 |
| T20 | **.1063** | .1320 | .151 | .2360 | 2.480 | 725020-C6 | 79.30 |
| T25 | **.1220** | .0840 | .106 | .2360 | 2.480 | 741125-C6 | 77.70 |
| T25 | **.1220** | .1680 | .190 | .2360 | 2.480 | 725025-C6 | 79.30 |
| | $D_1$ +.001″ −.001″ | $L_4$ +.010″ −.000″ | $L_2$ | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| T30 | **.1496** | .0960 | .123 | .2360 | 2.480 | 741130-C6 | 77.70 |
| T30 | **.1496** | .1920 | .219 | .2360 | 2.480 | 725030-C6 | 79.30 |

## Hexalobe Order of Operations

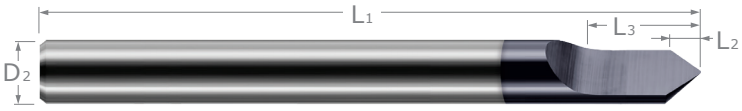


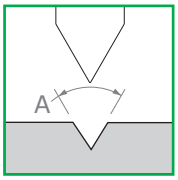

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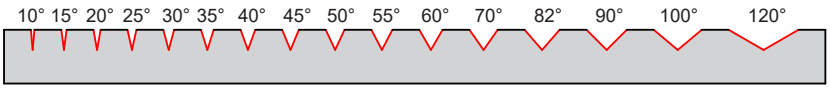
# ENGRAVING CUTTERS

## Pointed




- Ground to a point
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA

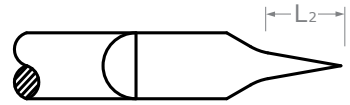



Stocked in Sixteen Included Angles!

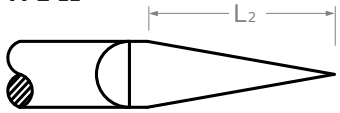
| INCL. ANGLE | DIA. | LENGTH OF CUT | TYPE | SPLIT LENGTH | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | $D_2$ | $L_2$ | | $L_3$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| | 1/8 | .080 | I | .200 | 1-1/2 | | 996508 | 27.40 | 996508-C3 | 33.30 | | |
| **10°** | 3/16 | .080 | I | 1/4 | 2 | | 996512 | 27.70 | 996512-C3 | 33.90 | | |
| | 1/4 | .080 | I | 5/16 | 2-1/2 | | 996516 | 33.60 | 996516-C3 | 41.70 | | |
| | 1/8 | .080 | I | .200 | 1-1/2 | | 998108 | 27.40 | 998108-C3 | 33.30 | | |
| **15°** | 3/16 | .080 | I | 1/4 | 2 | | 998112 | 27.70 | 998112-C3 | 34.40 | | |
| | 1/4 | .080 | I | 5/16 | 2-1/2 | | 998116 | 33.60 | 998116-C3 | 42.70 | | |
| | 1/8 | .080 | I | .200 | 1-1/2 | | 999708 | 27.40 | 999708-C3 | 33.30 | 999708-C4 | 42.40 |
| **20°** | 3/16 | .080 | I | 1/4 | 2 | | 999712 | 27.70 | 999712-C3 | 33.90 | | |
| | 1/4 | .080 | I | 5/16 | 2-1/2 | | 999716 | 33.60 | 999716-C3 | 41.70 | | |
| | 1/8 | .080 | I | .200 | 1-1/2 | | 983808 | 27.40 | 983808-C3 | 33.30 | | |
| **25°** | 3/16 | .080 | I | 1/4 | 2 | | 983812 | 27.70 | 983812-C3 | 33.90 | | |
| | 1/4 | .080 | I | 5/16 | 2-1/2 | | 983816 | 33.60 | 983816-C3 | 41.70 | | |
| | 1/8 | .080 | I | .200 | 1-1/2 | | 981508 | 23.30 | 981508-C3 | 29.20 | | |
| | 1/8 | .233 | II | 3/8 | 1-1/2 | | 25010 | 17.70 | 25010-C3 | 23.70 | 25010-C4 | 32.70 |
| **30°** | 1/8 | .233 | II | 3/8 | 4 | **LONG!** | 941708 | 30.10 | 941708-C3 | 36.40 | | |
| | 3/16 | .350 | II | 3/8 | 2 | | 25020 | 23.00 | 25020-C3 | 29.50 | | |
| | 1/4 | .466 | II | 1/2 | 2-1/2 | | 25030 | 28.50 | 25030-C3 | 37.30 | 25030-C4 | 52.10 |
| **35°** | 1/8 | .198 | II | 3/8 | 1-1/2 | | 853508 | 22.10 | 853508-C3 | 28.00 | | |
| | 1/8 | .080 | I | .200 | 1-1/2 | | 978608 | 24.30 | 978608-C3 | 30.20 | | |
| | 1/8 | .171 | II | 3/8 | 1-1/2 | | 25110 | 18.60 | 25110-C3 | 24.50 | 25110-C4 | 33.50 |
| **40°** | 1/8 | .171 | II | 3/8 | 4 | **LONG!** | 937808 | 31.80 | 937808-C3 | 38.10 | | |
| | 3/16 | .257 | II | 3/8 | 2 | | 25120 | 25.20 | 25120-C3 | 31.50 | | |
| | 1/4 | .343 | II | 3/8 | 2-1/2 | | 25130 | 30.00 | 25130-C3 | 38.90 | | |
| | 1/8 | .151 | II | 3/8 | 1-1/2 | | 997308 | 20.40 | 997308-C3 | 26.40 | 997308-C4 | 35.40 |
| **45°** | 3/16 | .226 | II | 3/8 | 2 | | 997312 | 26.40 | 997312-C3 | 33.00 | | |
| | 1/4 | .302 | II | 3/8 | 2-1/2 | | 997316 | 33.00 | 997316-C3 | 41.90 | | |
| | 1/8 | .134 | II | 3/8 | 1-1/2 | | 998408 | 20.60 | 998408-C3 | 26.50 | | |
| **50°** | 3/16 | .201 | II | 3/8 | 2 | | 998412 | 26.90 | 998412-C3 | 33.10 | | |
| | 1/4 | .268 | II | 3/8 | 2-1/2 | | 998416 | 33.60 | 998416-C3 | 41.70 | | |

continued on next page

**TYPE I**




**TYPE II**



# ENGRAVING CUTTERS

## Pointed (cont.)

continued from previous page

| INCL. ANGLE | DIA. | LENGTH OF CUT | TYPE | SPLIT LENGTH | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | $D_2$ | $L_2$ | | $L_3$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| **55°** | 1/8 | .120 | II | 3/8 | 1-1/2 | | 855508 | 22.10 | 855508-C3 | 28.00 | | |
| **60°** | 3 mm | 2.60 mm | II | 10 mm | 38 mm | | 898657 | 20.20 | 898657-C3 | 26.20 | | |
| | 1/8 | .108 | II | 3/8 | 1-1/2 | | 30010 | 17.70 | 30010-C3 | 23.70 | 30010-C4 | 32.70 |
| | 1/8 | .108 | II | 3/8 | 4 | LONG! | 30410 | 30.10 | 30410-C3 | 36.40 | 30410-C4 | 45.70 |
| | 3/16 | .162 | II | 3/8 | 2 | | 30020 | 23.00 | 30020-C3 | 29.50 | 30020-C4 | 41.40 |
| | 3/16 | .162 | II | 3/8 | 4 | LONG! | 30420 | 39.90 | 30420-C3 | 48.70 | | |
| | 6 mm | 5.20 mm | II | 10 mm | 63 mm | | 898666 | 33.10 | 898666-C3 | 41.20 | | |
| | 1/4 | .216 | II | 3/8 | 2-1/2 | | 30030 | 28.50 | 30030-C3 | 37.30 | 30030-C4 | 52.10 |
| | 1/4 | .216 | II | 3/8 | 6 | LONG! | 30430 | 57.30 | 30430-C3 | 69.20 | | |
| | 3/8 | .325 | II | 3/8 | 2-1/2 | | 30040 | 41.90 | 30040-C3 | 53.40 | | |
| **70°** | 1/8 | .089 | II | 3/8 | 1-1/2 | | 937208 | 20.60 | 937208-C3 | 26.50 | | |
| | 3/16 | .134 | II | 3/8 | 2 | | 937212 | 26.90 | 937212-C3 | 33.10 | | |
| | 1/4 | .179 | II | 3/8 | 2-1/2 | | 937216 | 33.60 | 937216-C3 | 42.70 | | |
| **82°** | 1/8 | .072 | II | 3/8 | 1-1/2 | | 971708 | 20.60 | 971708-C3 | 26.50 | | |
| | 3/16 | .108 | II | 3/8 | 2 | | 971712 | 26.90 | 971712-C3 | 33.10 | | |
| | 1/4 | .144 | II | 3/8 | 2-1/2 | | 971716 | 33.60 | 971716-C3 | 42.70 | | |
| **90°** | 3 mm | 1.50 mm | II | 10 mm | 38 mm | | 884157 | 20.20 | 884157-C3 | 26.20 | | |
| | 1/8 | .062 | II | 3/8 | 1-1/2 | | 30110 | 17.70 | 30110-C3 | 23.70 | 30110-C4 | 32.70 |
| | 1/8 | .062 | II | 3/8 | 4 | LONG! | 30510 | 30.10 | 30510-C3 | 36.40 | | |
| | 3/16 | .093 | II | 3/8 | 2 | | 30120 | 23.00 | 30120-C3 | 29.50 | 30120-C4 | 41.40 |
| | 3/16 | .093 | II | 3/8 | 4 | LONG! | 30520 | 39.90 | 30520-C3 | 47.00 | | |
| | 6 mm | 3.00 mm | II | 10 mm | 63 mm | | 884166 | 33.10 | 884166-C3 | 41.20 | | |
| | 1/4 | .125 | II | 3/8 | 2-1/2 | | 30130 | 28.50 | 30130-C3 | 37.30 | 30130-C4 | 52.10 |
| | 1/4 | .125 | II | 3/8 | 6 | LONG! | 30530 | 57.30 | 30530-C3 | 69.20 | | |
| | 3/8 | .187 | II | 3/8 | 2-1/2 | | 30140 | 41.90 | 30140-C3 | 53.40 | | |
| **100°** | 1/8 | .052 | II | 3/8 | 1-1/2 | | 983508 | 20.60 | 983508-C3 | 26.50 | | |
| | 3/16 | .079 | II | 3/8 | 2 | | 983512 | 26.90 | 983512-C3 | 33.50 | | |
| | 1/4 | .105 | II | 3/8 | 2-1/2 | | 983516 | 33.60 | 983516-C3 | 41.70 | | |
| **120°** | 1/8 | .036 | II | 3/8 | 1-1/2 | | 990508 | 17.70 | 990508-C3 | 23.70 | | |
| | 3/16 | .054 | II | 3/8 | 2 | | 990512 | 23.00 | 990512-C3 | 29.30 | | |
| | 1/4 | .072 | II | 3/8 | 2-1/2 | | 990516 | 28.50 | 990516-C3 | 37.30 | | |

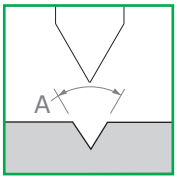


**Check Out All of Our Engraving Solutions!**

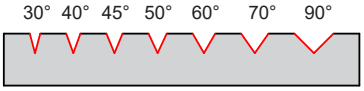
# ENGRAVING CUTTERS

## Pointed – Double-Ended



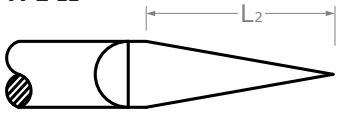

- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Ground to a point
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA




Stocked in Seven Included Angles!

| INCLUDED ANGLE | DIA. | LENGTH OF CUT | TYPE | SPLIT LENGTH | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | $D_2$ | $L_2$ | | $L_3$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| **30°** | 1/8 | .233 | II | 3/8 | 2 | 938408 | 30.70 | 938408-C3 | 38.00 | | |
| | 3/16 | .350 | II | 3/8 | 2 | 938410 | 38.20 | 938410-C3 | 47.00 | | |
| | 1/4 | .466 | II | 1/2 | 2-1/2 | 938412 | 45.50 | 938412-C3 | 54.10 | | |
| **40°** | 1/8 | .172 | II | 3/8 | 2 | 854008 | 34.30 | 854008-C3 | 40.20 | | |
| | 3/16 | .258 | II | 3/8 | 2 | 854010 | 42.50 | 854010-C3 | 48.70 | | |
| | 1/4 | .343 | II | 3/8 | 2-1/2 | 854012 | 50.40 | 854012-C3 | 58.50 | | |
| **45°** | 1/8 | .151 | II | 3/8 | 2 | 854508 | 34.30 | 854508-C3 | 41.90 | | |
| | 3/16 | .226 | II | 3/8 | 2 | 854510 | 42.00 | 854510-C3 | 48.30 | | |
| | 1/4 | .302 | II | 3/8 | 2-1/2 | 854512 | 50.40 | 854512-C3 | 62.20 | | |
| **50°** | 1/8 | .134 | II | 3/8 | 2 | 855008 | 34.70 | 855008-C3 | 40.60 | | |
| | 3/16 | .201 | II | 3/8 | 2 | 855010 | 42.00 | 855010-C3 | 48.30 | | |
| | 1/4 | .268 | II | 3/8 | 2-1/2 | 855012 | 50.40 | 855012-C3 | 62.20 | | |
| **60°** | 1/8 | .108 | II | 3/8 | 2 | 954608 | 30.70 | 954608-C3 | 38.00 | 954608-C4 | 54.50 |
| | 3/16 | .162 | II | 3/8 | 2 | 954610 | 38.20 | 954610-C3 | 47.00 | | |
| | 1/4 | .216 | II | 3/8 | 2-1/2 | 954612 | 45.50 | 954612-C3 | 54.10 | | |
| **70°** | 1/8 | .089 | II | 3/8 | 2 | 857008 | 34.30 | 857008-C3 | 41.90 | | |
| | 3/16 | .134 | II | 3/8 | 2 | 857010 | 42.50 | 857010-C3 | 48.70 | | |
| | 1/4 | .179 | II | 3/8 | 2-1/2 | 857012 | 50.40 | 857012-C3 | 58.50 | | |
| **90°** | 1/8 | .062 | II | 3/8 | 2 | 975108 | 30.70 | 975108-C3 | 38.00 | 975108-C4 | 54.50 |
| | 3/16 | .093 | II | 3/8 | 2 | 975110 | 38.20 | 975110-C3 | 47.00 | | |
| | 1/4 | .125 | II | 3/8 | 2-1/2 | 975112 | 45.50 | 975112-C3 | 54.10 | | |

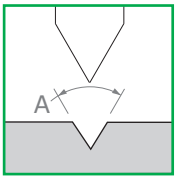
**TYPE II**



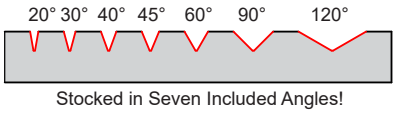
# ENGRAVING CUTTERS

## Pointed – Pyramid Point




- 3 facet design increases tip strength
- Ground to a point
- Solid carbide
- CNC ground in the USA



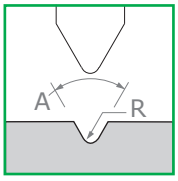

Stocked in Seven Included Angles!

| INCLUDED ANGLE | DIAMETER | LENGTH OF CUT | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|
| A | $D_2$ | $L_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| **20°** | 1/8 | .354 | 1-1/2 | 842810 | 31.20 | 842810-C3 | 37.20 |
| | 1/8 | .354 | 2-1/2 | 716510 | 32.50 | 716510-C3 | 38.40 |
| | 3/16 | .532 | 2 | 822010 | 34.00 | 822010-C3 | 40.70 |
| | 1/4 | .709 | 2-1/2 | 834010 | 48.70 | 834010-C3 | 57.60 |
| **30°** | 1/8 | .233 | 1-1/2 | 842815 | 31.20 | 842815-C3 | 37.20 |
| | 1/8 | .233 | 2-1/2 | 716515 | 32.50 | 716515-C3 | 38.40 |
| | 3/16 | .350 | 2 | 822015 | 34.00 | 822015-C3 | 40.70 |
| | 1/4 | .467 | 2-1/2 | 834015 | 48.70 | 834015-C3 | 57.60 |
| **40°** | 1/8 | .172 | 1-1/2 | 842820 | 31.20 | 842820-C3 | 37.20 |
| | 1/4 | .343 | 2-1/2 | 834020 | 49.10 | 834020-C3 | 58.10 |
| **45°** | 1/8 | .151 | 1-1/2 | 842823 | 31.20 | 842823-C3 | 37.20 |
| | 1/4 | .302 | 2-1/2 | 834023 | 34.00 | 834023-C3 | 43.00 |
| **60°** | 1/8 | .108 | 1-1/2 | 842830 | 31.20 | 842830-C3 | 37.20 |
| | 1/8 | .108 | 2-1/2 | 716530 | 32.50 | 716530-C3 | 38.40 |
| | 3/16 | .162 | 2 | 822030 | 34.00 | 822030-C3 | 40.70 |
| | 1/4 | .217 | 2-1/2 | 834030 | 48.70 | 834030-C3 | 57.60 |
| **90°** | 1/8 | .063 | 1-1/2 | 842845 | 31.20 | 842845-C3 | 37.20 |
| | 1/8 | .063 | 2-1/2 | 716545 | 32.50 | 716545-C3 | 38.40 |
| | 3/16 | .094 | 2 | 822045 | 34.00 | 822045-C3 | 40.70 |
| | 1/4 | .125 | 2-1/2 | 834045 | 48.70 | 834045-C3 | 57.60 |
| **120°** | 1/8 | .036 | 1-1/2 | 842860 | 31.60 | 842860-C3 | 37.50 |

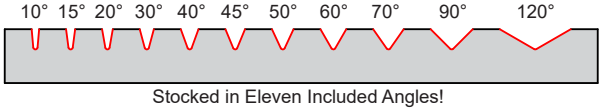
# ENGRAVING CUTTERS

## Tip Radius




- Radius on tip creates radius in bottom of groove and improves strength
- Half-round drill style
- Relieved for right-hand milling
- Solid carbide • CNC ground in the USA

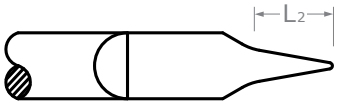



Stocked in Eleven Included Angles!

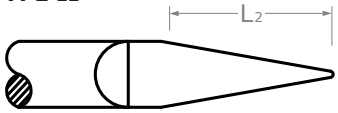
| INCL. ANGLE | DIA. | RADIUS | LENGTH OF CUT | TYPE | SPLIT LENGTH | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | $D_2$ | R | $L_2$ | | $L_3$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 10° | 1/8 | .0050 | .080 | I | .200 | 1-1/2 | | 940410 | 29.60 | 940410-C3 | 35.50 | | |
| | 1/8 | .0100 | .080 | I | .200 | 1-1/2 | | 948010 | 29.60 | 948010-C3 | 35.50 | | |
| 15° | 1/8 | .0050 | .080 | I | .200 | 1-1/2 | | 952910 | 29.60 | 952910-C3 | 35.50 | | |
| | 1/8 | .0100 | .080 | I | .200 | 1-1/2 | | 963510 | 29.60 | 963510-C3 | 35.50 | | |
| 20° | 1/8 | .0050 | .080 | I | .200 | 1-1/2 | | 989310 | 29.60 | 989310-C3 | 35.50 | | |
| | 1/8 | .0100 | .080 | I | .200 | 1-1/2 | | 956010 | 29.60 | 956010-C3 | 35.50 | | |
| 30° | 1/8 | .0025 | .226 | II | 3/8 | 1-1/2 | | 72715 | 26.40 | 72715-C3 | 32.30 | 72715-C4 | 41.30 |
| | 1/8 | .0050 | .219 | II | 3/8 | 1-1/2 | | 47510 | 26.40 | 47510-C3 | 32.30 | 47510-C4 | 41.30 |
| | 1/8 | .0100 | .207 | II | 3/8 | 1-1/2 | | 48810 | 26.40 | 48810-C3 | 32.30 | 48810-C4 | 41.30 |
| | 1/8 | .0150 | .190 | II | 3/8 | 1-1/2 | | 49710 | 26.40 | 49710-C3 | 32.30 | | |
| | 1/8 | .0200 | .176 | II | 3/8 | 1-1/2 | | 58610 | 26.40 | 58610-C3 | 32.30 | | |
| | 1/8 | .0300 | .147 | II | 3/8 | 1-1/2 | | 868910 | 26.40 | 868910-C3 | 32.30 | | |
| | 3/16 | .0050 | .336 | II | 3/8 | 2 | | 47520 | 32.30 | 47520-C3 | 38.90 | | |
| | 3/16 | .0100 | .321 | II | 3/8 | 2 | | 48820 | 32.30 | 48820-C3 | 38.50 | | |
| | 1/4 | .0050 | .452 | II | 1/2 | 2-1/2 | | 47530 | 45.50 | 47530-C3 | 53.60 | | |
| | 1/4 | .0100 | .438 | II | 1/2 | 2-1/2 | | 48830 | 45.50 | 48830-C3 | 54.20 | | |
| 40° | 1/8 | .0025 | .167 | II | 3/8 | 1-1/2 | | 72720 | 27.70 | 72720-C3 | 33.60 | | |
| | 1/8 | .0050 | .162 | II | 3/8 | 1-1/2 | | 57610 | 27.70 | 57610-C3 | 33.60 | | |
| | 1/8 | .0100 | .152 | II | 3/8 | 1-1/2 | | 58210 | 27.70 | 58210-C3 | 33.60 | | |
| | 1/8 | .0150 | .143 | II | 3/8 | 1-1/2 | | 59310 | 27.70 | 59310-C3 | 33.60 | | |
| | 1/8 | .0200 | .133 | II | 3/8 | 1-1/2 | | 60510 | 27.70 | 60510-C3 | 33.60 | | |
| 45° | 1/8 | .0050 | .143 | II | 3/8 | 1-1/2 | | 946502 | 29.20 | 946502-C3 | 35.10 | | |
| | 1/8 | .0100 | .135 | II | 3/8 | 1-1/2 | | 957910 | 29.20 | 957910-C3 | 35.10 | | |
| 50° | 1/8 | .0050 | .127 | II | 3/8 | 1-1/2 | | 845010 | 29.40 | 845010-C3 | 35.30 | | |
| | 1/8 | .0100 | .120 | II | 3/8 | 1-1/2 | | 847210 | 29.40 | 847210-C3 | 35.30 | | |
| 60° | 1/8 | .0025 | .106 | II | 3/8 | 1-1/2 | | 72730 | 26.40 | 72730-C3 | 32.30 | 72730-C4 | 41.30 |
| | 1/8 | .0050 | .103 | II | 3/8 | 1-1/2 | | 48110 | 26.40 | 48110-C3 | 32.30 | 48110-C4 | 41.30 |
| | 1/8 | .0050 | .103 | II | 3/8 | 4 | LONG! | 974910 | 47.60 | 974910-C3 | 54.00 | | |
| | 1/8 | .0075 | .101 | II | 3/8 | 1-1/2 | | 967310 | 26.40 | 967310-C3 | 32.30 | | |
| | 1/8 | .0100 | .098 | II | 3/8 | 1-1/2 | | 49410 | 26.40 | 49410-C3 | 32.30 | 49410-C4 | 41.30 |
| | 1/8 | .0125 | .096 | II | 3/8 | 1-1/2 | | 817110 | 26.40 | 817110-C3 | 32.30 | | |
| | 1/8 | .0150 | .093 | II | 3/8 | 1-1/2 | | 51710 | 26.40 | 51710-C3 | 32.30 | | |
| | 1/8 | .0200 | .088 | II | 3/8 | 1-1/2 | | 58910 | 26.40 | 58910-C3 | 32.30 | | |
| | 1/8 | .0300 | .078 | II | 3/8 | 1-1/2 | | 877010 | 26.40 | 877010-C3 | 32.30 | | |

continued on next page

**TYPE I**




**TYPE II**



# ENGRAVING CUTTERS

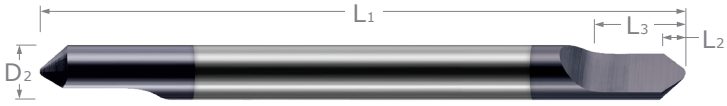
## Tip Radius (cont.)

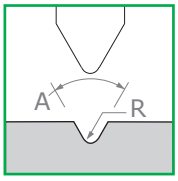
continued from previous page

| INCL. ANGLE | DIA. | RADIUS | LENGTH OF CUT | TYPE | SPLIT LENGTH | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | $D_2$ | R | $L_2$ | | $L_3$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 60° | 3/16 | .0025 | .160 | II | 3/8 | 2 | | 964830 | 32.30 | 964830-C3 | 38.90 | | |
| | 3/16 | .0050 | .157 | II | 3/8 | 2 | | 48120 | 32.30 | 48120-C3 | 38.90 | | |
| | 3/16 | .0075 | .155 | II | 3/8 | 2 | | 967320 | 32.30 | 967320-C3 | 38.50 | | |
| | 3/16 | .0100 | .152 | II | 3/8 | 2 | | 49420 | 32.30 | 49420-C3 | 38.90 | | |
| | 3/16 | .0150 | .147 | II | 3/8 | 2 | | 51720 | 32.30 | 51720-C3 | 38.50 | | |
| | 3/16 | .0200 | .142 | II | 3/8 | 2 | | 58920 | 32.30 | 58920-C3 | 38.50 | | |
| | 1/4 | .0025 | .214 | II | 3/8 | 2-1/2 | | 943730 | 35.50 | 943730-C3 | 43.60 | | |
| | 1/4 | .0050 | .212 | II | 3/8 | 2-1/2 | | 48130 | 35.50 | 48130-C3 | 44.20 | | |
| | 1/4 | .0075 | .209 | II | 3/8 | 2-1/2 | | 967330 | 35.50 | 967330-C3 | 43.60 | | |
| | 1/4 | .0100 | .207 | II | 3/8 | 2-1/2 | | 49430 | 35.50 | 49430-C3 | 44.20 | | |
| | 1/4 | .0150 | .202 | II | 3/8 | 2-1/2 | | 51730 | 35.50 | 51730-C3 | 44.20 | | |
| | 1/4 | .0200 | .196 | II | 3/8 | 2-1/2 | | 58930 | 35.50 | 58930-C3 | 44.20 | | |
| 70° | 1/8 | .0050 | .086 | II | 3/8 | 1-1/2 | | 843810 | 29.20 | 843810-C3 | 35.10 | | |
| | 1/8 | .0100 | .082 | II | 3/8 | 1-1/2 | | 844710 | 29.40 | 844710-C3 | 35.30 | | |
| 90° | 1/8 | .0025 | .061 | II | 3/8 | 1-1/2 | | 72745 | 26.40 | 72745-C3 | 32.30 | 72745-C4 | 41.30 |
| | 1/8 | .0050 | .060 | II | 3/8 | 1-1/2 | | 48410 | 26.40 | 48410-C3 | 32.30 | 48410-C4 | 41.30 |
| | 1/8 | .0050 | .060 | II | 3/8 | 4 | LONG! | 986810 | 47.60 | 986810-C3 | 54.00 | | |
| | 1/8 | .0075 | .059 | II | 3/8 | 1-1/2 | | 959810 | 26.40 | 959810-C3 | 32.30 | | |
| | 1/8 | .0100 | .058 | II | 3/8 | 1-1/2 | | 49110 | 26.40 | 49110-C3 | 32.30 | 49110-C4 | 41.30 |
| | 1/8 | .0125 | .057 | II | 3/8 | 1-1/2 | | 817010 | 26.90 | 817010-C3 | 32.80 | | |
| | 1/8 | .0150 | .056 | II | 3/8 | 1-1/2 | | 50810 | 26.40 | 50810-C3 | 32.30 | | |
| | 1/8 | .0200 | .054 | II | 3/8 | 1-1/2 | | 59910 | 26.40 | 59910-C3 | 32.30 | | |
| | 1/8 | .0300 | .050 | II | 3/8 | 1-1/2 | | 891410 | 26.40 | 891410-C3 | 32.30 | | |
| | 3/16 | .0025 | .093 | II | 3/8 | 2 | | 964845 | 32.30 | 964845-C3 | 38.50 | | |
| | 3/16 | .0050 | .092 | II | 3/8 | 2 | | 48420 | 32.30 | 48420-C3 | 38.50 | | |
| | 3/16 | .0100 | .090 | II | 3/8 | 2 | | 49120 | 32.30 | 49120-C3 | 38.50 | | |
| | 3/16 | .0150 | .088 | II | 3/8 | 2 | | 50820 | 32.30 | 50820-C3 | 38.50 | | |
| | 3/16 | .0200 | .085 | II | 3/8 | 2 | | 59920 | 32.30 | 59920-C3 | 38.90 | | |
| | 1/4 | .0025 | .124 | II | 3/8 | 2-1/2 | | 943745 | 35.50 | 943745-C3 | 44.20 | | |
| | 1/4 | .0050 | .123 | II | 3/8 | 2-1/2 | | 48430 | 35.50 | 48430-C3 | 44.20 | | |
| | 1/4 | .0100 | .121 | II | 3/8 | 2-1/2 | | 49130 | 35.50 | 49130-C3 | 44.20 | | |
| | 1/4 | .0150 | .119 | II | 3/8 | 2-1/2 | | 50830 | 35.50 | 50830-C3 | 43.60 | | |
| | 1/4 | .0200 | .116 | II | 3/8 | 2-1/2 | | 59930 | 35.50 | 59930-C3 | 44.20 | | |
| 120° | 1/8 | .0050 | .035 | II | 3/8 | 1-1/2 | | 947310 | 26.90 | 947310-C3 | 32.80 | | |
| | 1/8 | .0100 | .035 | II | 3/8 | 1-1/2 | | 939110 | 26.40 | 939110-C3 | 32.30 | | |

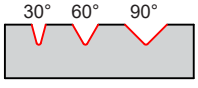
# ENGRAVING CUTTERS

## Tip Radius – Double-Ended



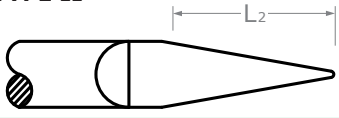

- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Radius on tip creates radius in bottom of groove and improves strength
- Half-round drill style
- Relieved for right-hand milling
- Solid carbide
- CNC ground in the USA




Stocked in Three Included Angles!

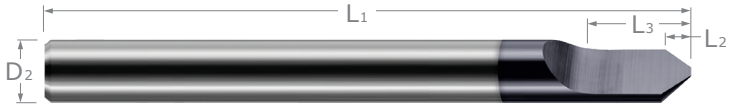
| INCLUDED ANGLE | DIAMETER | RADIUS | LENGTH OF CUT | TYPE | SPLIT LENGTH | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| A | $D_2$ | R | $L_2$ | | $L_3$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 30° | 1/8 | .0025 | .226 | II | 3/8 | 2 | 842008 | 41.90 | 842008-C3 | 49.60 |
| | 1/8 | .0050 | .219 | II | 3/8 | 2 | 834408 | 41.90 | 834408-C3 | 49.60 |
| | 1/8 | .0100 | .205 | II | 3/8 | 2 | 835008 | 41.90 | 835008-C3 | 49.60 |
| | 1/8 | .0150 | .190 | II | 3/8 | 2 | 744508 | 42.40 | 744508-C3 | 48.30 |
| | 1/8 | .0200 | .176 | II | 3/8 | 2 | 836108 | 41.90 | 836108-C3 | 47.90 |
| | 1/4 | .0050 | .452 | II | 1/2 | 2-1/2 | 834416 | 55.60 | 834416-C3 | 63.70 |
| | 1/4 | .0100 | .438 | II | 1/2 | 2-1/2 | 835016 | 55.10 | 835016-C3 | 67.00 |
| 60° | 1/8 | .0025 | .106 | II | 3/8 | 2 | 834708 | 41.90 | 834708-C3 | 49.60 |
| | 1/8 | .0050 | .103 | II | 3/8 | 2 | 828208 | 41.90 | 828208-C3 | 49.60 |
| | 1/8 | .0100 | .098 | II | 3/8 | 2 | 828808 | 41.90 | 828808-C3 | 49.60 |
| | 1/8 | .0150 | .093 | II | 3/8 | 2 | 743808 | 42.40 | 743808-C3 | 49.90 |
| | 1/8 | .0200 | .088 | II | 3/8 | 2 | 829908 | 41.90 | 829908-C3 | 49.60 |
| | 1/4 | .0050 | .212 | II | 3/8 | 2-1/2 | 828216 | 55.60 | 828216-C3 | 67.50 |
| | 1/4 | .0100 | .207 | II | 3/8 | 2-1/2 | 828816 | 55.10 | 828816-C3 | 67.00 |
| 90° | 1/8 | .0025 | .061 | II | 3/8 | 2 | 828908 | 41.90 | 828908-C3 | 47.90 |
| | 1/8 | .0050 | .060 | II | 3/8 | 2 | 818308 | 41.90 | 818308-C3 | 49.60 |
| | 1/8 | .0100 | .058 | II | 3/8 | 2 | 818908 | 41.90 | 818908-C3 | 49.60 |
| | 1/8 | .0150 | .056 | II | 3/8 | 2 | 743208 | 42.40 | 743208-C3 | 49.90 |
| | 1/8 | .0200 | .054 | II | 3/8 | 2 | 820108 | 41.90 | 820108-C3 | 49.60 |
| | 1/4 | .0050 | .123 | II | 3/8 | 2-1/2 | 818316 | 55.10 | 818316-C3 | 67.00 |
| | 1/4 | .0100 | .121 | II | 3/8 | 2-1/2 | 818916 | 55.10 | 818916-C3 | 67.00 |

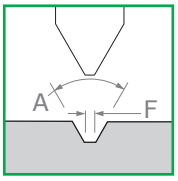
**TYPE II**



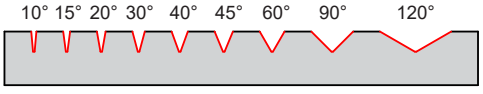
# ENGRAVING CUTTERS

## Tipped Off




- Tipped off end diameter for improved cutting
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA

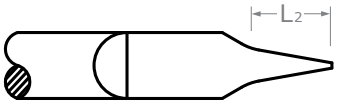



Stocked in Nine Included Angles!

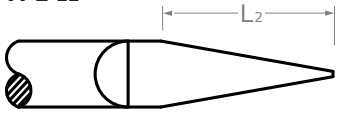
| INCL. ANGLE | DIA. | FLAT ON PART | LENGTH OF CUT | TYPE | SPLIT LENGTH | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | $D_2$ | F | $L_2$ | | $L_3$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 10° | 1/8 | .005 | .080 | I | .200 | 1-1/2 | 993002 | 28.60 | 993002-C3 | 34.60 | | |
| | 1/8 | .010 | .080 | I | .200 | 1-1/2 | 993010 | 28.60 | 993010-C3 | 34.60 | | |
| | 1/8 | .020 | .080 | I | .200 | 1-1/2 | 993052 | 28.60 | 993052-C3 | 34.60 | | |
| 15° | 1/8 | .005 | .080 | I | .200 | 1-1/2 | 990002 | 28.60 | 990002-C3 | 34.60 | | |
| | 1/8 | .010 | .080 | I | .200 | 1-1/2 | 990010 | 28.60 | 990010-C3 | 34.60 | | |
| | 1/8 | .020 | .080 | I | .200 | 1-1/2 | 990052 | 29.10 | 990052-C3 | 35.00 | | |
| 20° | 1/8 | .005 | .080 | I | .200 | 1-1/2 | 987002 | 28.60 | 987002-C3 | 34.60 | | |
| | 1/8 | .010 | .080 | I | .200 | 1-1/2 | 987010 | 28.60 | 987010-C3 | 34.60 | | |
| | 1/8 | .020 | .080 | I | .200 | 1-1/2 | 987052 | 28.60 | 987052-C3 | 34.60 | | |
| 30° | 1/8 | .005 | .224 | II | 3/8 | 1-1/2 | 25202 | 20.10 | 25202-C3 | 26.10 | 25202-C4 | 35.10 |
| | 1/8 | .010 | .215 | II | 3/8 | 1-1/2 | 25210 | 20.10 | 25210-C3 | 26.10 | 25210-C4 | 35.10 |
| | 1/8 | .015 | .205 | II | 3/8 | 1-1/2 | 25242 | 20.10 | 25242-C3 | 26.10 | 25242-C4 | 35.10 |
| | 1/8 | .020 | .196 | II | 3/8 | 1-1/2 | 25252 | 20.10 | 25252-C3 | 26.10 | | |
| | 1/8 | .030 | .177 | II | 3/8 | 1-1/2 | 25256 | 20.10 | 25256-C3 | 26.10 | | |
| | 3/16 | .010 | .331 | II | 3/8 | 2 | 25220 | 26.40 | 25220-C3 | 32.60 | | |
| | 3/16 | .020 | .313 | II | 3/8 | 2 | 25226 | 26.40 | 25226-C3 | 32.60 | | |
| | 3/16 | .030 | .294 | II | 3/8 | 2 | 25224 | 26.40 | 25224-C3 | 32.60 | | |
| | 1/4 | .005 | .457 | II | 1/2 | 2-1/2 | 25228 | 30.50 | 25228-C3 | 38.60 | | |
| | 1/4 | .010 | .448 | II | 1/2 | 2-1/2 | 25230 | 30.50 | 25230-C3 | 39.40 | | |
| | 1/4 | .020 | .429 | II | 1/2 | 2-1/2 | 25234 | 30.50 | 25234-C3 | 38.60 | | |
| | 1/4 | .030 | .411 | II | 1/2 | 2-1/2 | 25236 | 30.50 | 25236-C3 | 38.60 | | |
| 40° | 1/8 | .005 | .165 | II | 3/8 | 1-1/2 | 25302 | 21.10 | 25302-C3 | 27.00 | | |
| | 1/8 | .010 | .158 | II | 3/8 | 1-1/2 | 25310 | 21.10 | 25310-C3 | 27.00 | 25310-C4 | 36.00 |
| | 1/8 | .015 | .151 | II | 3/8 | 1-1/2 | 25342 | 21.10 | 25342-C3 | 27.00 | | |
| | 1/8 | .020 | .144 | II | 3/8 | 1-1/2 | 25352 | 21.10 | 25352-C3 | 27.00 | | |
| | 3/16 | .010 | .244 | II | 3/8 | 2 | 25320 | 28.20 | 25320-C3 | 34.50 | | |
| | 1/4 | .005 | .337 | II | 3/8 | 2-1/2 | 25328 | 32.30 | 25328-C3 | 40.40 | | |
| | 1/4 | .010 | .330 | II | 3/8 | 2-1/2 | 25330 | 32.30 | 25330-C3 | 41.10 | | |

continued on next page

**TYPE I**




**TYPE II**



# ENGRAVING CUTTERS

## Tipped Off (cont.)

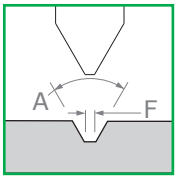
continued from previous page

| INCL. ANGLE | DIA. | FLAT ON PART | LENGTH OF CUT | TYPE | SPLIT LENGTH | OAL | | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | $D_2$ | F | $L_2$ | | $L_3$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 45° | 1/8 | .005 | .145 | II | 3/8 | 1-1/2 | | 955002 | 22.10 | 955002-C3 | 28.00 | | |
| | 1/8 | .010 | .139 | II | 3/8 | 1-1/2 | | 955010 | 22.10 | 955010-C3 | 28.00 | | |
| | 3/16 | .010 | .214 | II | 3/8 | 2 | | 955020 | 29.40 | 955020-C3 | 35.60 | | |
| | 1/4 | .010 | .290 | II | 3/8 | 2-1/2 | | 955030 | 34.00 | 955030-C3 | 42.10 | | |
| 60° | 1/8 | .005 | .104 | II | 3/8 | 1-1/2 | | 50710 | 20.10 | 50710-C3 | 26.10 | 50710-C4 | 35.10 |
| | 1/8 | .005 | .104 | II | 3/8 | 4 | LONG! | 823602 | 20.10 | 823602-C3 | 33.80 | | |
| | 1/8 | .010 | .099 | II | 3/8 | 1-1/2 | | 30210 | 20.10 | 30210-C3 | 26.10 | 30210-C4 | 35.10 |
| | 1/8 | .015 | .095 | II | 3/8 | 1-1/2 | | 18242 | 20.10 | 18242-C3 | 26.10 | | |
| | 1/8 | .020 | .091 | II | 3/8 | 1-1/2 | | 26910 | 20.10 | 26910-C3 | 26.10 | 26910-C4 | 35.10 |
| | 1/8 | .025 | .087 | II | 3/8 | 1-1/2 | | 793055 | 20.70 | 793055-C3 | 26.60 | | |
| | 1/8 | .030 | .082 | II | 3/8 | 1-1/2 | | 27610 | 20.10 | 27610-C3 | 26.10 | 27610-C4 | 35.10 |
| | 3/16 | .005 | .158 | II | 3/8 | 2 | | 50720 | 26.40 | 50720-C3 | 32.60 | | |
| | 3/16 | .005 | .158 | II | 3/8 | 4 | LONG! | 823618 | 26.40 | 823618-C3 | 33.50 | | |
| | 3/16 | .010 | .153 | II | 3/8 | 2 | | 30220 | 26.40 | 30220-C3 | 33.00 | | |
| | 3/16 | .020 | .145 | II | 3/8 | 2 | | 26920 | 26.40 | 26920-C3 | 33.00 | | |
| | 3/16 | .030 | .136 | II | 3/8 | 2 | | 27620 | 26.40 | 27620-C3 | 33.00 | | |
| | 1/4 | .005 | .212 | II | 3/8 | 2-1/2 | | 50730 | 30.50 | 50730-C3 | 39.40 | | |
| | 1/4 | .005 | .212 | II | 3/8 | 6 | LONG! | 823628 | 30.50 | 823628-C3 | 40.50 | | |
| | 1/4 | .010 | .207 | II | 3/8 | 2-1/2 | | 30230 | 30.50 | 30230-C3 | 39.40 | 30230-C4 | 51.90 |
| | 1/4 | .015 | .204 | II | 3/8 | 2-1/2 | | 18232 | 30.50 | 18232-C3 | 38.60 | | |
| | 1/4 | .020 | .199 | II | 3/8 | 2-1/2 | | 26930 | 30.50 | 26930-C3 | 39.40 | | |
| | 1/4 | .030 | .191 | II | 3/8 | 2-1/2 | | 27630 | 30.50 | 27630-C3 | 39.40 | | |
| 90° | 1/8 | .005 | .060 | II | 3/8 | 1-1/2 | | 30302 | 20.10 | 30302-C3 | 26.10 | | |
| | 1/8 | .010 | .057 | II | 3/8 | 1-1/2 | | 30310 | 20.10 | 30310-C3 | 26.10 | 30310-C4 | 35.10 |
| | 1/8 | .015 | .055 | II | 3/8 | 1-1/2 | | 30342 | 20.10 | 30342-C3 | 26.10 | | |
| | 1/8 | .020 | .053 | II | 3/8 | 1-1/2 | | 30352 | 20.10 | 30352-C3 | 26.10 | | |
| | 1/8 | .030 | .048 | II | 3/8 | 1-1/2 | | 30356 | 20.10 | 30356-C3 | 26.10 | | |
| | 3/16 | .010 | .088 | II | 3/8 | 2 | | 30320 | 26.40 | 30320-C3 | 33.00 | | |
| | 3/16 | .020 | .084 | II | 3/8 | 2 | | 30324 | 26.40 | 30324-C3 | 32.60 | | |
| | 3/16 | .030 | .079 | II | 3/8 | 2 | | 30326 | 26.40 | 30326-C3 | 32.60 | | |
| | 1/4 | .005 | .123 | II | 3/8 | 2-1/2 | | 30328 | 30.50 | 30328-C3 | 39.40 | 30328-C4 | 51.90 |
| | 1/4 | .010 | .120 | II | 3/8 | 2-1/2 | | 30330 | 30.50 | 30330-C3 | 39.40 | | |
| | 1/4 | .020 | .115 | II | 3/8 | 2-1/2 | | 30334 | 31.20 | 30334-C3 | 39.30 | | |
| | 1/4 | .030 | .110 | II | 3/8 | 2-1/2 | | 30336 | 30.50 | 30336-C3 | 37.00 | | |
| 120° | 1/8 | .005 | .035 | II | 3/8 | 1-1/2 | | 954102 | 20.10 | 954102-C3 | 26.10 | | |
| | 1/8 | .010 | .033 | II | 3/8 | 1-1/2 | | 954110 | 20.10 | 954110-C3 | 26.10 | | |

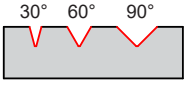
# ENGRAVING CUTTERS

## Tipped Off – Double-Ended



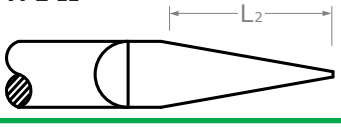

- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Tipped off end diameter for improved cutting
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA




Stocked in Three Included Angles!

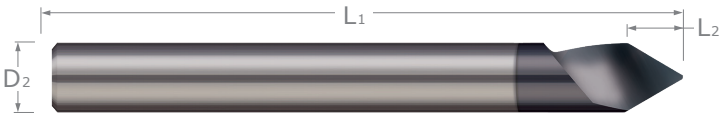
| INCLUDED ANGLE | DIAMETER | FLAT ON PART | LENGTH OF CUT | TYPE | SPLIT LENGTH | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| A | $D_2$ | F | $L_2$ | | $L_3$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 30° | 1/8 | **.005** | .224 | II | 3/8 | 2 | 834308 | 35.50 | 834308-C3 | 43.00 |
| | 1/8 | **.010** | .215 | II | 3/8 | 2 | 834908 | 35.50 | 834908-C3 | 43.00 |
| | 1/8 | **.015** | .205 | II | 3/8 | 2 | 835508 | 35.50 | 835508-C3 | 41.40 |
| | 1/8 | **.020** | .196 | II | 3/8 | 2 | 836208 | 35.50 | 836208-C3 | 41.40 |
| | 1/4 | **.010** | .448 | II | 1/2 | 2-1/2 | 834916 | 50.80 | 834916-C3 | 58.90 |
| 60° | 1/8 | **.005** | .104 | II | 3/8 | 2 | 828108 | 35.50 | 828108-C3 | 43.00 |
| | 1/8 | **.010** | .100 | II | 3/8 | 2 | 828708 | 35.50 | 828708-C3 | 43.00 |
| | 1/8 | **.015** | .095 | II | 3/8 | 2 | 829308 | 35.50 | 829308-C3 | 43.00 |
| | 1/8 | **.020** | .091 | II | 3/8 | 2 | 829808 | 35.80 | 829808-C3 | 41.70 |
| | 1/4 | **.010** | .208 | II | 3/8 | 2-1/2 | 828716 | 50.30 | 828716-C3 | 62.00 |
| 90° | 1/8 | **.005** | .060 | II | 3/8 | 2 | 818208 | 35.50 | 818208-C3 | 43.00 |
| | 1/8 | **.010** | .058 | II | 3/8 | 2 | 818808 | 35.50 | 818808-C3 | 41.40 |
| | 1/8 | **.015** | .055 | II | 3/8 | 2 | 819408 | 35.80 | 819408-C3 | 41.70 |
| | 1/8 | **.020** | .053 | II | 3/8 | 2 | 820008 | 35.80 | 820008-C3 | 43.40 |
| | 1/4 | **.010** | .120 | II | 3/8 | 2-1/2 | 818816 | 50.30 | 818816-C3 | 62.00 |

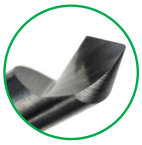
**TYPE II**



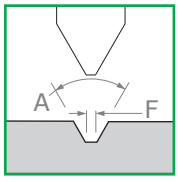
# ENGRAVING CUTTERS

## Tipped Off – Helical Flute

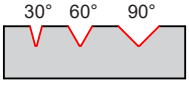


Spiral flute for soft materials




- Optimized geometry for superior engraving in softer materials such as plastics and aluminum
- Also excellent for stainless steel, Inconel, titanium, and other high temp alloys
- Free cutting action provides excellent surface finish and chip evacuation
- Tipped-off end diameter for improved cutting action
- AlTiN coating for increased performance in ferrous materials
- $TiB_2$ coating for outstanding performance in non-ferrous materials due to its extremely low affinity to aluminum
- Right hand spiral, right hand cut
- Solid carbide
- CNC ground in the USA

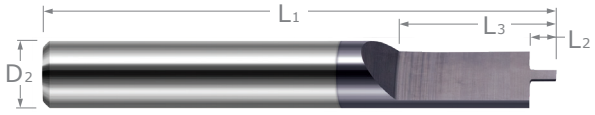



Stocked in Three Included Angles!

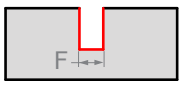
| INCLUDED ANGLE | DIAMETER | FLAT ON PART | LENGTH OF CUT | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| A | $D_2$ | F | $L_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 30° | 1/8 | .010 | .215 | 2 | 779008 | 22.00 | 779008-C3 | 27.90 | 779008-C8 | 30.90 |
| | 1/4 | .010 | .448 | 2-1/2 | 779016 | 33.60 | 779016-C3 | 41.70 | 779016-C8 | 44.70 |
| 60° | 1/8 | .005 | .104 | 1-1/2 | 764708 | 22.00 | 764708-C3 | 27.90 | 764708-C8 | 30.90 |
| | 1/8 | .010 | .100 | 1-1/2 | 824708 | 22.00 | 824708-C3 | 27.90 | 824708-C8 | 29.70 |
| | 3/16 | .010 | .154 | 2 | 824712 | 28.50 | 824712-C3 | 34.80 | 824712-C8 | 37.20 |
| | 1/4 | .010 | .208 | 2-1/2 | 824716 | 33.60 | 824716-C3 | 39.90 | 824716-C8 | 43.50 |
| 90° | 1/8 | .010 | .058 | 1-1/2 | 814708 | 22.00 | 814708-C3 | 27.90 | 814708-C8 | 29.70 |
| | 3/16 | .010 | .089 | 2 | 814712 | 29.00 | 814712-C3 | 35.20 | 814712-C8 | 37.60 |
| | 1/4 | .010 | .120 | 2-1/2 | 814716 | 33.60 | 814716-C3 | 42.60 | 814716-C8 | 44.70 |

# ENGRAVING CUTTERS

## Parallel – Square



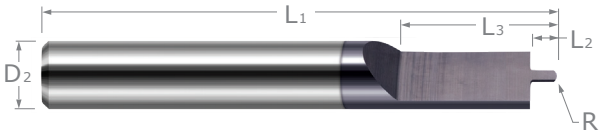

- Engraves a 90° vertical wall
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Non-cutting transition radius at end of length of cut
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



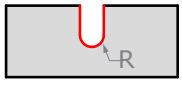

| DIAMETER | FLAT ON PART | LENGTH OF CUT | SPLIT LENGTH | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_2$ | F | $L_2$ | $L_3$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/8 | **.030** | .044 | 3/8 | 1-1/2 | 844230 | 22.70 | 844230-C3 | 28.60 |
| 1/8 | **.060** | .090 | 3/8 | 1-1/2 | 844260 | 23.00 | 844260-C3 | 29.00 |
| 1/8 | **.090** | .135 | 3/8 | 1-1/2 | 844290 | 23.00 | 844290-C3 | 29.00 |
| 3/16 | **.060** | .090 | 3/8 | 2 | 827260 | 29.60 | 827260-C3 | 35.80 |
| 3/16 | **.090** | .135 | 3/8 | 2 | 827290 | 29.60 | 827290-C3 | 35.80 |
| 3/16 | **.125** | .190 | 1/2 | 2 | 827308 | 29.60 | 827308-C3 | 35.80 |
| 1/4 | **.060** | .090 | 3/8 | 2-1/2 | 838960 | 34.40 | 838960-C3 | 42.50 |
| 1/4 | **.090** | .135 | 3/8 | 2-1/2 | 838990 | 34.40 | 838990-C3 | 42.50 |
| 1/4 | **.125** | .190 | 1/2 | 2-1/2 | 839008 | 34.40 | 839008-C3 | 42.50 |

# ENGRAVING CUTTERS

## Parallel – Ball




- Engraves a 90° vertical wall
- Radius on tip creates radius in the bottom of groove and improves strength
- Half-round drill style
- Non-cutting transition radius at end of length of cut
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA

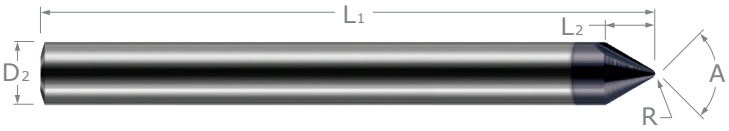



| DIAMETER | RADIUS | LENGTH OF CUT | SPLIT LENGTH | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_2$ | R | $L_2$ | $L_3$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/8 | **.0150** | .044 | 3/8 | 1-1/2 | 828530 | 25.50 | 828530-C3 | 31.50 |
| 1/8 | **.0300** | .090 | 3/8 | 1-1/2 | 828560 | 25.50 | 828560-C3 | 31.50 |
| 1/8 | **.0450** | .135 | 3/8 | 1-1/2 | 828590 | 25.70 | 828590-C3 | 31.70 |
| 3/16 | **.0300** | .090 | 3/8 | 2 | 832660 | 32.30 | 832660-C3 | 38.50 |
| 3/16 | **.0450** | .135 | 3/8 | 2 | 832690 | 32.30 | 832690-C3 | 38.50 |
| 3/16 | **.0625** | .190 | 1/2 | 2 | 832708 | 32.30 | 832708-C3 | 38.50 |
| 1/4 | **.0300** | .090 | 3/8 | 2-1/2 | 841360 | 37.40 | 841360-C3 | 45.50 |
| 1/4 | **.0450** | .135 | 3/8 | 2-1/2 | 841390 | 37.40 | 841390-C3 | 45.50 |
| 1/4 | **.0625** | .190 | 1/2 | 2-1/2 | 841408 | 37.40 | 841408-C3 | 45.50 |

NEW SIZES!

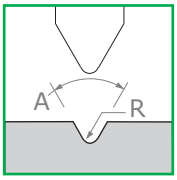
# ENGRAVING CUTTERS

## Tip Radius – 2 Flute – For Hardened Steels

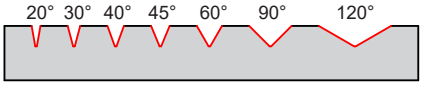




2 Shallow Flute Design



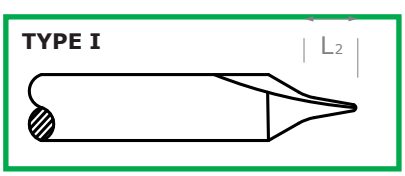

- **Strong 2 flute design for engraving hardened steels 46–68Rc**
- Eccentric relief increases durability and tool life
- Tip radius end diameter and shallow flute design for improved cutting and strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Solid carbide
- CNC ground in the USA

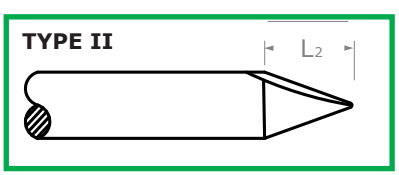


Stocked in Seven Included Angles!

| INCLUDED ANGLE | DIAMETER | RADIUS | LENGTH OF CUT | TYPE | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| A +0°30' −0°30' | $D_2$ | R | $L_2$ | | $L_1$ | 2 FL | USD$ |
| 20° | 1/8 | .0050 | .080 | I | 1-1/2 | 873308-C6 | 37.20 |
| | 1/8 | .0075 | .080 | I | 1-1/2 | 724908-C6 | 37.20 |
| | 1/8 | .0100 | .080 | I | 1-1/2 | 857508-C6 | 37.20 |
| | 1/8 | .0150 | .080 | I | 1-1/2 | 763308-C6 | 37.20 |
| | 1/8 | .0200 | .080 | I | 1-1/2 | 724708-C6 | 37.20 |
| | 1/4 | .0100 | .080 | I | 2-1/2 | 857516-C6 | 57.30 |
| 30° | 1/8 | .0050 | .218 | II | 1-1/2 | 858308-C6 | 35.70 |
| | 1/8 | .0075 | .211 | II | 1-1/2 | 825508-C6 | 35.70 |
| | 1/8 | .0100 | .204 | II | 1-1/2 | 851208-C6 | 35.70 |
| | 1/8 | .0150 | .190 | II | 1-1/2 | 821208-C6 | 35.70 |
| | 1/8 | .0200 | .175 | II | 1-1/2 | 843708-C6 | 35.70 |
| | 1/8 | .0250 | .161 | II | 1-1/2 | 821008-C6 | 35.70 |
| | 1/8 | .0300 | .147 | II | 1-1/2 | 692008-C6 | 35.70 NEW |
| | 3/16 | .0050 | .335 | II | 2 | 858312-C6 | 43.70 |
| | 3/16 | .0100 | .331 | II | 2 | 851212-C6 | 43.70 |
| | 1/4 | .0050 | .452 | II | 2-1/2 | 858316-C6 | 54.90 |
| | 1/4 | .0100 | .437 | II | 2-1/2 | 851216-C6 | 54.90 |
| | 1/4 | .0200 | .409 | II | 2-1/2 | 843716-C6 | 54.90 |
| 40° | 1/8 | .0050 | .162 | II | 1-1/2 | 837508-C6 | 37.20 |
| | 1/8 | .0100 | .152 | II | 1-1/2 | 859308-C6 | 37.20 |
| | 1/4 | .0100 | .324 | II | 2-1/2 | 859316-C6 | 57.30 |
| 45° | 1/8 | .0050 | .142 | II | 1-1/2 | 825808-C6 | 37.20 |
| | 1/8 | .0100 | .152 | II | 1-1/2 | 825708-C6 | 37.20 |
| | 1/8 | .0150 | .126 | II | 1-1/2 | 756608-C6 | 37.50 |
| | 1/4 | .0100 | .285 | II | 2-1/2 | 825716-C6 | 57.90 |

continued on next page



# ENGRAVING CUTTERS

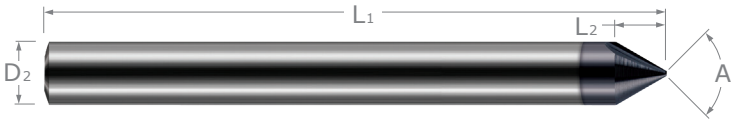
## Tip Radius – 2 Flute – For Hardened Steels (cont.)

continued from previous page

| INCLUDED ANGLE | DIAMETER | RADIUS | LENGTH OF CUT | TYPE | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| A $^{+0°30'}_{-0°30'}$ | $D_2$ | R | $L_2$ | | $L_1$ | 2 FL | USD$ |
| 60° | 1/8 | **.0050** | .103 | II | 1-1/2 | 860008-C6 | 35.70 |
| | 1/8 | **.0075** | .100 | II | 1-1/2 | 838108-C6 | 35.70 |
| | 1/8 | **.0100** | .098 | II | 1-1/2 | 877308-C6 | 35.70 |
| | 1/8 | **.0150** | .093 | II | 1-1/2 | 849008-C6 | 35.70 |
| | 1/8 | **.0200** | .088 | II | 1-1/2 | 845808-C6 | 36.00 |
| | 1/8 | **.0250** | .083 | II | 1-1/2 | 820908-C6 | 36.00 |
| NEW | 1/8 | **.0300** | .078 | II | 1-1/2 | 691908-C6 | 36.00 |
| | 3/16 | **.0050** | .157 | II | 2 | 860012-C6 | 43.70 |
| | 3/16 | **.0100** | .152 | II | 2 | 877312-C6 | 44.00 |
| | 3/16 | **.0150** | .147 | II | 2 | 849012-C6 | 44.00 |
| | 1/4 | **.0050** | .211 | II | 2-1/2 | 860016-C6 | 54.90 |
| | 1/4 | **.0075** | .209 | II | 2-1/2 | 838116-C6 | 55.40 |
| | 1/4 | **.0100** | .206 | II | 2-1/2 | 877316-C6 | 54.90 |
| | 1/4 | **.0150** | .201 | II | 2-1/2 | 849016-C6 | 54.90 |
| | 1/4 | **.0200** | .196 | II | 2-1/2 | 845816-C6 | 54.90 |
| 90° | 1/8 | **.0050** | .060 | II | 1-1/2 | 853108-C6 | 35.70 |
| | 1/8 | **.0075** | .058 | II | 1-1/2 | 825908-C6 | 35.70 |
| | 1/8 | **.0100** | .058 | II | 1-1/2 | 869408-C6 | 35.70 |
| | 1/8 | **.0150** | .056 | II | 1-1/2 | 821108-C6 | 35.70 |
| | 1/8 | **.0200** | .054 | II | 1-1/2 | 837108-C6 | 36.00 |
| | 1/8 | **.0250** | .052 | II | 1-1/2 | 820808-C6 | 35.70 |
| | 3/16 | **.0050** | .091 | II | 2 | 853112-C6 | 43.70 |
| | 3/16 | **.0100** | .089 | II | 2 | 869412-C6 | 43.70 |
| | 1/4 | **.0050** | .122 | II | 2-1/2 | 853116-C6 | 54.90 |
| | 1/4 | **.0100** | .120 | II | 2-1/2 | 869416-C6 | 54.90 |
| | 1/4 | **.0200** | .116 | II | 2-1/2 | 837116-C6 | 54.90 |
| 120° | 1/8 | **.0050** | .035 | II | 1-1/2 | 762908-C6 | 36.00 |
| | 1/8 | **.0100** | .034 | II | 1-1/2 | 762408-C6 | 35.70 |

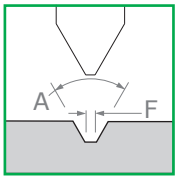
# ENGRAVING CUTTERS

## Tipped Off – 2 Flute – For Hardened Steels

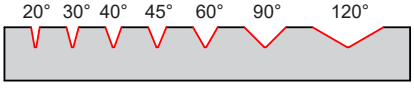




2 Shallow Flute Design




- **Strong 2 flute design for engraving hardened steels 46–68Rc**
- Eccentric relief increases durability and tool life
- Tipped off end diameter and shallow flute design for improved cutting and strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Solid carbide
- CNC ground in the USA

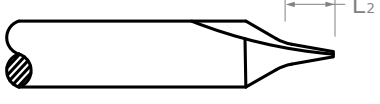


Stocked in Seven Included Angles!

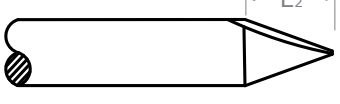
| INCLUDED ANGLE | DIAMETER | TIP FLAT | LENGTH OF CUT | TYPE | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| A +0°30' −0°30' | $D_2$ | F | $L_2$ | | $L_1$ | 2 FL | USD$ |
| **20°** | 1/8 | **.005** | .080 | I | 1-1/2 | 775008-C6 | 30.10 |
| | 1/8 | **.010** | .080 | I | 1-1/2 | 892508-C6 | 30.10 |
| | 1/4 | **.010** | .080 | I | 2-1/2 | 892516-C6 | 48.70 |
| **30°** | 1/8 | **.005** | .223 | II | 1-1/2 | 896708-C6 | 28.60 |
| | 1/8 | **.008** | .218 | II | 1-1/2 | 763908-C6 | 29.10 |
| | 1/8 | **.010** | .214 | II | 1-1/2 | 882008-C6 | 28.60 |
| | 1/8 | **.015** | .205 | II | 1-1/2 | 817908-C6 | 28.60 |
| | 1/8 | **.020** | .195 | II | 1-1/2 | 879608-C6 | 28.60 |
| | 1/8 | **.030** | .177 | II | 1-1/2 | 817608-C6 | 28.60 |
| | 3/16 | **.010** | .331 | II | 2 | 882012-C6 | 34.90 |
| | 1/4 | **.010** | .447 | II | 2-1/2 | 882016-C6 | 46.40 |
| **40°** | 1/8 | **.005** | .164 | I | 1-1/2 | 811708-C6 | 30.50 |
| | 1/8 | **.010** | .157 | II | 1-1/2 | 875108-C6 | 30.10 |
| | 1/4 | **.010** | .329 | II | 2-1/2 | 875116-C6 | 48.70 |
| **45°** | 1/8 | **.005** | .144 | II | 1-1/2 | 811608-C6 | 30.50 |
| | 1/8 | **.010** | .138 | II | 1-1/2 | 811508-C6 | 30.50 |
| **60°** | 1/8 | **.005** | .103 | II | 1-1/2 | 866708-C6 | 28.60 |
| | 1/8 | **.008** | .101 | II | 1-1/2 | 762508-C6 | 29.10 |
| | 1/8 | **.010** | .099 | II | 1-1/2 | 889608-C6 | 28.60 |
| | 1/8 | **.015** | .095 | II | 1-1/2 | 868108-C6 | 28.60 |
| | 1/8 | **.020** | .090 | II | 1-1/2 | 892308-C6 | 28.60 |
| | 1/8 | **.030** | .082 | II | 1-1/2 | 817508-C6 | 28.60 |
| | 3/16 | **.005** | .158 | II | 2 | 866712-C6 | 35.20 |
| | 3/16 | **.010** | .153 | II | 2 | 889612-C6 | 35.20 |
| | 1/4 | **.005** | .212 | II | 2-1/2 | 866716-C6 | 46.40 |
| | 1/4 | **.010** | .207 | II | 2-1/2 | 889616-C6 | 46.40 |
| | 1/4 | **.020** | .199 | II | 2-1/2 | 892316-C6 | 46.40 |
| | 1/4 | **.030** | .190 | II | 2-1/2 | 817516-C6 | 46.40 |

continued on next page

**TYPE I**




**TYPE II**



# ENGRAVING CUTTERS

## Tipped Off – 2 Flute – For Hardened Steels (cont.)

continued from previous page

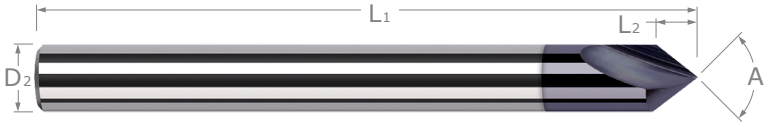
| INCLUDED ANGLE | DIAMETER | TIP FLAT | LENGTH OF CUT | TYPE | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| A $^{+0°30'}_{-0°30'}$ | $D_2$ | F | $L_2$ | | $L_1$ | 2 FL | USD$ |
| 90° | 1/8 | **.005** | .060 | II | 1-1/2 | 880908-C6 | 28.60 |
| | 1/8 | **.010** | .057 | II | 1-1/2 | 876508-C6 | 28.60 |
| | 1/8 | **.015** | .055 | II | 1-1/2 | 817708-C6 | 28.60 |
| | 1/8 | **.020** | .052 | II | 1-1/2 | 868408-C6 | 28.60 |
| | 1/8 | **.030** | .047 | II | 1-1/2 | 817408-C6 | 29.10 |
| | 3/16 | **.005** | .091 | II | 2 | 880912-C6 | 35.20 |
| | 3/16 | **.010** | .088 | II | 2 | 876512-C6 | 34.90 |
| | 1/4 | **.005** | .122 | II | 2-1/2 | 880916-C6 | 46.70 |
| | 1/4 | **.010** | .120 | II | 2-1/2 | 876516-C6 | 46.40 |
| 120° | 1/8 | **.010** | .033 | II | 1-1/2 | 865308-C6 | 28.60 |
| | 1/4 | **.010** | .069 | II | 2-1/2 | 865316-C6 | 46.70 |

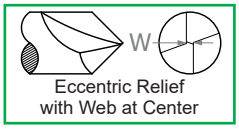


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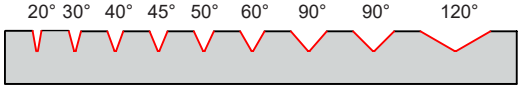
# ENGRAVING CUTTERS

## Marking Cutters for Ferrous Materials




- **Designed for milling legible part numbers in difficult-to-machine materials**
- Burr-free, two flute cutting design has improved strength over single point engravers
- Produces flat in bottom of groove
- Eccentric relief improves durability over half-round style engravers
- Requires less RPM than half-round engravers
- Solid carbide
- CNC ground in the USA

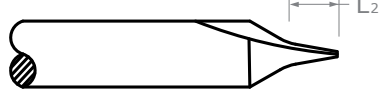



Stocked in Nine Included Angles

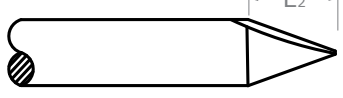
| INCLUDED ANGLE | DIAMETER | WEB THICKNESS | LENGTH OF CUT | TYPE | OAL | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A +1° −1° | $D_2$ | W | $L_2$ | | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| **20°** | 1/8 | .005 | .171 | I | 1-1/2 | 744608 | 24.60 | 744608-C3 | 30.50 | | |
| | 1/8 | .010 | .171 | I | 1-1/2 | 743308 | 24.60 | 743308-C3 | 30.50 | | |
| **30°** | 1/8 | .003 | .228 | II | 1-1/2 | 923908 | 22.10 | 923908-C3 | 28.00 | | |
| | 1/8 | .005 | .224 | II | 1-1/2 | 47708 | 22.10 | 47708-C3 | 28.00 | 47708-C4 | 37.10 |
| | 1/8 | .010 | .215 | II | 1-1/2 | 996108 | 22.10 | 996108-C3 | 28.00 | | |
| | 1/8 | .015 | .205 | II | 1-1/2 | 954008 | 22.10 | 954008-C3 | 28.00 | | |
| | 3/16 | .003 | .344 | II | 2 | 923912 | 27.50 | 923912-C3 | 34.00 | | |
| | 3/16 | .005 | .341 | II | 2 | 47712 | 27.50 | 47712-C3 | 33.70 | | |
| | 3/16 | .010 | .331 | II | 2 | 996112 | 27.50 | 996112-C3 | 33.70 | | |
| | 1/4 | .003 | .461 | II | 2-1/2 | 923916 | 38.60 | 923916-C3 | 47.40 | | |
| | 1/4 | .005 | .457 | II | 2-1/2 | 47716 | 38.60 | 47716-C3 | 47.40 | | |
| | 1/4 | .010 | .448 | II | 2-1/2 | 996116 | 38.60 | 996116-C3 | 47.40 | | |
| **40°** | 1/8 | .005 | .165 | II | 1-1/2 | 995508 | 24.40 | 995508-C3 | 30.30 | 995508-C4 | 39.30 |
| | 1/8 | .010 | .158 | II | 1-1/2 | 996708 | 24.40 | 996708-C3 | 30.30 | | |
| | 3/16 | .005 | .251 | II | 2 | 995512 | 30.90 | 995512-C3 | 37.40 | | |
| | 3/16 | .010 | .244 | II | 2 | 996712 | 30.90 | 996712-C3 | 37.40 | | |
| | 1/4 | .005 | .337 | II | 2-1/2 | 995516 | 43.20 | 995516-C3 | 52.20 | | |
| | 1/4 | .010 | .330 | II | 2-1/2 | 996716 | 43.70 | 996716-C3 | 52.60 | | |
| **45°** | 1/8 | .005 | .145 | II | 1-1/2 | 987408 | 24.00 | 987408-C3 | 29.90 | | |
| | 3/16 | .005 | .220 | II | 2 | 987412 | 30.90 | 987412-C3 | 37.40 | | |
| | 1/4 | .005 | .296 | II | 2-1/2 | 987416 | 43.20 | 987416-C3 | 52.20 | | |
| **50°** | 1/8 | .005 | .129 | II | 1-1/2 | 976608 | 24.40 | 976608-C3 | 30.30 | | |
| | 3/16 | .005 | .196 | II | 2 | 976612 | 31.00 | 976612-C3 | 37.30 | | |
| | 1/4 | .005 | .263 | II | 2-1/2 | 976616 | 43.10 | 976616-C3 | 52.10 | | |

continued on next page

**TYPE I**




**TYPE II**



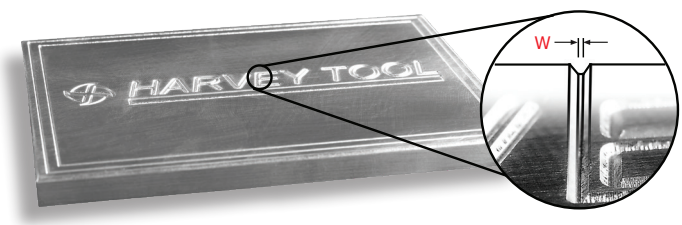
# ENGRAVING CUTTERS

## Marking Cutters for Ferrous Materials (cont.)

continued from previous page

| INCLUDED ANGLE | DIAMETER | WEB THICKNESS | LENGTH OF CUT | TYPE | OAL | | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_2$ | W | $L_2$ | | $L_1$ | | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| 60° | 1/8 | .003 | .106 | II | 1-1/2 | | 905708 | 22.10 | 905708-C3 | 28.00 | | |
| | 1/8 | .005 | .104 | II | 1-1/2 | | 29608 | 22.10 | 29608-C3 | 28.00 | 29608-C4 | 37.10 |
| | 1/8 | .005 | .104 | II | 3 | LONG! | 957808 | 27.10 | 957808-C3 | 33.00 | | |
| | 1/8 | .010 | .100 | II | 1-1/2 | | 48308 | 22.10 | 48308-C3 | 28.00 | 48308-C4 | 37.10 |
| | 1/8 | .015 | .095 | II | 1-1/2 | | 948108 | 22.10 | 948108-C3 | 28.00 | | |
| | 3/16 | .003 | .160 | II | 2 | | 905712 | 27.50 | 905712-C3 | 34.00 | | |
| | 3/16 | .005 | .158 | II | 2 | | 29612 | 27.50 | 29612-C3 | 34.00 | 29612-C4 | 44.20 |
| | 3/16 | .010 | .154 | II | 2 | | 48312 | 27.50 | 48312-C3 | 34.00 | | |
| | 3/16 | .015 | .149 | II | 2 | | 948112 | 27.50 | 948112-C3 | 34.00 | | |
| 60° | 1/4 | .003 | .214 | II | 2-1/2 | | 905716 | 38.60 | 905716-C3 | 47.40 | | |
| | 1/4 | .005 | .212 | II | 2-1/2 | | 29616 | 38.60 | 29616-C3 | 47.40 | 29616-C4 | 60.00 |
| | 1/4 | .010 | .208 | II | 2-1/2 | | 48316 | 38.60 | 48316-C3 | 47.40 | | |
| | 1/4 | .015 | .204 | II | 2-1/2 | | 948116 | 38.60 | 948116-C3 | 47.40 | | |
| | 3/8 | .005 | .320 | II | 2-1/2 | | 29624 | 48.90 | 29624-C3 | 60.30 | | |
| 82° | 1/8 | .005 | .069 | II | 1-1/2 | | 974108 | 24.40 | 974108-C3 | 30.30 | | |
| 90° | 1/8 | .003 | .061 | II | 1-1/2 | | 914608 | 22.10 | 914608-C3 | 28.00 | | |
| | 1/8 | .005 | .060 | II | 1-1/2 | | 23608 | 22.10 | 23608-C3 | 28.00 | 23608-C4 | 37.10 |
| | 1/8 | .005 | .060 | II | 3 | LONG! | 968108 | 27.10 | 968108-C3 | 33.00 | | |
| | 1/8 | .010 | .058 | II | 1-1/2 | | 50408 | 22.10 | 50408-C3 | 28.00 | 50408-C4 | 37.10 |
| | 1/8 | .015 | .055 | II | 1-1/2 | | 939708 | 22.10 | 939708-C3 | 28.00 | | |
| | 3/16 | .003 | .092 | II | 2 | | 914612 | 27.50 | 914612-C3 | 34.00 | | |
| | 3/16 | .005 | .091 | II | 2 | | 23612 | 27.50 | 23612-C3 | 34.00 | 23612-C4 | 44.20 |
| | 3/16 | .010 | .089 | II | 2 | | 50412 | 27.50 | 50412-C3 | 34.00 | | |
| | 3/16 | .015 | .086 | II | 2 | | 939712 | 27.50 | 939712-C3 | 34.00 | | |
| | 1/4 | .003 | .124 | II | 2-1/2 | | 914616 | 38.60 | 914616-C3 | 47.40 | | |
| | 1/4 | .005 | .123 | II | 2-1/2 | | 23616 | 38.60 | 23616-C3 | 47.40 | 23616-C4 | 60.00 |
| | 1/4 | .010 | .120 | II | 2-1/2 | | 50416 | 38.60 | 50416-C3 | 47.40 | | |
| | 1/4 | .015 | .118 | II | 2-1/2 | | 939716 | 38.60 | 939716-C3 | 46.70 | | |
| | 3/8 | .005 | .185 | II | 2-1/2 | | 23600 | 48.90 | 23600-C3 | 60.30 | | |
| 120° | 1/8 | .003 | .035 | II | 1-1/2 | | 844808 | 22.10 | 844808-C3 | 28.00 | | |
| | 1/8 | .005 | .035 | II | 1-1/2 | | 23708 | 22.10 | 23708-C3 | 28.00 | 23708-C4 | 37.10 |
| | 1/8 | .010 | .033 | II | 1-1/2 | | 998808 | 22.60 | 998808-C3 | 28.50 | | |
| | 3/16 | .005 | .053 | II | 2 | | 23712 | 27.50 | 23712-C3 | 34.00 | | |
| | 3/16 | .010 | .051 | II | 2 | | 998812 | 27.50 | 998812-C3 | 33.70 | | |
| | 1/4 | .005 | .071 | II | 2-1/2 | | 23716 | 38.60 | 23716-C3 | 47.40 | | |
| | 1/4 | .010 | .069 | II | 2-1/2 | | 998816 | 38.60 | 998816-C3 | 46.70 | | |

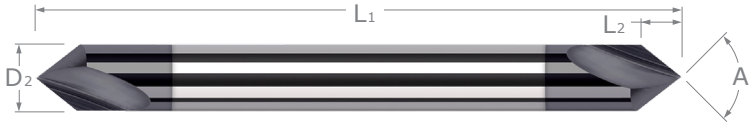
For Marking Cutters for Non-Ferrous Materials, please see page 384.

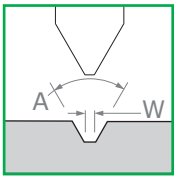



**Produces Flat in Bottom of Groove**

# ENGRAVING CUTTERS

## Marking Cutters – Double-Ended

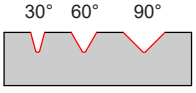



- Double-ended
- Designed for milling legible part numbers in difficult-to-machine materials
- Burr free 2 flute cutting design has improved strength over single point engravers
- Produces flat in bottom of groove
- Eccentric relief improves durability over half round style engravers
- Requires less RPM than half round engravers
- Solid carbide
- CNC ground in the USA




Flat Relief with Web at Center

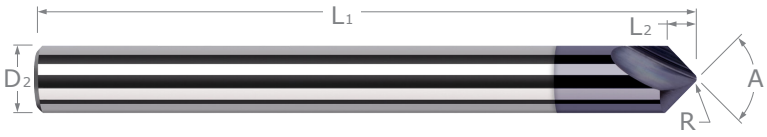


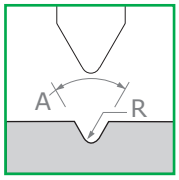

Stocked in Three Included Angles!

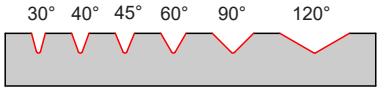
| INCLUDED ANGLE | DIAMETER | WEB THICKNESS | LENGTH OF CUT | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_2$ | W | $L_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 30° | 1/8 | .005 | .224 | 1-1/2 | 713808 | 38.10 | 713808-C3 | 44.00 |
| | 1/8 | .010 | .215 | 1-1/2 | 713508 | 38.10 | 713508-C3 | 44.00 |
| 60° | 1/8 | .005 | .104 | 1-1/2 | 713708 | 38.10 | 713708-C3 | 44.00 |
| | 1/8 | .010 | .100 | 1-1/2 | 713408 | 38.10 | 713408-C3 | 44.00 |
| 90° | 1/8 | .005 | .060 | 1-1/2 | 713608 | 38.10 | 713608-C3 | 44.00 |
| | 1/8 | .010 | .058 | 1-1/2 | 713308 | 38.10 | 713308-C3 | 44.00 |

# ENGRAVING CUTTERS

## Marking Cutters – Tip Radius



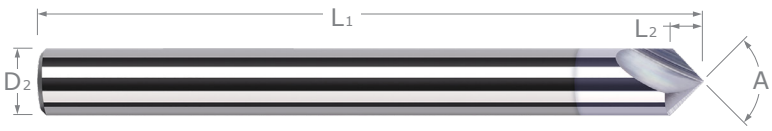

Stocked in Six Included Angles!

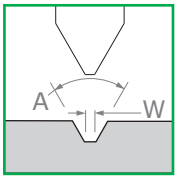
- **Designed for milling legible part numbers in difficult-to-machine materials**
- Radiused tip design for improved strength
- 2 flute cutting design has improved strength over single point engravers
- Produces radius in bottom of groove
- Solid carbide • CNC ground in the USA

| INCLUDED ANGLE | DIAMETER | RADIUS | LENGTH OF CUT | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_2$ | R | $L_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 30° | 1/8 | .0050 | .218 | 1-1/2 | 987615 | 27.30 | 987615-C3 | 33.20 |
| | 1/8 | .0100 | .204 | 1-1/2 | 961915 | 27.30 | 961915-C3 | 33.20 |
| | 1/8 | .0150 | .190 | 1-1/2 | 981815 | 27.30 | 981815-C3 | 33.20 |
| | 3/16 | .0050 | .335 | 2 | 958715 | 34.00 | 958715-C3 | 40.50 |
| | 3/16 | .0100 | .321 | 2 | 947215 | 33.30 | 947215-C3 | 39.80 |
| | 1/4 | .0050 | .452 | 2-1/2 | 966815 | 44.70 | 966815-C3 | 53.50 |
| | 1/4 | .0100 | .437 | 2-1/2 | 954915 | 44.70 | 954915-C3 | 53.50 |
| 40° | 1/8 | .0050 | .162 | 1-1/2 | 987640 | 30.60 | 987640-C3 | 36.50 |
| | 1/8 | .0100 | .152 | 1-1/2 | 961940 | 30.60 | 961940-C3 | 36.50 |
| | 1/8 | .0150 | .142 | 1-1/2 | 981820 | 30.60 | 981820-C3 | 36.50 |
| 45° | 1/8 | .0050 | .143 | 1-1/2 | 987622 | 30.60 | 987622-C3 | 36.50 |
| | 1/8 | .0100 | .135 | 1-1/2 | 961922 | 30.60 | 961922-C3 | 36.50 |
| 60° | 1/8 | .0050 | .103 | 1-1/2 | 987630 | 27.30 | 987630-C3 | 33.20 |
| | 1/8 | .0075 | .100 | 1-1/2 | 926330 | 27.30 | 926330-C3 | 33.20 |
| | 1/8 | .0100 | .098 | 1-1/2 | 961930 | 27.30 | 961930-C3 | 33.20 |
| | 1/8 | .0150 | .093 | 1-1/2 | 981830 | 27.30 | 981830-C3 | 33.20 |
| | 1/8 | .0200 | .088 | 1-1/2 | 918430 | 27.30 | 918430-C3 | 33.20 |
| | 3/16 | .0050 | .157 | 2 | 958730 | 33.30 | 958730-C3 | 39.80 |
| | 3/16 | .0100 | .152 | 2 | 947230 | 33.30 | 947230-C3 | 39.80 |
| | 3/16 | .0150 | .147 | 2 | 914330 | 33.30 | 914330-C3 | 39.80 |
| | 1/4 | .0050 | .211 | 2-1/2 | 966830 | 44.70 | 966830-C3 | 53.50 |
| | 1/4 | .0100 | .206 | 2-1/2 | 954930 | 44.70 | 954930-C3 | 53.50 |
| | 1/4 | .0150 | .201 | 2-1/2 | 909730 | 44.70 | 909730-C3 | 53.50 |
| | 1/4 | .0200 | .197 | 2-1/2 | 831430 | 44.70 | 831430-C3 | 52.80 |
| 90° | 1/8 | .0050 | .060 | 1-1/2 | 987645 | 27.30 | 987645-C3 | 33.20 |
| | 1/8 | .0075 | .059 | 1-1/2 | 926345 | 27.30 | 926345-C3 | 33.20 |
| | 1/8 | .0100 | .058 | 1-1/2 | 961945 | 27.30 | 961945-C3 | 33.20 |
| | 1/8 | .0150 | .056 | 1-1/2 | 981845 | 27.30 | 981845-C3 | 33.20 |
| | 1/8 | .0200 | .054 | 1-1/2 | 918445 | 27.30 | 918445-C3 | 33.20 |
| | 3/16 | .0050 | .091 | 2 | 958745 | 33.30 | 958745-C3 | 39.80 |
| | 3/16 | .0100 | .089 | 2 | 947245 | 33.30 | 947245-C3 | 39.80 |
| | 3/16 | .0150 | .087 | 2 | 914345 | 33.30 | 914345-C3 | 39.50 |
| | 1/4 | .0050 | .122 | 2-1/2 | 966845 | 44.70 | 966845-C3 | 53.50 |
| | 1/4 | .0075 | .122 | 2-1/2 | 830745 | 45.60 | 830745-C3 | 53.70 |
| | 1/4 | .0100 | .120 | 2-1/2 | 954945 | 44.70 | 954945-C3 | 53.50 |
| | 1/4 | .0150 | .118 | 2-1/2 | 909745 | 44.70 | 909745-C3 | 53.50 |
| | 1/4 | .0200 | .117 | 2-1/2 | 831445 | 44.70 | 831445-C3 | 53.50 |
| 120° | 1/8 | .0050 | .035 | 1-1/2 | 987660 | 27.30 | 987660-C3 | 33.20 |
| | 1/8 | .0100 | .034 | 1-1/2 | 961960 | 27.80 | 961960-C3 | 33.70 |

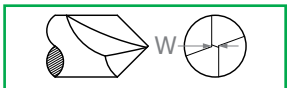
# ENGRAVING CUTTERS

## Marking Cutters for Non-Ferrous Materials

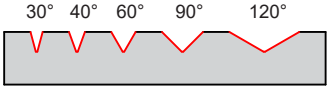



- **Designed for milling legible part numbers in non-ferrous and easy-to-machine materials**
- 2 flute cutting design has improved strength over single point engravers
- Flat relief design for improved results in aluminum and other non-ferrous applications
- Produces flat in bottom of groove
- Solid carbide
- CNC ground in the USA



Flat Relief with Web at Center

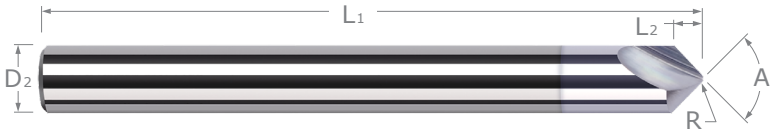


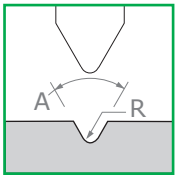
Stocked in Five Included Angles!

| INCLUDED ANGLE | DIAMETER | WEB THICKNESS | LENGTH OF CUT | OVERALL LENGTH | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_2$ | W | $L_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 30° | 1/8 | .005 | .230 | 1-1/2 | 993215 | 22.10 | 993215-C8 | 29.80 |
| | 1/8 | .010 | .228 | 1-1/2 | 963215 | 22.10 | 963215-C8 | 29.80 |
| | 1/8 | .015 | .225 | 1-1/2 | 902915 | 22.10 | 902915-C8 | 29.80 |
| | 3/16 | .005 | .347 | 2 | 987815 | 27.50 | 987815-C8 | 36.10 |
| | 1/4 | .005 | .461 | 2-1/2 | 967415 | 38.60 | 967415-C8 | 48.60 |
| 40° | 1/8 | .005 | .170 | 1-1/2 | 993220 | 24.40 | 993220-C8 | 32.10 |
| | 1/8 | .010 | .168 | 1-1/2 | 963220 | 24.40 | 963220-C8 | 32.10 |
| | 3/16 | .005 | .255 | 2 | 987820 | 28.60 | 987820-C8 | 37.30 |
| | 1/4 | .005 | .339 | 2-1/2 | 967420 | 39.90 | 967420-C8 | 51.00 |
| 60° | 1/8 | .005 | .107 | 1-1/2 | 993230 | 22.10 | 993230-C8 | 29.80 |
| | 1/8 | .010 | .106 | 1-1/2 | 963230 | 22.10 | 963230-C8 | 29.80 |
| | 1/8 | .015 | .104 | 1-1/2 | 902930 | 22.10 | 902930-C8 | 29.80 |
| | 3/16 | .005 | .161 | 2 | 987830 | 27.50 | 987830-C8 | 36.10 |
| | 3/16 | .010 | .160 | 2 | 921230 | 27.50 | 921230-C8 | 36.10 |
| | 1/4 | .005 | .215 | 2-1/2 | 967430 | 38.60 | 967430-C8 | 48.60 |
| | 1/4 | .010 | .214 | 2-1/2 | 918630 | 38.60 | 918630-C8 | 49.70 |
| 90° | 1/8 | .005 | .062 | 1-1/2 | 993245 | 22.10 | 993245-C8 | 29.80 |
| | 1/8 | .010 | .061 | 1-1/2 | 963245 | 22.10 | 963245-C8 | 29.80 |
| | 1/8 | .015 | .060 | 1-1/2 | 902945 | 22.10 | 902945-C8 | 29.80 |
| | 3/16 | .005 | .093 | 2 | 987845 | 27.50 | 987845-C8 | 36.10 |
| | 3/16 | .010 | .092 | 2 | 921245 | 28.10 | 921245-C8 | 36.70 |
| | 1/4 | .005 | .124 | 2-1/2 | 967445 | 38.60 | 967445-C8 | 48.60 |
| | 1/4 | .010 | .123 | 2-1/2 | 918645 | 38.60 | 918645-C8 | 48.60 |
| 120° | 1/8 | .005 | .036 | 1-1/2 | 993260 | 22.10 | 993260-C8 | 29.80 |
| | 1/8 | .010 | .035 | 1-1/2 | 963260 | 22.60 | 963260-C8 | 30.30 |

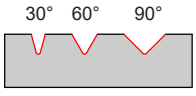
# ENGRAVING CUTTERS

## Marking Cutters – Tip Radius for Non-Ferrous Materials




- **Designed for milling legible part numbers in non-ferrous and easy-to-machine materials**
- Radiused tip design for improved strength
- Flat relief design for improved results
- Solid carbide
- CNC ground in the USA

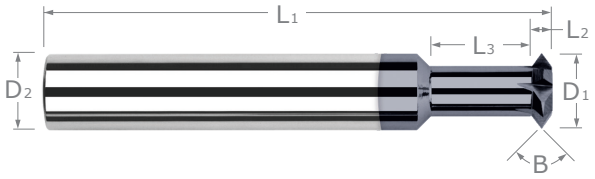


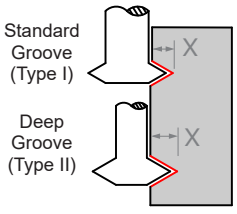

Stocked in Three Included Angles!

| INCLUDED ANGLE | DIAMETER | RADIUS | LENGTH OF CUT | OVERALL LENGTH | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_2$ | R | $L_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| **30°** | 1/8 | **.005** | .219 | 1-1/2 | 847115 | 27.30 | 847115-C8 | 35.00 |
| | 1/8 | **.010** | .205 | 1-1/2 | 854415 | 27.30 | 854415-C8 | 35.00 |
| | 1/8 | **.015** | .190 | 1-1/2 | 738115 | 27.30 | 738115-C8 | 35.00 |
| | 1/4 | **.005** | .452 | 2-1/2 | 774915 | 40.90 | 774915-C8 | 52.00 |
| **60°** | 1/8 | **.005** | .103 | 1-1/2 | 847130 | 27.30 | 847130-C8 | 35.00 |
| | 1/8 | **.010** | .098 | 1-1/2 | 854430 | 27.30 | 854430-C8 | 35.00 |
| | 1/8 | **.015** | .093 | 1-1/2 | 738130 | 27.30 | 738130-C8 | 35.00 |
| | 3/16 | **.005** | .336 | 2 | 724430 | 33.60 | 724430-C8 | 42.20 |
| | 3/16 | **.010** | .321 | 2 | 724330 | 33.60 | 724330-C8 | 42.20 |
| | 1/4 | **.005** | .212 | 2-1/2 | 774930 | 40.00 | 774930-C8 | 49.90 |
| **90°** | 1/8 | **.005** | .060 | 1-1/2 | 847145 | 27.30 | 847145-C8 | 35.00 |
| | 1/8 | **.010** | .058 | 1-1/2 | 854445 | 27.30 | 854445-C8 | 35.00 |
| | 1/8 | **.015** | .056 | 1-1/2 | 738145 | 27.30 | 738145-C8 | 35.00 |
| | 1/4 | **.005** | .123 | 2-1/2 | 774945 | 40.00 | 774945-C8 | 49.90 |

# DOUBLE ANGLE SHANK CUTTERS

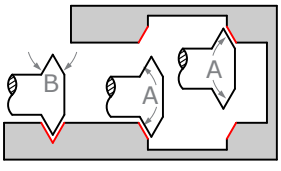
## Pointed



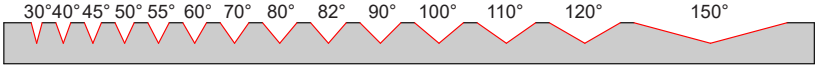

- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Reduced neck for long reach machining
- Tip of included angle ground to a point
- 60° angle can also be used for thread milling
- Solid carbide
- CNC ground in the USA

Great for Chamfering and Deburring




**Included Angle Conversion**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A = 180 - B | 150° | 140° | 135° | 130° | 125° | 120° | 110° | 100° | 98° | 90° | 80° | 70° | 60° | 30° |
| B = 180 - A | 30° | 40° | 45° | 50° | 55° | 60° | 70° | 80° | 82° | 90° | 100° | 110° | 120° | 150° |




Included Angle (B) | Stocked in Fourteen Included Angles!

| INCL. ANGLE | CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | ALTiN COATED | | ALTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B +1° −1° | D1 +.000″ −.002″ | L2 | | L3 +.020″ −.000″ | | | D2 | L1 | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 30° | 1/16 | .008 | 1/32 | **.093** | I | 2 | 1/8 | 1-1/2 | 66062 | 59.40 | 66062-C3 | 65.30 | | |
| | 5/64 | .010 | .039 | **.118** | I | 2 | 1/8 | 1-1/2 | 66078 | 59.40 | 66078-C3 | 65.30 | | |
| | 3/32 | .012 | 3/64 | **.141** | I | 2 | 1/8 | 1-1/2 | 66093 | 59.40 | 66093-C3 | 65.30 | | |
| | 1/8 | .017 | 1/16 | **.187** | I | 4 | 1/8 | 1-1/2 | 66108 | 57.90 | 66108-C3 | 63.80 | | |
| | 1/8 | .017 | 1/16 | **.500** | I | 4 | 1/8 | 1-1/2 | 934308 | 59.40 | 934308-C3 | 65.30 | | |
| | 3/16 | .025 | 3/32 | **.312** | I | 4 | 3/16 | 2 | 66112 | 60.10 | 66112-C3 | 66.60 | | |
| | 1/4 | .033 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 66116 | 76.30 | 66116-C3 | 85.10 | | |
| | 1/4 | .033 | 1/8 | **.625** | I | 4 | 1/4 | 2 | 921716 | 90.00 | 921716-C3 | 98.80 | | |
| | 3/8 | .033 | 1/4 | **.500** | I | 6 | 3/8 | 2-1/2 | 66105 | 102.50 | 66105-C3 | 113.90 | | |
| | 3/8 | .033 | 1/4 | **1.500** | I | 6 | 3/8 | 3-1/2 | 934324 | 119.60 | 934324-C3 | 131.80 | | |
| | 1/2 | .050 | 5/16 | **.500** | I | 6 | 1/2 | 3 | 66110 | 138.60 | 66110-C3 | 155.90 | | |
| | 1/2 | .050 | 5/16 | **1.500** | I | 6 | 1/2 | 4 | 934332 | 176.70 | 934332-C3 | 193.30 | | |
| 40° | 1/4 | .045 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 29720 | 78.00 | 29720-C3 | 86.90 | | |
| | 1/4 | .045 | 1/8 | **.625** | I | 4 | 1/4 | 2 | 918116 | 92.50 | 918116-C3 | 100.00 | | |
| | 3/8 | .045 | 1/4 | **.500** | I | 6 | 3/8 | 2-1/2 | 909924 | 100.60 | 909924-C3 | 112.00 | | |
| | 3/8 | .045 | 1/4 | **1.500** | I | 6 | 3/8 | 3-1/2 | 967505 | 124.90 | 967505-C3 | 137.10 | | |
| | 1/2 | .068 | 5/16 | **.500** | I | 6 | 1/2 | 3 | 909932 | 134.40 | 909932-C3 | 150.00 | | |
| | 1/2 | .068 | 5/16 | **1.500** | I | 6 | 1/2 | 4 | 967510 | 174.80 | 967510-C3 | 192.30 | | |
| 45° | 1/8 | .026 | 1/16 | **.187** | I | 4 | 1/8 | 1-1/2 | 905608 | 59.40 | 905608-C3 | 65.30 | | |
| | 3/16 | .039 | 3/32 | **.312** | I | 4 | 3/16 | 2 | 905612 | 60.10 | 905612-C3 | 66.60 | | |
| | 3/16 | .039 | 3/32 | **.750** | I | 4 | 3/16 | 2-1/2 | 984902 | 70.10 | 984902-C3 | 76.70 | | |
| | 1/4 | .052 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 29723 | 76.30 | 29723-C3 | 85.10 | | |
| | 1/4 | .052 | 1/8 | **.625** | I | 4 | 1/4 | 2 | 917016 | 90.00 | 917016-C3 | 98.80 | | |
| | 1/4 | .052 | 1/8 | **1.000** | I | 4 | 1/4 | 3 | 984903 | 93.50 | 984903-C3 | 102.30 | | |
| | 3/8 | .052 | 1/4 | **.500** | I | 6 | 3/8 | 2-1/2 | 905624 | 96.60 | 905624-C3 | 108.10 | | |
| | 3/8 | .052 | 1/4 | **1.000** | I | 6 | 3/8 | 2-1/2 | 917024 | 110.20 | 917024-C3 | 121.70 | | |
| | 3/8 | .052 | 1/4 | **1.500** | I | 6 | 3/8 | 3-1/2 | 984905 | 120.20 | 984905-C3 | 131.80 | | |
| | 1/2 | .078 | 5/16 | **.500** | I | 6 | 1/2 | 3 | 905632 | 131.80 | 905632-C3 | 149.10 | | |
| | 1/2 | .078 | 5/16 | **1.500** | I | 6 | 1/2 | 4 | 984910 | 171.50 | 984910-C3 | 188.80 | | |

continued on next page

# DOUBLE ANGLE SHANK CUTTERS

## Pointed (cont.)

continued from previous page

| INCL. ANGLE | CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B +1° −1° | $D_1$ +.000″ −.002″ | $L_2$ | | $L_3$ +.020″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| | 1/8 | .029 | 1/16 | **.187** | I | 4 | 1/8 | 1-1/2 | 985801 | 58.50 | 985801-C3 | 64.50 | | |
| | 1/8 | .029 | 1/16 | **.500** | I | 4 | 1/8 | 1-1/2 | 974401 | 69.80 | 974401-C3 | 75.70 | | |
| | 3/16 | .044 | 3/32 | **.312** | I | 4 | 3/16 | 2 | 985802 | 61.10 | 985802-C3 | 67.40 | | |
| | 3/16 | .044 | 3/32 | **.750** | I | 4 | 3/16 | 2-1/2 | 974402 | 71.20 | 974402-C3 | 77.90 | | |
| **50°** | 1/4 | .058 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 29725 | 81.20 | 29725-C3 | 88.60 | | |
| | 1/4 | .058 | 1/8 | **1.000** | I | 4 | 1/4 | 3 | 974403 | 95.80 | 974403-C3 | 103.90 | | |
| | 3/8 | .058 | 1/4 | **.500** | I | 6 | 3/8 | 2-1/2 | 985805 | 101.80 | 985805-C3 | 113.20 | | |
| | 3/8 | .058 | 1/4 | **1.500** | I | 6 | 3/8 | 3-1/2 | 974405 | 124.90 | 974405-C3 | 137.10 | | |
| | 1/2 | .088 | 5/16 | **.500** | I | 6 | 1/2 | 3 | 985810 | 138.90 | 985810-C3 | 154.50 | | |
| | 1/2 | .088 | 5/16 | **1.500** | I | 6 | 1/2 | 4 | 974410 | 174.70 | 974410-C3 | 191.30 | | |
| **55°** | 1/4 | .065 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 29728 | 82.80 | 29728-C3 | 91.70 | | |
| | 1/16 | .018 | 1/32 | **.093** | I | 2 | 1/8 | 1-1/2 | 47362 | 57.50 | 47362-C3 | 63.40 | | |
| | 1/16 | .018 | 1/32 | **.156** | I | 2 | 1/8 | 1-1/2 | 965562 | 57.50 | 965562-C3 | 63.40 | | |
| | 5/64 | .023 | .039 | **.118** | I | 2 | 1/8 | 1-1/2 | 47378 | 57.50 | 47378-C3 | 63.40 | | |
| | 3/32 | .027 | 3/64 | **.141** | I | 2 | 1/8 | 1-1/2 | 47393 | 57.50 | 47393-C3 | 63.40 | | |
| | 3/32 | .027 | 3/64 | **.250** | I | 2 | 1/8 | 1-1/2 | 965593 | 57.50 | 965593-C3 | 63.40 | | |
| | 1/8 | .036 | 1/16 | **.125** | I | 4 | 1/8 | 1-1/2 | 937501 | 53.10 | 937501-C3 | 59.10 | | |
| | 1/8 | .036 | 1/16 | **.187** | I | 4 | 1/8 | 1-1/2 | 16201 | 53.10 | 16201-C3 | 59.10 | | |
| | 1/8 | .036 | 1/16 | **.312** | I | 4 | 1/8 | 1-1/2 | 984401 | 59.80 | 984401-C3 | 65.70 | | |
| | 1/8 | .036 | 1/16 | **.500** | I | 4 | 1/8 | 2 | 27501 | 65.10 | 27501-C3 | 71.00 | | |
| | 1/8 | .036 | 1/16 | **.875** | I | 4 | 1/8 | 2 | 981001 | 71.10 | 981001-C3 | 77.00 | | |
| | 5/32 | .045 | 5/64 | **.250** | I | 4 | 3/16 | 2 | 16256 | 57.50 | 16256-C3 | 64.10 | | |
| | 5/32 | .045 | 5/64 | **.625** | I | 4 | 3/16 | 2-1/2 | 27556 | 65.10 | 27556-C3 | 71.70 | | |
| | 3/16 | .055 | 3/32 | **.187** | I | 4 | 3/16 | 2 | 937502 | 56.60 | 937502-C3 | 62.80 | | |
| | 3/16 | .055 | 3/32 | **.312** | I | 4 | 3/16 | 2 | 16202 | 56.60 | 16202-C3 | 63.20 | | |
| | 3/16 | .055 | 3/32 | **.500** | I | 4 | 3/16 | 2 | 984402 | 65.50 | 984402-C3 | 72.00 | | |
| | 3/16 | .055 | 3/32 | **.750** | I | 4 | 3/16 | 2-1/2 | 27502 | 69.50 | 27502-C3 | 76.20 | | |
| | 3/16 | .055 | 3/32 | **1.000** | I | 4 | 3/16 | 2-1/2 | 925502 | 72.80 | 925502-C3 | 79.40 | | |
| | 1/4 | .072 | 1/8 | **.187** | I | 4 | 1/4 | 2 | 937503 | 76.30 | 937503-C3 | 85.10 | | |
| | 1/4 | .072 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 16203 | 76.30 | 16203-C3 | 85.10 | 16203-C6 | 85.40 |
| **60°** | 1/4 | .072 | 1/8 | **.312** | I | 6 | 1/4 | 2 | 808016 | 81.80 | 808016-C3 | 90.70 | | |
| | 1/4 | .072 | 1/8 | **.625** | I | 4 | 1/4 | 2-1/2 | 984403 | 85.60 | 984403-C3 | 94.50 | | |
| | 1/4 | .072 | 1/8 | **1.000** | I | 4 | 1/4 | 3 | 27503 | 91.40 | 27503-C3 | 100.30 | | |
| | 1/4 | .072 | 1/8 | **1.312** | I | 4 | 1/4 | 3 | 925503 | 91.90 | 925503-C3 | 100.00 | | |
| | 1/4 | .072 | 1/8 | **1.750** | I | 4 | 1/4 | 3 | 981003 | 93.20 | 981003-C3 | 101.30 | | |
| | 5/16 | .072 | 3/16 | **.375** | I | 6 | 5/16 | 2-1/2 | 16272 | 92.60 | 16272-C3 | 102.80 | | |
| | 5/16 | .072 | 3/16 | **.875** | I | 6 | 5/16 | 2-1/2 | 984472 | 95.40 | 984472-C3 | 105.50 | | |
| | 3/8 | .072 | 1/4 | **.312** | I | 6 | 3/8 | 2-1/2 | 937505 | 97.50 | 937505-C3 | 108.90 | | |
| | 3/8 | .072 | 1/4 | **.500** | I | 6 | 3/8 | 2-1/2 | 16205 | 97.50 | 16205-C3 | 108.90 | 16205-C6 | 111.40 |
| | 3/8 | .072 | 1/4 | **.750** | I | 6 | 3/8 | 2-1/2 | 773305 | 103.60 | 773305-C3 | 115.00 | | |
| | 3/8 | .072 | 1/4 | **1.000** | I | 6 | 3/8 | 2-1/2 | 984405 | 109.80 | 984405-C3 | 121.20 | 984405-C6 | 123.70 |
| | 3/8 | .072 | 1/4 | **1.500** | I | 6 | 3/8 | 3-1/2 | 27505 | 122.10 | 27505-C3 | 133.70 | | |
| | 3/8 | .072 | 1/4 | **2.000** | I | 6 | 3/8 | 3-1/2 | 925505 | 127.90 | 925505-C3 | 139.50 | | |
| | 1/2 | .109 | 5/16 | **.500** | I | 6 | 1/2 | 3 | 16210 | 133.50 | 16210-C3 | 150.80 | | |
| | 1/2 | .109 | 5/16 | **.750** | I | 6 | 1/2 | 3 | 773310 | 138.80 | 773310-C3 | 156.10 | | |
| | 1/2 | .109 | 5/16 | **1.000** | I | 6 | 1/2 | 3 | 984410 | 145.40 | 984410-C3 | 162.70 | | |
| | 1/2 | .109 | 5/16 | **1.250** | I | 6 | 1/2 | 3-1/2 | 762310 | 157.80 | 762310-C3 | 175.10 | | |
| | 1/2 | .109 | 5/16 | **1.500** | I | 6 | 1/2 | 4 | 27510 | 170.10 | 27510-C3 | 187.40 | 27510-C6 | 190.50 |
| | 1/2 | .109 | 5/16 | **2.000** | I | 6 | 1/2 | 4 | 925510 | 174.50 | 925510-C3 | 191.80 | | |
| | 1/2 | .109 | 5/16 | **2.625** | I | 6 | 1/2 | 4 | 981010 | 179.10 | 981010-C3 | 196.30 | | |
| | 5/8 | .144 | 3/8 | **.750** | I | 6 | 5/8 | 3-1/2 | 16215 | 240.40 | 16215-C3 | 257.70 | | |

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# DOUBLE ANGLE SHANK CUTTERS

## Pointed (cont.)

continued from previous page

| INCL. ANGLE | CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B +1° −1° | $D_1$ +.000″ −.002″ | $L_2$ | | $L_3$ +.020″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| **70°** | 1/4 | .088 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 871903 | 82.80 | 871903-C3 | 91.70 | | |
| | 3/8 | .088 | 1/4 | **1.500** | I | 6 | 3/8 | 3-1/2 | 791005 | 130.80 | 791005-C3 | 142.50 | | |
| **80°** | 1/4 | .105 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 29740 | 82.80 | 29740-C3 | 91.70 | | |
| | 3/8 | .105 | 1/4 | **1.500** | I | 6 | 3/8 | 3-1/2 | 792005 | 133.30 | 792005-C3 | 145.10 | | |
| **82°** | 1/4 | .109 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 29741 | 82.80 | 29741-C3 | 91.70 | | |
| | 3/8 | .109 | 1/4 | **1.500** | I | 6 | 3/8 | 3-1/2 | 920805 | 133.30 | 920805-C3 | 145.10 | | |
| | 1/2 | .163 | 5/16 | **1.500** | I | 6 | 1/2 | 4 | 920810 | 182.30 | 920810-C3 | 199.90 | | |
| **90°** | 1/32 | .015 | .016 | **.062** | I | 2 | 1/8 | 1-1/2 | 807002 | 52.80 | 807002-C3 | 58.80 | | |
| | 1/32 | .015 | .016 | **.093** | I | 2 | 1/8 | 1-1/2 | 45131 | 51.80 | 45131-C3 | 57.70 | | |
| | 1/32 | .015 | .016 | **.125** | I | 2 | 1/8 | 1-1/2 | 71604 | 52.80 | 71604-C3 | 58.80 | | |
| | 1/16 | .031 | 1/32 | **.062** | I | 2 | 1/8 | 1-1/2 | 946862 | 51.80 | 946862-C3 | 57.70 | | |
| | 1/16 | .031 | 1/32 | **.093** | I | 2 | 1/8 | 1-1/2 | 19162 | 51.80 | 19162-C3 | 57.70 | | |
| | 1/16 | .031 | 1/32 | **.093** | I | 4 | 1/8 | 1-1/2 | 838804 | 51.80 | 838804-C3 | 57.70 | | |
| | 1/16 | .031 | 1/32 | **.125** | I | 2 | 1/8 | 1-1/2 | 807662 | 51.80 | 807662-C3 | 57.70 | | |
| | 1/16 | .031 | 1/32 | **.156** | I | 2 | 1/8 | 1-1/2 | 45162 | 57.50 | 45162-C3 | 63.40 | 45162-C6 | 64.40 |
| | 1/16 | .031 | 1/32 | **.156** | I | 4 | 1/8 | 1-1/2 | 832404 | 60.50 | 832404-C3 | 66.40 | | |
| | 1/16 | .031 | 1/32 | **.187** | I | 2 | 1/8 | 1-1/2 | 822104 | 63.10 | 822104-C3 | 69.00 | | |
| | 1/16 | .031 | 1/32 | **.250** | I | 2 | 1/8 | 1-1/2 | 71662 | 63.10 | 71662-C3 | 69.00 | | |
| | 1/16 | .031 | 1/32 | **.250** | I | 4 | 1/8 | 1-1/2 | 792962 | 64.50 | 792962-C3 | 70.40 | | |
| | 1/16 | .031 | 1/32 | **.312** | I | 2 | 1/8 | 1-1/2 | 857862 | 63.10 | 857862-C3 | 69.00 | | |
| | 1/16 | .031 | 1/32 | **.375** | I | 2 | 1/8 | 1-1/2 | 963662 | 63.10 | 963662-C3 | 69.00 | | |
| | 1/16 | .031 | 1/32 | **.437** | I | 2 | 1/8 | 1-1/2 | 855762 | 64.50 | 855762-C3 | 70.40 | | |
| | 5/64 | .039 | .039 | **.078** | I | 2 | 1/8 | 1-1/2 | 946878 | 51.80 | 946878-C3 | 57.70 | | |
| | 5/64 | .039 | .039 | **.093** | I | 2 | 1/8 | 1-1/2 | 807105 | 51.80 | 807105-C3 | 57.70 | | |
| | 5/64 | .039 | .039 | **.118** | I | 2 | 1/8 | 1-1/2 | 19178 | 51.80 | 19178-C3 | 57.70 | | |
| | 5/64 | .039 | .039 | **.125** | I | 2 | 1/8 | 1-1/2 | 807005 | 51.80 | 807005-C3 | 57.70 | | |
| | 5/64 | .039 | .039 | **.187** | I | 2 | 1/8 | 1-1/2 | 45178 | 57.50 | 45178-C3 | 63.40 | | |
| | 5/64 | .039 | .039 | **.187** | I | 4 | 1/8 | 1-1/2 | 832405 | 60.50 | 832405-C3 | 66.40 | | |
| | 5/64 | .039 | .039 | **.250** | I | 2 | 1/8 | 1-1/2 | 822178 | 60.50 | 822178-C3 | 68.10 | | |
| | 5/64 | .039 | .039 | **.312** | I | 2 | 1/8 | 1-1/2 | 71678 | 63.10 | 71678-C3 | 69.00 | | |
| | 5/64 | .039 | .039 | **.312** | I | 4 | 1/8 | 1-1/2 | 792978 | 64.50 | 792978-C3 | 70.40 | | |
| | 5/64 | .039 | .039 | **.375** | I | 2 | 1/8 | 1-1/2 | 771978 | 64.50 | 771978-C3 | 70.40 | | |
| | 5/64 | .039 | .039 | **.500** | I | 2 | 1/8 | 1-1/2 | 963678 | 63.10 | 963678-C3 | 69.00 | | |
| | 3/32 | .047 | 3/64 | **.093** | I | 2 | 1/8 | 1-1/2 | 946893 | 51.80 | 946893-C3 | 57.70 | | |
| | 3/32 | .047 | 3/64 | **.125** | I | 2 | 1/8 | 1-1/2 | 807106 | 51.80 | 807106-C3 | 57.70 | | |
| | 3/32 | .047 | 3/64 | **.141** | I | 2 | 1/8 | 1-1/2 | 19193 | 51.80 | 19193-C3 | 57.70 | | |
| | 3/32 | .047 | 3/64 | **.141** | I | 4 | 1/8 | 1-1/2 | 838806 | 51.80 | 838806-C3 | 57.70 | | |
| | 3/32 | .047 | 3/64 | **.187** | I | 2 | 1/8 | 1-1/2 | 807693 | 51.80 | 807693-C3 | 57.70 | | |
| | 3/32 | .047 | 3/64 | **.250** | I | 2 | 1/8 | 1-1/2 | 45193 | 57.50 | 45193-C3 | 63.40 | | |
| | 3/32 | .047 | 3/64 | **.250** | I | 4 | 1/8 | 1-1/2 | 832406 | 60.50 | 832406-C3 | 66.40 | | |
| | 3/32 | .047 | 3/64 | **.312** | I | 2 | 1/8 | 1-1/2 | 807493 | 63.10 | 807493-C3 | 69.00 | | |
| | 3/32 | .047 | 3/64 | **.375** | I | 2 | 1/8 | 1-1/2 | 71693 | 63.10 | 71693-C3 | 69.00 | | |
| | 3/32 | .047 | 3/64 | **.375** | I | 4 | 1/8 | 1-1/2 | 792906 | 63.10 | 792906-C3 | 69.00 | | |
| | 3/32 | .047 | 3/64 | **.500** | I | 2 | 1/8 | 1-1/2 | 857893 | 63.10 | 857893-C3 | 69.00 | | |
| | 3/32 | .047 | 3/64 | **.625** | I | 2 | 1/8 | 2 | 963693 | 65.50 | 963693-C3 | 71.40 | | |
| | 3/32 | .047 | 3/64 | **.750** | I | 2 | 1/8 | 2 | 855793 | 68.30 | 855793-C3 | 74.20 | | |
| | 3 mm | .059 | .059 | **.187** | I | 2 | 1/8 | 1-1/2 | 1913M | 52.60 | 1913M-C3 | 58.50 | | |
| | 3 mm | .059 | .059 | **.250** | I | 2 | 1/8 | 1-1/2 | 80763M | 61.70 | 80763M-C3 | 67.60 | | |
| | 3 mm | .059 | .059 | **.312** | I | 2 | 1/8 | 1-1/2 | 4513M | 60.50 | 4513M-C3 | 66.40 | | |
| | 3 mm | .059 | .059 | **.438** | I | 2 | 1/8 | 1-1/2 | 82213M | 69.30 | 82213M-C3 | 75.30 | | |

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# DOUBLE ANGLE SHANK CUTTERS

## Pointed (cont.)

continued from previous page

| INCL. ANGLE | CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ | | $L_3$ $^{+.020″}_{-.000″}$ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 90° | 1/8 | .062 | 1/16 | **.125** | I | 4 | 1/8 | 1-1/2 | 946901 | 51.80 | 946901-C3 | 57.70 | | |
| | 1/8 | .062 | 1/16 | **.125** | I | 6 | 1/8 | 1-1/2 | 791908 | 51.80 | 791908-C3 | 57.70 | | |
| | 1/8 | .062 | 1/16 | **.187** | I | 4 | 1/8 | 1-1/2 | 19201 | 51.80 | 19201-C3 | 57.70 | 19201-C6 | 58.60 |
| | 1/8 | .083 | .042 | **.187** | II | 4 | 1/8 | 1-1/2 | 759908 | 58.20 | 759908-C3 | 64.10 | | |
| | 1/8 | .062 | 1/16 | **.187** | I | 6 | 1/8 | 1-1/2 | 838808 | 54.30 | 838808-C3 | 60.20 | 838808-C6 | 61.10 |
| | 1/8 | .062 | 1/16 | **.250** | I | 4 | 1/8 | 1-1/2 | 807308 | 54.90 | 807308-C3 | 60.80 | | |
| | 1/8 | .062 | 1/16 | **.312** | I | 4 | 1/8 | 1-1/2 | 72601 | 58.10 | 72601-C3 | 64.00 | 72601-C6 | 65.00 |
| | 1/8 | .062 | 1/16 | **.312** | I | 6 | 1/8 | 1-1/2 | 847408 | 61.00 | 847408-C3 | 67.00 | | |
| | 1/8 | .062 | 1/16 | **.375** | I | 4 | 1/8 | 1-1/2 | 806908 | 58.10 | 806908-C3 | 64.00 | | |
| | 1/8 | .062 | 1/16 | **.500** | I | 4 | 1/8 | 2 | 19501 | 67.20 | 19501-C3 | 73.10 | 19501-C6 | 74.00 |
| | 1/8 | .062 | 1/16 | **.500** | I | 6 | 1/8 | 2 | 807908 | 70.20 | 807908-C3 | 76.10 | | |
| | 1/8 | .062 | 1/16 | **.625** | I | 4 | 1/8 | 2 | 71701 | 69.50 | 71701-C3 | 75.50 | | |
| | 1/8 | .062 | 1/16 | **.750** | I | 4 | 1/8 | 2 | 821808 | 71.30 | 821808-C3 | 77.20 | | |
| | 1/8 | .062 | 1/16 | **.875** | I | 4 | 1/8 | 2 | 26801 | 73.20 | 26801-C3 | 79.10 | | |
| | 1/8 | .062 | 1/16 | **1.000** | I | 4 | 1/8 | 2 | 772301 | 76.80 | 772301-C3 | 82.70 | | |
| | 1/8 | .062 | 1/16 | **1.125** | I | 4 | 1/8 | 2-1/2 | 963701 | 80.50 | 963701-C3 | 86.50 | | |
| | 5/32 | .078 | 5/64 | **.125** | I | 4 | 3/16 | 2 | 771056 | 52.40 | 771056-C3 | 58.90 | | |
| | 5/32 | .078 | 5/64 | **.156** | I | 4 | 3/16 | 2 | 946956 | 52.40 | 946956-C3 | 58.90 | | |
| | 5/32 | .078 | 5/64 | **.187** | I | 4 | 3/16 | 2 | 807157 | 52.40 | 807157-C3 | 58.90 | | |
| | 5/32 | .078 | 5/64 | **.250** | I | 4 | 3/16 | 2 | 19256 | 55.00 | 19256-C3 | 61.60 | | |
| | 5/32 | .078 | 5/64 | **.250** | I | 6 | 3/16 | 2 | 838810 | 56.80 | 838810-C3 | 63.40 | | |
| | 5/32 | .078 | 5/64 | **.375** | I | 4 | 3/16 | 2 | 807310 | 59.10 | 807310-C3 | 65.50 | | |
| | 5/32 | .078 | 5/64 | **.437** | I | 4 | 3/16 | 2 | 72656 | 63.10 | 72656-C3 | 69.70 | | |
| | 5/32 | .078 | 5/64 | **.500** | I | 4 | 3/16 | 2 | 807210 | 63.10 | 807210-C3 | 69.70 | | |
| | 5/32 | .078 | 5/64 | **.625** | I | 4 | 3/16 | 2-1/2 | 19556 | 68.10 | 19556-C3 | 74.50 | | |
| | 5/32 | .078 | 5/64 | **.875** | I | 4 | 3/16 | 2-1/2 | 71756 | 73.30 | 71756-C3 | 79.90 | | |
| | 5/32 | .078 | 5/64 | **1.125** | I | 4 | 3/16 | 2-1/2 | 26856 | 75.90 | 26856-C3 | 82.50 | | |
| | 3/16 | .095 | 3/32 | **.156** | I | 4 | 3/16 | 2 | 771002 | 53.00 | 771002-C3 | 59.50 | | |
| | 3/16 | .095 | 3/32 | **.187** | I | 4 | 3/16 | 2 | 946902 | 53.00 | 946902-C3 | 59.50 | | |
| | 3/16 | .095 | 3/32 | **.187** | I | 6 | 3/16 | 2 | 807812 | 55.90 | 807812-C3 | 62.30 | | |
| | 3/16 | .095 | 3/32 | **.250** | I | 4 | 3/16 | 2 | 807112 | 54.00 | 807112-C3 | 60.50 | | |
| | 3/16 | .095 | 3/32 | **.312** | I | 4 | 3/16 | 2 | 19202 | 54.00 | 19202-C3 | 60.50 | 19202-C6 | 61.70 |
| | 3/16 | .125 | 1/16 | **.312** | II | 4 | 3/16 | 2 | 759912 | 62.50 | 759912-C3 | 69.20 | | |
| | 3/16 | .095 | 3/32 | **.312** | I | 6 | 3/16 | 2 | 838812 | 56.90 | 838812-C3 | 63.50 | 838812-C6 | 66.40 |
| | 3/16 | .095 | 3/32 | **.375** | I | 4 | 3/16 | 2 | 807312 | 59.10 | 807312-C3 | 65.50 | | |
| | 3/16 | .095 | 3/32 | **.500** | I | 4 | 3/16 | 2 | 72602 | 64.30 | 72602-C3 | 70.70 | 72602-C6 | 71.90 |
| | 3/16 | .095 | 3/32 | **.500** | I | 6 | 3/16 | 2 | 847412 | 67.30 | 847412-C3 | 73.90 | | |
| | 3/16 | .095 | 3/32 | **.625** | I | 4 | 3/16 | 2 | 807212 | 68.30 | 807212-C3 | 74.70 | | |
| | 3/16 | .095 | 3/32 | **.750** | I | 4 | 3/16 | 2-1/2 | 19502 | 68.30 | 19502-C3 | 74.70 | 19502-C6 | 76.50 |
| | 3/16 | .095 | 3/32 | **.750** | I | 6 | 3/16 | 2-1/2 | 822612 | 69.80 | 822612-C3 | 76.40 | | |
| | 3/16 | .095 | 3/32 | **1.000** | I | 4 | 3/16 | 2-1/2 | 71702 | 74.60 | 71702-C3 | 81.00 | | |
| | 3/16 | .095 | 3/32 | **1.000** | I | 6 | 3/16 | 2-1/2 | 755912 | 82.00 | 755912-C3 | 88.60 | | |
| | 3/16 | .095 | 3/32 | **1.312** | I | 4 | 3/16 | 2-1/2 | 26802 | 76.30 | 26802-C3 | 82.90 | | |
| | 3/16 | .095 | 3/32 | **1.625** | I | 4 | 3/16 | 3 | 963702 | 84.80 | 963702-C3 | 91.40 | | |
| | 6 mm | .118 | .118 | **.312** | I | 4 | 1/4 | 2 | 19262 | 84.50 | 19262-C3 | 93.20 | | |
| | 6 mm | .118 | .118 | **.625** | I | 4 | 1/4 | 2 | 72662 | 87.30 | 72662-C3 | 96.10 | | |
| | 6 mm | .118 | .118 | **1.000** | I | 4 | 1/4 | 2-1/2 | 19562 | 90.10 | 19562-C3 | 98.90 | | |
| | 1/4 | .125 | 1/8 | **.187** | I | 4 | 1/4 | 2 | 946903 | 65.10 | 946903-C3 | 73.90 | | |
| | 1/4 | .125 | 1/8 | **.250** | I | 4 | 1/4 | 2 | 807116 | 66.20 | 807116-C3 | 74.90 | | |
| | 1/4 | .125 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 19203 | 66.20 | 19203-C3 | 74.90 | 19203-C6 | 79.00 |
| | 1/4 | .167 | .083 | **.312** | II | 4 | 1/4 | 2 | 759916 | 69.80 | 759916-C3 | 78.60 | | |
| | 1/4 | .125 | 1/8 | **.312** | I | 6 | 1/4 | 2 | 838816 | 69.50 | 838816-C3 | 78.40 | 838816-C6 | 82.50 |
| | 1/4 | .125 | 1/8 | **.375** | I | 4 | 1/4 | 2-1/2 | 807016 | 73.20 | 807016-C3 | 82.10 | | |

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# DOUBLE ANGLE SHANK CUTTERS

## Pointed (cont.)

continued from previous page

| INCL. ANGLE | CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B +1° −1° | $D_1$ +.000″ −.002″ | $L_2$ | | $L_3$ +.020″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 90° | 1/4 | .125 | 1/8 | **.500** | I | 4 | 1/4 | 2 | 807316 | 67.00 | 807316-C3 | 75.80 | | |
| | 1/4 | .125 | 1/8 | **.625** | I | 4 | 1/4 | 2-1/2 | 72603 | 73.50 | 72603-C3 | 82.40 | 72603-C6 | 83.20 |
| | 1/4 | .125 | 1/8 | **.625** | I | 6 | 1/4 | 2-1/2 | 847416 | 77.30 | 847416-C3 | 86.10 | | |
| | 1/4 | .125 | 1/8 | **.750** | I | 4 | 1/4 | 2-1/2 | 807216 | 73.50 | 807216-C3 | 82.40 | | |
| | 1/4 | .125 | 1/8 | **1.000** | I | 4 | 1/4 | 3 | 19503 | 80.50 | 19503-C3 | 89.20 | 19503-C6 | 90.30 |
| | 1/4 | .125 | 1/8 | **1.000** | I | 6 | 1/4 | 3 | 822616 | 84.20 | 822616-C3 | 91.20 | | |
| | 1/4 | .125 | 1/8 | **1.250** | I | 4 | 1/4 | 3 | 822216 | 86.10 | 822216-C3 | 94.80 | | |
| | 1/4 | .125 | 1/8 | **1.312** | I | 4 | 1/4 | 3 | 71703 | 86.10 | 71703-C3 | 94.80 | | |
| | 1/4 | .125 | 1/8 | **1.500** | I | 4 | 1/4 | 3 | 821816 | 88.60 | 821816-C3 | 97.40 | | |
| | 1/4 | .125 | 1/8 | **1.750** | I | 4 | 1/4 | 3 | 26803 | 88.60 | 26803-C3 | 97.40 | | |
| | 1/4 | .125 | 1/8 | **2.125** | I | 4 | 1/4 | 4 | 963703 | 95.90 | 963703-C3 | 106.10 | | |
| | 5/16 | .125 | 3/16 | **.250** | I | 6 | 5/16 | 2-1/2 | 946904 | 89.70 | 946904-C3 | 99.90 | | |
| | 5/16 | .125 | 3/16 | **.375** | I | 6 | 5/16 | 2-1/2 | 19272 | 92.60 | 19272-C3 | 102.80 | | |
| | 5/16 | .125 | 3/16 | **.375** | I | 8 | 5/16 | 2-1/2 | 838820 | 102.50 | 838820-C3 | 112.10 | | |
| | 5/16 | .125 | 3/16 | **.625** | I | 6 | 5/16 | 2-1/2 | 833572 | 93.80 | 833572-C3 | 104.10 | | |
| | 5/16 | .125 | 3/16 | **.625** | I | 8 | 5/16 | 2-1/2 | 754920 | 101.50 | 754920-C3 | 111.60 | | |
| | 5/16 | .125 | 3/16 | **.875** | I | 6 | 5/16 | 2-1/2 | 72672 | 93.80 | 72672-C3 | 104.10 | | |
| | 5/16 | .125 | 3/16 | **.875** | I | 8 | 5/16 | 2-1/2 | 847420 | 103.40 | 847420-C3 | 113.60 | | |
| | 5/16 | .125 | 3/16 | **1.000** | I | 6 | 5/16 | 3 | 807220 | 100.50 | 807220-C3 | 110.80 | | |
| | 5/16 | .125 | 3/16 | **1.250** | I | 6 | 5/16 | 3 | 19572 | 100.50 | 19572-C3 | 110.80 | | |
| | 5/16 | .125 | 3/16 | **1.250** | I | 8 | 5/16 | 3 | 822620 | 105.40 | 822620-C3 | 115.00 | | |
| | 5/16 | .125 | 3/16 | **1.500** | I | 6 | 5/16 | 3 | 772873 | 102.20 | 772873-C3 | 112.60 | | |
| | 5/16 | .125 | 3/16 | **1.625** | I | 6 | 5/16 | 3 | 71772 | 104.40 | 71772-C3 | 114.60 | | |
| | 5/16 | .125 | 3/16 | **2.125** | I | 6 | 5/16 | 3 | 26872 | 108.20 | 26872-C3 | 118.40 | | |
| | 3/8 | .125 | 1/4 | **.312** | I | 6 | 3/8 | 2-1/2 | 946905 | 90.00 | 946905-C3 | 101.40 | | |
| | 3/8 | .125 | 1/4 | **.375** | I | 6 | 3/8 | 2-1/2 | 807124 | 93.00 | 807124-C3 | 104.40 | | |
| | 3/8 | .125 | 1/4 | **.500** | I | 6 | 3/8 | 2-1/2 | 19205 | 94.60 | 19205-C3 | 104.60 | 19205-C6 | 109.10 |
| | 3/8 | .250 | 1/8 | **.500** | II | 6 | 3/8 | 2-1/2 | 759924 | 104.20 | 759924-C3 | 115.60 | | |
| | 3/8 | .125 | 1/4 | **.500** | I | 8 | 3/8 | 2-1/2 | 838824 | 99.40 | 838824-C3 | 110.90 | 838824-C6 | 113.80 |
| | 3/8 | .125 | 1/4 | **.750** | I | 6 | 3/8 | 2-1/2 | 807324 | 100.10 | 807324-C3 | 111.50 | | |
| | 3/8 | .125 | 1/4 | **1.000** | I | 6 | 3/8 | 2-1/2 | 72605 | 105.40 | 72605-C3 | 116.80 | 72605-C6 | 119.30 |
| | 3/8 | .125 | 1/4 | **1.000** | I | 8 | 3/8 | 2-1/2 | 847424 | 116.30 | 847424-C3 | 127.70 | | |
| | 3/8 | .125 | 1/4 | **1.250** | I | 6 | 3/8 | 3 | 807224 | 117.80 | 807224-C3 | 129.20 | | |
| | 3/8 | .125 | 1/4 | **1.500** | I | 6 | 3/8 | 3-1/2 | 19505 | 119.10 | 19505-C3 | 130.70 | 19505-C6 | 134.10 |
| | 3/8 | .125 | 1/4 | **1.500** | I | 8 | 3/8 | 3-1/2 | 822624 | 123.90 | 822624-C3 | 131.30 | | |
| | 3/8 | .125 | 1/4 | **1.750** | I | 6 | 3/8 | 3-1/2 | 822224 | 124.90 | 822224-C3 | 136.40 | | |
| | 3/8 | .125 | 1/4 | **2.000** | I | 6 | 3/8 | 3-1/2 | 71705 | 124.90 | 71705-C3 | 136.40 | | |
| | 3/8 | .125 | 1/4 | **2.312** | I | 6 | 3/8 | 3-1/2 | 26805 | 128.20 | 26805-C3 | 139.90 | | |
| | 3/8 | .125 | 1/4 | **2.625** | I | 6 | 3/8 | 4 | 963705 | 135.80 | 963705-C3 | 151.60 | | |
| | .393 | .133 | .260 | **.500** | I | 6 | 7/16 | 2-3/4 | 19279 | 142.50 | 19279-C3 | 155.80 | | |
| | .393 | .133 | .260 | **1.500** | I | 6 | 7/16 | 3-1/2 | 19579 | 165.00 | 19579-C3 | 182.20 | | |
| | 7/16 | .157 | 9/32 | **.500** | I | 6 | 7/16 | 2-3/4 | 19208 | 139.70 | 19208-C3 | 154.20 | | |
| | 7/16 | .157 | 9/32 | **1.500** | I | 6 | 7/16 | 3-1/2 | 19508 | 161.90 | 19508-C3 | 179.20 | | |
| | 1/2 | .187 | 5/16 | **.312** | I | 6 | 1/2 | 3 | 946910 | 122.50 | 946910-C3 | 139.90 | | |
| | 1/2 | .187 | 5/16 | **.500** | I | 6 | 1/2 | 3 | 19210 | 126.60 | 19210-C3 | 143.90 | 19210-C6 | 145.50 |
| | 1/2 | .187 | 5/16 | **.500** | I | 8 | 1/2 | 3 | 838832 | 132.90 | 838832-C3 | 150.10 | 838832-C6 | 151.80 |
| | 1/2 | .187 | 5/16 | **.750** | I | 6 | 1/2 | 3 | 807332 | 130.20 | 807332-C3 | 147.40 | | |
| | 1/2 | .187 | 5/16 | **1.000** | I | 6 | 1/2 | 3 | 72610 | 137.80 | 72610-C3 | 155.20 | | |
| | 1/2 | .187 | 5/16 | **1.000** | I | 8 | 1/2 | 3 | 847432 | 140.20 | 847432-C3 | 157.40 | | |
| | 1/2 | .187 | 5/16 | **1.250** | I | 6 | 1/2 | 3-1/2 | 822432 | 141.50 | 822432-C3 | 153.10 | | |

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# DOUBLE ANGLE SHANK CUTTERS

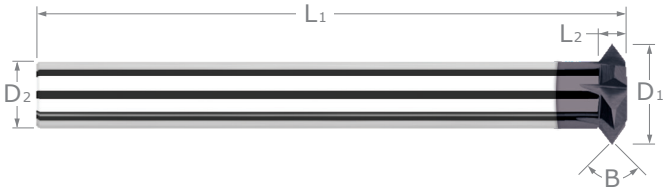
## Pointed (cont.)

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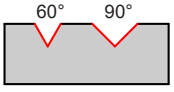
| INCL. ANGLE | CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B +1° −1° | $D_1$ +.000″ −.002″ | $L_2$ | | $L_3$ +.020″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 90° | 1/2 | .187 | 5/16 | **1.500** | I | 6 | 1/2 | 4 | 19510 | 161.90 | 19510-C3 | 179.20 | | |
| | 1/2 | .187 | 5/16 | **1.500** | I | 8 | 1/2 | 4 | 807932 | 168.30 | 807932-C3 | 185.50 | | |
| | 1/2 | .187 | 5/16 | **1.750** | I | 6 | 1/2 | 4 | 822232 | 165.00 | 822232-C3 | 182.20 | | |
| | 1/2 | .187 | 5/16 | **2.000** | I | 6 | 1/2 | 4 | 71710 | 167.60 | 71710-C3 | 184.90 | | |
| | 1/2 | .187 | 5/16 | **2.312** | I | 6 | 1/2 | 4 | 821810 | 169.20 | 821810-C3 | 186.40 | | |
| | 1/2 | .187 | 5/16 | **2.625** | I | 6 | 1/2 | 4 | 26810 | 172.20 | 26810-C3 | 189.50 | | |
| | 1/2 | .187 | 5/16 | **3.125** | I | 6 | 1/2 | 6 | 963710 | 180.10 | 963710-C3 | 197.40 | | |
| | 1/2 | .333 | .167 | **.500** | II | 6 | 1/2 | 3 | 759932 | 132.30 | 759932-C3 | 149.90 | | |
| | 5/8 | .250 | 3/8 | **.750** | I | 6 | 5/8 | 3-1/2 | 19215 | 240.90 | 19215-C3 | 258.20 | | |
| | 5/8 | .250 | 3/8 | **1.250** | I | 6 | 5/8 | 3-1/2 | 72615 | 247.70 | 72615-C3 | 264.90 | | |
| 100° | 1/8 | .075 | 1/16 | **.187** | I | 4 | 1/8 | 1-1/2 | 983401 | 57.90 | 983401-C3 | 63.80 | | |
| | 1/8 | .075 | 1/16 | **.500** | I | 4 | 1/8 | 1-1/2 | 969901 | 69.90 | 969901-C3 | 75.80 | | |
| | 3/16 | .113 | 3/32 | **.312** | I | 4 | 3/16 | 2 | 983402 | 59.80 | 983402-C3 | 66.40 | | |
| | 3/16 | .113 | 3/32 | **.750** | I | 4 | 3/16 | 2-1/2 | 969902 | 72.60 | 969902-C3 | 79.20 | | |
| | 1/4 | .149 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 29750 | 83.40 | 29750-C3 | 90.80 | | |
| | 1/4 | .149 | 1/8 | **1.000** | I | 4 | 1/4 | 3 | 969903 | 97.40 | 969903-C3 | 105.50 | | |
| | 3/8 | .149 | 1/4 | **.500** | I | 6 | 3/8 | 2-1/2 | 983405 | 98.60 | 983405-C3 | 110.00 | | |
| | 3/8 | .149 | 1/4 | **1.500** | I | 6 | 3/8 | 3-1/2 | 969905 | 127.30 | 969905-C3 | 139.50 | | |
| | 1/2 | .224 | 5/16 | **.500** | I | 6 | 1/2 | 3 | 983410 | 131.10 | 983410-C3 | 146.70 | | |
| | 1/2 | .224 | 5/16 | **1.500** | I | 6 | 1/2 | 4 | 969910 | 169.70 | 969910-C3 | 187.30 | | |
| 110° | 1/4 | .179 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 830503 | 87.40 | 830503-C3 | 96.30 | | |
| 120° | 1/8 | .109 | 1/16 | **.125** | I | 4 | 1/8 | 1-1/2 | 903608 | 53.10 | 903608-C3 | 59.10 | | |
| | 1/8 | .109 | 1/16 | **.187** | I | 4 | 1/8 | 1-1/2 | 39108 | 53.10 | 39108-C3 | 59.10 | | |
| | 1/8 | .109 | 1/16 | **.500** | I | 4 | 1/8 | 2 | 989401 | 63.10 | 989401-C3 | 69.00 | | |
| | 3/16 | .163 | 3/32 | **.187** | I | 4 | 3/16 | 2 | 903612 | 57.10 | 903612-C3 | 63.70 | | |
| | 3/16 | .163 | 3/32 | **.312** | I | 4 | 3/16 | 2 | 39112 | 57.90 | 39112-C3 | 64.40 | | |
| | 3/16 | .163 | 3/32 | **.750** | I | 4 | 3/16 | 2-1/2 | 989402 | 68.10 | 989402-C3 | 74.50 | | |
| | 1/4 | .216 | 1/8 | **.187** | I | 4 | 1/4 | 2 | 903616 | 75.50 | 903616-C3 | 82.90 | | |
| | 1/4 | .216 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 39116 | 76.30 | 39116-C3 | 85.10 | | |
| | 1/4 | .216 | 1/8 | **.625** | I | 4 | 1/4 | 2-1/2 | 910716 | 73.50 | 910716-C3 | 82.40 | | |
| | 1/4 | .216 | 1/8 | **1.000** | I | 4 | 1/4 | 3 | 989403 | 86.80 | 989403-C3 | 95.40 | | |
| | 3/8 | .216 | 1/4 | **.500** | I | 6 | 3/8 | 2-1/2 | 39124 | 99.90 | 39124-C3 | 111.30 | | |
| | 3/8 | .216 | 1/4 | **1.000** | I | 6 | 3/8 | 2-1/2 | 910724 | 110.80 | 910724-C3 | 122.20 | | |
| | 3/8 | .216 | 1/4 | **1.500** | I | 6 | 3/8 | 3-1/2 | 989405 | 124.90 | 989405-C3 | 136.40 | | |
| | 1/2 | .325 | 5/16 | **.500** | I | 6 | 1/2 | 3 | 39132 | 132.90 | 39132-C3 | 150.10 | | |
| | 1/2 | .325 | 5/16 | **1.000** | I | 6 | 1/2 | 3 | 910732 | 144.40 | 910732-C3 | 160.00 | | |
| | 1/2 | .325 | 5/16 | **1.500** | I | 6 | 1/2 | 4 | 989410 | 169.60 | 989410-C3 | 186.90 | | |
| 150° | 1/4 | .467 | 1/8 | **.312** | I | 4 | 1/4 | 2 | 826003 | 87.40 | 826003-C3 | 96.30 | | |
| | 3/8 | .467 | 1/4 | **.500** | I | 6 | 3/8 | 2-1/2 | 826005 | 113.60 | 826005-C3 | 125.00 | | |

# DOUBLE ANGLE SHANK CUTTERS

## Pointed - Reduced Shank




- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Reduced straight shank allows any chucking depth
- Tip of included angle ground to a point
- 60° angle can also be used for thread milling
- Solid carbide head brazed onto steel shank
- CNC ground in the USA

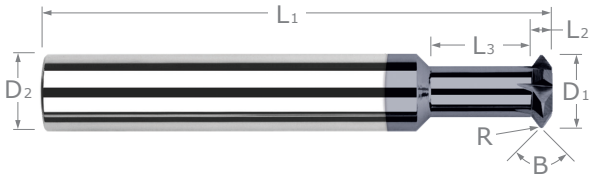


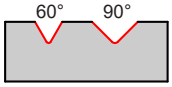

Included Angle (B)
Stocked in Two Included Angles!

| INCL. ANGLE | CUTTER DIAMETER | CUTTER WIDTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| B +1° −1° | D1 +.000″ −.002″ | L2 | | D2 | L1 | TOOL # | USD$ | TOOL # | USD$ |
| 60° | 1/4 | .072 | 6 | 1/8 | 2.572 | 866403 | 108.00 | 866403-C3 | 116.20 |
| | 3/8 | .108 | 8 | 3/16 | 3.108 | 866405 | 151.50 | 866405-C3 | 162.50 |
| | 1/2 | .144 | 8 | 1/4 | 3.144 | 866410 | 170.80 | 866410-C3 | 188.00 |
| | 3/4 | .144 | 8 | 1/2 | 3.644 | 16220 | 180.30 | 16220-C3 | 201.30 |
| | 3/4 | .144 | 8 | 1/2 | 6.144 | 27520 | 188.80 | 27520-C3 | 215.70 |
| | 1 | .217 | 8 | 5/8 | 4.217 | 16230 | 198.50 | 16230-C3 | 229.30 |
| 90° | 1/4 | .125 | 6 | 1/8 | 2.625 | 875503 | 108.00 | 875503-C3 | 116.70 |
| | 1/4 | .125 | 6 | 1/8 | 4.125 | 777903 | 109.20 | 777903-C3 | 118.30 |
| | 5/16 | .155 | 8 | 4 mm | 3.155 | 877572 | 130.80 | 877572-C3 | 141.20 |
| | 3/8 | .188 | 8 | 3/16 | 3.188 | 875505 | 151.50 | 875505-C3 | 170.20 |
| | 7/16 | .201 | 8 | 15/64 | 3.201 | 877508 | 161.20 | 877508-C3 | 175.30 |
| | 1/2 | .250 | 8 | 1/4 | 3.250 | 875510 | 170.80 | 875510-C3 | 188.00 |
| | 1/2 | .250 | 8 | 1/4 | 6.250 | 777910 | 179.00 | 777910-C3 | 200.80 |
| | 5/8 | .313 | 8 | 5/16 | 3.313 | 875515 | 173.30 | 875515-C3 | 192.00 |
| | 3/4 | .250 | 8 | 1/2 | 3.750 | 19220 | 179.80 | 19220-C3 | 200.60 |
| | 3/4 | .250 | 8 | 1/2 | 6.250 | 19520 | 188.10 | 19520-C3 | 214.90 |
| | 1 | .375 | 8 | 5/8 | 4.375 | 19230 | 198.80 | 19230-C3 | 229.70 |
| | 1-1/4 | .500 | 8 | 3/4 | 4.500 | 875520 | 246.00 | 875520-C3 | 285.30 |

# DOUBLE ANGLE SHANK CUTTERS

## Tip Radius




Included Angle (B)

Stocked in Two Included Angles!

- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Radius on tip for improved strength and wear resistance
- Reduced neck for long reach machining
- Solid carbide
- CNC ground in the USA

| INCL. ANGLE | CUTTER DIA. | RADIUS | CUTTER WIDTH | NECK DIAMETER | NECK LENGTH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | R $^{+.001″}_{-.001″}$ | $L_2$ | | $L_3$ $^{+.020″}_{-.000″}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 60° | 1/8 | **.005** | .042 | 1/16 | **.187** | 4 | 1/8 | 1-1/2 | 922508 | 68.10 | 922508-C3 | 74.00 |
| | 3/16 | **.005** | .060 | 3/32 | **.312** | 4 | 3/16 | 2 | 922512 | 71.70 | 922512-C3 | 78.30 |
| | 1/4 | **.005** | .078 | 1/8 | **.312** | 4 | 1/4 | 2 | 922516 | 92.00 | 922516-C3 | 100.70 |
| | 1/4 | **.010** | .084 | 1/8 | **.312** | 4 | 1/4 | 2 | 934716 | 92.00 | 934716-C3 | 100.70 |
| | 1/4 | **.010** | .084 | 1/8 | **1.000** | 4 | 1/4 | 3 | 930516 | 103.20 | 930516-C3 | 112.10 |
| | 3/8 | **.010** | .084 | 1/4 | **.500** | 6 | 3/8 | 2-1/2 | 934724 | 123.40 | 934724-C3 | 134.80 |
| | 3/8 | **.015** | .089 | 1/4 | **.500** | 6 | 3/8 | 2-1/2 | 911224 | 123.40 | 911224-C3 | 134.80 |
| | 1/2 | **.010** | .120 | 5/16 | **.500** | 6 | 1/2 | 3 | 934732 | 153.20 | 934732-C3 | 170.70 |
| | 1/2 | **.015** | .126 | 5/16 | **.500** | 6 | 1/2 | 3 | 911232 | 153.20 | 911232-C3 | 170.70 |
| 90° | 1/16 | **.005** | .035 | 1/32 | **.093** | 2 | 1/8 | 1-1/2 | 45804 | 70.50 | 45804-C3 | 76.40 |
| | 5/64 | **.005** | .043 | .039 | **.118** | 2 | 1/8 | 1-1/2 | 45805 | 70.50 | 45805-C3 | 76.40 |
| | 3/32 | **.005** | .050 | 3/64 | **.141** | 2 | 1/8 | 1-1/2 | 45806 | 70.50 | 45806-C3 | 76.40 |
| | 1/8 | **.005** | .067 | 1/16 | **.187** | 4 | 1/8 | 1-1/2 | 45808 | 70.50 | 45808-C3 | 76.40 |
| | 1/8 | **.005** | .067 | 1/16 | **.312** | 4 | 1/8 | 1-1/2 | 898408 | 79.30 | 898408-C3 | 85.20 |
| | 1/8 | **.005** | .067 | 1/16 | **.500** | 4 | 1/8 | 1-1/2 | 928708 | 86.90 | 928708-C3 | 92.80 |
| | 1/8 | **.010** | .071 | 1/16 | **.187** | 4 | 1/8 | 1-1/2 | 46608 | 71.00 | 46608-C3 | 76.90 |
| | 5/32 | **.005** | .082 | 5/64 | **.250** | 4 | 3/16 | 2 | 45810 | 74.20 | 45810-C3 | 80.80 |
| | 5/32 | **.005** | .082 | 5/64 | **.625** | 4 | 3/16 | 2-1/2 | 928710 | 83.10 | 928710-C3 | 89.80 |
| | 3/16 | **.005** | .099 | 3/32 | **.187** | 4 | 3/16 | 2 | 755212 | 74.80 | 755212-C3 | 81.40 |
| | 3/16 | **.005** | .099 | 3/32 | **.312** | 4 | 3/16 | 2 | 45812 | 74.20 | 45812-C3 | 80.80 |
| | 3/16 | **.005** | .099 | 3/32 | **.500** | 4 | 3/16 | 2 | 898412 | 78.70 | 898412-C3 | 85.30 |
| | 3/16 | **.005** | .099 | 3/32 | **.750** | 4 | 3/16 | 2-1/2 | 928712 | 83.10 | 928712-C3 | 89.80 |
| | 3/16 | **.010** | .103 | 3/32 | **.312** | 4 | 3/16 | 2 | 46612 | 74.20 | 46612-C3 | 80.80 |
| | 1/4 | **.005** | .129 | 1/8 | **.312** | 4 | 1/4 | 2 | 45816 | 85.50 | 45816-C3 | 94.40 |
| | 1/4 | **.005** | .129 | 1/8 | **.625** | 4 | 1/4 | 2-1/2 | 898416 | 91.70 | 898416-C3 | 100.50 |
| | 1/4 | **.005** | .129 | 1/8 | **1.000** | 4 | 1/4 | 3 | 928716 | 99.80 | 928716-C3 | 108.70 |
| | 1/4 | **.010** | .133 | 1/8 | **.312** | 4 | 1/4 | 2 | 46616 | 85.50 | 46616-C3 | 94.40 |
| | 1/4 | **.010** | .133 | 1/8 | **.625** | 4 | 1/4 | 2-1/2 | 890716 | 91.70 | 890716-C3 | 100.50 |
| | 1/4 | **.010** | .133 | 1/8 | **1.000** | 4 | 1/4 | 3 | 931916 | 99.80 | 931916-C3 | 108.70 |
| | 1/4 | **.015** | .137 | 1/8 | **.312** | 4 | 1/4 | 2 | 988616 | 86.30 | 988616-C3 | 93.70 |
| | 1/4 | **.020** | .142 | 1/8 | **.312** | 4 | 1/4 | 2 | 831016 | 85.50 | 831016-C3 | 94.40 |
| | 5/16 | **.005** | .130 | 3/16 | **1.250** | 6 | 5/16 | 3 | 928720 | 105.70 | 928720-C3 | 116.10 |
| | 5/16 | **.010** | .134 | 3/16 | **.375** | 6 | 5/16 | 2-1/2 | 46620 | 107.50 | 46620-C3 | 118.00 |
| | 5/16 | **.010** | .134 | 3/16 | **.875** | 6 | 5/16 | 2-1/2 | 890720 | 109.10 | 890720-C3 | 119.50 |
| | 5/16 | **.010** | .134 | 3/16 | **1.250** | 6 | 5/16 | 3 | 931920 | 108.60 | 931920-C3 | 119.10 |

continued on next page

# DOUBLE ANGLE SHANK CUTTERS

## Tip Radius (cont.)

continued from previous page

| INCL. ANGLE | CUTTER DIA. | RADIUS | CUTTER WIDTH | NECK DIAMETER | NECK LENGTH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | R $^{+.001″}_{-.001″}$ | $L_2$ | | $L_3$ $^{+.020″}_{-.000″}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 90° | 3/8 | **.010** | .133 | 1/4 | **.500** | 6 | 3/8 | 2-1/2 | 46624 | 115.80 | 46624-C3 | 127.30 |
| | 3/8 | **.010** | .133 | 1/4 | **1.000** | 6 | 3/8 | 2-1/2 | 890724 | 117.80 | 890724-C3 | 129.20 |
| | 3/8 | **.010** | .133 | 1/4 | **1.500** | 6 | 3/8 | 3-1/2 | 931924 | 139.70 | 931924-C3 | 152.00 |
| | 3/8 | **.015** | .137 | 1/4 | **.500** | 6 | 3/8 | 2-1/2 | 988624 | 114.70 | 988624-C3 | 126.10 |
| | 3/8 | **.015** | .137 | 1/4 | **1.000** | 6 | 3/8 | 2-1/2 | 894124 | 117.80 | 894124-C3 | 129.20 |
| | 3/8 | **.015** | .137 | 1/4 | **1.500** | 6 | 3/8 | 3-1/2 | 923524 | 139.70 | 923524-C3 | 152.00 |
| | 3/8 | **.020** | .142 | 1/4 | **.500** | 6 | 3/8 | 2-1/2 | 831024 | 114.70 | 831024-C3 | 126.10 |
| | 1/2 | **.010** | .196 | 5/16 | **.500** | 6 | 1/2 | 3 | 46632 | 148.60 | 46632-C3 | 166.10 |
| | 1/2 | **.010** | .196 | 5/16 | **1.000** | 6 | 1/2 | 3 | 890732 | 151.40 | 890732-C3 | 169.10 |
| | 1/2 | **.010** | .196 | 5/16 | **1.500** | 6 | 1/2 | 4 | 931932 | 182.60 | 931932-C3 | 199.20 |
| | 1/2 | **.015** | .200 | 5/16 | **.500** | 6 | 1/2 | 3 | 988632 | 148.60 | 988632-C3 | 166.10 |
| | 1/2 | **.015** | .200 | 5/16 | **1.000** | 6 | 1/2 | 3 | 894132 | 151.40 | 894132-C3 | 169.10 |
| | 1/2 | **.015** | .200 | 5/16 | **1.500** | 6 | 1/2 | 4 | 923532 | 182.60 | 923532-C3 | 200.30 |

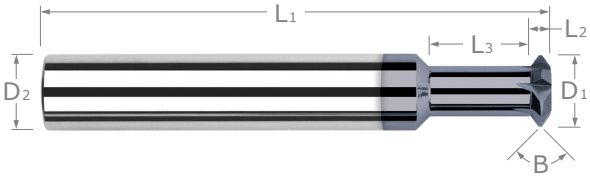


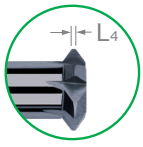
**Find the Perfect Harvey Tool For Your Next Job With Product Table Filtering**

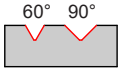
harveytool.com

# DOUBLE ANGLE SHANK CUTTERS

## Tip Flat



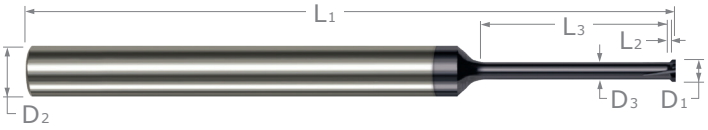



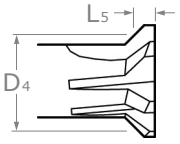

Included Angle (B)
Stocked in Two Included Angles!

- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Flat on tip for improved strength and wear resistance
- Reduced neck for long reach machining
- Solid carbide
- CNC ground in the USA

| INCL. ANGLE | CUTTER DIA. | TIP FLAT | CUTTER WIDTH | NECK DIAMETER | NECK LENGTH | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_4$ $^{+.001″}_{-.001″}$ | $L_2$ | | $L_3$ $^{+.020″}_{-.000″}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 60° | 1/8 | **.010** | .046 | 1/16 | **.187** | 4 | 1/8 | 1-1/2 | 778008 | 56.70 | 778008-C3 | 62.60 |
| | 3/16 | **.010** | .065 | 3/32 | **.312** | 4 | 3/16 | 2 | 778012 | 60.20 | 778012-C3 | 66.90 |
| | 1/4 | **.010** | .082 | 1/8 | **.312** | 4 | 1/4 | 2 | 778016 | 80.40 | 778016-C3 | 87.90 |
| | 3/8 | **.010** | .082 | 1/4 | **.500** | 6 | 3/8 | 2-1/2 | 778024 | 102.90 | 778024-C3 | 114.30 |
| | 1/2 | **.010** | .119 | 5/16 | **.500** | 6 | 1/2 | 3 | 778032 | 140.90 | 778032-C3 | 158.50 |
| 90° | 1/8 | **.010** | .073 | 1/16 | **.187** | 4 | 1/8 | 1-1/2 | 776608 | 54.60 | 776608-C3 | 60.50 |
| | 1/8 | **.010** | .073 | 1/16 | **.500** | 4 | 1/8 | 1-1/2 | 775108 | 70.90 | 775108-C3 | 76.80 |
| | 3/16 | **.010** | .105 | 3/32 | **.312** | 4 | 3/16 | 2 | 776612 | 57.00 | 776612-C3 | 63.60 |
| | 3/16 | **.010** | .105 | 3/32 | **.750** | 4 | 3/16 | 2-1/2 | 775112 | 72.00 | 775112-C3 | 78.70 |
| | 1/4 | **.010** | .135 | 1/8 | **.312** | 4 | 1/4 | 2 | 776616 | 69.90 | 776616-C3 | 78.70 |
| | 1/4 | **.010** | .135 | 1/8 | **1.000** | 4 | 1/4 | 3 | 775116 | 85.00 | 775116-C3 | 93.90 |
| | 3/8 | **.010** | .135 | 1/4 | **.500** | 6 | 3/8 | 2-1/2 | 776624 | 99.80 | 776624-C3 | 111.20 |
| | 3/8 | **.010** | .135 | 1/4 | **1.500** | 6 | 3/8 | 3-1/2 | 775124 | 125.60 | 775124-C3 | 137.40 |
| | 1/2 | **.010** | .198 | 5/16 | **.500** | 6 | 1/2 | 3 | 776632 | 133.60 | 776632-C3 | 151.10 |
| | 1/2 | **.010** | .198 | 5/16 | **1.500** | 6 | 1/2 | 4 | 775132 | 170.90 | 775132-C3 | 188.40 |

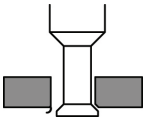
# BACK DEBURRING MILLS




- **Ideal for deburring on backside of small holes and tight pockets**
- Slightly undersized to fit in common hole sizes
- 90° included angle, cutting on angle only
- Design has smaller radial projection than double angle shank cutters and back chamfer cutters, which results in increased neck diameter and improved strength
- Left hand shear flute / right hand cut evacuates chip away from part
- Multiple flutes for improved finish
- Solid carbide • CNC ground in the USA

Reach Through Miniature Holes and Slots to Remove Burr on Backside of Part

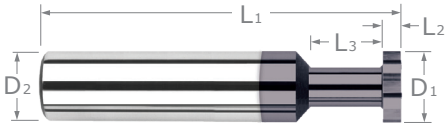


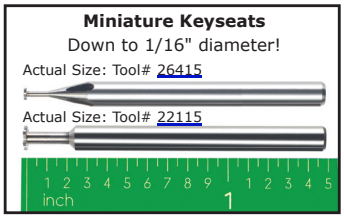
| HEAD DIA. | AXIAL LOC | NECK DIA. | NECK LENGTH | CHAMFER CENTER LENGTH | CHAMFER CENTER DIAMETER | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ | $D_3$ | $L_3$ +.010″ −.000″ | $L_5$ +.0005″ −.0005″ | $D_4$ (Max.) | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .028 | .0029 | .021 | **.093** | .0215 | .0261 | 3 | 1/8 | 2 | 846328 | 79.30 | 846328-C3 | 85.20 |
| .028 | .0029 | .021 | **.125** | .0215 | .0261 | 3 | 1/8 | 2 | 65728 | 79.30 | 65728-C3 | 85.20 |
| .028 | .0029 | .021 | **.250** | .0215 | .0261 | 3 | 1/8 | 2 | 57028 | 79.30 | 57028-C3 | 85.20 |
| .040 | .0048 | .028 | **.125** | .0324 | .0362 | 4 | 1/8 | 2 | 846340 | 73.70 | 846340-C3 | 79.60 |
| .040 | .0048 | .028 | **.187** | .0324 | .0362 | 4 | 1/8 | 2 | 65740 | 73.70 | 65740-C3 | 79.60 |
| .040 | .0048 | .028 | **.312** | .0324 | .0362 | 4 | 1/8 | 2 | 57040 | 73.70 | 57040-C3 | 79.60 |
| .055 | .0045 | .043 | **.187** | .0423 | .0515 | 4 | 1/8 | 2 | 846355 | 73.70 | 846355-C3 | 79.60 |
| .055 | .0045 | .043 | **.281** | .0423 | .0515 | 4 | 1/8 | 2 | 65755 | 73.70 | 65755-C3 | 79.60 |
| .055 | .0045 | .043 | **.437** | .0423 | .0515 | 4 | 1/8 | 2 | 57055 | 73.70 | 57055-C3 | 79.60 |
| .080 | .0077 | .060 | **.250** | .0638 | .0733 | 5 | 1/8 | 2 | 846380 | 66.60 | 846380-C3 | 72.60 |
| .080 | .0077 | .060 | **.375** | .0638 | .0733 | 5 | 1/8 | 2 | 65780 | 66.60 | 65780-C3 | 72.60 |
| .080 | .0077 | .060 | **.625** | .0638 | .0733 | 5 | 1/8 | 2 | 57080 | 66.60 | 57080-C3 | 72.60 |
| .115 | .0111 | .087 | **.375** | .0655 | .1049 | 5 | 1/8 | 2 | 846410 | 66.60 | 846410-C3 | 72.60 |
| .115 | .0111 | .087 | **.562** | .0655 | .1049 | 5 | 1/8 | 2 | 65810 | 66.60 | 65810-C3 | 72.60 |
| .115 | .0111 | .087 | **1.000** | .0655 | .1049 | 5 | 1/8 | 2 | 57110 | 66.60 | 57110-C3 | 72.60 |

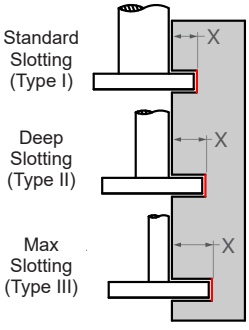
| $D_1$ +.000″ −.002″ | $L_2$ | $D_3$ | $L_3$ +.010″ −.000″ | $L_5$ +.0005″ −.0005″ | $D_4$ (Max.) | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .125 | .0111 | .097 | **.375** | .0655 | .1139 | 6 | 1/8 | 2 | 846425 | 66.60 | 846425-C3 | 72.60 |
| .135 | .0111 | .107 | **.437** | .0655 | .1249 | 5 | 3/16 | 2 | 846420 | 67.70 | 846420-C3 | 74.30 |
| .135 | .0111 | .107 | **.625** | .0655 | .1249 | 5 | 3/16 | 2-1/2 | 65820 | 68.60 | 65820-C3 | 75.30 |
| .135 | .0111 | .107 | **1.125** | .0655 | .1249 | 5 | 3/16 | 2-1/2 | 57120 | 68.60 | 57120-C3 | 75.30 |
| .165 | .0191 | .121 | **.500** | .0695 | .1469 | 6 | 3/16 | 2 | 846430 | 67.70 | 846430-C3 | 74.30 |
| .165 | .0191 | .121 | **.750** | .0695 | .1469 | 6 | 3/16 | 2-1/2 | 65830 | 68.60 | 65830-C3 | 75.30 |
| .165 | .0191 | .121 | **1.375** | .0695 | .1469 | 6 | 3/16 | 2-1/2 | 57130 | 68.60 | 57130-C3 | 75.30 |
| .187 | .0191 | .143 | **.563** | .0695 | .1679 | 6 | 3/16 | 2 | 846435 | 67.70 | 846435-C3 | 74.30 |
| .210 | .0191 | .166 | **.625** | .0695 | .1919 | 6 | 1/4 | 2-1/2 | 846440 | 72.20 | 846440-C3 | 81.10 |
| .210 | .0191 | .166 | **1.000** | .0695 | .1919 | 6 | 1/4 | 3 | 65840 | 73.70 | 65840-C3 | 82.70 |
| .210 | .0191 | .166 | **1.750** | .0695 | .1919 | 6 | 1/4 | 3 | 57140 | 73.70 | 57140-C3 | 82.70 |
| .262 | .0251 | .206 | **1.375** | .0925 | .2379 | 8 | 5/16 | 3 | 65850 | 74.80 | 65850-C3 | 85.30 |
| .262 | .0251 | .206 | **2.125** | .0925 | .2379 | 8 | 5/16 | 4 | 57150 | 86.30 | 57150-C3 | 96.60 |
| .315 | .0251 | .259 | **1.625** | .0925 | .2909 | 8 | 3/8 | 3 | 65860 | 92.60 | 65860-C3 | 104.00 |
| .315 | .0251 | .259 | **2.500** | .0925 | .2909 | 8 | 3/8 | 4 | 57160 | 104.20 | 57160-C3 | 120.30 |
| .420 | .0321 | .350 | **2.125** | .1160 | .3889 | 10 | 7/16 | 4 | 65870 | 117.20 | 65870-C3 | 134.90 |
| .420 | .0321 | .350 | **3.375** | .1160 | .3889 | 10 | 7/16 | 6 | 57170 | 136.10 | 57170-C3 | 155.80 |

# KEYSEAT CUTTERS

## Square




- **Keyseat cutters down to 1/16″ diameter**
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

Stocked in Multiple Radial Depths of Cut!

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .010 | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 26410 | 57.90 | 26410-C3 | 63.80 |
| | .015 (1/64) | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 26415 | 54.80 | 26415-C3 | 60.70 |
| | .015 (1/64) | 1/32 | 3/16 (3x) | .012 | I | 4 | 1/8 | 1-1/2 | 955115 | 64.30 | 955115-C3 | 70.20 |
| | .020 | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 26420 | 54.80 | 26420-C3 | 60.70 |
| | .020 | 1/32 | 3/16 (3x) | .012 | I | 4 | 1/8 | 1-1/2 | 955120 | 56.10 | 955120-C3 | 62.00 |
| | .025 | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 26425 | 54.80 | 26425-C3 | 60.70 |
| **1/16** | .030 | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 26430 | 54.80 | 26430-C3 | 60.70 |
| | .031 (1/32) | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 26431 | 54.80 | 26431-C3 | 60.70 |
| | .031 (1/32) | 1/32 | 3/16 (3x) | .012 | I | 4 | 1/8 | 1-1/2 | 955131 | 64.30 | 955131-C3 | 70.20 |
| | .039 (1 mm) | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 26439 | 54.80 | 26439-C3 | 60.70 |
| | .047 (3/64) | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 26447 | 54.80 | 26447-C3 | 60.70 |
| | .062 (1/16) | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 26462 | 54.80 | 26462-C3 | 60.70 |
| | .062 (1/16) | 1/32 | 3/16 (3x) | .012 | I | 4 | 1/8 | 1-1/2 | 955162 | 64.30 | 955162-C3 | 70.20 |
| | .010 | 1 mm | 3 mm (1.5x) | .018 | I | 4 | 1/8 | 1-1/2 | 27310 | 57.10 | 27310-C3 | 63.00 |
| | .015 (1/64) | 1 mm | 3 mm (1.5x) | .018 | I | 4 | 1/8 | 1-1/2 | 27315 | 54.00 | 27315-C3 | 59.90 |
| | .020 | 1 mm | 3 mm (1.5x) | .018 | I | 4 | 1/8 | 1-1/2 | 27320 | 54.00 | 27320-C3 | 59.90 |
| | .025 | 1 mm | 3 mm (1.5x) | .018 | I | 4 | 1/8 | 1-1/2 | 27325 | 54.00 | 27325-C3 | 59.90 |
| **5/64** | .031 (1/32) | 1 mm | 3 mm (1.5x) | .018 | I | 4 | 1/8 | 1-1/2 | 27331 | 54.00 | 27331-C3 | 59.90 |
| | .031 (1/32) | 1 mm | 6 mm (3x) | .018 | I | 4 | 1/8 | 1-1/2 | 922031 | 63.20 | 922031-C3 | 69.10 |
| | .039 (1 mm) | 1 mm | 3 mm (1.5x) | .018 | I | 4 | 1/8 | 1-1/2 | 27339 | 54.00 | 27339-C3 | 59.90 |
| | .047 (3/64) | 1 mm | 3 mm (1.5x) | .018 | I | 4 | 1/8 | 1-1/2 | 27347 | 54.00 | 27347-C3 | 59.90 |
| | .062 (1/16) | 1 mm | 3 mm (1.5x) | .018 | I | 4 | 1/8 | 1-1/2 | 27362 | 54.00 | 27362-C3 | 59.90 |
| | .010 | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 28210 | 56.60 | 28210-C3 | 62.50 |
| | .015 (1/64) | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 28215 | 53.10 | 28215-C3 | 59.10 |
| | .020 | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 28220 | 53.10 | 28220-C3 | 59.10 |
| | .020 | 3/64 | 9/32 (3x) | .021 | I | 4 | 1/8 | 1-1/2 | 967720 | 53.10 | 967720-C3 | 59.10 |
| | .025 | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 28225 | 53.10 | 28225-C3 | 59.10 |
| | .030 | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 28230 | 53.10 | 28230-C3 | 59.10 |
| | .031 (1/32) | 1/32 | 3/64 (.5x) | **.031** | II | 4 | 1/8 | 1-1/2 | 901131 | 57.70 | 901131-C3 | 63.60 |
| | .031 (1/32) | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 28231 | 53.10 | 28231-C3 | 59.10 |
| **3/32** | .031 (1/32) | 3/64 | 9/32 (3x) | .021 | I | 4 | 1/8 | 1-1/2 | 967731 | 62.50 | 967731-C3 | 68.40 |
| | .039 (1 mm) | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 28239 | 53.10 | 28239-C3 | 59.10 |
| | .040 | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 28240 | 53.10 | 28240-C3 | 59.10 |
| | .047 (3/64) | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 28247 | 53.10 | 28247-C3 | 59.10 |
| | .047 (3/64) | 3/64 | 9/32 (3x) | .021 | I | 4 | 1/8 | 1-1/2 | 967747 | 62.50 | 967747-C3 | 68.40 |
| | .062 (1/16) | 1/32 | 3/64 (.5x) | **.031** | II | 4 | 1/8 | 1-1/2 | 901162 | 57.70 | 901162-C3 | 63.60 |
| | .062 (1/16) | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 28262 | 53.10 | 28262-C3 | 59.10 |
| | .062 (1/16) | 3/64 | 9/32 (3x) | .021 | I | 4 | 1/8 | 1-1/2 | 967762 | 62.50 | 967762-C3 | 68.40 |
| | .093 (3/32) | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 28293 | 53.10 | 28293-C3 | 59.10 |
| | .015 (1/64) | .059 | 3/16 (1.5x) | .019 | I | 4 | 1/8 | 1-1/2 | 777415 | 56.90 | 777415-C3 | 62.80 |
| **3 mm** | .031 (1/32) | .059 | 3/16 (1.5x) | .019 | I | 4 | 1/8 | 1-1/2 | 777431 | 56.40 | 777431-C3 | 62.30 |
| | .047 (3/64) | .059 | 3/16 (1.5x) | .019 | I | 4 | 1/8 | 1-1/2 | 777447 | 56.40 | 777447-C3 | 62.30 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Square (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.0005''}_{-.0005''}$ | | $L_3$ $^{+.020''}_{-.000''}$ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/8 | .010 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22110 | 54.30 | 22110-C3 | 60.20 |
| | .010 | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43510 | 64.60 | 43510-C3 | 70.50 |
| | .015 (1/64) | .040 | 1/16 (.5x) | **.032** | II | 6 | 1/8 | 1-1/2 | 982515 | 66.20 | 982515-C3 | 72.10 |
| | .015 (1/64) | .040 | 1/8 (1x) | **.032** | II | 6 | 1/8 | 1-1/2 | 893315 | 67.60 | 893315-C3 | 73.50 |
| | .015 (1/64) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22115 | 51.30 | 22115-C3 | 57.20 |
| | .015 (1/64) | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43515 | 60.30 | 43515-C3 | 66.20 |
| | .020 | .040 | 1/16 (.5x) | **.032** | II | 6 | 1/8 | 1-1/2 | 982520 | 66.20 | 982520-C3 | 72.10 |
| | .020 | .040 | 1/8 (1x) | **.032** | II | 6 | 1/8 | 1-1/2 | 893320 | 67.60 | 893320-C3 | 73.50 |
| | .020 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22120 | 51.30 | 22120-C3 | 57.20 |
| | .020 | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43520 | 60.30 | 43520-C3 | 66.20 |
| | .025 | .040 | 1/16 (.5x) | **.032** | II | 6 | 1/8 | 1-1/2 | 982525 | 66.20 | 982525-C3 | 72.10 |
| | .025 | .040 | 1/8 (1x) | **.032** | II | 6 | 1/8 | 1-1/2 | 893325 | 67.60 | 893325-C3 | 73.50 |
| | .025 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22125 | 51.30 | 22125-C3 | 57.20 |
| | .025 | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43525 | 60.30 | 43525-C3 | 66.20 |
| | .030 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22130 | 51.30 | 22130-C3 | 57.20 |
| | .030 | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43530 | 60.30 | 43530-C3 | 66.20 |
| | .031 (1/32) | .040 | 1/16 (.5x) | **.032** | II | 6 | 1/8 | 1-1/2 | 982531 | 66.20 | 982531-C3 | 72.10 |
| | .031 (1/32) | .040 | 1/8 (1x) | **.032** | II | 6 | 1/8 | 1-1/2 | 893331 | 67.60 | 893331-C3 | 73.50 |
| | .031 (1/32) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22131 | 51.30 | 22131-C3 | 57.20 |
| | .031 (1/32) | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43531 | 60.30 | 43531-C3 | 66.20 |
| | .035 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22135 | 51.30 | 22135-C3 | 57.20 |
| | .035 | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43535 | 60.30 | 43535-C3 | 66.20 |
| | .039 (1 mm) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22139 | 51.30 | 22139-C3 | 57.20 |
| | .039 (1 mm) | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43539 | 61.40 | 43539-C3 | 67.40 |
| | .040 | .040 | 1/16 (.5x) | **.032** | II | 6 | 1/8 | 1-1/2 | 982540 | 66.20 | 982540-C3 | 72.10 |
| | .040 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22140 | 51.30 | 22140-C3 | 57.20 |
| | .040 | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43540 | 60.30 | 43540-C3 | 66.20 |
| | .045 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22145 | 51.30 | 22145-C3 | 57.20 |
| | .047 (3/64) | .040 | 1/16 (.5x) | **.032** | II | 6 | 1/8 | 1-1/2 | 982547 | 66.20 | 982547-C3 | 72.10 |
| | .047 (3/64) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22147 | 51.30 | 22147-C3 | 57.20 |
| | .047 (3/64) | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43547 | 60.30 | 43547-C3 | 66.20 |
| | .050 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22150 | 51.30 | 22150-C3 | 57.20 |
| | .055 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22155 | 51.30 | 22155-C3 | 57.20 |
| | .060 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22160 | 51.30 | 22160-C3 | 57.20 |
| | .062 (1/16) | .040 | 1/16 (.5x) | **.032** | II | 6 | 1/8 | 1-1/2 | 982562 | 66.20 | 982562-C3 | 72.10 |
| | .062 (1/16) | .040 | 1/8 (1x) | **.032** | II | 6 | 1/8 | 1-1/2 | 893362 | 67.60 | 893362-C3 | 73.50 |
| | .062 (1/16) | 1/16 | 1/8 (1x) | .022 | I | 6 | 1/8 | 1-1/2 | 806662 | 51.30 | 806662-C3 | 57.20 |
| | .062 (1/16) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22162 | 51.30 | 22162-C3 | 57.20 |
| | .062 (1/16) | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43562 | 60.30 | 43562-C3 | 66.20 |
| | .062 (1/16) | 1/16 | 1/2 (4x) | .022 | I | 6 | 1/8 | 1-1/2 | 749762 | 63.60 | 749762-C3 | 69.50 |
| | .078 (5/64) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22178 | 51.30 | 22178-C3 | 57.20 |
| | .078 (5/64) | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43578 | 60.30 | 43578-C3 | 66.20 |
| | .093 (3/32) | .040 | 1/16 (.5x) | **.032** | II | 6 | 1/8 | 1-1/2 | 982593 | 66.70 | 982593-C3 | 72.70 |
| | .093 (3/32) | .040 | 1/8 (1x) | **.032** | II | 6 | 1/8 | 1-1/2 | 893393 | 67.60 | 893393-C3 | 73.50 |
| | .093 (3/32) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22193 | 51.30 | 22193-C3 | 57.20 |
| | .093 (3/32) | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43593 | 60.30 | 43593-C3 | 66.20 |
| | .100 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22182 | 51.30 | 22182-C3 | 57.20 |
| | .118 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22157 | 52.40 | 22157-C3 | 58.30 |
| | .125 (1/8) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 22195 | 51.30 | 22195-C3 | 57.20 |
| | .125 (1/8) | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 43595 | 60.30 | 43595-C3 | 66.20 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Square (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.0005''}_{-.0005''}$ | | $L_3$ $^{+.020''}_{-.000''}$ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 9/64 | .031 (1/32) | .070 | 13/64 (1.5x) | .035 | I | 6 | 3/16 | 2 | 716310 | 53.90 | 716310-C3 | 60.10 |
| | .062 (1/16) | .070 | 13/64 (1.5x) | .035 | I | 6 | 3/16 | 2 | 716330 | 53.90 | 716330-C3 | 60.10 |
| | .093 (3/32) | .070 | 13/64 (1.5x) | .035 | I | 6 | 3/16 | 2 | 716350 | 53.90 | 716350-C3 | 60.10 |
| | .125 (1/8) | .070 | 13/64 (1.5x) | .035 | I | 6 | 3/16 | 2 | 716360 | 53.90 | 716360-C3 | 60.10 |
| 5/32 | .010 | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69410 | 56.80 | 69410-C3 | 63.40 |
| | .015 (1/64) | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69415 | 53.90 | 69415-C3 | 60.40 |
| | .015 (1/64) | 5/64 | 1/2 (3x) | .029 | I | 6 | 3/16 | 2 | 956215 | 62.70 | 956215-C3 | 68.90 |
| | .020 | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69420 | 53.90 | 69420-C3 | 60.40 |
| | .020 | 5/64 | 1/2 (3x) | .029 | I | 6 | 3/16 | 2 | 956220 | 62.70 | 956220-C3 | 69.30 |
| | .025 | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69425 | 53.90 | 69425-C3 | 60.10 |
| | .025 | 5/64 | 1/2 (3x) | .029 | I | 6 | 3/16 | 2 | 956225 | 62.70 | 956225-C3 | 69.30 |
| | .031 (1/32) | .050 | 5/64 (.5x) | **.043** | II | 6 | 3/16 | 2 | 900331 | 68.60 | 900331-C3 | 75.30 |
| | .031 (1/32) | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69431 | 53.90 | 69431-C3 | 60.40 |
| | .031 (1/32) | 5/64 | 1/2 (3x) | .029 | I | 6 | 3/16 | 2 | 956231 | 62.70 | 956231-C3 | 69.30 |
| | .039 (1 mm) | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69439 | 53.90 | 69439-C3 | 60.40 |
| | .040 | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69440 | 53.90 | 69440-C3 | 60.40 |
| | .047 (3/64) | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69447 | 53.90 | 69447-C3 | 60.40 |
| | .047 (3/64) | 5/64 | 1/2 (3x) | .029 | I | 6 | 3/16 | 2 | 956247 | 62.70 | 956247-C3 | 68.90 |
| | .050 | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69450 | 53.90 | 69450-C3 | 60.40 |
| | .060 | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69460 | 53.90 | 69460-C3 | 60.10 |
| | .062 (1/16) | .050 | 5/64 (.5x) | **.043** | II | 6 | 3/16 | 2 | 900362 | 68.60 | 900362-C3 | 75.30 |
| | .062 (1/16) | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69462 | 53.90 | 69462-C3 | 60.40 |
| | .062 (1/16) | 5/64 | 1/2 (3x) | .029 | I | 6 | 3/16 | 2 | 956262 | 62.70 | 956262-C3 | 69.30 |
| | .078 (5/64) | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69478 | 53.90 | 69478-C3 | 60.40 |
| | .078 (5/64) | 5/64 | 1/2 (3x) | .029 | I | 6 | 3/16 | 2 | 956278 | 62.70 | 956278-C3 | 69.30 |
| | .093 (3/32) | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69493 | 53.90 | 69493-C3 | 60.40 |
| | .093 (3/32) | 5/64 | 1/2 (3x) | .029 | I | 6 | 3/16 | 2 | 956293 | 62.70 | 956293-C3 | 69.30 |
| | .125 (1/8) | 5/64 | 1/4 (1.5x) | .029 | I | 6 | 3/16 | 2 | 69495 | 53.90 | 69495-C3 | 60.40 |
| | .125 (1/8) | 5/64 | 1/2 (3x) | .029 | I | 6 | 3/16 | 2 | 956295 | 62.70 | 956295-C3 | 69.30 |
| 3/16 | .010 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22210 | 56.60 | 22210-C3 | 63.20 |
| | .015 (1/64) | 1/16 | 3/32 (.5x) | **.052** | II | 6 | 3/16 | 2 | 980015 | 67.70 | 980015-C3 | 74.30 |
| | .015 (1/64) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22215 | 53.00 | 22215-C3 | 59.50 |
| | .015 (1/64) | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43715 | 66.60 | 43715-C3 | 72.90 |
| | .018 | Please see page 414 for Retaining Ring sizes. | | | | | | | | | | |
| | .020 | 1/16 | 3/32 (.5x) | **.052** | II | 6 | 3/16 | 2 | 980020 | 67.70 | 980020-C3 | 74.30 |
| | .020 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22220 | 53.00 | 22220-C3 | 59.50 |
| | .020 | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43720 | 66.60 | 43720-C3 | 73.10 |
| | .025 | 1/16 | 3/32 (.5x) | **.052** | II | 6 | 3/16 | 2 | 980025 | 67.70 | 980025-C3 | 73.90 |
| | .025 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22225 | 53.00 | 22225-C3 | 59.50 |
| | .025 | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43725 | 66.60 | 43725-C3 | 73.10 |
| | .029 | Please see page 414 for Retaining Ring sizes. | | | | | | | | | | |
| | .030 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22230 | 53.00 | 22230-C3 | 59.50 |
| | .030 | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43730 | 66.60 | 43730-C3 | 73.10 |
| | .031 (1/32) | 1/16 | 3/32 (.5x) | **.052** | II | 6 | 3/16 | 2 | 980031 | 67.70 | 980031-C3 | 74.30 |
| | .031 (1/32) | 1/16 | 3/16 (1x) | **.052** | II | 6 | 3/16 | 2 | 928931 | 67.70 | 928931-C3 | 74.30 |
| | .031 (1/32) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22231 | 53.00 | 22231-C3 | 59.50 |
| | .031 (1/32) | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43731 | 66.60 | 43731-C3 | 72.90 |
| | .035 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22235 | 53.00 | 22235-C3 | 59.50 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Square (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 3/16 | .035 | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43735 | 66.60 | 43735-C3 | 73.10 |
| | .039 (1 mm) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22239 | 53.00 | 22239-C3 | 59.50 |
| | .039 (1 mm) | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43739 | 66.60 | 43739-C3 | 73.10 |
| | .040 | 1/16 | 3/32 (.5x) | **.052** | II | 6 | 3/16 | 2 | 980040 | 67.70 | 980040-C3 | 74.30 |
| | .040 | 1/16 | 3/16 (1x) | **.052** | II | 6 | 3/16 | 2 | 928940 | 67.70 | 928940-C3 | 74.30 |
| | .040 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22240 | 53.00 | 22240-C3 | 59.50 |
| | .040 | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43740 | 66.60 | 43740-C3 | 73.10 |
| | .045 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22246 | 53.00 | 22246-C3 | 59.50 |
| | .045 | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43745 | 66.60 | 43745-C3 | 73.10 |
| | .047 (3/64) | 1/16 | 3/32 (.5x) | **.052** | II | 6 | 3/16 | 2 | 980047 | 67.70 | 980047-C3 | 74.30 |
| | .047 (3/64) | 1/16 | 3/16 (1x) | **.052** | II | 6 | 3/16 | 2 | 928947 | 67.70 | 928947-C3 | 74.30 |
| | .047 (3/64) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22247 | 53.00 | 22247-C3 | 59.50 |
| | .047 (3/64) | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43747 | 66.60 | 43747-C3 | 72.90 |
| | .050 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22250 | 53.00 | 22250-C3 | 59.50 |
| | .050 | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43750 | 66.60 | 43750-C3 | 73.10 |
| | .055 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22255 | 53.00 | 22255-C3 | 59.50 |
| | .055 | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43755 | 66.60 | 43755-C3 | 72.90 |
| | .060 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22261 | 53.00 | 22261-C3 | 59.50 |
| | .060 | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43760 | 66.60 | 43760-C3 | 73.10 |
| | .062 (1/16) | 1/16 | 3/32 (.5x) | **.052** | II | 6 | 3/16 | 2 | 980062 | 67.70 | 980062-C3 | 74.30 |
| | .062 (1/16) | 1/16 | 3/16 (1x) | **.052** | II | 6 | 3/16 | 2 | 928962 | 67.70 | 928962-C3 | 74.30 |
| | .062 (1/16) | 3/32 | 3/16 (1x) | .037 | I | 6 | 3/16 | 2 | 806562 | 53.00 | 806562-C3 | 59.30 |
| | .062 (1/16) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22262 | 53.00 | 22262-C3 | 59.50 |
| | .062 (1/16) | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43762 | 66.60 | 43762-C3 | 73.10 |
| | .078 (5/64) | 1/16 | 3/32 (.5x) | **.052** | II | 6 | 3/16 | 2 | 980078 | 67.70 | 980078-C3 | 74.30 |
| | .078 (5/64) | 1/16 | 3/16 (1x) | **.052** | II | 6 | 3/16 | 2 | 928978 | 67.70 | 928978-C3 | 74.30 |
| | .078 (5/64) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22278 | 53.00 | 22278-C3 | 59.50 |
| | .078 (5/64) | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43778 | 66.60 | 43778-C3 | 73.10 |
| | .093 (3/32) | 1/16 | 3/32 (.5x) | **.052** | II | 6 | 3/16 | 2 | 980093 | 67.70 | 980093-C3 | 74.30 |
| | .093 (3/32) | 1/16 | 3/16 (1x) | **.052** | II | 6 | 3/16 | 2 | 928993 | 67.70 | 928993-C3 | 74.30 |
| | .093 (3/32) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22293 | 53.00 | 22293-C3 | 59.50 |
| | .093 (3/32) | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43793 | 66.60 | 43793-C3 | 73.10 |
| | .118 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22257 | 57.00 | 22257-C3 | 63.20 |
| | .125 (1/8) | 1/16 | 3/32 (.5x) | **.052** | II | 6 | 3/16 | 2 | 980095 | 67.70 | 980095-C3 | 74.30 |
| | .125 (1/8) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22295 | 53.00 | 22295-C3 | 59.50 |
| | .125 (1/8) | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 43795 | 66.60 | 43795-C3 | 73.10 |
| | .156 (5/32) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 22297 | 53.00 | 22297-C3 | 59.50 |
| 6 mm | .031 (1/32) | 3 mm | 9 mm (1.5x) | .049 | I | 6 | 1/4 | 2-1/2 | 947531 | 62.90 | 947531-C3 | 71.90 |
| | .039 (1 mm) | 3 mm | 9 mm (1.5x) | .049 | I | 6 | 1/4 | 2-1/2 | 947539 | 62.90 | 947539-C3 | 71.90 |
| | .062 (1/16) | 3 mm | 9 mm (1.5x) | .049 | I | 6 | 1/4 | 2-1/2 | 947562 | 62.90 | 947562-C3 | 71.90 |
| | .093 (3/32) | 3 mm | 9 mm (1.5x) | .049 | I | 6 | 1/4 | 2-1/2 | 947593 | 62.90 | 947593-C3 | 71.90 |
| | .118 (3 mm) | 3 mm | 9 mm (1.5x) | .049 | I | 6 | 1/4 | 2-1/2 | 947588 | 62.90 | 947588-C3 | 71.90 |
| | .125 (1/8) | 3 mm | 9 mm (1.5x) | .049 | I | 6 | 1/4 | 2-1/2 | 947595 | 62.90 | 947595-C3 | 71.90 |
| 1/4 | .010 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22310 | 63.60 | 22310-C3 | 72.50 |
| | .010 | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43910 | 76.30 | 43910-C3 | 84.40 |
| | .015 (1/64) | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70815 | 74.80 | 70815-C3 | 83.70 |
| | .015 (1/64) | 5/64 | 1/4 (1x) | **.076** | II | 6 | 1/4 | 2-1/2 | 986115 | 77.30 | 986115-C3 | 86.30 |
| | .015 (1/64) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22315 | 60.10 | 22315-C3 | 68.80 |
| | .015 (1/64) | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43915 | 73.20 | 43915-C3 | 82.10 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Square (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .020 | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70820 | 65.50 | 70820-C3 | 74.40 |
| | .020 | 5/64 | 1/4 (1x) | **.076** | II | 6 | 1/4 | 2-1/2 | 986120 | 67.70 | 986120-C3 | 75.80 |
| | .020 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22320 | 60.10 | 22320-C3 | 68.80 |
| | .020 | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43920 | 73.20 | 43920-C3 | 82.10 |
| | .025 | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70825 | 66.00 | 70825-C3 | 74.90 |
| | .025 | 5/64 | 1/4 (1x) | **.076** | II | 6 | 1/4 | 2-1/2 | 986125 | 67.70 | 986125-C3 | 76.60 |
| | .025 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22325 | 60.10 | 22325-C3 | 68.80 |
| | .025 | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43925 | 73.20 | 43925-C3 | 82.10 |
| | .030 | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70830 | 66.00 | 70830-C3 | 74.90 |
| | .030 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22330 | 60.10 | 22330-C3 | 68.80 |
| | .030 | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43930 | 73.20 | 43930-C3 | 82.10 |
| | .031 (1/32) | .050 | 5/64 (.3x) | **.092** | III | 8 | 1/4 | 2-1/2 | 964731 | 110.30 | 964731-C3 | 119.40 |
| | .031 (1/32) | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70831 | 65.50 | 70831-C3 | 74.40 |
| | .031 (1/32) | 5/64 | 1/4 (1x) | **.076** | II | 6 | 1/4 | 2-1/2 | 986131 | 85.50 | 986131-C3 | 94.40 |
| | .031 (1/32) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22331 | 60.10 | 22331-C3 | 68.80 |
| | .031 (1/32) | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43931 | 73.20 | 43931-C3 | 82.10 |
| | .035 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22335 | 60.10 | 22335-C3 | 68.80 |
| | .035 | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43935 | 74.70 | 43935-C3 | 82.80 |
| | .039 (1 mm) | Please see page 414 for Retaining Ring sizes. | | | | | | | | | | |
| | .039 (1 mm) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22339 | 60.10 | 22339-C3 | 68.80 |
| | .040 | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70840 | 65.50 | 70840-C3 | 74.40 |
| | .040 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22340 | 60.10 | 22340-C3 | 68.80 |
| | .040 | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43940 | 73.20 | 43940-C3 | 82.10 |
| | .045 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22346 | 60.10 | 22346-C3 | 68.80 |
| **1/4** | .046 | Please see page 414 for Retaining Ring sizes. | | | | | | | | | | |
| | .047 (3/64) | .050 | 5/64 (.3x) | **.092** | III | 8 | 1/4 | 2-1/2 | 964747 | 107.60 | 964747-C3 | 115.70 |
| | .047 (3/64) | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70847 | 65.50 | 70847-C3 | 74.40 |
| | .047 (3/64) | 5/64 | 1/4 (1x) | **.076** | II | 6 | 1/4 | 2-1/2 | 986147 | 85.50 | 986147-C3 | 94.40 |
| | .047 (3/64) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22347 | 60.10 | 22347-C3 | 68.80 |
| | .047 (3/64) | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43947 | 73.20 | 43947-C3 | 82.10 |
| | .050 | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70850 | 65.50 | 70850-C3 | 74.40 |
| | .050 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22350 | 60.10 | 22350-C3 | 68.80 |
| | .050 | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43950 | 73.20 | 43950-C3 | 82.10 |
| | .055 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22355 | 60.10 | 22355-C3 | 68.80 |
| | .055 | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43955 | 73.20 | 43955-C3 | 82.10 |
| | .060 | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70860 | 66.00 | 70860-C3 | 74.90 |
| | .060 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22361 | 60.10 | 22361-C3 | 68.80 |
| | .060 | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43961 | 73.20 | 43961-C3 | 82.10 |
| | .062 (1/16) | .050 | 5/64 (.3x) | **.092** | III | 8 | 1/4 | 2-1/2 | 964762 | 110.30 | 964762-C3 | 119.40 |
| | .062 (1/16) | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70862 | 65.50 | 70862-C3 | 74.40 |
| | .062 (1/16) | 5/64 | 1/4 (1x) | **.076** | II | 6 | 1/4 | 2-1/2 | 986162 | 85.50 | 986162-C3 | 94.40 |
| | .062 (1/16) | 1/8 | 1/4 (1x) | .053 | I | 6 | 1/4 | 2-1/2 | 806462 | 60.10 | 806462-C3 | 68.80 |
| | .062 (1/16) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22362 | 60.10 | 22362-C3 | 68.80 |
| | .062 (1/16) | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43962 | 73.20 | 43962-C3 | 82.10 |
| | .062 (1/16) | 1/8 | 1 (4x) | .053 | I | 6 | 1/4 | 2-1/2 | 984262 | 84.80 | 984262-C3 | 93.50 |
| | .078 (5/64) | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70878 | 65.50 | 70878-C3 | 74.40 |
| | .078 (5/64) | 5/64 | 1/4 (1x) | **.076** | II | 6 | 1/4 | 2-1/2 | 986178 | 85.50 | 986178-C3 | 94.40 |
| | .078 (5/64) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22378 | 60.10 | 22378-C3 | 68.80 |
| | .078 (5/64) | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43978 | 73.20 | 43978-C3 | 82.10 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Square (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/4 | .080 | 1/8 | 3/8 (1.5x) | **.053** | I | 6 | 1/4 | 2-1/2 | 22380 | 60.10 | 22380-C3 | 68.20 |
| | .090 | 1/8 | 3/8 (1.5x) | **.053** | I | 6 | 1/4 | 2-1/2 | 22390 | 60.10 | 22390-C3 | 68.20 |
| | .093 (3/32) | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70893 | 65.50 | 70893-C3 | 74.40 |
| | .093 (3/32) | 5/64 | 1/4 (1x) | **.076** | II | 6 | 1/4 | 2-1/2 | 986193 | 85.50 | 986193-C3 | 94.40 |
| | .093 (3/32) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22393 | 60.10 | 22393-C3 | 68.80 |
| | .093 (3/32) | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43993 | 73.20 | 43993-C3 | 82.10 |
| | .100 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22382 | 60.10 | 22382-C3 | 68.80 |
| | .100 | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43982 | 73.20 | 43982-C3 | 82.10 |
| | .109 (7/64) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22384 | 60.10 | 22384-C3 | 68.80 |
| | .118 (3 mm) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22388 | 60.10 | 22388-C3 | 68.80 |
| | .125 (1/8) | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 70895 | 65.50 | 70895-C3 | 74.40 |
| | .125 (1/8) | 5/64 | 1/4 (1x) | **.076** | II | 6 | 1/4 | 2-1/2 | 986195 | 85.50 | 986195-C3 | 94.40 |
| | .125 (1/8) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22395 | 60.10 | 22395-C3 | 68.80 |
| | .125 (1/8) | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43995 | 73.20 | 43995-C3 | 82.10 |
| | .125 (1/8) | 1/8 | 1 (4x) | .053 | I | 6 | 1/4 | 2-1/2 | 984295 | 84.80 | 984295-C3 | 93.50 |
| | .156 (5/32) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22397 | 60.10 | 22397-C3 | 68.80 |
| | .156 (5/32) | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43997 | 73.20 | 43997-C3 | 82.10 |
| | .187 (3/16) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22398 | 60.10 | 22398-C3 | 68.80 |
| | .187 (3/16) | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 43998 | 73.20 | 43998-C3 | 82.10 |
| | .250 (1/4) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 22399 | 60.10 | 22399-C3 | 68.80 |
| 5/16 | .010 | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22401 | 84.10 | 22401-C3 | 94.40 |
| | .015 (1/64) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22403 | 81.00 | 22403-C3 | 91.20 |
| | .020 | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22405 | 79.40 | 22405-C3 | 89.70 |
| | .025 | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22407 | 79.40 | 22407-C3 | 89.70 |
| | .030 | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22409 | 79.40 | 22409-C3 | 89.70 |
| | .031 (1/32) | 7/64 | 3/16 (.5x) | **.091** | II | 6 | 5/16 | 2-1/2 | 973410 | 91.00 | 973410-C3 | 101.60 |
| | .031 (1/32) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22410 | 79.40 | 22410-C3 | 89.70 |
| | .031 (1/32) | 5/32 | 1 (3x) | .068 | I | 6 | 5/16 | 2-1/2 | 69710 | 93.80 | 69710-C3 | 104.10 |
| | .039 (1 mm) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22414 | 79.40 | 22414-C3 | 89.70 |
| | .039 (1 mm) | 5/32 | 1 (3x) | .068 | I | 6 | 5/16 | 2-1/2 | 69714 | 93.80 | 69714-C3 | 103.50 |
| | .040 | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22415 | 79.40 | 22415-C3 | 89.70 |
| | .047 (3/64) | 7/64 | 3/16 (.5x) | **.091** | II | 6 | 5/16 | 2-1/2 | 973420 | 91.00 | 973420-C3 | 101.60 |
| | .047 (3/64) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22420 | 79.40 | 22420-C3 | 89.70 |
| | .050 | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22422 | 79.40 | 22422-C3 | 89.70 |
| | .056 | Please see page 414 for Retaining Ring sizes. | | | | | | | | | | |
| | .060 | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22428 | 79.40 | 22428-C3 | 89.70 |
| | .062 (1/16) | .063 | 3/32 (.3x) | **.116** | III | 10 | 5/16 | 2-1/2 | 959430 | 125.10 | 959430-C3 | 135.50 |
| | .062 (1/16) | 7/64 | 3/16 (.5x) | **.091** | II | 6 | 5/16 | 2-1/2 | 973430 | 91.00 | 973430-C3 | 101.60 |
| | .062 (1/16) | 7/64 | 3/8 (1x) | **.091** | II | 6 | 5/16 | 2-1/2 | 907930 | 110.80 | 907930-C3 | 121.30 |
| | .062 (1/16) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22430 | 79.40 | 22430-C3 | 89.70 |
| | .062 (1/16) | 5/32 | 1 (3x) | .068 | I | 6 | 5/16 | 2-1/2 | 69730 | 93.80 | 69730-C3 | 104.10 |
| | .078 (5/64) | 7/64 | 3/16 (.5x) | **.091** | II | 6 | 5/16 | 2-1/2 | 973440 | 91.00 | 973440-C3 | 101.60 |
| | .078 (5/64) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22440 | 79.40 | 22440-C3 | 89.70 |
| | .078 (5/64) | 5/32 | 1 (3x) | .068 | I | 6 | 5/16 | 2-1/2 | 69740 | 93.80 | 69740-C3 | 104.10 |
| | .093 (3/32) | .063 | 3/32 (.3x) | **.116** | III | 10 | 5/16 | 2-1/2 | 959450 | 125.10 | 959450-C3 | 134.70 |
| | .093 (3/32) | 7/64 | 3/16 (.5x) | **.091** | II | 6 | 5/16 | 2-1/2 | 973450 | 91.00 | 973450-C3 | 101.60 |
| | .093 (3/32) | 7/64 | 3/8 (1x) | **.091** | II | 6 | 5/16 | 2-1/2 | 907950 | 110.80 | 907950-C3 | 121.30 |
| | .093 (3/32) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22450 | 79.40 | 22450-C3 | 89.70 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Square (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 5/16 | .093 (3/32) | 5/32 | 1 (3x) | .068 | I | 6 | 5/16 | 2-1/2 | 69750 | 93.80 | 69750-C3 | 104.10 |
| | .100 | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22452 | 79.40 | 22452-C3 | 89.70 |
| | .125 (1/8) | 7/64 | 3/16 (.5x) | **.091** | II | 6 | 5/16 | 2-1/2 | 973460 | 91.00 | 973460-C3 | 101.60 |
| | .125 (1/8) | 7/64 | 3/8 (1x) | **.091** | II | 6 | 5/16 | 2-1/2 | 907960 | 110.80 | 907960-C3 | 121.30 |
| | .125 (1/8) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22455 | 79.40 | 22455-C3 | 89.70 |
| | .125 (1/8) | 5/32 | 1 (3x) | .068 | I | 6 | 5/16 | 2-1/2 | 69760 | 93.80 | 69760-C3 | 104.10 |
| | .156 (5/32) | 7/64 | 3/16 (.5x) | **.091** | II | 6 | 5/16 | 2-1/2 | 973465 | 91.00 | 973465-C3 | 101.60 |
| | .156 (5/32) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22465 | 79.40 | 22465-C3 | 89.70 |
| | .156 (5/32) | 5/32 | 1 (3x) | .068 | I | 6 | 5/16 | 2-1/2 | 69765 | 93.80 | 69765-C3 | 103.50 |
| | .187 (3/16) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22470 | 79.40 | 22470-C3 | 89.70 |
| | .187 (3/16) | 5/32 | 1 (3x) | .068 | I | 6 | 5/16 | 2-1/2 | 69770 | 93.80 | 69770-C3 | 104.10 |
| | .250 (1/4) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 22480 | 79.40 | 22480-C3 | 89.70 |
| 3/8 | .015 (1/64) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22503 | 92.80 | 22503-C3 | 104.20 |
| | .020 | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71105 | 97.60 | 71105-C3 | 109.00 |
| | .020 | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22505 | 92.80 | 22505-C3 | 104.20 |
| | .020 | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70305 | 104.80 | 70305-C3 | 116.30 |
| | .025 | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22507 | 92.80 | 22507-C3 | 104.20 |
| | .025 | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70307 | 104.80 | 70307-C3 | 116.30 |
| | .030 | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22509 | 92.80 | 22509-C3 | 104.20 |
| | .031 (1/32) | .075 | 7/64 (.3x) | **.142** | III | 10 | 3/8 | 2-1/2 | 991310 | 129.50 | 991310-C3 | 141.00 |
| | .031 (1/32) | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71110 | 97.60 | 71110-C3 | 109.00 |
| | .031 (1/32) | 1/8 | 3/8 (1x) | **.115** | II | 8 | 3/8 | 2-1/2 | 958910 | 117.80 | 958910-C3 | 129.20 |
| | .031 (1/32) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22510 | 89.60 | 22510-C3 | 101.00 |
| | .031 (1/32) | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70310 | 104.80 | 70310-C3 | 116.30 |
| | .035 | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22512 | 89.60 | 22512-C3 | 101.00 |
| | .035 | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70312 | 106.80 | 70312-C3 | 118.20 |
| | .039 (1 mm) | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71114 | 97.60 | 71114-C3 | 109.00 |
| | .039 (1 mm) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22514 | 89.60 | 22514-C3 | 101.00 |
| | .039 (1 mm) | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70314 | 104.80 | 70314-C3 | 116.30 |
| | .040 | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71115 | 96.70 | 71115-C3 | 108.20 |
| | .040 | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22515 | 89.60 | 22515-C3 | 101.00 |
| | .040 | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70315 | 104.80 | 70315-C3 | 116.30 |
| | .045 | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22518 | 89.60 | 22518-C3 | 101.00 |
| | .047 (3/64) | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71120 | 97.60 | 71120-C3 | 109.00 |
| | .047 (3/64) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22520 | 89.60 | 22520-C3 | 101.00 |
| | .047 (3/64) | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70320 | 104.80 | 70320-C3 | 116.30 |
| | .050 | 1/8 | 3/8 (1x) | **.115** | II | 8 | 3/8 | 2-1/2 | 958922 | 97.60 | 958922-C3 | 109.00 |
| | .050 | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22522 | 89.60 | 22522-C3 | 101.00 |
| | .055 | 1/8 | 3/8 (1x) | **.115** | II | 8 | 3/8 | 2-1/2 | 958925 | 97.60 | 958925-C3 | 109.00 |
| | .055 | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22525 | 89.60 | 22525-C3 | 101.00 |
| | .060 | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22528 | 89.60 | 22528-C3 | 101.00 |
| | .060 | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70328 | 104.80 | 70328-C3 | 116.30 |
| | .062 (1/16) | .075 | 7/64 (.3x) | **.142** | III | 10 | 3/8 | 2-1/2 | 991330 | 129.50 | 991330-C3 | 141.00 |
| | .062 (1/16) | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71130 | 97.60 | 71130-C3 | 109.00 |
| | .062 (1/16) | 1/8 | 3/8 (1x) | **.115** | II | 8 | 3/8 | 2-1/2 | 958930 | 117.80 | 958930-C3 | 129.20 |
| | .062 (1/16) | 3/16 | 3/8 (1x) | .084 | I | 8 | 3/8 | 2-1/2 | 806330 | 89.60 | 806330-C3 | 101.00 |
| | .062 (1/16) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22530 | 89.60 | 22530-C3 | 101.00 |
| | .062 (1/16) | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70330 | 104.80 | 70330-C3 | 116.30 |
| | .068 | Please see page 385 for Retaining Ring sizes. | | | | | | | | | | |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Square (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 3/8 | .078 (5/64) | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71140 | 97.60 | 71140-C3 | 109.00 |
| | .078 (5/64) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22540 | 89.60 | 22540-C3 | 101.00 |
| | .078 (5/64) | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70340 | 89.60 | 70340-C3 | 101.00 |
| | .086 | Please see page 414 for Retaining Ring sizes. | | | | | | | | | | |
| | .093 (3/32) | .075 | 7/64 (.3x) | **.142** | III | 10 | 3/8 | 2-1/2 | 991350 | 129.50 | 991350-C3 | 141.00 |
| | .093 (3/32) | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71150 | 97.60 | 71150-C3 | 109.00 |
| | .093 (3/32) | 1/8 | 3/8 (1x) | **.115** | II | 8 | 3/8 | 2-1/2 | 958950 | 117.80 | 958950-C3 | 129.20 |
| | .093 (3/32) | 3/16 | 3/8 (1x) | .084 | I | 8 | 3/8 | 2-1/2 | 806350 | 89.60 | 806350-C3 | 101.00 |
| | .093 (3/32) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22550 | 89.60 | 22550-C3 | 101.00 |
| | .093 (3/32) | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70350 | 104.80 | 70350-C3 | 116.30 |
| | .100 | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71152 | 93.90 | 71152-C3 | 105.40 |
| | .100 | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22552 | 89.60 | 22552-C3 | 101.00 |
| | .100 | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70352 | 104.80 | 70352-C3 | 116.30 |
| | .125 (1/8) | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71160 | 97.60 | 71160-C3 | 109.00 |
| | .125 (1/8) | 1/8 | 3/8 (1x) | **.115** | II | 8 | 3/8 | 2-1/2 | 958960 | 117.80 | 958960-C3 | 129.20 |
| | .125 (1/8) | 3/16 | 3/8 (1x) | .084 | I | 8 | 3/8 | 2-1/2 | 806360 | 89.60 | 806360-C3 | 101.00 |
| | .125 (1/8) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22560 | 89.60 | 22560-C3 | 101.00 |
| | .125 (1/8) | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 70360 | 104.80 | 70360-C3 | 116.30 |
| | .156 (5/32) | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71165 | 97.60 | 71165-C3 | 109.00 |
| | .156 (5/32) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22565 | 89.60 | 22565-C3 | 101.00 |
| | .156 (5/32) | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 3 | 70365 | 104.80 | 70365-C3 | 116.30 |
| | .187 (3/16) | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71170 | 97.60 | 71170-C3 | 109.00 |
| | .187 (3/16) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22570 | 89.60 | 22570-C3 | 101.00 |
| | .187 (3/16) | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 3 | 70370 | 104.80 | 70370-C3 | 116.30 |
| | .250 (1/4) | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 71180 | 97.60 | 71180-C3 | 109.00 |
| | .250 (1/4) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22580 | 89.60 | 22580-C3 | 101.00 |
| | .250 (1/4) | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 3 | 70380 | 104.80 | 70380-C3 | 116.30 |
| | .312 (5/16) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 22585 | 89.60 | 22585-C3 | 101.00 |
| 7/16 | .031 (1/32) | 7/32 | 5/8 (1.5x) | .099 | I | 8 | 7/16 | 2-3/4 | 71810 | 121.90 | 71810-C3 | 135.10 |
| | .047 (3/64) | 7/32 | 5/8 (1.5x) | .099 | I | 8 | 7/16 | 2-3/4 | 71820 | 119.60 | 71820-C3 | 134.10 |
| | .062 (1/16) | 7/32 | 5/8 (1.5x) | .099 | I | 8 | 7/16 | 2-3/4 | 71830 | 119.60 | 71830-C3 | 134.10 |
| | .078 (5/64) | 7/32 | 5/8 (1.5x) | .099 | I | 8 | 7/16 | 2-3/4 | 71840 | 119.60 | 71840-C3 | 134.10 |
| | .093 (3/32) | 7/32 | 5/8 (1.5x) | .099 | I | 8 | 7/16 | 2-3/4 | 71850 | 119.60 | 71850-C3 | 134.10 |
| | .125 (1/8) | 7/32 | 5/8 (1.5x) | .099 | I | 8 | 7/16 | 2-3/4 | 71860 | 119.60 | 71860-C3 | 134.10 |
| | .125 (1/8) | 7/32 | 1-5/16 (3x) | .099 | I | 8 | 7/16 | 2-3/4 | 892960 | 135.30 | 892960-C3 | 149.70 |
| | .156 (5/32) | 7/32 | 5/8 (1.5x) | .099 | I | 8 | 7/16 | 2-3/4 | 71865 | 119.60 | 71865-C3 | 134.10 |
| | .187 (3/16) | 7/32 | 5/8 (1.5x) | .099 | I | 8 | 7/16 | 2-3/4 | 71870 | 119.60 | 71870-C3 | 134.10 |
| | .187 (3/16) | 7/32 | 1-5/16 (3x) | .099 | I | 8 | 7/16 | 2-3/4 | 892970 | 135.30 | 892970-C3 | 149.70 |
| | .250 (1/4) | 7/32 | 5/8 (1.5x) | .099 | I | 8 | 7/16 | 2-3/4 | 71880 | 119.60 | 71880-C3 | 134.10 |
| | .250 (1/4) | 7/32 | 1-5/16 (3x) | .099 | I | 8 | 7/16 | 2-3/4 | 892980 | 135.30 | 892980-C3 | 149.70 |
| 1/2 | .015 (1/64) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22603 | 121.80 | 22603-C3 | 138.90 |
| | .020 | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71205 | 131.40 | 71205-C3 | 148.90 |
| | .020 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22605 | 121.80 | 22605-C3 | 138.90 |
| | .025 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22607 | 121.80 | 22607-C3 | 138.90 |
| | .025 | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71507 | 136.80 | 71507-C3 | 152.40 |
| | .030 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22609 | 121.80 | 22609-C3 | 138.90 |
| | .031 (1/32) | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71210 | 127.40 | 71210-C3 | 144.90 |
| | .031 (1/32) | 5/32 | 1/2 (1x) | **.162** | II | 8 | 1/2 | 3 | 975710 | 129.10 | 975710-C3 | 146.60 |
| | .031 (1/32) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22610 | 117.80 | 22610-C3 | 135.10 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Square (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.0005''}_{-.0005''}$ | | $L_3$ $^{+.020''}_{-.000''}$ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .031 (1/32) | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71510 | 133.10 | 71510-C3 | 150.40 |
| | .035 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22612 | 117.80 | 22612-C3 | 135.10 |
| | .039 (1 mm) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22614 | 117.80 | 22614-C3 | 135.10 |
| | .040 | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71215 | 127.40 | 71215-C3 | 144.90 |
| | .040 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22615 | 117.80 | 22615-C3 | 135.10 |
| | .040 | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71515 | 133.10 | 71515-C3 | 150.40 |
| | .045 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22618 | 117.80 | 22618-C3 | 135.10 |
| | .045 | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71518 | 133.10 | 71518-C3 | 148.60 |
| | .047 (3/64) | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71220 | 127.40 | 71220-C3 | 144.90 |
| | .047 (3/64) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22620 | 117.80 | 22620-C3 | 135.10 |
| | .047 (3/64) | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71520 | 133.10 | 71520-C3 | 148.60 |
| | .050 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22622 | 117.80 | 22622-C3 | 135.10 |
| | .050 | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71522 | 133.10 | 71522-C3 | 150.40 |
| | .055 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22625 | 117.80 | 22625-C3 | 135.10 |
| | .055 | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71525 | 133.10 | 71525-C3 | 150.40 |
| | .060 | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71228 | 127.40 | 71228-C3 | 142.90 |
| | .060 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22628 | 117.80 | 22628-C3 | 135.10 |
| | .062 (1/16) | .100 | 5/32 (.3x) | **.192** | III | 12 | 1/2 | 3 | 985230 | 161.90 | 985230-C3 | 179.50 |
| | .062 (1/16) | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71230 | 127.40 | 71230-C3 | 144.90 |
| | .062 (1/16) | 5/32 | 1/2 (1x) | **.162** | II | 8 | 1/2 | 3 | 975730 | 151.00 | 975730-C3 | 168.60 |
| | .062 (1/16) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22630 | 117.80 | 22630-C3 | 135.10 |
| | .062 (1/16) | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71530 | 133.10 | 71530-C3 | 150.40 |
| | .070 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22635 | 117.80 | 22635-C3 | 135.10 |
| | .078 (5/64) | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71240 | 127.40 | 71240-C3 | 144.90 |
| | .078 (5/64) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22640 | 117.80 | 22640-C3 | 135.10 |
| **1/2** | .078 (5/64) | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71540 | 133.10 | 71540-C3 | 150.40 |
| | .080 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22642 | 117.80 | 22642-C3 | 135.10 |
| | .090 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22647 | 117.80 | 22647-C3 | 135.10 |
| | .093 (3/32) | .100 | 5/32 (.3x) | **.192** | III | 12 | 1/2 | 3 | 985250 | 161.90 | 985250-C3 | 179.50 |
| | .093 (3/32) | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71250 | 127.40 | 71250-C3 | 144.90 |
| | .093 (3/32) | 5/32 | 1/2 (1x) | **.162** | II | 8 | 1/2 | 3 | 975750 | 151.00 | 975750-C3 | 168.60 |
| | .093 (3/32) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22650 | 117.80 | 22650-C3 | 135.10 |
| | .093 (3/32) | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71550 | 133.10 | 71550-C3 | 150.40 |
| | .100 | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71252 | 127.40 | 71252-C3 | 144.90 |
| | .100 | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22652 | 117.80 | 22652-C3 | 135.10 |
| | .100 | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71552 | 133.10 | 71552-C3 | 148.60 |
| | .103 | Please see page 414 for Retaining Ring sizes. | | | | | | | | | | |
| | .109 (7/64) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22654 | 117.80 | 22654-C3 | 135.10 |
| | .118 (3 mm) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22657 | 117.80 | 22657-C3 | 135.10 |
| | .118 (3 mm) | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71557 | 133.10 | 71557-C3 | 148.60 |
| | .120 | Please see page 414 for Retaining Ring sizes. | | | | | | | | | | |
| | .125 (1/8) | .100 | 5/32 (.3x) | **.192** | III | 12 | 1/2 | 3 | 985260 | 161.90 | 985260-C3 | 177.50 |
| | .125 (1/8) | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71260 | 127.40 | 71260-C3 | 144.90 |
| | .125 (1/8) | 5/32 | 1/2 (1x) | **.162** | II | 8 | 1/2 | 3 | 975760 | 151.00 | 975760-C3 | 168.60 |
| | .125 (1/8) | 1/4 | 1/2 (1x) | .115 | I | 8 | 1/2 | 3 | 806260 | 117.80 | 806260-C3 | 135.10 |
| | .125 (1/8) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22660 | 117.80 | 22660-C3 | 135.10 |
| | .125 (1/8) | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 71560 | 133.10 | 71560-C3 | 150.40 |
| | .125 (1/8) | 1/4 | 2 (4x) | .115 | I | 8 | 1/2 | 4 | 933160 | 198.80 | 933160-C3 | 216.10 |
| | .140 (9/64) | 5/32 | 1/2 (1x) | **.162** | II | 8 | 1/2 | 3 | 975762 | 151.00 | 975762-C3 | 168.60 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Square (cont.)

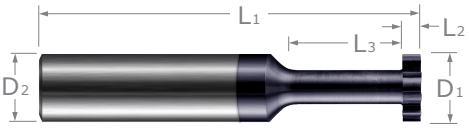
continued from previous page

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/2 | .140 (9/64) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22662 | 117.80 | 22662-C3 | 135.10 |
| | .156 (5/32) | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71265 | 127.40 | 71265-C3 | 142.90 |
| | .156 (5/32) | 5/32 | 1/2 (1x) | **.162** | II | 8 | 1/2 | 3 | 975765 | 151.00 | 975765-C3 | 168.60 |
| | .156 (5/32) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22665 | 117.80 | 22665-C3 | 135.10 |
| | .156 (5/32) | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3-1/2 | 71565 | 133.10 | 71565-C3 | 150.40 |
| | .187 (3/16) | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71270 | 127.40 | 71270-C3 | 144.90 |
| | .187 (3/16) | 5/32 | 1/2 (1x) | **.162** | II | 8 | 1/2 | 3 | 975770 | 151.00 | 975770-C3 | 168.60 |
| | .187 (3/16) | 1/4 | 1/2 (1x) | .115 | I | 8 | 1/2 | 3 | 806270 | 120.10 | 806270-C3 | 137.40 |
| | .187 (3/16) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22670 | 117.80 | 22670-C3 | 135.10 |
| | .187 (3/16) | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3-1/2 | 71570 | 133.10 | 71570-C3 | 150.40 |
| | .250 (1/4) | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 71280 | 127.40 | 71280-C3 | 144.90 |
| | .250 (1/4) | 5/32 | 1/2 (1x) | **.162** | II | 8 | 1/2 | 3 | 975780 | 151.00 | 975780-C3 | 168.60 |
| | .250 (1/4) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22680 | 117.80 | 22680-C3 | 135.10 |
| | .250 (1/4) | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3-1/2 | 71580 | 133.10 | 71580-C3 | 150.40 |
| | .312 (5/16) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22685 | 117.80 | 22685-C3 | 135.10 |
| | .312 (5/16) | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3-1/2 | 71585 | 133.10 | 71585-C3 | 149.70 |
| | .375 (3/8) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 22687 | 117.80 | 22687-C3 | 135.10 |
| 5/8 | .031 (1/32) | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 70910 | 184.60 | 70910-C3 | 201.80 |
| | .031 (1/32) | 5/16 | 2 (3x) | .146 | I | 8 | 5/8 | 3-1/2 | 972910 | 238.70 | 972910-C3 | 258.00 |
| | .047 (3/64) | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 70920 | 184.60 | 70920-C3 | 201.80 |
| | .062 (1/16) | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 70930 | 184.60 | 70930-C3 | 201.80 |
| | .078 (5/64) | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 70940 | 184.60 | 70940-C3 | 201.80 |
| | .093 (3/32) | 13/64 | 5/16 (.5x) | **.201** | II | 8 | 5/8 | 3-1/2 | 950650 | 255.80 | 950650-C3 | 273.40 |
| | .093 (3/32) | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 70950 | 184.60 | 70950-C3 | 201.80 |
| | .093 (3/32) | 5/16 | 2 (3x) | .146 | I | 8 | 5/8 | 4 | 972950 | 238.70 | 972950-C3 | 258.00 |
| | .120 | Please see page 414 for Retaining Ring sizes. | | | | | | | | | | |
| | .125 (1/8) | 13/64 | 5/16 (.5x) | **.201** | II | 8 | 5/8 | 3-1/2 | 950660 | 255.80 | 950660-C3 | 273.40 |
| | .125 (1/8) | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 70960 | 184.60 | 70960-C3 | 201.80 |
| | .125 (1/8) | 5/16 | 2 (3x) | .146 | I | 8 | 5/8 | 4 | 972960 | 238.70 | 972960-C3 | 258.00 |
| | .139 | Please see page 414 for Retaining Ring sizes. | | | | | | | | | | |
| | .156 (5/32) | 13/64 | 5/16 (.5x) | **.201** | II | 8 | 5/8 | 3-1/2 | 950665 | 255.80 | 950665-C3 | 273.40 |
| | .156 (5/32) | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 70965 | 184.60 | 70965-C3 | 201.80 |
| | .156 (5/32) | 5/16 | 2 (3x) | .146 | I | 8 | 5/8 | 4 | 972965 | 238.70 | 972965-C3 | 258.00 |
| | .187 (3/16) | 13/64 | 5/16 (.5x) | **.201** | II | 8 | 5/8 | 3-1/2 | 950670 | 255.80 | 950670-C3 | 273.40 |
| | .187 (3/16) | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 70970 | 184.60 | 70970-C3 | 201.80 |
| | .187 (3/16) | 5/16 | 2 (3x) | .146 | I | 8 | 5/8 | 4 | 972970 | 238.70 | 972970-C3 | 258.00 |
| | .250 (1/4) | 13/64 | 5/16 (.5x) | **.201** | II | 8 | 5/8 | 3-1/2 | 950680 | 255.80 | 950680-C3 | 273.40 |
| | .250 (1/4) | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 70980 | 184.60 | 70980-C3 | 201.80 |
| | .250 (1/4) | 5/16 | 2 (3x) | .146 | I | 8 | 5/8 | 4 | 972980 | 238.70 | 972980-C3 | 258.00 |
| | .312 (5/16) | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 70985 | 184.60 | 70985-C3 | 201.80 |
| | .375 (3/8) | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 70987 | 184.60 | 70987-C3 | 201.80 |

For reduced shank and greater radial depths of cut, please see Reduced Shank Keyseat Cutters on pages 411, 419, 422, 427

# KEYSEAT CUTTERS

## Square for Hardened Steels

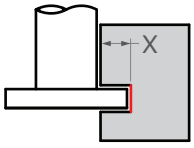



- Optimized for hardened steels 45-68Rc with high flute count and specialized internal geometry
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA



High Flute Count and Specialized Internal Geometry

Standard Slotting (Type I)




| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ |
| | .015 (1/64) | 1/16 | 3/16 (1.5x) | .022 | I | 8 | 1/8 | 1-1/2 | 867415-C6 | 67.90 |
| | .020 | 1/16 | 3/16 (1.5x) | .022 | I | 8 | 1/8 | 1-1/2 | 867420-C6 | 67.90 |
| **1/8** | .031 (1/32) | 1/16 | 3/16 (1.5x) | .022 | I | 8 | 1/8 | 1-1/2 | 867431-C6 | 67.90 |
| | .062 (1/16) | 1/16 | 3/16 (1.5x) | .022 | I | 8 | 1/8 | 1-1/2 | 867462-C6 | 67.90 |
| | .093 (3/32) | 1/16 | 3/16 (1.5x) | .022 | I | 8 | 1/8 | 1-1/2 | 867493-C6 | 67.90 |
| **5/32** | .031 (1/32) | 5/64 | 1/4 (1.5x) | .029 | I | 8 | 3/16 | 2 | 746631-C6 | 70.40 |
| | .062 (1/16) | 5/64 | 1/4 (1.5x) | .029 | I | 8 | 3/16 | 2 | 746662-C6 | 70.40 |
| | .020 | 3/32 | 9/32 (1.5x) | .037 | I | 8 | 3/16 | 2 | 875920-C6 | 70.40 |
| | .031 (1/32) | 3/32 | 9/32 (1.5x) | .037 | I | 8 | 3/16 | 2 | 875931-C6 | 70.40 |
| **3/16** | .062 (1/16) | 3/32 | 9/32 (1.5x) | .037 | I | 8 | 3/16 | 2 | 875962-C6 | 70.40 |
| | .093 (3/32) | 3/32 | 9/32 (1.5x) | .037 | I | 8 | 3/16 | 2 | 875993-C6 | 70.40 |
| | .125 (1/8) | 3/32 | 9/32 (1.5x) | .037 | I | 8 | 3/16 | 2 | 875995-C6 | 70.40 |
| | .015 (1/64) | 1/8 | 3/8 (1.5x) | .048 | I | 8 | 1/4 | 2-1/2 | 860115-C6 | 79.40 |
| | .020 | 1/8 | 3/8 (1.5x) | .048 | I | 8 | 1/4 | 2-1/2 | 860120-C6 | 79.40 |
| | .031 (1/32) | 1/8 | 3/8 (1.5x) | .048 | I | 8 | 1/4 | 2-1/2 | 860131-C6 | 79.40 |
| | .040 | 1/8 | 3/8 (1.5x) | .048 | I | 8 | 1/4 | 2-1/2 | 860140-C6 | 79.40 |
| | .047 (3/64) | 1/8 | 3/8 (1.5x) | .048 | I | 8 | 1/4 | 2-1/2 | 860147-C6 | 79.40 |
| **1/4** | .062 (1/16) | 1/8 | 1/4 (1x) | .048 | I | 8 | 1/4 | 2-1/2 | 743962-C6 | 79.40 |
| | .062 (1/16) | 1/8 | 3/8 (1.5x) | .048 | I | 8 | 1/4 | 2-1/2 | 860162-C6 | 79.40 |
| | .062 (1/16) | 1/8 | 3/4 (3x) | .048 | I | 8 | 1/4 | 2-1/2 | 742830-C6 | 83.00 |
| | .078 (5/64) | 1/8 | 3/8 (1.5x) | .048 | I | 8 | 1/4 | 2-1/2 | 860178-C6 | 79.40 |
| | .093 (3/32) | 1/8 | 3/8 (1.5x) | .048 | I | 8 | 1/4 | 2-1/2 | 860193-C6 | 79.40 |
| | .125 (1/8) | 1/8 | 3/8 (1.5x) | .048 | I | 8 | 1/4 | 2-1/2 | 860195-C6 | 79.40 |
| | .031 (1/32) | 5/32 | 15/32 (1.5x) | .063 | I | 8 | 5/16 | 2-1/2 | 855610-C6 | 105.30 |
| | .062 (1/16) | 5/32 | 15/32 (1.5x) | .063 | I | 8 | 5/16 | 2-1/2 | 855630-C6 | 105.30 |
| **5/16** | .093 (3/32) | 5/32 | 15/32 (1.5x) | .063 | I | 8 | 5/16 | 2-1/2 | 855650-C6 | 105.30 |
| | .125 (1/8) | 5/32 | 15/32 (1.5x) | .063 | I | 8 | 5/16 | 2-1/2 | 855660-C6 | 105.30 |
| | .156 (5/32) | 5/32 | 15/32 (1.5x) | .063 | I | 8 | 5/16 | 2-1/2 | 855665-C6 | 105.30 |
| | .031 (1/32) | 3/16 | 9/16 (1.5x) | .074 | I | 10 | 3/8 | 3 | 894710-C6 | 118.50 |
| | .062 (1/16) | 3/16 | 9/16 (1.5x) | .074 | I | 10 | 3/8 | 3 | 894730-C6 | 118.50 |
| | .093 (3/32) | 3/16 | 9/16 (1.5x) | .074 | I | 10 | 3/8 | 3 | 894750-C6 | 118.50 |
| **3/8** | .100 | 3/16 | 9/16 (1.5x) | .074 | I | 10 | 3/8 | 3 | 894752-C6 | 118.50 |
| | .125 (1/8) | 3/16 | 9/16 (1.5x) | .074 | I | 10 | 3/8 | 3 | 894760-C6 | 118.50 |
| | .187 (3/16) | 3/16 | 9/16 (1.5x) | .074 | I | 10 | 3/8 | 3 | 894770-C6 | 118.50 |
| | .250 (1/4) | 3/16 | 9/16 (1.5x) | .074 | I | 10 | 3/8 | 3 | 894780-C6 | 118.50 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Square for Hardened Steels (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.0005''}_{-.0005''}$ | | $L_3$ $^{+.020''}_{-.000''}$ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ |
| 1/2 | .031 (1/32) | 1/4 | 3/4 (1.5x) | .105 | I | 10 | 1/2 | 3 | 891310-C6 | 161.00 |
| | .047 (3/64) | 1/4 | 3/4 (1.5x) | .105 | I | 10 | 1/2 | 3 | 891320-C6 | 161.00 |
| | .062 (1/16) | 1/4 | 3/4 (1.5x) | .105 | I | 10 | 1/2 | 3 | 891330-C6 | 161.00 |
| | .078 (5/64) | 1/4 | 3/4 (1.5x) | .105 | I | 10 | 1/2 | 3 | 891340-C6 | 161.00 |
| | .093 (3/32) | 1/4 | 3/4 (1.5x) | .105 | I | 10 | 1/2 | 3 | 891350-C6 | 161.00 |
| | .125 (1/8) | 1/4 | 1/2 (1x) | .105 | I | 10 | 1/2 | 3 | 744760-C6 | 161.00 |
| | .125 (1/8) | 1/4 | 3/4 (1.5x) | .105 | I | 10 | 1/2 | 3 | 891360-C6 | 161.00 |
| | .125 (1/8) | 1/4 | 1-1/2 (3x) | .105 | I | 10 | 1/2 | 3 | 748260-C6 | 164.60 |
| | .156 (5/32) | 1/4 | 3/4 (1.5x) | .105 | I | 10 | 1/2 | 3 | 891365-C6 | 161.00 |
| | .187 (3/16) | 1/4 | 3/4 (1.5x) | .105 | I | 10 | 1/2 | 3 | 891370-C6 | 161.00 |
| | .250 (1/4) | 1/4 | 3/4 (1.5x) | .105 | I | 10 | 1/2 | 3 | 891380-C6 | 161.00 |
| 5/8 | .125 (1/8) | 5/16 | 1 (1.5x) | .137 | I | 10 | 5/8 | 3-1/2 | 744360-C6 | 244.80 |
| | .187 (3/16) | 5/16 | 1 (1.5x) | .137 | I | 10 | 5/8 | 3-1/2 | 744370-C6 | 244.80 |
| | .250 (1/4) | 5/16 | 1 (1.5x) | .137 | I | 10 | 5/8 | 3-1/2 | 744380-C6 | 244.80 |

*Radial DOC accounts for max transition radius at neck

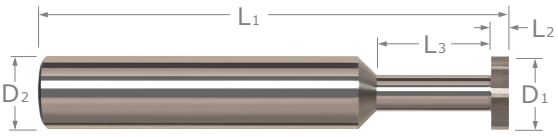


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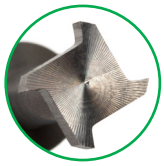
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# KEYSEAT CUTTERS

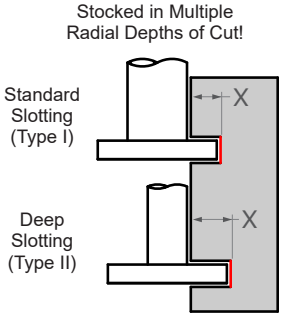
## Square for Non-Ferrous Materials




- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Large flute opening and sharper cutting edge
- Offered with $TiB_2$ coating to minimize galling
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA



Large Flute Opening & Sharper Cutting Edge




| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| **3/32** | .015 (1/64) | 3/64 | 9/64 (1.5x) | .021 | I | 3 | 1/8 | 1-1/2 | 849815 | 57.90 | 849815-C8 | 65.60 |
| | .031 (1/32) | 3/64 | 9/64 (1.5x) | .021 | I | 3 | 1/8 | 1-1/2 | 849831 | 57.90 | 849831-C8 | 65.60 |
| | .062 (1/16) | 3/64 | 9/64 (1.5x) | .021 | I | 3 | 1/8 | 1-1/2 | 849862 | 59.10 | 849862-C8 | 66.70 |
| **1/8** | .015 (1/64) | 1/16 | 3/16 (1.5x) | .022 | I | 4 | 1/8 | 1-1/2 | 962915 | 57.90 | 962915-C8 | 65.60 |
| | .031 (1/32) | 1/16 | 3/16 (1.5x) | .022 | I | 4 | 1/8 | 1-1/2 | 962931 | 57.90 | 962931-C8 | 66.70 |
| | .062 (1/16) | 1/16 | 3/16 (1.5x) | .022 | I | 4 | 1/8 | 1-1/2 | 962962 | 57.90 | 962962-C8 | 66.70 |
| | .093 (3/32) | 1/16 | 3/16 (1.5x) | .022 | I | 4 | 1/8 | 1-1/2 | 962993 | 57.90 | 962993-C8 | 65.60 |
| **5/32** | .031 (1/32) | 5/64 | 1/4 (1.5x) | .029 | I | 4 | 3/16 | 2 | 744031 | 61.10 | 744031-C8 | 69.80 |
| | .062 (1/16) | 5/64 | 1/4 (1.5x) | .029 | I | 4 | 3/16 | 2 | 744062 | 61.10 | 744062-C8 | 69.80 |
| **3/16** | .031 (1/32) | 3/32 | 9/32 (1.5x) | .037 | I | 4 | 3/16 | 2 | 998031 | 60.10 | 998031-C8 | 68.70 |
| | .047 (3/64) | 3/32 | 9/32 (1.5x) | .037 | I | 4 | 3/16 | 2 | 998047 | 60.10 | 998047-C8 | 68.70 |
| | .062 (1/16) | 3/32 | 9/32 (1.5x) | .037 | I | 4 | 3/16 | 2 | 998062 | 60.10 | 998062-C8 | 68.70 |
| | .125 (1/8) | 3/32 | 9/32 (1.5x) | .037 | I | 4 | 3/16 | 2 | 998095 | 60.10 | 998095-C8 | 68.70 |
| **1/4** | .015 (1/64) | 1/8 | 3/8 (1.5x) | .053 | I | 4 | 1/4 | 2-1/2 | 970315 | 66.60 | 970315-C8 | 77.00 |
| | .020 | 1/8 | 3/8 (1.5x) | .053 | I | 4 | 1/4 | 2-1/2 | 970320 | 66.60 | 970320-C8 | 77.00 |
| | .025 | 1/8 | 3/8 (1.5x) | .053 | I | 4 | 1/4 | 2-1/2 | 970325 | 66.60 | 970325-C8 | 77.70 |
| | .031 (1/32) | 1/8 | 3/8 (1.5x) | .053 | I | 4 | 1/4 | 2-1/2 | 970331 | 66.60 | 970331-C8 | 77.00 |
| | .040 | 1/8 | 3/8 (1.5x) | .053 | I | 4 | 1/4 | 2-1/2 | 970340 | 66.60 | 970340-C8 | 77.00 |
| | .047 (3/64) | 1/8 | 3/8 (1.5x) | .053 | I | 4 | 1/4 | 2-1/2 | 970347 | 66.60 | 970347-C8 | 77.00 |
| | .060 | 1/8 | 3/8 (1.5x) | .053 | I | 4 | 1/4 | 2-1/2 | 970360 | 66.60 | 970360-C8 | 77.00 |
| | .062 (1/16) | 5/64 | 1/8 (.5x) | **.076** | II | 4 | 1/4 | 2-1/2 | 909262 | 72.20 | 909262-C8 | 82.40 |
| | .062 (1/16) | 1/8 | 3/8 (1.5x) | .053 | I | 4 | 1/4 | 2-1/2 | 970362 | 66.60 | 970362-C8 | 77.00 |
| | .078 (5/64) | 1/8 | 3/8 (1.5x) | .053 | I | 4 | 1/4 | 2-1/2 | 970378 | 66.60 | 970378-C8 | 77.00 |
| | .093 (3/32) | 1/8 | 3/8 (1.5x) | .053 | I | 4 | 1/4 | 2-1/2 | 970393 | 66.60 | 970393-C8 | 77.00 |
| | .125 (1/8) | 5/64 | 1/8 (.5x) | **.076** | II | 4 | 1/4 | 2-1/2 | 909295 | 72.20 | 909295-C8 | 82.40 |
| | .125 (1/8) | 1/8 | 3/8 (1.5x) | .053 | I | 4 | 1/4 | 2-1/2 | 970395 | 66.60 | 970395-C8 | 77.00 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Square for Non-Ferrous Materials (cont.)

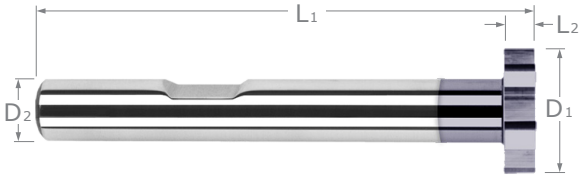
continued from previous page

| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.0005''}_{-.0005''}$ | | $L_3$ $^{+.020''}_{-.000''}$ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 5/16 | .031 (1/32) | 5/32 | 15/32 (1.5x) | .068 | I | 4 | 5/16 | 2-1/2 | 984310 | 91.40 | 984310-C8 | 105.50 |
| | .062 (1/16) | 5/32 | 15/32 (1.5x) | .068 | I | 4 | 5/16 | 2-1/2 | 984330 | 91.40 | 984330-C8 | 105.50 |
| | .093 (3/32) | 5/32 | 15/32 (1.5x) | .068 | I | 4 | 5/16 | 2-1/2 | 984350 | 91.40 | 984350-C8 | 105.50 |
| | .125 (1/8) | 5/32 | 15/32 (1.5x) | .068 | I | 4 | 5/16 | 2-1/2 | 984360 | 91.40 | 984360-C8 | 104.70 |
| 3/8 | .031 (1/32) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 975210 | 102.20 | 975210-C8 | 119.70 |
| | .047 (3/64) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 975220 | 102.20 | 975220-C8 | 118.00 |
| | .062 (1/16) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 975230 | 102.20 | 975230-C8 | 119.70 |
| | .078 (5/64) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 975240 | 102.20 | 975240-C8 | 118.00 |
| | .093 (3/32) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 975250 | 102.20 | 975250-C8 | 119.70 |
| | .125 (1/8) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 975260 | 102.20 | 975260-C8 | 119.70 |
| | .187 (3/16) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 975270 | 102.20 | 975270-C8 | 119.70 |
| 1/2 | .031 (1/32) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 988910 | 134.70 | 988910-C8 | 154.50 |
| | .047 (3/64) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 988920 | 134.70 | 988920-C8 | 153.10 |
| | .062 (1/16) | 5/32 | 1/4 (.5x) | **.162** | II | 6 | 1/2 | 3 | 917530 | 144.00 | 917530-C8 | 163.00 |
| | .062 (1/16) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 988930 | 134.70 | 988930-C8 | 154.50 |
| | .078 (5/64) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 988940 | 134.70 | 988940-C8 | 153.10 |
| | .093 (3/32) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 988950 | 134.70 | 988950-C8 | 154.50 |
| | .125 (1/8) | 5/32 | 1/4 (.5x) | **.162** | II | 6 | 1/2 | 3 | 917560 | 144.00 | 917560-C8 | 163.00 |
| | .125 (1/8) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 988960 | 134.70 | 988960-C8 | 154.50 |
| | .156 (5/32) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 988965 | 134.70 | 988965-C8 | 153.10 |
| | .187 (3/16) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 988970 | 134.70 | 988970-C8 | 154.50 |
| | .250 (1/4) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 988980 | 134.70 | 988980-C8 | 154.50 |
| 5/8 | .062 (1/16) | 5/16 | 1 (1.5x) | .146 | I | 6 | 5/8 | 3-1/2 | 891730 | 193.20 | 891730-C8 | 219.80 |
| | .078 (5/64) | 5/16 | 1 (1.5x) | .146 | I | 6 | 5/8 | 3-1/2 | 891740 | 193.20 | 891740-C8 | 219.80 |
| | .093 (3/32) | 5/16 | 1 (1.5x) | .146 | I | 6 | 5/8 | 3-1/2 | 891750 | 197.00 | 891750-C8 | 223.70 |
| | .125 (1/8) | 5/16 | 1 (1.5x) | .146 | I | 6 | 5/8 | 3-1/2 | 891760 | 193.20 | 891760-C8 | 222.10 |
| | .187 (3/16) | 5/16 | 1 (1.5x) | .146 | I | 6 | 5/8 | 3-1/2 | 891770 | 193.20 | 891770-C8 | 222.10 |
| | .250 (1/4) | 5/16 | 1 (1.5x) | .146 | I | 6 | 5/8 | 3-1/2 | 891780 | 193.20 | 891780-C8 | 222.10 |

*Radial DOC accounts for max transition radius at neck

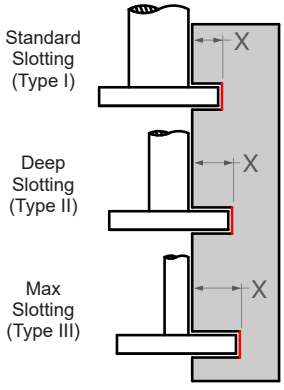
# KEYSEAT CUTTERS

## Square – Reduced Shank




- Solid carbide head brazed onto a steel shank
- Both sides of cutter are dished for clearance
- Weldon flat
- CNC ground in the USA

Stocked in Multiple Radial Depths of Cut!




| CUTTER DIAMETER | CUTTER WIDTH | RADIAL DOC** | TYPE | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.001''}_{-.001''}$ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/2 | .031 (1/32) | .115 | I | 8 | 1/4* | 3-1/32 | 849305 | 104.70 | 849305-C3 | 121.30 |
| | .047 (3/64) | .115 | I | 8 | 1/4* | 3-3/64 | 849310 | 104.70 | 849310-C3 | 121.30 |
| | .062 (1/16) | **.146** | II | 8 | 3/16* | 3-1/16 | 713162 | 114.90 | 713162-C3 | 131.50 |
| | .062 (1/16) | .115 | I | 8 | 1/4* | 3-1/16 | 849320 | 104.70 | 849320-C3 | 122.00 |
| | .078 (5/64) | .115 | I | 8 | 1/4* | 3-5/64 | 849330 | 104.70 | 849330-C3 | 122.00 |
| | .093 (3/32) | **.146** | II | 8 | 3/16* | 3-3/32 | 713193 | 114.90 | 713193-C3 | 131.50 |
| | .093 (3/32) | .115 | I | 8 | 1/4* | 3-3/32 | 849340 | 104.70 | 849340-C3 | 122.00 |
| | .125 (1/8) | **.146** | II | 8 | 3/16* | 3-1/8 | 713195 | 114.90 | 713195-C3 | 131.50 |
| | .125 (1/8) | .115 | I | 8 | 1/4* | 3-1/8 | 849350 | 104.70 | 849350-C3 | 122.00 |
| | .156 (5/32) | .115 | I | 8 | 1/4* | 3-5/32 | 849355 | 104.70 | 849355-C3 | 121.30 |
| | .187 (3/16) | .115 | I | 8 | 1/4* | 3-3/16 | 849360 | 104.70 | 849360-C3 | 122.00 |
| | .250 (1/4) | .115 | I | 8 | 1/4* | 3-1/4 | 849370 | 104.70 | 849370-C3 | 122.00 |
| 3/4 | .031 (1/32) | **.240** | III | 10 | 1/4* | 3-1/32 | 899805 | 145.10 | 899805-C3 | 164.30 |
| | .031 (1/32) | **.177** | II | 10 | 3/8 | 3-1/32 | 984505 | 133.80 | 984505-C3 | 153.90 |
| | .031 (1/32) | .115 | I | 10 | 1/2 | 3-1/32 | 52005 | 126.10 | 52005-C3 | 146.30 |
| | .040 | **.177** | II | 10 | 3/8 | 3.040 | 984508 | 133.80 | 984508-C3 | 153.90 |
| | .040 | .115 | I | 10 | 1/2 | 3.040 | 52008 | 126.10 | 52008-C3 | 146.30 |
| | .047 (3/64) | **.240** | III | 10 | 1/4* | 3-3/64 | 899810 | 145.10 | 899810-C3 | 164.30 |
| | .047 (3/64) | **.177** | II | 10 | 3/8 | 3-3/64 | 984510 | 133.80 | 984510-C3 | 153.90 |
| | .047 (3/64) | .115 | I | 10 | 1/2 | 3-3/64 | 52010 | 126.10 | 52010-C3 | 146.30 |
| | .050 | .115 | I | 10 | 1/2 | 3.050 | 52011 | 126.10 | 52011-C3 | 146.30 |
| | .060 | .115 | I | 10 | 1/2 | 3.060 | 52019 | 126.10 | 52019-C3 | 146.30 |
| | .062 (1/16) | **.240** | III | 10 | 1/4* | 3-1/16 | 899820 | 145.10 | 899820-C3 | 164.30 |
| | .062 (1/16) | **.177** | II | 10 | 3/8 | 3-1/16 | 984520 | 133.80 | 984520-C3 | 153.90 |
| | .062 (1/16) | .115 | I | 10 | 1/2 | 3-1/16 | 52020 | 126.10 | 52020-C3 | 146.30 |
| | .078 (5/64) | **.177** | II | 10 | 3/8 | 3-5/64 | 984530 | 133.80 | 984530-C3 | 153.90 |
| | .078 (5/64) | .115 | I | 10 | 1/2 | 3-5/64 | 52030 | 126.10 | 52030-C3 | 146.30 |
| | .093 (3/32) | **.240** | III | 10 | 1/4* | 3-3/32 | 899840 | 145.10 | 899840-C3 | 164.30 |
| | .093 (3/32) | **.177** | II | 10 | 3/8 | 3-3/32 | 984540 | 133.80 | 984540-C3 | 153.90 |
| | .093 (3/32) | .115 | I | 10 | 1/2 | 3-3/32 | 52040 | 126.10 | 52040-C3 | 146.30 |
| | .100 | .115 | I | 10 | 1/2 | 3.100 | 52045 | 126.10 | 52045-C3 | 146.30 |
| | .118 (3 mm) | .115 | I | 10 | 1/2 | 3.118 | 52048 | 126.10 | 52048-C3 | 146.30 |
| | .125 (1/8) | **.177** | II | 10 | 3/8 | 3-1/8 | 984550 | 133.80 | 984550-C3 | 153.90 |
| | .125 (1/8) | .115 | I | 10 | 1/2 | 3-1/8 | 52050 | 126.10 | 52050-C3 | 146.30 |

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

continued on next page

# KEYSEAT CUTTERS

## Square – Reduced Shank (cont.)

continued from previous page

| CUTTER DIAMETER | CUTTER WIDTH | RADIAL DOC** | TYPE | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.001''}_{-.001''}$ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 3/4 | .156 (5/32) | **.177** | II | 10 | 3/8 | 3-5/32 | 984555 | 133.80 | 984555-C3 | 153.90 |
| | .156 (5/32) | .115 | I | 10 | 1/2 | 3-5/32 | 52055 | 126.10 | 52055-C3 | 146.30 |
| | .174 | Please see page 414 for Retaining Ring sizes. | | | | | | | | |
| | .187 (3/16) | **.177** | II | 10 | 3/8 | 3-3/16 | 984560 | 133.80 | 984560-C3 | 153.90 |
| | .187 (3/16) | .115 | I | 10 | 1/2 | 3-3/16 | 52060 | 126.10 | 52060-C3 | 146.30 |
| | .236 (6 mm) | .115 | I | 10 | 1/2 | 3.236 | 52066 | 136.80 | 52066-C3 | 159.90 |
| | .250 (1/4) | **.177** | II | 10 | 3/8 | 3-1/4 | 984570 | 150.10 | 984570-C3 | 170.20 |
| | .250 (1/4) | .115 | I | 10 | 1/2 | 3-1/4 | 52070 | 142.30 | 52070-C3 | 162.70 |
| | .312 (5/16) | .115 | I | 10 | 1/2 | 3-5/16 | 52080 | 167.60 | 52080-C3 | 190.70 |
| | .375 (3/8) | .115 | I | 10 | 1/2 | 3-3/8 | 52090 | 174.70 | 52090-C3 | 203.10 |
| 7/8 | .062 (1/16) | .177 | I | 12 | 1/2 | 3-1/16 | 961020 | 134.70 | 961020-C3 | 155.20 |
| | .093 (3/32) | .177 | I | 12 | 1/2 | 3-3/32 | 961040 | 134.70 | 961040-C3 | 155.20 |
| | .125 (1/8) | **.240** | II | 12 | 3/8 | 3-1/8 | 890650 | 142.10 | 890650-C3 | 162.10 |
| | .125 (1/8) | .177 | I | 12 | 1/2 | 3-1/8 | 961050 | 134.70 | 961050-C3 | 155.20 |
| | .187 (3/16) | **.240** | II | 12 | 3/8 | 3-3/16 | 890660 | 142.10 | 890660-C3 | 162.10 |
| | .187 (3/16) | .177 | I | 12 | 1/2 | 3-3/16 | 961060 | 134.70 | 961060-C3 | 162.40 |
| | .250 (1/4) | **.240** | II | 12 | 3/8 | 3-1/4 | 890670 | 158.20 | 890670-C3 | 178.40 |
| | .250 (1/4) | .177 | I | 12 | 1/2 | 3-1/4 | 961070 | 149.90 | 961070-C3 | 170.60 |
| | .312 (5/16) | .177 | I | 12 | 1/2 | 3-5/16 | 961080 | 167.60 | 961080-C3 | 188.30 |
| | .375 (3/8) | .177 | I | 12 | 1/2 | 3-3/8 | 961090 | 174.70 | 961090-C3 | 195.60 |
| 1 | .031 (1/32) | **.365** | III | 12 | 1/4* | 3-1/32 | 914905 | 169.20 | 914905-C3 | 198.20 |
| | .031 (1/32) | **.302** | II | 12 | 3/8 | 3-1/32 | 982005 | 149.50 | 982005-C3 | 179.40 |
| | .031 (1/32) | .240 | I | 12 | 1/2 | 3-1/32 | 55905 | 141.80 | 55905-C3 | 172.00 |
| | .040 | .240 | I | 12 | 1/2 | 3.040 | 55908 | 141.80 | 55908-C3 | 172.00 |
| | .047 (3/64) | **.365** | III | 12 | 1/4* | 3-3/64 | 914910 | 169.20 | 914910-C3 | 198.20 |
| | .047 (3/64) | **.302** | II | 12 | 3/8 | 3-3/64 | 982010 | 149.50 | 982010-C3 | 179.40 |
| | .047 (3/64) | .240 | I | 12 | 1/2 | 3-3/64 | 55910 | 141.80 | 55910-C3 | 172.00 |
| | .062 (1/16) | **.365** | III | 12 | 1/4* | 3-1/16 | 914920 | 169.20 | 914920-C3 | 198.20 |
| | .062 (1/16) | **.302** | II | 12 | 3/8 | 3-1/16 | 982020 | 149.50 | 982020-C3 | 179.40 |
| | .062 (1/16) | .240 | I | 12 | 1/2 | 3-1/16 | 55920 | 141.80 | 55920-C3 | 172.00 |
| | .078 (5/64) | **.365** | III | 12 | 1/4* | 3-5/64 | 914930 | 169.20 | 914930-C3 | 198.20 |
| | .078 (5/64) | **.302** | II | 12 | 3/8 | 3-5/64 | 982030 | 149.50 | 982030-C3 | 179.40 |
| | .078 (5/64) | .240 | I | 12 | 1/2 | 3-5/64 | 55930 | 141.80 | 55930-C3 | 172.00 |
| | .093 (3/32) | **.365** | III | 12 | 1/4* | 3-3/32 | 914940 | 169.20 | 914940-C3 | 198.20 |
| | .093 (3/32) | **.302** | II | 12 | 3/8 | 3-3/32 | 982040 | 149.50 | 982040-C3 | 179.40 |
| | .093 (3/32) | .240 | I | 12 | 1/2 | 3-3/32 | 55940 | 141.80 | 55940-C3 | 172.00 |
| | .125 (1/8) | **.365** | III | 12 | 1/4* | 3-1/8 | 914950 | 169.20 | 914950-C3 | 198.20 |
| | .125 (1/8) | **.302** | II | 12 | 3/8 | 3-1/8 | 982050 | 149.50 | 982050-C3 | 179.40 |
| | .125 (1/8) | .240 | I | 12 | 1/2 | 3-1/8 | 55950 | 141.80 | 55950-C3 | 172.00 |
| | .156 (5/32) | **.302** | II | 12 | 3/8 | 3-5/32 | 982055 | 149.50 | 982055-C3 | 179.40 |
| | .156 (5/32) | .240 | I | 12 | 1/2 | 3-5/32 | 55955 | 141.80 | 55955-C3 | 172.00 |
| | .187 (3/16) | **.302** | II | 12 | 3/8 | 3-3/16 | 982060 | 149.50 | 982060-C3 | 179.40 |
| | .187 (3/16) | .240 | I | 12 | 1/2 | 3-3/16 | 55960 | 141.80 | 55960-C3 | 172.00 |
| | .209 | Please see page 414 for Retaining Ring sizes. | | | | | | | | |
| | .250 (1/4) | **.302** | II | 12 | 3/8 | 3-1/4 | 982070 | 166.00 | 982070-C3 | 196.00 |
| | .250 (1/4) | .240 | I | 12 | 1/2 | 3-1/4 | 55970 | 157.40 | 55970-C3 | 187.70 |
| | .312 (5/16) | **.302** | II | 12 | 3/8 | 3-5/16 | 982080 | 177.00 | 982080-C3 | 207.10 |
| | .312 (5/16) | .240 | I | 12 | 1/2 | 3-5/16 | 55980 | 167.60 | 55980-C3 | 198.20 |
| | .375 (3/8) | **.302** | II | 12 | 3/8 | 3-3/8 | 982090 | 167.50 | 982090-C3 | 197.70 |
| | .375 (3/8) | .240 | I | 12 | 1/2 | 3-3/8 | 55990 | 174.70 | 55990-C3 | 205.40 |

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

continued on next page

# KEYSEAT CUTTERS

## Square – Reduced Shank (cont.)

continued from previous page

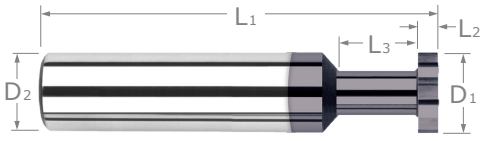
| CUTTER DIAMETER | CUTTER WIDTH | RADIAL DOC** | TYPE | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.001″ −.001″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .500 (1/2) | .240 | I | 12 | 1/2 | 3-1/2 | 55995 | 181.90 | 55995-C3 | 212.40 |
| **1-1/8** | .125 (1/8) | .177 | I | 14 | 3/4 | 3-3/8 | 741750 | 165.60 | 741750-C3 | 204.80 |
| | .250 (1/4) | .177 | I | 14 | 3/4 | 3-1/2 | 741770 | 185.30 | 741770-C3 | 224.50 |
| | .093 (3/32) | .240 | I | 14 | 3/4 | 3-11/32 | 973940 | 179.60 | 973940-C3 | 218.80 |
| | .125 (1/8) | **.365** | II | 14 | 1/2 | 3-1/8 | 879950 | 185.80 | 879950-C3 | 217.60 |
| | .125 (1/8) | .240 | I | 14 | 3/4 | 3-3/8 | 973950 | 176.10 | 973950-C3 | 206.00 |
| **1-1/4** | .250 (1/4) | **.365** | II | 14 | 1/2 | 3-1/4 | 879970 | 187.60 | 879970-C3 | 217.60 |
| | .250 (1/4) | .240 | I | 14 | 3/4 | 3-1/2 | 973970 | 196.00 | 973970-C3 | 216.80 |
| | .375 (3/8) | .240 | I | 14 | 3/4 | 3-5/8 | 973990 | 211.20 | 973990-C3 | 250.50 |
| | .500 (1/2) | .240 | I | 14 | 3/4 | 3-3/4 | 973995 | 211.20 | 973995-C3 | 250.50 |
| | .062 (1/16) | **.428** | II | 14 | 1/2 | 3-1/16 | 713262 | 198.60 | 713262-C3 | 246.20 |
| **1-3/8** | .125 (1/8) | **.428** | II | 14 | 1/2 | 3-1/8 | 713295 | 198.60 | 713295-C3 | 246.20 |
| | .250 (1/4) | **.428** | II | 14 | 1/2 | 3-1/4 | 713299 | 198.60 | 713299-C3 | 246.20 |
| | .062 (1/16) | **.490** | II | 16 | 1/2 | 3-1/16 | 887020 | 197.60 | 887020-C3 | 235.40 |
| | .062 (1/16) | .365 | I | 16 | 3/4 | 3-5/16 | 962020 | 187.70 | 962020-C3 | 225.50 |
| | .093 (3/32) | .365 | I | 16 | 3/4 | 3-11/32 | 962040 | 187.70 | 962040-C3 | 225.50 |
| | .125 (1/8) | **.552** | III | 16 | 3/8 | 3-1/8 | 868750 | 208.80 | 868750-C3 | 245.10 |
| | .125 (1/8) | **.490** | II | 16 | 1/2 | 3-1/8 | 887050 | 197.60 | 887050-C3 | 235.40 |
| | .125 (1/8) | .365 | I | 16 | 3/4 | 3-3/8 | 962050 | 187.70 | 962050-C3 | 225.50 |
| | .187 (3/16) | **.552** | III | 16 | 3/8 | 3-3/16 | 868760 | 208.80 | 868760-C3 | 245.10 |
| **1-1/2** | .187 (3/16) | **.490** | II | 16 | 1/2 | 3-3/16 | 887060 | 197.60 | 887060-C3 | 235.40 |
| | .187 (3/16) | .365 | I | 16 | 3/4 | 3-7/16 | 962060 | 187.70 | 962060-C3 | 225.50 |
| | .250 (1/4) | **.490** | II | 16 | 1/2 | 3-1/4 | 887070 | 212.70 | 887070-C3 | 250.40 |
| | .250 (1/4) | .365 | I | 16 | 3/4 | 3-1/2 | 962070 | 201.70 | 962070-C3 | 239.80 |
| | .312 (5/16) | .365 | I | 16 | 3/4 | 3-9/16 | 962080 | 232.00 | 962080-C3 | 270.50 |
| | .375 (3/8) | .365 | I | 16 | 3/4 | 3-5/8 | 962090 | 260.50 | 962090-C3 | 299.40 |
| | .437 (7/16) | .365 | I | 16 | 3/4 | 3-11/16 | 962093 | 287.40 | 962093-C3 | 335.10 |
| | .500 (1/2) | .365 | I | 16 | 3/4 | 3-3/4 | 962095 | 303.00 | 962095-C3 | 342.20 |

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

**For reduced shank and greater radial depths of cut, please see Reduced Shank Keyseat Cutters on pages 411, 419, 422, 427**

# KEYSEAT CUTTERS

## Retaining Ring Keyseats




**Designed for Milling Retaining / Snap Ring Grooves**

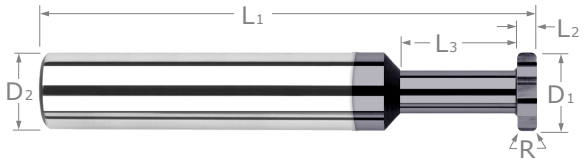
- Designed to mill proper slot widths for common retaining ring sizes
- Cutter diameter, neck length, radial, and axial depths of cut optimized for internal retaining ring grooves per ANSI standards
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

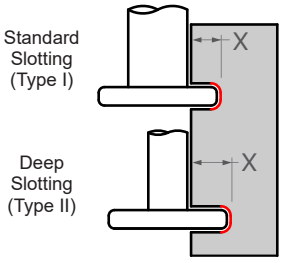
| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC** | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.002″ −.000″ | | $L_3$ +.020″ −.000″ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| **3/16** | .018 | 1/8 | 1/8 | .021 | 6 | 3/16 | 2 | 23504 | 56.80 | 23504-C3 | 63.40 |
| | .029 | 1/8 | 1/8 | .021 | 6 | 3/16 | 2 | 23508 | 56.80 | 23508-C3 | 63.40 |
| **1/4** | .039 | 5/32 | 5/32 | .037 | 6 | 1/4 | 2-1/2 | 23512 | 67.20 | 23512-C3 | 76.00 |
| | .046 | 5/32 | 5/32 | .037 | 6 | 1/4 | 2-1/2 | 23516 | 67.20 | 23516-C3 | 76.00 |
| **5/16** | .056 | 3/16 | 3/16 | .052 | 6 | 5/16 | 2-1/2 | 23520 | 80.50 | 23520-C3 | 90.80 |
| **3/8** | .068 | 3/16 | 1/4 | .084 | 8 | 3/8 | 2-1/2 | 23524 | 93.80 | 23524-C3 | 105.30 |
| | .086 | 3/16 | 1/4 | .084 | 8 | 3/8 | 2-1/2 | 23528 | 93.80 | 23528-C3 | 105.30 |
| **1/2** | .103 | 1/4 | 5/16 | .115 | 8 | 1/2 | 3 | 23532 | 103.40 | 23532-C3 | 120.70 |
| | .120 | 1/4 | 3/8 | .115 | 8 | 1/2 | 3 | 23536 | 103.40 | 23536-C3 | 120.70 |
| **5/8** | .120 | 5/16 | 1/2 | .146 | 8 | 5/8 | 3-1/2 | 23540 | 192.40 | 23540-C3 | 211.80 |
| | .139 | 5/16 | 1/2 | .146 | 8 | 5/8 | 3-1/2 | 23544 | 192.40 | 23544-C3 | 209.70 |
| **3/4** | .174 | - | - | .177 | 10 | 3/8 | 3.174 | 23548* | 139.00 | 23548-C3* | 159.40 |
| **1** | .209 | - | - | .240 | 12 | 1/2 | 3.209 | 23564* | 166.40 | 23564-C3* | 196.90 |

*Carbide head with reduced steel shank **Radial DOC accounts for max transition at neck

# KEYSEAT CUTTERS

## Corner Radius




- Both sides of cutter are dished for clearance
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA

| CUTTER DIA. | CUTTER WIDTH | CORNER RADIUS | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | R +.001″ −.001″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| **1/16** | .015 (1/64) | **.005** | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 910615 | 67.20 | 910615-C3 | 73.10 |
| | .020 | **.005** | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 910620 | 67.20 | 910620-C3 | 73.10 |
| | .031 (1/32) | **.005** | 1/32 | 3/32 (1.5x) | .012 | I | 4 | 1/8 | 1-1/2 | 910631 | 67.20 | 910631-C3 | 73.10 |
| **3/32** | .031 (1/32) | **.005** | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 902531 | 65.50 | 902531-C3 | 71.40 |
| | .031 (1/32) | **.010** | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 909131 | 65.50 | 909131-C3 | 71.40 |
| | .062 (1/16) | **.005** | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 902562 | 65.50 | 902562-C3 | 71.40 |
| | .062 (1/16) | **.010** | 3/64 | 9/64 (1.5x) | .021 | I | 4 | 1/8 | 1-1/2 | 909162 | 65.50 | 909162-C3 | 71.40 |
| **1/8** | .015 (1/64) | **.005** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 965115 | 63.60 | 965115-C3 | 69.50 |
| | .020 | **.005** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 965120 | 63.60 | 965120-C3 | 69.50 |
| | .025 | **.005** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 965125 | 63.60 | 965125-C3 | 69.50 |
| | .031 (1/32) | **.005** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 965131 | 63.60 | 965131-C3 | 69.50 |
| | .031 (1/32) | **.005** | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 732231 | 73.30 | 732231-C3 | 79.20 |
| | .031 (1/32) | **.010** | .040 | 1/16 (.5x) | **.032** | II | 6 | 1/8 | 1-1/2 | 837631 | 77.20 | 837631-C3 | 83.10 |
| | .040 | **.005** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 965140 | 63.60 | 965140-C3 | 69.50 |
| | .047 (3/64) | **.005** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 965147 | 63.60 | 965147-C3 | 69.50 |
| | .062 (1/16) | **.005** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 965162 | 63.60 | 965162-C3 | 69.50 |
| | .062 (1/16) | **.010** | .040 | 1/16 (.5x) | **.032** | II | 6 | 1/8 | 1-1/2 | 837662 | 77.20 | 837662-C3 | 83.10 |
| | .062 (1/16) | **.010** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 985962 | 63.60 | 985962-C3 | 69.50 |
| | .078 (5/64) | **.010** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 985978 | 65.00 | 985978-C3 | 70.90 |
| | .093 (3/32) | **.010** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 985993 | 63.60 | 985993-C3 | 69.50 |
| | .093 (3/32) | **.015** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 960793 | 65.00 | 960793-C3 | 70.90 |
| **3/16** | .015 (1/64) | **.005** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 954715 | 65.90 | 954715-C3 | 72.40 |
| | .020 | **.005** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 954720 | 65.90 | 954720-C3 | 72.40 |
| | .025 | **.005** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 954725 | 65.90 | 954725-C3 | 72.10 |
| | .031 (1/32) | **.005** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 954731 | 65.90 | 954731-C3 | 72.40 |
| | .040 | **.005** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 954740 | 65.90 | 954740-C3 | 72.40 |
| | .047 (3/64) | **.005** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 954747 | 65.90 | 954747-C3 | 72.40 |
| | .062 (1/16) | **.005** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 954762 | 65.90 | 954762-C3 | 72.40 |
| | .062 (1/16) | **.010** | 1/16 | 3/32 (.5x) | **.052** | II | 6 | 3/16 | 2 | 837262 | 80.00 | 837262-C3 | 86.70 |
| | .062 (1/16) | **.010** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 949962 | 65.90 | 949962-C3 | 72.40 |
| | .062 (1/16) | **.015** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 937762 | 65.90 | 937762-C3 | 72.40 |
| | .078 (5/64) | **.010** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 949978 | 65.90 | 949978-C3 | 72.40 |
| | .093 (3/32) | **.010** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 949993 | 65.90 | 949993-C3 | 72.40 |
| | .093 (3/32) | **.015** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 937793 | 65.90 | 937793-C3 | 72.40 |
| | .125 (1/8) | **.010** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 949995 | 65.90 | 949995-C3 | 72.40 |
| | .125 (1/8) | **.015** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 937795 | 65.90 | 937795-C3 | 72.40 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | CORNER RADIUS | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | R +.001″ −.001″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/4 | .015 (1/64) | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 981115 | 72.80 | 981115-C3 | 81.60 |
| | .020 | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 981120 | 72.80 | 981120-C3 | 81.60 |
| | .025 | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 981125 | 72.80 | 981125-C3 | 81.60 |
| | .031 (1/32) | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 981131 | 72.80 | 981131-C3 | 81.60 |
| | .031 (1/32) | **.005** | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 916631 | 86.10 | 916631-C3 | 94.10 |
| | .031 (1/32) | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972631 | 72.80 | 972631-C3 | 81.60 |
| | .040 | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 981140 | 72.80 | 981140-C3 | 81.60 |
| | .047 (3/64) | **.005** | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 777147 | 86.90 | 777147-C3 | 95.90 |
| | .047 (3/64) | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 981147 | 72.80 | 981147-C3 | 81.60 |
| | .047 (3/64) | **.005** | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 916647 | 86.10 | 916647-C3 | 94.10 |
| | .047 (3/64) | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972647 | 72.80 | 972647-C3 | 81.60 |
| | .047 (3/64) | **.015** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 968447 | 72.80 | 968447-C3 | 81.60 |
| | .050 | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 981150 | 72.80 | 981150-C3 | 81.60 |
| | .060 | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972660 | 72.80 | 972660-C3 | 81.60 |
| | .062 (1/16) | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 981162 | 71.40 | 981162-C3 | 80.20 |
| | .062 (1/16) | **.010** | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 911762 | 86.90 | 911762-C3 | 95.90 |
| | .062 (1/16) | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972662 | 71.40 | 972662-C3 | 80.20 |
| | .062 (1/16) | **.010** | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 900062 | 84.70 | 900062-C3 | 93.40 |
| | .062 (1/16) | **.015** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 968462 | 71.40 | 968462-C3 | 80.20 |
| | .062 (1/16) | **.020** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 776762 | 71.40 | 776762-C3 | 80.20 |
| | .078 (5/64) | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972678 | 72.80 | 972678-C3 | 81.60 |
| | .093 (3/32) | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 981193 | 71.40 | 981193-C3 | 80.20 |
| | .093 (3/32) | **.010** | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 911793 | 86.90 | 911793-C3 | 95.90 |
| | .093 (3/32) | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972693 | 71.40 | 972693-C3 | 80.20 |
| | .093 (3/32) | **.010** | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 900093 | 84.70 | 900093-C3 | 93.40 |
| | .093 (3/32) | **.015** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 968493 | 71.40 | 968493-C3 | 80.20 |
| | .093 (3/32) | **.030** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 904593 | 71.40 | 904593-C3 | 80.20 |
| | .125 (1/8) | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 981195 | 71.40 | 981195-C3 | 80.20 |
| | .125 (1/8) | **.010** | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 911795 | 86.90 | 911795-C3 | 95.90 |
| | .125 (1/8) | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972695 | 71.40 | 972695-C3 | 80.20 |
| | .125 (1/8) | **.010** | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 900095 | 84.70 | 900095-C3 | 93.40 |
| | .125 (1/8) | **.015** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 968495 | 71.40 | 968495-C3 | 80.20 |
| | .125 (1/8) | **.020** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 776795 | 71.40 | 776795-C3 | 80.20 |
| | .125 (1/8) | **.030** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 904595 | 71.40 | 904595-C3 | 80.20 |
| | .187 (3/16) | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972697 | 71.40 | 972697-C3 | 80.20 |
| | .187 (3/16) | **.015** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 968497 | 71.40 | 968497-C3 | 79.50 |
| 5/16 | .031 (1/32) | **.005** | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 931610 | 104.80 | 931610-C3 | 115.10 |
| | .031 (1/32) | **.010** | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 921110 | 104.80 | 921110-C3 | 115.10 |
| | .062 (1/16) | **.005** | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 931630 | 104.80 | 931630-C3 | 115.10 |
| | .062 (1/16) | **.010** | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 921130 | 104.80 | 921130-C3 | 115.10 |
| | .062 (1/16) | **.020** | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 776562 | 104.80 | 776562-C3 | 114.50 |
| | .093 (3/32) | **.010** | 7/64 | 3/16 (.5x) | **.091** | II | 6 | 5/16 | 2-1/2 | 776850 | 110.70 | 776850-C3 | 121.20 |
| | .093 (3/32) | **.010** | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 921150 | 104.80 | 921150-C3 | 115.10 |
| | .093 (3/32) | **.015** | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 927750 | 104.80 | 927750-C3 | 115.10 |
| | .093 (3/32) | **.020** | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 776550 | 104.80 | 776550-C3 | 115.10 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Corner Radius (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | CORNER RADIUS | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | R +.001″ −.001″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| | .031 (1/32) | **.005** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 987210 | 107.80 | 987210-C3 | 119.30 |
| | .047 (3/64) | **.005** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 987220 | 107.80 | 987220-C3 | 119.30 |
| | .062 (1/16) | **.005** | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 836830 | 114.00 | 836830-C3 | 125.40 |
| | .062 (1/16) | **.005** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 987230 | 105.70 | 987230-C3 | 117.10 |
| | .062 (1/16) | **.010** | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 916830 | 114.90 | 916830-C3 | 126.30 |
| | .062 (1/16) | **.010** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 981630 | 105.70 | 981630-C3 | 117.10 |
| | .062 (1/16) | **.010** | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 793730 | 107.20 | 793730-C3 | 118.60 |
| | .062 (1/16) | **.015** | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 903330 | 114.90 | 903330-C3 | 126.30 |
| | .062 (1/16) | **.015** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 970030 | 105.70 | 970030-C3 | 117.10 |
| | .062 (1/16) | **.020** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 776462 | 105.70 | 776462-C3 | 117.10 |
| | .078 (5/64) | **.010** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 981640 | 107.80 | 981640-C3 | 119.30 |
| | .093 (3/32) | **.005** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 987250 | 105.70 | 987250-C3 | 117.10 |
| | .093 (3/32) | **.010** | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 916850 | 114.90 | 916850-C3 | 126.30 |
| | .093 (3/32) | **.010** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 981650 | 105.70 | 981650-C3 | 117.10 |
| | .093 (3/32) | **.010** | 3/16 | 1-1/8 (3x) | .084 | I | 8 | 3/8 | 2-1/2 | 793750 | 107.20 | 793750-C3 | 118.60 |
| | .093 (3/32) | **.015** | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 903350 | 114.90 | 903350-C3 | 126.30 |
| **3/8** | .093 (3/32) | **.015** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 970050 | 105.70 | 970050-C3 | 117.10 |
| | .093 (3/32) | **.030** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 905950 | 105.70 | 905950-C3 | 117.10 |
| | .125 (1/8) | **.005** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 987260 | 105.70 | 987260-C3 | 117.10 |
| | .125 (1/8) | **.010** | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 916860 | 114.90 | 916860-C3 | 126.30 |
| | .125 (1/8) | **.010** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 981660 | 105.70 | 981660-C3 | 117.10 |
| | .125 (1/8) | **.015** | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 903360 | 114.90 | 903360-C3 | 126.30 |
| | .125 (1/8) | **.015** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 970060 | 105.70 | 970060-C3 | 117.10 |
| | .125 (1/8) | **.020** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 776460 | 105.70 | 776460-C3 | 117.10 |
| | .125 (1/8) | **.030** | 1/8 | 3/16 (.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 857960 | 114.90 | 857960-C3 | 126.30 |
| | .125 (1/8) | **.030** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 905960 | 105.70 | 905960-C3 | 117.10 |
| | .156 (5/32) | **.015** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 970065 | 109.80 | 970065-C3 | 121.20 |
| | .156 (5/32) | **.030** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 905965 | 109.80 | 905965-C3 | 121.20 |
| | .187 (3/16) | **.010** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 981670 | 107.80 | 981670-C3 | 119.30 |
| | .187 (3/16) | **.015** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 970070 | 107.80 | 970070-C3 | 119.30 |
| | .187 (3/16) | **.030** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 905970 | 107.80 | 905970-C3 | 119.30 |
| | .250 (1/4) | **.015** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 970080 | 107.80 | 970080-C3 | 119.30 |
| | .250 (1/4) | **.030** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 905980 | 107.80 | 905980-C3 | 119.30 |
| | .020 | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 976005 | 139.20 | 976005-C3 | 156.50 |
| | .025 | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 976007 | 136.60 | 976007-C3 | 152.20 |
| | .031 (1/32) | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 976010 | 136.60 | 976010-C3 | 153.90 |
| | .031 (1/32) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 987710 | 136.60 | 987710-C3 | 153.90 |
| | .040 | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 976015 | 136.60 | 976015-C3 | 153.90 |
| | .047 (3/64) | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 976020 | 136.60 | 976020-C3 | 153.90 |
| **1/2** | .047 (3/64) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 987720 | 136.60 | 987720-C3 | 153.90 |
| | .062 (1/16) | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 976030 | 134.20 | 976030-C3 | 151.40 |
| | .062 (1/16) | **.010** | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 901030 | 143.30 | 901030-C3 | 161.00 |
| | .062 (1/16) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 987730 | 134.20 | 987730-C3 | 151.40 |
| | .062 (1/16) | **.015** | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 913430 | 143.30 | 913430-C3 | 161.00 |
| | .062 (1/16) | **.015** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 990330 | 134.20 | 990330-C3 | 151.40 |
| | .062 (1/16) | **.020** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 933730 | 134.20 | 933730-C3 | 151.40 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Corner Radius (cont.)

continued from previous page

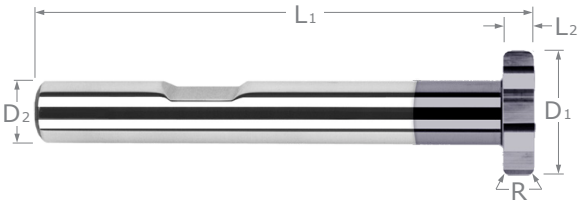
| CUTTER DIA. | CUTTER WIDTH | CORNER RADIUS | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | R +.001″ −.001″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/2 | .078 (5/64) | **.010** | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 901040 | 146.00 | 901040-C3 | 161.60 |
| | .078 (5/64) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 987740 | 136.60 | 987740-C3 | 153.90 |
| | .078 (5/64) | **.015** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 990340 | 136.60 | 990340-C3 | 153.90 |
| | .093 (3/32) | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 976050 | 134.20 | 976050-C3 | 151.40 |
| | .093 (3/32) | **.010** | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 901050 | 143.30 | 901050-C3 | 161.00 |
| | .093 (3/32) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 987750 | 134.20 | 987750-C3 | 151.40 |
| | .093 (3/32) | **.015** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 990350 | 134.20 | 990350-C3 | 151.40 |
| | .093 (3/32) | **.020** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 933750 | 134.20 | 933750-C3 | 151.40 |
| | .093 (3/32) | **.030** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 969150 | 136.60 | 969150-C3 | 153.90 |
| | .125 (1/8) | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 976060 | 134.20 | 976060-C3 | 151.40 |
| | .125 (1/8) | **.010** | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 901060 | 143.30 | 901060-C3 | 161.00 |
| | .125 (1/8) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 987760 | 134.20 | 987760-C3 | 151.40 |
| | .125 (1/8) | **.010** | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 793960 | 135.70 | 793960-C3 | 152.90 |
| | .125 (1/8) | **.015** | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 913460 | 143.30 | 913460-C3 | 161.00 |
| | .125 (1/8) | **.015** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 990360 | 134.20 | 990360-C3 | 151.40 |
| | .125 (1/8) | **.020** | 5/32 | 1/4 (.5x) | .162 | II | 8 | 1/2 | 3 | 777060 | 143.30 | 777060-C3 | 161.00 |
| | .125 (1/8) | **.020** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 933760 | 134.20 | 933760-C3 | 151.40 |
| | .125 (1/8) | **.030** | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 926660 | 143.30 | 926660-C3 | 161.00 |
| | .125 (1/8) | **.030** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 969160 | 136.60 | 969160-C3 | 153.90 |
| | .125 (1/8) | **.040** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 838060 | 136.60 | 838060-C3 | 153.90 |
| | .156 (5/32) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 987765 | 140.10 | 987765-C3 | 157.30 |
| | .156 (5/32) | **.015** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 990365 | 140.10 | 990365-C3 | 157.30 |
| | .187 (3/16) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 987770 | 136.60 | 987770-C3 | 153.90 |
| | .187 (3/16) | **.015** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 990370 | 136.60 | 990370-C3 | 153.90 |
| | .187 (3/16) | **.015** | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 792870 | 137.80 | 792870-C3 | 155.20 |
| | .187 (3/16) | **.020** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 933770 | 136.60 | 933770-C3 | 153.90 |
| | .187 (3/16) | **.030** | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 926670 | 166.10 | 926670-C3 | 183.60 |
| | .187 (3/16) | **.030** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 969170 | 136.60 | 969170-C3 | 153.90 |
| | .187 (3/16) | **.060** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 926170 | 139.10 | 926170-C3 | 156.40 |
| | .250 (1/4) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 987780 | 134.20 | 987780-C3 | 151.40 |
| | .250 (1/4) | **.015** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 990380 | 134.20 | 990380-C3 | 151.40 |
| | .250 (1/4) | **.020** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 933780 | 134.20 | 933780-C3 | 151.40 |
| | .250 (1/4) | **.030** | 5/32 | 1/4 (.5x) | **.162** | II | 8 | 1/2 | 3 | 926680 | 143.30 | 926680-C3 | 161.00 |
| | .250 (1/4) | **.030** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 969180 | 134.20 | 969180-C3 | 151.40 |
| | .250 (1/4) | **.045** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 929580 | 134.20 | 929580-C3 | 151.40 |
| | .250 (1/4) | **.060** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 926180 | 134.20 | 926180-C3 | 151.40 |
| 5/8 | .125 (1/8) | **.010** | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 903960 | 201.00 | 903960-C3 | 218.20 |
| | .125 (1/8) | **.015** | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 911160 | 201.00 | 911160-C3 | 218.20 |
| | .125 (1/8) | **.020** | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 731060 | 201.00 | 731060-C3 | 220.30 |
| | .125 (1/8) | **.030** | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 908560 | 201.00 | 908560-C3 | 218.20 |
| | .187 (3/16) | **.010** | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 903970 | 201.00 | 903970-C3 | 218.20 |
| | .187 (3/16) | **.015** | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 911170 | 201.00 | 911170-C3 | 218.20 |
| | .187 (3/16) | **.030** | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 908570 | 201.00 | 908570-C3 | 218.20 |
| | .250 (1/4) | **.010** | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 903980 | 201.00 | 903980-C3 | 218.20 |
| | .250 (1/4) | **.015** | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 911180 | 201.00 | 911180-C3 | 218.20 |
| | .250 (1/4) | **.030** | 5/16 | 1 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 908580 | 201.00 | 908580-C3 | 218.20 |

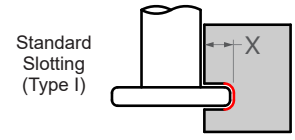
*Radial DOC accounts for max transition radius at neck

**For reduced shank and greater radial depths of cut, please see Reduced Shank Keyseat Cutters on pages 383, 391, 394, 399.**

# KEYSEAT CUTTERS

## Corner Radius – Reduced Shank




- Solid carbide head brazed onto a steel shank
- Both sides of cutter are dished for clearance
- Corner radius for improved strength
- Weldon flat
- CNC ground in the USA

| CUTTER DIAMETER | CUTTER WIDTH | CORNER RADIUS | RADIAL DOC* | TYPE | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.001″ −.001″ | R +.001″ −.001″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/2 | .031 (1/32) | **.010** | .115 | I | 8 | 1/4 | 3-1/32 | 721910 | 109.60 | 721910-C3 | 126.20 |
| | .062 (1/16) | **.010** | .115 | I | 8 | 1/4 | 3-1/16 | 721930 | 109.60 | 721930-C3 | 126.20 |
| | .093 (3/32) | **.010** | .115 | I | 8 | 1/4 | 3-3/32 | 721950 | 109.60 | 721950-C3 | 126.20 |
| | .125 (1/8) | **.010** | .115 | I | 8 | 1/4 | 3-1/8 | 721960 | 109.60 | 721960-C3 | 126.20 |
| | .187 (3/16) | **.010** | .115 | I | 8 | 1/4 | 3-3/16 | 721970 | 109.60 | 721970-C3 | 126.20 |
| | .250 (1/4) | **.010** | .115 | I | 8 | 1/4 | 3-1/4 | 721980 | 109.60 | 721980-C3 | 126.20 |
| 3/4 | .031 (1/32) | **.005** | .177 | I | 10 | 3/8 | 3-1/32 | 841505 | 142.80 | 841505-C3 | 163.20 |
| | .062 (1/16) | **.005** | .177 | I | 10 | 3/8 | 3-1/16 | 841520 | 142.80 | 841520-C3 | 163.20 |
| | .062 (1/16) | **.010** | .177 | I | 10 | 3/8 | 3-1/16 | 923820 | 142.80 | 923820-C3 | 163.20 |
| | .078 (5/64) | **.005** | .177 | I | 10 | 3/8 | 3-5/64 | 841530 | 145.50 | 841530-C3 | 166.00 |
| | .078 (5/64) | **.010** | .177 | I | 10 | 3/8 | 3-5/64 | 923830 | 142.80 | 923830-C3 | 163.20 |
| | .093 (3/32) | **.005** | .177 | I | 10 | 3/8 | 3-3/32 | 841540 | 142.80 | 841540-C3 | 163.20 |
| | .093 (3/32) | **.010** | .177 | I | 10 | 3/8 | 3-3/32 | 923840 | 142.80 | 923840-C3 | 163.20 |
| | .093 (3/32) | **.030** | .177 | I | 10 | 3/8 | 3-3/32 | 905240 | 142.80 | 905240-C3 | 163.20 |
| | .125 (1/8) | **.005** | .177 | I | 10 | 3/8 | 3-1/8 | 841550 | 142.80 | 841550-C3 | 163.20 |
| | .125 (1/8) | **.010** | .177 | I | 10 | 3/8 | 3-1/8 | 923850 | 142.80 | 923850-C3 | 163.20 |
| | .125 (1/8) | **.015** | .177 | I | 10 | 3/8 | 3-1/8 | 840950 | 142.80 | 840950-C3 | 163.20 |
| | .125 (1/8) | **.030** | .177 | I | 10 | 3/8 | 3-1/8 | 905250 | 142.80 | 905250-C3 | 163.20 |
| | .187 (3/16) | **.010** | .177 | I | 10 | 3/8 | 3-3/16 | 923860 | 151.30 | 923860-C3 | 171.80 |
| | .187 (3/16) | **.015** | .177 | I | 10 | 3/8 | 3-3/16 | 840960 | 151.30 | 840960-C3 | 171.80 |
| | .187 (3/16) | **.030** | .177 | I | 10 | 3/8 | 3-3/16 | 905260 | 151.30 | 905260-C3 | 171.80 |
| | .250 (1/4) | **.010** | .177 | I | 10 | 3/8 | 3-1/4 | 923870 | 159.20 | 923870-C3 | 179.90 |
| | .250 (1/4) | **.015** | .177 | I | 10 | 3/8 | 3-1/4 | 840970 | 159.20 | 840970-C3 | 179.90 |
| | .250 (1/4) | **.030** | .177 | I | 10 | 3/8 | 3-1/4 | 905270 | 159.20 | 905270-C3 | 179.90 |
| | .250 (1/4) | **.060** | .177 | I | 10 | 3/8 | 3-1/4 | 894070 | 167.80 | 894070-C3 | 187.90 |
| 1 | .031 (1/32) | **.005** | .240 | I | 12 | 1/2 | 3-1/32 | 840305 | 161.40 | 840305-C3 | 194.60 |
| | .062 (1/16) | **.005** | .240 | I | 12 | 1/2 | 3-1/16 | 840320 | 158.30 | 840320-C3 | 188.70 |
| | .062 (1/16) | **.010** | .240 | I | 12 | 1/2 | 3-1/16 | 918520 | 158.30 | 918520-C3 | 188.70 |
| | .078 (5/64) | **.005** | .240 | I | 12 | 1/2 | 3-5/64 | 840330 | 161.40 | 840330-C3 | 194.60 |
| | .078 (5/64) | **.010** | .240 | I | 12 | 1/2 | 3-5/64 | 918530 | 158.30 | 918530-C3 | 188.70 |
| | .093 (3/32) | **.005** | .240 | I | 12 | 1/2 | 3-3/32 | 840340 | 161.40 | 840340-C3 | 191.80 |
| | .093 (3/32) | **.010** | .240 | I | 12 | 1/2 | 3-3/32 | 918540 | 158.30 | 918540-C3 | 188.70 |
| | .093 (3/32) | **.030** | .240 | I | 12 | 1/2 | 3-3/32 | 910040 | 158.30 | 910040-C3 | 188.70 |
| | .125 (1/8) | **.005** | .240 | I | 12 | 1/2 | 3-1/8 | 840350 | 158.30 | 840350-C3 | 188.70 |
| | .125 (1/8) | **.010** | .240 | I | 12 | 1/2 | 3-1/8 | 918550 | 158.30 | 918550-C3 | 188.70 |
| | .125 (1/8) | **.015** | .240 | I | 12 | 1/2 | 3-1/8 | 839750 | 158.30 | 839750-C3 | 188.70 |
| | .125 (1/8) | **.030** | .240 | I | 12 | 1/2 | 3-1/8 | 910050 | 158.30 | 910050-C3 | 188.70 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Corner Radius – Reduced Shank (cont.)

continued from previous page

| CUTTER DIAMETER | CUTTER WIDTH | CORNER RADIUS | RADIAL DOC* | TYPE | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.001″ −.001″ | R +.001″ −.001″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1 | .187 (3/16) | **.010** | .240 | I | 12 | 1/2 | 3-3/16 | 918560 | 167.10 | 918560-C3 | 197.50 |
| | .187 (3/16) | **.015** | .240 | I | 12 | 1/2 | 3-3/16 | 839760 | 167.10 | 839760-C3 | 197.50 |
| | .187 (3/16) | **.030** | .240 | I | 12 | 1/2 | 3-3/16 | 910060 | 167.10 | 910060-C3 | 197.50 |
| | .250 (1/4) | **.010** | .240 | I | 12 | 1/2 | 3-1/4 | 918570 | 173.90 | 918570-C3 | 204.40 |
| | .250 (1/4) | **.015** | .240 | I | 12 | 1/2 | 3-1/4 | 839770 | 173.90 | 839770-C3 | 204.40 |
| | .250 (1/4) | **.030** | .240 | I | 12 | 1/2 | 3-1/4 | 910070 | 173.90 | 910070-C3 | 204.40 |
| | .250 (1/4) | **.060** | .240 | I | 12 | 1/2 | 3-1/4 | 897570 | 173.90 | 897570-C3 | 204.40 |
| | .375 (3/8) | **.010** | .240 | I | 12 | 1/2 | 3-3/8 | 918590 | 182.30 | 918590-C3 | 212.80 |
| | .375 (3/8) | **.015** | .240 | I | 12 | 1/2 | 3-3/8 | 839790 | 182.30 | 839790-C3 | 212.80 |
| | .375 (3/8) | **.030** | .240 | I | 12 | 1/2 | 3-3/8 | 910090 | 182.30 | 910090-C3 | 212.80 |
| 1-1/2 | .125 (1/8) | **.010** | .365 | I | 16 | 3/4 | 3-3/8 | 839150 | 204.40 | 839150-C3 | 242.50 |
| | .125 (1/8) | **.030** | .365 | I | 16 | 3/4 | 3-3/8 | 838550 | 204.40 | 838550-C3 | 242.50 |
| | .187 (3/16) | **.010** | .365 | I | 16 | 3/4 | 3-7/16 | 839160 | 204.40 | 839160-C3 | 242.50 |
| | .187 (3/16) | **.030** | .365 | I | 16 | 3/4 | 3-7/16 | 838560 | 204.40 | 838560-C3 | 242.50 |
| | .250 (1/4) | **.010** | .365 | I | 16 | 3/4 | 3-1/2 | 839170 | 218.90 | 839170-C3 | 257.20 |
| | .250 (1/4) | **.030** | .365 | I | 16 | 3/4 | 3-1/2 | 838570 | 218.90 | 838570-C3 | 257.20 |
| | .375 (3/8) | **.010** | .365 | I | 16 | 3/4 | 3-5/8 | 839190 | 277.50 | 839190-C3 | 316.40 |
| | .375 (3/8) | **.030** | .365 | I | 16 | 3/4 | 3-5/8 | 838590 | 277.50 | 838590-C3 | 316.40 |
| | .500 (1/2) | **.010** | .365 | I | 16 | 3/4 | 3-3/4 | 839195 | 320.00 | 839195-C3 | 359.40 |
| | .500 (1/2) | **.030** | .365 | I | 16 | 3/4 | 3-3/4 | 838595 | 320.00 | 838595-C3 | 359.40 |

*Radial DOC accounts for max transition radius at neck



# QUICKTURN KEYSEATS

**3 Day Turnaround • Instant Pricing Model • Infinite Custom Combinations**

### THE PROGRAM

The Quickturn Keyseat Program complements our already expansive line of over 2,200 fully stocked Keyseat Cutters. This program provides instant access to pricing of custom-designed keyseats that will be manufactured and shipped to you within 3 business days, guaranteed!



"Machined 3x faster" – Brandon L.

### THE PROCESS

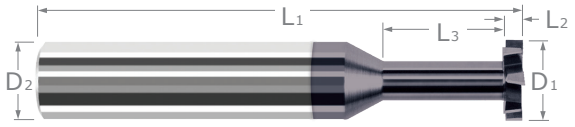
We've established a quick and easy process to ensure your order ships in 3 business days. Download the form at www.harveytool.com and send it to quickturn@harveyperformance.com. We'll send you a quote number within an hour, which you can use to place an order with your prefered distributor.

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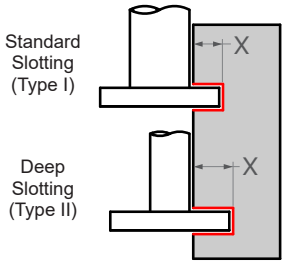
harveytool.com/resources

# KEYSEAT CUTTERS

## Staggered Tooth – Square




Stocked in Multiple Radial Depths of Cut!



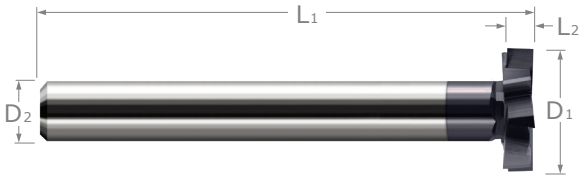

- Staggered tooth design with alternating RH / LH shear flutes, RH cut
- Relieved to allow cutting on both sides of head
- Design improves shearing action and finish while minimizing chip dragging and recutting and decreasing vibration
- Tool can be offset to increase width of groove
- Solid carbide • CNC ground in the USA

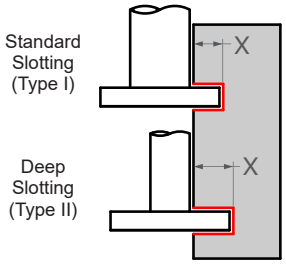
| CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/8 | .015 (1/64) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 969815 | 72.50 | 969815-C3 | 78.40 |
| | .031 (1/32) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 969831 | 72.50 | 969831-C3 | 78.40 |
| | .047 (3/64) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 969847 | 72.50 | 969847-C3 | 78.40 |
| | .062 (1/16) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 969862 | 72.50 | 969862-C3 | 78.40 |
| | .093 (3/32) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 969893 | 73.80 | 969893-C3 | 79.70 |
| 5/32 | .031 (1/32) | 5/64 | 15/64 (1.5x) | .029 | I | 6 | 3/16 | 2 | 744831 | 86.30 | 744831-C3 | 92.70 |
| | .062 (1/16) | 5/64 | 15/64 (1.5x) | .029 | I | 6 | 3/16 | 2 | 744862 | 86.30 | 744862-C3 | 92.50 |
| | .093 (3/32) | 5/64 | 15/64 (1.5x) | .029 | I | 6 | 3/16 | 2 | 744893 | 86.30 | 744893-C3 | 92.50 |
| 3/16 | .031 (1/32) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 907031 | 87.60 | 907031-C3 | 94.20 |
| | .062 (1/16) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 907062 | 86.10 | 907062-C3 | 92.30 |
| | .093 (3/32) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 907093 | 86.10 | 907093-C3 | 92.50 |
| | .125 (1/8) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 907095 | 86.10 | 907095-C3 | 92.50 |
| 1/4 | .031 (1/32) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972131 | 100.30 | 972131-C3 | 109.10 |
| | .047 (3/64) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972147 | 100.30 | 972147-C3 | 109.10 |
| | .062 (1/16) | 5/64 | 1/8 (0.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 878962 | 112.30 | 878962-C3 | 120.40 |
| | .062 (1/16) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972162 | 100.30 | 972162-C3 | 109.10 |
| | .078 (5/64) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972178 | 100.30 | 972178-C3 | 108.40 |
| | .093 (3/32) | 5/64 | 1/8 (0.5x) | .076 | II | 6 | 1/4 | 2-1/2 | 878993 | 112.30 | 878993-C3 | 120.40 |
| | .093 (3/32) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972193 | 100.30 | 972193-C3 | 109.10 |
| | .125 (1/8) | 5/64 | 1/8 (0.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 878995 | 114.70 | 878995-C3 | 123.70 |
| | .125 (1/8) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 972195 | 100.30 | 972195-C3 | 109.10 |
| 5/16 | .062 (1/16) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 759530 | 123.90 | 759530-C3 | 134.20 |
| | .093 (3/32) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 759550 | 126.30 | 759550-C3 | 136.40 |
| | .156 (5/32) | 5/32 | 15/32 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 759565 | 126.30 | 759565-C3 | 136.40 |
| 3/8 | .062 (1/16) | 1/8 | 3/16 (0.5x) | **.115** | II | 8 | 3/8 | 2-1/2 | 867330 | 136.90 | 867330-C3 | 148.30 |
| | .062 (1/16) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 915830 | 123.90 | 915830-C3 | 135.40 |
| | .078 (5/64) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 915878 | 123.90 | 915878-C3 | 135.40 |
| | .093 (3/32) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 915850 | 123.90 | 915850-C3 | 135.40 |
| | .125 (1/8) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 915860 | 123.90 | 915860-C3 | 135.40 |
| | .187 (3/16) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 915870 | 123.90 | 915870-C3 | 135.40 |
| | .250 (1/4) | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 915880 | 123.90 | 915880-C3 | 135.40 |
| 1/2 | .062 (1/16) | 5/32 | 1/4 (0.5x) | **.162** | II | 8 | 1/2 | 3 | 895030 | 178.70 | 895030-C3 | 196.30 |
| | .062 (1/16) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 955630 | 161.30 | 955630-C3 | 178.60 |
| | .078 (5/64) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 955640 | 161.30 | 955640-C3 | 178.60 |
| | .093 (3/32) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 955650 | 161.30 | 955650-C3 | 178.60 |
| | .125 (1/8) | 5/32 | 1/4 (0.5x) | **.162** | II | 8 | 1/2 | 3 | 895060 | 178.70 | 895060-C3 | 196.30 |
| | .125 (1/8) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 955660 | 161.30 | 955660-C3 | 178.60 |
| | .187 (3/16) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 955670 | 161.30 | 955670-C3 | 178.60 |
| | .250 (1/4) | 5/32 | 1/4 (0.5x) | **.162** | II | 8 | 1/2 | 3 | 895080 | 178.70 | 895080-C3 | 196.30 |
| | .250 (1/4) | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 955680 | 161.30 | 955680-C3 | 178.60 |
| 5/8 | .093 (3/32) | 5/16 | 15/16 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 904993 | 228.20 | 904993-C3 | 247.50 |
| | .125 (1/8) | 5/16 | 15/16 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 904960 | 228.20 | 904960-C3 | 245.40 |
| | .187 (3/16) | 5/16 | 15/16 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 904970 | 228.20 | 904970-C3 | 245.40 |
| | .250 (1/4) | 5/16 | 15/16 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 904980 | 228.20 | 904980-C3 | 245.40 |

*Radial DOC accounts for max transition radius at neck

# KEYSEAT CUTTERS

## Staggered Tooth – Square – Reduced Shank



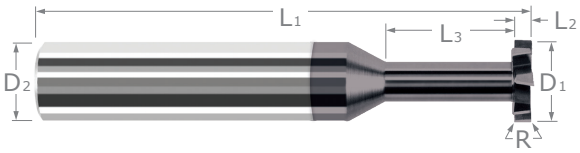

- Staggered tooth design with alternating right-hand/left-hand shear flutes, right-hand cut
- Relieved to allow cutting on both sides of head
- Tool can be offset to increase width of groove
- Solid carbide construction for maximum rigidity
- CNC ground in the USA

| CUTTER DIAMETER | CUTTER WIDTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.001″ −.001″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 3/4 | .062 (1/16) | .178 | II | 10 | 3/8 | 3 | 773530 | 379.00 | 773530-C3 | 400.40 |
| | .078 (5/64) | .178 | II | 10 | 3/8 | 3 | 773540 | 379.00 | 773540-C3 | 400.40 |
| | .093 (3/32) | .178 | II | 10 | 3/8 | 3 | 773550 | 379.00 | 773550-C3 | 398.10 |
| | .125 (1/8) | .178 | II | 10 | 3/8 | 3 | 773560 | 379.00 | 773560-C3 | 398.10 |
| | .187 (3/16) | .178 | II | 10 | 3/8 | 3 | 773570 | 379.00 | 773570-C3 | 398.10 |
| | .250 (1/4) | .178 | II | 10 | 3/8 | 3 | 773580 | 379.00 | 773580-C3 | 398.10 |
| 1 | .062 (1/16) | .240 | I | 12 | 1/2 | 3-1/2 | 772430 | 431.70 | 772430-C3 | 464.90 |
| | .078 (5/64) | .240 | I | 12 | 1/2 | 3-1/2 | 772440 | 431.70 | 772440-C3 | 464.90 |
| | .093 (3/32) | .240 | I | 12 | 1/2 | 3-1/2 | 772450 | 431.70 | 772450-C3 | 460.60 |
| | .125 (1/8) | .240 | I | 12 | 1/2 | 3-1/2 | 772460 | 431.70 | 772460-C3 | 460.60 |
| | .187 (3/16) | .240 | I | 12 | 1/2 | 3-1/2 | 772470 | 431.70 | 772470-C3 | 460.60 |
| | .250 (1/4) | .240 | I | 12 | 1/2 | 3-1/2 | 772480 | 431.70 | 772480-C3 | 460.60 |
| 1-1/2 | .062 (1/16) | .365 | I | 16 | 3/4 | 3-1/2 | 771130 | 546.10 | 771130-C3 | 586.10 |
| | .078 (5/64) | .365 | I | 16 | 3/4 | 3-1/2 | 771140 | 546.10 | 771140-C3 | 593.70 |
| | .093 (3/32) | .365 | I | 16 | 3/4 | 3-1/2 | 771150 | 546.10 | 771150-C3 | 593.70 |
| | .125 (1/8) | .365 | I | 16 | 3/4 | 3-1/2 | 771160 | 546.10 | 771160-C3 | 586.10 |
| | .187 (3/16) | .365 | I | 16 | 3/4 | 3-1/2 | 771170 | 546.10 | 771170-C3 | 586.10 |
| | .250 (1/4) | .365 | I | 16 | 3/4 | 3-1/2 | 771180 | 546.10 | 771180-C3 | 586.10 |

*Radial DOC Accounts for max transition radius at neck

# KEYSEAT CUTTERS

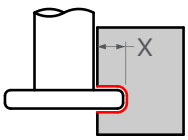
## Staggered Tooth – Corner Radius

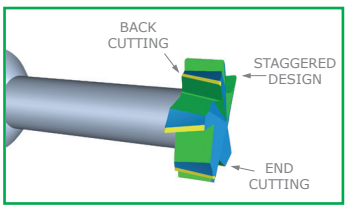



**Staggered Tooth Design for Optimal Performance**

- Staggered tooth design with alternating RH / LH shear flutes, RH cut
- Design improves shearing action, minimizes chip dragging and recutting, decreases vibration, and improves side wall finish
- Relieved to allow cutting on both sides of head
- Tool can be offset to increase width of groove
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA

Standard Slotting (Type I)




| CUTTER DIA. | CUTTER WIDTH | CORNER RADIUS | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.002″ | $L_2$ +.0005″ −.0005″ | R +.001″ −.001″ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/8 | .031 (1/32) | **.005** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 43631 | 76.50 | 43631-C3 | 82.40 |
| | .031 (1/32) | **.005** | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 989931 | 92.90 | 989931-C3 | 98.80 |
| | .047 (3/64) | **.005** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 43647 | 77.20 | 43647-C3 | 83.10 |
| | .062 (1/16) | **.005** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 43662 | 76.50 | 43662-C3 | 82.40 |
| | .062 (1/16) | **.005** | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 989962 | 92.10 | 989962-C3 | 98.00 |
| | .062 (1/16) | **.010** | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 44462 | 76.50 | 44462-C3 | 82.40 |
| 3/16 | .031 (1/32) | **.005** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 943531 | 84.80 | 943531-C3 | 91.40 |
| | .047 (3/64) | **.005** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 943547 | 84.80 | 943547-C3 | 91.40 |
| | .062 (1/16) | **.005** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 943562 | 84.80 | 943562-C3 | 91.40 |
| | .062 (1/16) | **.010** | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 951762 | 84.80 | 951762-C3 | 91.40 |
| 1/4 | .031 (1/32) | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 43831 | 105.70 | 43831-C3 | 114.80 |
| | .031 (1/32) | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 44531 | 106.80 | 44531-C3 | 114.90 |
| | .047 (3/64) | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 43847 | 105.70 | 43847-C3 | 114.80 |
| | .047 (3/64) | **.005** | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 958047 | 122.40 | 958047-C3 | 130.50 |
| | .062 (1/16) | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 43862 | 105.70 | 43862-C3 | 114.80 |
| | .062 (1/16) | **.005** | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 958062 | 122.40 | 958062-C3 | 131.30 |
| | .062 (1/16) | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 44562 | 105.70 | 44562-C3 | 114.80 |
| | .093 (3/32) | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 43893 | 105.70 | 43893-C3 | 113.80 |
| | .093 (3/32) | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 44593 | 106.80 | 44593-C3 | 114.90 |
| | .125 (1/8) | **.005** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 43895 | 105.70 | 43895-C3 | 114.80 |
| | .125 (1/8) | **.010** | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 44595 | 105.70 | 44595-C3 | 114.80 |
| 3/8 | .031 (1/32) | **.005** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 967210 | 137.10 | 967210-C3 | 148.50 |
| | .062 (1/16) | **.005** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 967230 | 137.10 | 967230-C3 | 148.50 |
| | .062 (1/16) | **.010** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 970930 | 137.10 | 970930-C3 | 148.50 |
| | .093 (3/32) | **.005** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 967250 | 137.10 | 967250-C3 | 148.50 |
| | .093 (3/32) | **.010** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 970950 | 137.10 | 970950-C3 | 148.50 |
| | .125 (1/8) | **.005** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 967260 | 137.10 | 967260-C3 | 148.50 |
| | .125 (1/8) | **.010** | 3/16 | 9/16 (1.5x) | .084 | I | 8 | 3/8 | 2-1/2 | 970960 | 137.10 | 970960-C3 | 148.50 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Staggered Tooth – Corner Radius (cont.)

continued from previous page

| CUTTER DIA. | CUTTER WIDTH | CORNER RADIUS | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.0005''}_{-.0005''}$ | R $^{+.001''}_{-.001''}$ | | $L_3$ $^{+.020''}_{-.000''}$ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/2 | .062 (1/16) | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 44330 | 170.00 | 44330-C3 | 187.50 |
| | .062 (1/16) | **.005** | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 976730 | 188.10 | 976730-C3 | 205.70 |
| | .062 (1/16) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 44630 | 170.00 | 44630-C3 | 187.50 |
| | .062 (1/16) | **.015** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 921330 | 170.00 | 921330-C3 | 185.60 |
| | .093 (3/32) | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 44350 | 170.00 | 44350-C3 | 187.50 |
| | .093 (3/32) | **.005** | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 976750 | 188.10 | 976750-C3 | 203.70 |
| | .093 (3/32) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 44650 | 170.00 | 44650-C3 | 187.50 |
| | .093 (3/32) | **.015** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 921350 | 170.00 | 921350-C3 | 187.50 |
| | .125 (1/8) | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 44360 | 170.00 | 44360-C3 | 187.50 |
| | .125 (1/8) | **.005** | 1/4 | 1-1/2 (3x) | .115 | I | 8 | 1/2 | 3 | 976760 | 188.10 | 976760-C3 | 205.70 |
| | .125 (1/8) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 44660 | 170.00 | 44660-C3 | 187.50 |
| | .125 (1/8) | **.015** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 921360 | 170.00 | 921360-C3 | 187.50 |
| | .187 (3/16) | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 44370 | 170.00 | 44370-C3 | 187.50 |
| | .187 (3/16) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 44670 | 170.00 | 44670-C3 | 187.50 |
| | .250 (1/4) | **.005** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 44380 | 170.00 | 44380-C3 | 187.50 |
| | .250 (1/4) | **.010** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 44680 | 170.00 | 44680-C3 | 187.50 |
| | .250 (1/4) | **.015** | 1/4 | 3/4 (1.5x) | .115 | I | 8 | 1/2 | 3 | 921380 | 170.00 | 921380-C3 | 187.50 |
| 5/8 | .125 (1/8) | **.005** | 5/16 | 15/16 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 860460 | 240.20 | 860460-C3 | 257.80 |
| | .125 (1/8) | **.010** | 5/16 | 15/16 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 872960 | 240.20 | 872960-C3 | 257.80 |
| | .187 (3/16) | **.005** | 5/16 | 15/16 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 860470 | 240.20 | 860470-C3 | 259.50 |
| | .187 (3/16) | **.010** | 5/16 | 15/16 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 872970 | 240.20 | 872970-C3 | 257.80 |
| | .250 (1/4) | **.005** | 5/16 | 15/16 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 860480 | 240.20 | 860480-C3 | 259.50 |
| | .250 (1/4) | **.010** | 5/16 | 15/16 (1.5x) | .146 | I | 8 | 5/8 | 3-1/2 | 872980 | 240.20 | 872980-C3 | 257.80 |

*Radial DOC accounts for max transition radius at neck

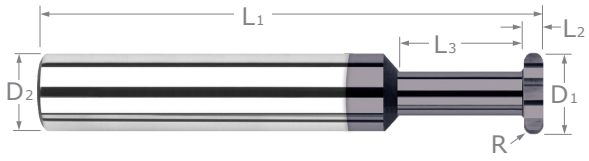


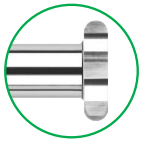
**Access Simulation Files in DXF Format for Every Harvey Tool Product**

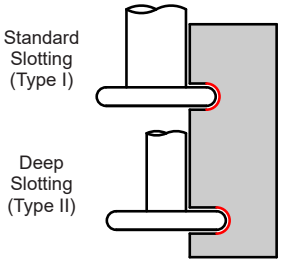
harveytool.com/resources/simulation-files

# KEYSEAT CUTTERS

## Full Radius




- Ground form relieved (can be reground without losing radius)
- Both sides of cutter are dished for clearance
- Solid carbide • CNC ground in the USA

| RADIUS | CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R +.001" −.001" | D1 +.000" −.002" | L2 | | L3 +.020" −.000" | X | | | D2 | L1 | TOOL # | USD$ | TOOL # | USD$ |
| .0075 | **3/32** | .015 (1/64) | 3/64 | 9/64 (1.5x) | .020 | I | 4 | 1/8 | 1-1/2 | 976907 | 93.80 | 976907-C3 | 99.80 |
| .0075 | **1/8** | .015 (1/64) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 67507 | 97.40 | 67507-C3 | 103.30 |
| .0075 | **1/4** | .015 (1/64) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 67707 | 120.50 | 67707-C3 | 129.40 |
| .0075 | **3/8** | .015 (1/64) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 43303 | 136.10 | 43303-C3 | 147.50 |
| .0100 | **3/32** | .020 | 3/64 | 9/64 (1.5x) | .020 | I | 4 | 1/8 | 1-1/2 | 976910 | 88.60 | 976910-C3 | 94.60 |
| .0100 | **1/8** | .020 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 67510 | 92.00 | 67510-C3 | 97.90 |
| .0100 | **5/32** | .020 | 5/64 | 15/64 (1.5x) | .029 | I | 6 | 3/16 | 2 | 965310 | 96.60 | 965310-C3 | 103.20 |
| .0100 | **3/16** | .020 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 68310 | 106.30 | 68310-C3 | 112.90 |
| .0100 | **1/4** | .020 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 67710 | 114.40 | 67710-C3 | 123.20 |
| .0100 | **5/16** | .020 | 5/32 | 1/2 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 944410 | 126.60 | 944410-C3 | 136.90 |
| .0100 | **3/8** | .020 | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 68410 | 136.10 | 68410-C3 | 147.50 |
| .0156 (1/64) | **3/32** | .031 (1/32) | 3/64 | 9/64 (1.5x) | .020 | I | 4 | 1/8 | 1-1/2 | 976915 | 79.00 | 976915-C3 | 84.90 |
| .0156 (1/64) | **1/8** | .031 (1/32) | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 67515 | 81.80 | 67515-C3 | 87.70 |
| .0156 (1/64) | **1/8** | .031 (1/32) | 1/16 | 3/8 (3x) | .022 | I | 6 | 1/8 | 1-1/2 | 895215 | 87.30 | 895215-C3 | 93.20 |
| .0156 (1/64) | **5/32** | .031 (1/32) | 5/64 | 15/64 (1.5x) | .029 | I | 6 | 3/16 | 2 | 965315 | 96.60 | 965315-C3 | 103.20 |
| .0156 (1/64) | **3/16** | .031 (1/32) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 68315 | 96.90 | 68315-C3 | 103.40 |
| .0156 (1/64) | **3/16** | .031 (1/32) | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 924415 | 113.30 | 924415-C3 | 119.80 |
| .0156 (1/64) | **1/4** | .031 (1/32) | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 953915 | 111.50 | 953915-C3 | 120.50 |
| .0156 (1/64) | **1/4** | .031 (1/32) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 43315 | 104.20 | 43315-C3 | 113.10 |
| .0156 (1/64) | **1/4** | .031 (1/32) | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 971415 | 120.80 | 971415-C3 | 129.60 |
| .0156 (1/64) | **5/16** | .031 (1/32) | 5/32 | 1/2 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 944415 | 115.90 | 944415-C3 | 126.20 |
| .0156 (1/64) | **3/8** | .031 (1/32) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 68415 | 125.70 | 68415-C3 | 137.10 |
| .0156 (1/64) | **1/2** | .031 (1/32) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 67915 | 129.60 | 67915-C3 | 146.90 |
| .0200 | **1/8** | .040 | 1/16 | 3/16 (1.5x) | .022 | I | 6 | 1/8 | 1-1/2 | 67520 | 81.80 | 67520-C3 | 87.70 |
| .0200 | **5/32** | .040 | 5/64 | 15/64 (1.5x) | .029 | I | 6 | 3/16 | 2 | 965320 | 96.60 | 965320-C3 | 103.20 |
| .0200 | **3/16** | .040 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 68320 | 96.90 | 68320-C3 | 103.40 |
| .0200 | **3/16** | .040 | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 924420 | 113.30 | 924420-C3 | 119.80 |
| .0200 | **1/4** | .040 | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 953920 | 111.50 | 953920-C3 | 120.50 |
| .0200 | **1/4** | .040 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 67720 | 105.40 | 67720-C3 | 114.00 |
| .0200 | **1/4** | .040 | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 971420 | 120.80 | 971420-C3 | 129.60 |
| .0200 | **5/16** | .040 | 5/32 | 1/2 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 944420 | 115.90 | 944420-C3 | 126.20 |
| .0200 | **3/8** | .040 | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 68420 | 126.90 | 68420-C3 | 138.40 |
| .0200 | **3/8** | .040 | 3/16 | 1-1/8 (3x) | .084 | I | 6 | 3/8 | 3 | 968520 | 142.80 | 968520-C3 | 154.20 |
| .0200 | **1/2** | .040 | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 67920 | 130.30 | 67920-C3 | 147.60 |
| .0250 | **3/16** | .050 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 68325 | 96.90 | 68325-C3 | 103.40 |
| .0250 | **1/4** | .050 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 67725 | 105.40 | 67725-C3 | 114.00 |
| .0250 | **3/8** | .050 | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 68425 | 126.90 | 68425-C3 | 138.40 |
| .0300 | **5/32** | .060 | 5/64 | 15/64 (1.5x) | .029 | I | 6 | 3/16 | 2 | 965330 | 96.60 | 965330-C3 | 103.20 |
| .0300 | **3/16** | .060 | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 68330 | 96.90 | 68330-C3 | 103.40 |
| .0300 | **1/4** | .060 | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 67730 | 105.40 | 67730-C3 | 114.00 |

*Radial DOC accounts for max transition radius at neck

continued on next page

# KEYSEAT CUTTERS

## Full Radius (cont.)

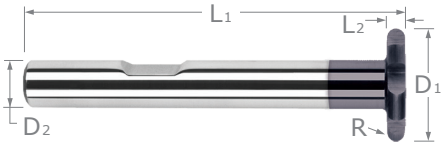
continued from previous page

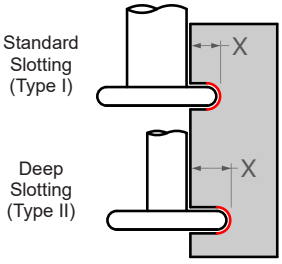
| RADIUS | CUTTER DIA. | CUTTER WIDTH | NECK DIA. | NECK LENGTH | RADIAL DOC* | TYPE | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R +.001″ −.001″ | $D_1$ +.000″ −.002″ | $L_2$ | | $L_3$ +.020″ −.000″ | X | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .0312 (1/32) | **3/16** | .062 (1/16) | 3/32 | 9/32 (1.5x) | .037 | I | 6 | 3/16 | 2 | 68331 | 96.90 | 68331-C3 | 103.40 |
| .0312 (1/32) | **3/16** | .062 (1/16) | 3/32 | 9/16 (3x) | .037 | I | 6 | 3/16 | 2 | 924431 | 113.30 | 924431-C3 | 119.80 |
| .0312 (1/32) | **1/4** | .062 (1/16) | 5/64 | 1/8 (.5x) | **.076** | II | 6 | 1/4 | 2-1/2 | 953931 | 111.50 | 953931-C3 | 120.50 |
| .0312 (1/32) | **1/4** | .062 (1/16) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 43331 | 104.20 | 43331-C3 | 113.10 |
| .0312 (1/32) | **1/4** | .062 (1/16) | 1/8 | 3/4 (3x) | .053 | I | 6 | 1/4 | 2-1/2 | 971431 | 120.80 | 971431-C3 | 129.60 |
| .0312 (1/32) | **5/16** | .062 (1/16) | 5/32 | 1/2 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 944431 | 115.90 | 944431-C3 | 126.20 |
| .0312 (1/32) | **3/8** | .062 (1/16) | 1/8 | 3/16 (.5x) | .115 | II | 6 | 3/8 | 2-1/2 | 949231 | 133.40 | 949231-C3 | 144.80 |
| .0312 (1/32) | **3/8** | .062 (1/16) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 68431 | 125.70 | 68431-C3 | 137.10 |
| .0312 (1/32) | **1/2** | .062 (1/16) | 5/32 | 1/4 (.5x) | **.162** | II | 6 | 1/2 | 3 | 898531 | 139.00 | 898531-C3 | 156.60 |
| .0312 (1/32) | **1/2** | .062 (1/16) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 67931 | 129.60 | 67931-C3 | 146.90 |
| .0312 (1/32) | **1/2** | .062 (1/16) | 1/4 | 1-1/2 (3x) | .115 | I | 6 | 1/2 | 3-1/2 | 942731 | 141.50 | 942731-C3 | 158.80 |
| .0312 (1/32) | **5/8** | .062 (1/16) | .300 | 1 (1.5x) | .152 | I | 6 | 5/8 | 3-1/2 | 43431 | 212.50 | 43431-C3 | 229.70 |
| .0394 (1 mm) | **1/4** | .078 (2 mm) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 67739 | 105.40 | 67739-C3 | 114.00 |
| .0394 (1 mm) | **5/16** | .078 (2 mm) | 5/32 | 1/2 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 944439 | 117.50 | 944439-C3 | 127.70 |
| .0394 (1 mm) | **3/8** | .078 (2 mm) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 43339 | 126.90 | 43339-C3 | 138.40 |
| .0394 (1 mm) | **3/8** | .078 (2 mm) | 3/16 | 1-1/8 (3x) | .084 | I | 6 | 3/8 | 3 | 968539 | 142.80 | 968539-C3 | 154.20 |
| .0394 (1 mm) | **1/2** | .078 (2 mm) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 67939 | 130.30 | 67939-C3 | 147.60 |
| .0469 (3/64) | **1/4** | .093 (3/32) | 1/8 | 3/8 (1.5x) | .053 | I | 6 | 1/4 | 2-1/2 | 67747 | 104.20 | 67747-C3 | 113.10 |
| .0469 (3/64) | **5/16** | .093 (3/32) | 5/32 | 1/2 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 944447 | 115.90 | 944447-C3 | 126.20 |
| .0469 (3/64) | **3/8** | .093 (3/32) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 43347 | 125.70 | 43347-C3 | 137.10 |
| .0469 (3/64) | **3/8** | .093 (3/32) | 3/16 | 1-1/8 (3x) | .084 | I | 6 | 3/8 | 3 | 968547 | 142.80 | 968547-C3 | 154.20 |
| .0469 (3/64) | **1/2** | .093 (3/32) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 67947 | 129.60 | 67947-C3 | 146.90 |
| .0469 (3/64) | **5/8** | .093 (3/32) | .300 | 1 (1.5x) | .152 | I | 6 | 5/8 | 3-1/2 | 43447 | 212.50 | 43447-C3 | 229.70 |
| .0500 | **3/8** | .100 | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 68450 | 133.80 | 68450-C3 | 145.20 |
| .0500 | **1/2** | .100 | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 67950 | 151.30 | 67950-C3 | 169.00 |
| .0590 (1.5 mm) | **5/16** | .118 (3 mm) | 5/32 | 1/2 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 944459 | 117.50 | 944459-C3 | 127.70 |
| .0590 (1.5 mm) | **3/8** | .118 (3 mm) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 68459 | 126.90 | 68459-C3 | 138.40 |
| .0590 (1.5 mm) | **1/2** | .118 (3 mm) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 67959 | 130.30 | 67959-C3 | 147.60 |
| .0625 (1/16) | **5/16** | .125 (1/8) | 5/32 | 1/2 (1.5x) | .068 | I | 6 | 5/16 | 2-1/2 | 944462 | 115.90 | 944462-C3 | 126.20 |
| .0625 (1/16) | **3/8** | .125 (1/8) | 1/8 | 3/16 (.5x) | **.115** | II | 6 | 3/8 | 2-1/2 | 949262 | 134.30 | 949262-C3 | 145.70 |
| .0625 (1/16) | **3/8** | .125 (1/8) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 43362 | 125.70 | 43362-C3 | 137.10 |
| .0625 (1/16) | **3/8** | .125 (1/8) | 3/16 | 1-1/8 (3x) | .084 | I | 6 | 3/8 | 3 | 968562 | 142.80 | 968562-C3 | 154.20 |
| .0625 (1/16) | **1/2** | .125 (1/8) | 5/32 | 1/4 (.5x) | **.162** | II | 6 | 1/2 | 3 | 898562 | 139.00 | 898562-C3 | 156.60 |
| .0625 (1/16) | **1/2** | .125 (1/8) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 67962 | 129.60 | 67962-C3 | 146.90 |
| .0625 (1/16) | **1/2** | .125 (1/8) | 1/4 | 1-1/2 (3x) | .115 | I | 6 | 1/2 | 3-1/2 | 942762 | 180.30 | 942762-C3 | 197.60 |
| .0625 (1/16) | **5/8** | .125 (1/8) | .300 | 1 (1.5x) | .152 | I | 6 | 5/8 | 3-1/2 | 43462 | 212.50 | 43462-C3 | 229.70 |
| .0781 (5/64) | **3/8** | .156 (5/32) | 3/16 | 9/16 (1.5x) | .084 | I | 6 | 3/8 | 2-1/2 | 68478 | 125.70 | 68478-C3 | 137.10 |
| .0781 (5/64) | **1/2** | .156 (5/32) | 5/32 | 1/4 (.5x) | **.162** | II | 6 | 1/2 | 3 | 898578 | 139.70 | 898578-C3 | 157.30 |
| .0781 (5/64) | **1/2** | .156 (5/32) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 43378 | 130.30 | 43378-C3 | 147.60 |
| .0781 (5/64) | **5/8** | .156 (5/32) | .300 | 1 (1.5x) | .152 | I | 6 | 5/8 | 3-1/2 | 43478 | 212.50 | 43478-C3 | 229.70 |
| .0937 (3/32) | **1/2** | .187 (3/16) | 5/32 | 1/4 (.5x) | **.162** | II | 6 | 1/2 | 3 | 898593 | 139.70 | 898593-C3 | 157.30 |
| .0937 (3/32) | **1/2** | .187 (3/16) | 1/4 | 3/4 (1.5x) | .115 | I | 6 | 1/2 | 3 | 43393 | 130.30 | 43393-C3 | 147.60 |
| .0937 (3/32) | **1/2** | .187 (3/16) | 1/4 | 1-1/2 (3x) | .115 | I | 6 | 1/2 | 3-1/2 | 942793 | 152.10 | 942793-C3 | 169.30 |
| .0937 (3/32) | **5/8** | .187 (3/16) | .300 | 1 (1.5x) | .152 | I | 6 | 5/8 | 3-1/2 | 43493 | 212.50 | 43493-C3 | 229.70 |
| .1181 (3 mm) | **5/8** | .236 (6 mm) | .300 | 1 (1.5x) | .152 | I | 6 | 5/8 | 3-1/2 | 4343M | 212.50 | 4343M-C3 | 229.70 |
| .1250 (1/8) | **5/8** | .250 (1/4) | .300 | 1 (1.5x) | .152 | I | 6 | 5/8 | 3-1/2 | 43408 | 212.50 | 43408-C3 | 229.70 |
| .1250 (1/8) | **5/8** | .250 (1/4) | .300 | 2 (3x) | .152 | I | 6 | 5/8 | 4 | 983008 | 239.80 | 983008-C3 | 259.10 |

*Radial DOC accounts for max transition radius at neck

# KEYSEAT CUTTERS

## Full Radius – Reduced Shank



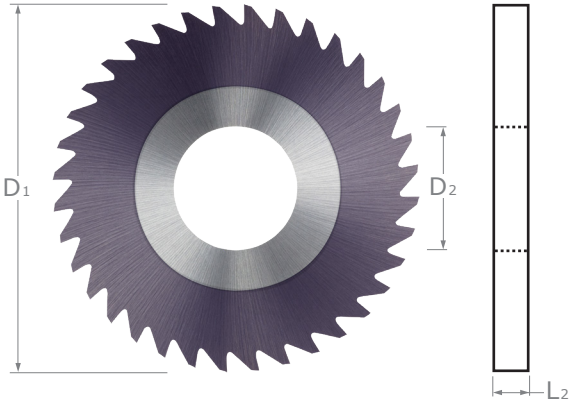




- Ground form relieved (can be reground without losing radius)
- 6 flutes • Both sides of cutter are dished for clearance
- Solid carbide head with steel shank
- Weldon flat • CNC ground in the USA

| RADIUS | CUTTER DIAMETER | CUTTER WIDTH | RADIAL DOC* | TYPE | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| R +.001″ −.001″ | D1 +.010″ −.000″ | L2 | X | | D2 | L1 | 6 FL | USD$ | 6 FL | USD$ |
| .0156 (1/64) | 3/4 | .031 (1/32) | **.177** | II | 3/8 | 3-1/32 | 965415 | 184.50 | 965415-C3 | 204.80 |
| .0156 (1/64) | 3/4 | .031 (1/32) | .115 | I | 1/2 | 3-1/32 | 32901 | 162.10 | 32901-C3 | 182.90 |
| .0156 (1/64) | 1 | .031 (1/32) | .240 | I | 1/2 | 3-1/32 | 942615 | 178.10 | 942615-C3 | 208.70 |
| .0200 | 3/4 | .040 | .115 | I | 1/2 | 3.040 | 959720 | 162.10 | 959720-C3 | 182.90 |
| .0200 | 1 | .040 | .240 | I | 1/2 | 3.040 | 942620 | 178.10 | 942620-C3 | 208.70 |
| .0300 | 3/4 | .060 | **.177** | II | 3/8 | 3.060 | 965430 | 184.50 | 965430-C3 | 204.80 |
| .0312 (1/32) | 3/4 | .062 (1/16) | **.177** | II | 3/8 | 3-1/16 | 965431 | 184.50 | 965431-C3 | 204.80 |
| .0312 (1/32) | 3/4 | .062 (1/16) | .115 | I | 1/2 | 3-1/16 | 32902 | 162.10 | 32902-C3 | 182.90 |
| .0312 (1/32) | 1 | .062 (1/16) | .240 | I | 1/2 | 3-1/16 | 942631 | 178.10 | 942631-C3 | 208.70 |
| .0394 (1 mm) | 3/4 | .078 (2 mm) | .115 | I | 1/2 | 3.078 | 3291M | 162.10 | 3291M-C3 | 182.90 |
| .0394 (1 mm) | 1 | .078 (2 mm) | .240 | I | 1/2 | 3.078 | 94261M | 178.10 | 94261M-C3 | 208.70 |
| .0469 (3/64) | 3/4 | .093 (3/32) | **.177** | II | 3/8 | 3-3/32 | 965447 | 184.50 | 965447-C3 | 204.80 |
| .0469 (3/64) | 3/4 | .093 (3/32) | .115 | I | 1/2 | 3-3/32 | 32903 | 162.10 | 32903-C3 | 182.90 |
| .0469 (3/64) | 1 | .093 (3/32) | .240 | I | 1/2 | 3-3/32 | 942647 | 178.10 | 942647-C3 | 208.70 |
| .0590 (1.5 mm) | 3/4 | .118 (3 mm) | **.177** | II | 3/8 | 3.118 | 965459 | 184.50 | 965459-C3 | 204.80 |
| .0625 (1/16) | 3/4 | .125 (1/8) | **.177** | II | 3/8 | 3-1/8 | 965462 | 184.50 | 965462-C3 | 204.80 |
| .0625 (1/16) | 3/4 | .125 (1/8) | .115 | I | 1/2 | 3-1/8 | 32904 | 162.10 | 32904-C3 | 182.90 |
| .0625 (1/16) | 1 | .125 (1/8) | **.302** | II | 3/8 | 3-1/8 | 937362 | 184.50 | 937362-C3 | 214.80 |
| .0625 (1/16) | 1 | .125 (1/8) | .240 | I | 1/2 | 3-1/8 | 942662 | 178.10 | 942662-C3 | 208.70 |
| .0781 (5/64) | 3/4 | .156 (5/32) | .115 | I | 1/2 | 3-5/32 | 959778 | 162.10 | 959778-C3 | 182.90 |
| .0781 (5/64) | 1 | .156 (5/32) | **.302** | II | 3/8 | 3-5/32 | 937378 | 187.70 | 937378-C3 | 217.80 |
| .0781 (5/64) | 1 | .156 (5/32) | .240 | I | 1/2 | 3-5/32 | 32905 | 190.20 | 32905-C3 | 220.90 |
| .0787 (2 mm) | 3/4 | .157 (4 mm) | **.177** | II | 3/8 | 3.157 | 96542M | 184.50 | 96542M-C3 | 204.80 |
| .0787 (2 mm) | 1 | .157 (4 mm) | .240 | I | 1/2 | 3.157 | 3292M | 190.20 | 3292M-C3 | 220.90 |
| .0937 (3/32) | 3/4 | .187 (3/16) | .115 | I | 1/2 | 3-3/16 | 959793 | 162.10 | 959793-C3 | 182.90 |
| .0937 (3/32) | 1 | .187 (3/16) | **.302** | II | 3/8 | 3-3/16 | 937393 | 184.50 | 937393-C3 | 214.80 |
| .0937 (3/32) | 1 | .187 (3/16) | .240 | I | 1/2 | 3-3/16 | 32906 | 190.20 | 32906-C3 | 220.90 |
| .0937 (3/32) | 1-1/2 | .187 (3/16) | .365 | I | 3/4 | 3-11/16 | 850493 | 203.40 | 850493-C3 | 241.60 |
| .1181 (3 mm) | 1 | .236 (6 mm) | .240 | I | 1/2 | 3.236 | 942694 | 190.20 | 942694-C3 | 216.30 |
| .1250 (1/8) | 1 | .250 (1/4) | **.302** | II | 3/8 | 3-1/4 | 937395 | 184.50 | 937395-C3 | 214.80 |
| .1250 (1/8) | 1 | .250 (1/4) | .240 | I | 1/2 | 3-1/4 | 942695 | 190.20 | 942695-C3 | 220.90 |
| .1250 (1/8) | 1-1/4 | .250 (1/4) | **.365** | II | 1/2 | 3-1/4 | 848695 | 216.40 | 848695-C3 | 254.20 |
| .1250 (1/8) | 1-1/4 | .250 (1/4) | .240 | I | 3/4 | 3-1/2 | 32908 | 213.60 | 32908-C3 | 251.90 |
| .1250 (1/8) | 1-1/2 | .250 (1/4) | .365 | I | 3/4 | 3-3/4 | 850495 | 216.60 | 850495-C3 | 254.90 |
| .1562 (5/32) | 1-1/2 | .312 (5/16) | .365 | I | 3/4 | 3-13/16 | 32910 | 261.90 | 32910-C3 | 300.70 |
| .1875 (3/16) | 1-3/8 | .375 (3/8) | .302 | I | 3/4 | 3-5/8 | 32912 | 261.90 | 32912-C3 | 300.70 |
| .2500 (1/4) | 1-1/2 | .500 (1/2) | .365 | I | 3/4 | 4 | 32916 | 289.90 | 32916-C3 | 329.00 |

*Radial DOC accounts for max transition radius at neck

# SLITTING SAWS




- Sides of saw are dished for clearance
- Cutting on OD only • No keyway or hub
- For use with standard saw arbors
- Solid carbide • CNC ground in the USA

◀ **Fully stocked uncoated or AlTiN coated**

| CUTTER DIAMETER | CENTER THICKNESS | INSIDE DIAMETER | NUMBER OF TEETH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.005''}_{-.000''}$ | $L_2$ $^{+.00025''}_{-.00025''}$ | $D_2$ $^{+.0005''}_{+.0001''}$ | | TOOL # | USD$ | TOOL # | USD$ |
| 3/4 | .0100 | 1/4 | 18 | SAG0100 | 71.70 | SAG0100-C3 | 92.30 |
| | .0156 (1/64) | 1/4 | 18 | SAG0156 | 71.70 | SAG0156-C3 | 92.30 |
| | .0200 | 1/4 | 18 | SAG0200 | 71.70 | SAG0200-C3 | 92.30 |
| | .0312 (1/32) | 1/4 | 18 | SAG0312 | 71.70 | SAG0312-C3 | 92.30 |
| | .0400 | 1/4 | 18 | SAG0400 | 71.70 | SAG0400-C3 | 91.90 |
| | .0625 (1/16) | 1/4 | 18 | SAG0625 | 63.60 | SAG0625-C3 | 84.20 |
| 1 | .0100 | 3/8 | 20 | SAA0100 | 74.70 | SAA0100-C3 | 100.60 |
| | .0120 | 3/8 | 20 | SAA0120 | 74.70 | SAA0120-C3 | 100.60 |
| | .0156 (1/64) | 3/8 | 20 | SAA0156 | 74.70 | SAA0156-C3 | 100.60 |
| | .0156 (1/64) | 3/8 | 40 | SLG0156 | 74.70 | SLG0156-C3 | 104.00 |
| | .0180 | 3/8 | 20 | SAA0180 | 74.70 | SAA0180-C3 | 100.60 |
| | .0200 | 3/8 | 20 | SAA0200 | 75.20 | SAA0200-C3 | 101.00 |
| | .0250 | 3/8 | 20 | SAA0250 | 75.20 | SAA0250-C3 | 101.00 |
| | .0312 (1/32) | 3/8 | 20 | SAA0312 | 75.20 | SAA0312-C3 | 101.00 |
| | .0312 (1/32) | 3/8 | 40 | SLG0312 | 75.20 | SLG0312-C3 | 104.40 |
| | .0400 | 3/8 | 20 | SAA0400 | 75.20 | SAA0400-C3 | 101.00 |
| | .0468 (3/64) | 3/8 | 20 | SAA0468 | 66.70 | SAA0468-C3 | 92.50 |
| | .0468 (3/64) | 3/8 | 40 | SLG0468 | 80.50 | SLG0468-C3 | 109.80 |
| | .0625 (1/16) | 3/8 | 20 | SAA0625 | 66.70 | SAA0625-C3 | 92.50 |
| | .0625 (1/16) | 3/8 | 40 | SLG0625 | 80.50 | SLG0625-C3 | 109.80 |
| 1-1/4 | .0100 | 3/8 | 24 | SAB0100 | 89.10 | SAB0100-C3 | 123.50 |
| | .0156 (1/64) | 3/8 | 24 | SAB0156 | 89.10 | SAB0156-C3 | 123.50 |
| | .0200 | 3/8 | 24 | SAB0200 | 83.40 | SAB0200-C3 | 117.80 |
| | .0312 (1/32) | 3/8 | 24 | SAB0312 | 83.40 | SAB0312-C3 | 117.80 |
| | .0625 (1/16) | 3/8 | 24 | SAB0625 | 83.40 | SAB0625-C3 | 117.80 |
| 1-1/2 | .0100 | 1/2 | 36 | SAC0100 | 95.60 | SAC0100-C3 | 135.30 |
| | .0120 | 1/2 | 36 | SAC0120 | 97.40 | SAC0120-C3 | 139.10 |
| | .0156 (1/64) | 1/2 | 36 | SAC0156 | 95.60 | SAC0156-C3 | 135.30 |
| | .0180 | 1/2 | 36 | SAC0180 | 97.40 | SAC0180-C3 | 139.10 |
| | .0200 | 1/2 | 36 | SAC0200 | 86.10 | SAC0200-C3 | 125.60 |
| | .0250 | 1/2 | 36 | SAC0250 | 86.10 | SAC0250-C3 | 125.60 |
| | .0312 (1/32) | 1/2 | 36 | SAC0312 | 86.10 | SAC0312-C3 | 125.60 |
| | .0400 | 1/2 | 36 | SAC0400 | 86.10 | SAC0400-C3 | 125.60 |
| | .0468 (3/64) | 1/2 | 36 | SAC0468 | 83.80 | SAC0468-C3 | 123.40 |
| | .0625 (1/16) | 1/2 | 36 | SAC0625 | 83.80 | SAC0625-C3 | 123.40 |

continued on next page

# SLITTING SAWS

(cont.)

continued from previous page

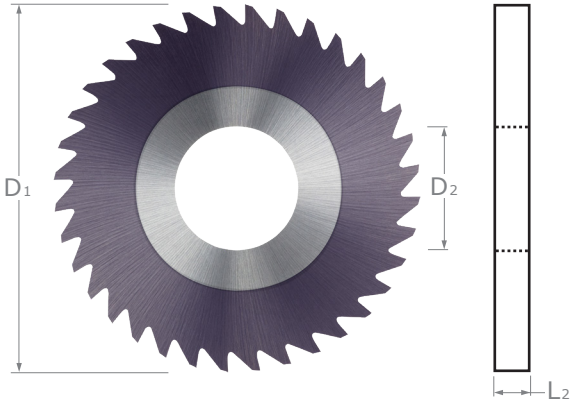
| CUTTER DIAMETER | CENTER THICKNESS | INSIDE DIAMETER | NUMBER OF TEETH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.005''}_{-.000''}$ | $L_2$ $^{+.00025''}_{-.00025''}$ | $D_2$ $^{+.0005''}_{+.0001''}$ | | TOOL # | USD$ | TOOL # | USD$ |
| 1-3/4 | .0100 | 1/2 | 38 | SAD0100 | 116.50 | SAD0100-C3 | 158.20 |
| | .0156 (1/64) | 1/2 | 38 | SAD0156 | 116.50 | SAD0156-C3 | 158.20 |
| | .0200 | 1/2 | 38 | SAD0200 | 102.30 | SAD0200-C3 | 142.20 |
| | .0312 (1/32) | 1/2 | 38 | SAD0312 | 102.30 | SAD0312-C3 | 142.20 |
| | .0625 (1/16) | 1/2 | 38 | SAD0625 | 111.60 | SAD0625-C3 | 151.50 |
| 2 | .0100 | 1/2 | 40 | SAW0100 | 134.70 | SAW0100-C3 | 175.00 |
| | .0120 | 1/2 | 40 | SAW0120 | 134.70 | SAW0120-C3 | 175.00 |
| | .0156 (1/64) | 1/2 | 40 | SAW0156 | 134.70 | SAW0156-C3 | 176.50 |
| | .0156 (1/64) | 1/2 | 80 | SLH0156 | 134.70 | SLH0156-C3 | 176.50 |
| | .0180 | 1/2 | 40 | SAW0180 | 137.30 | SAW0180-C3 | 179.10 |
| | .0200 | 1/2 | 40 | SAW0200 | 134.70 | SAW0200-C3 | 175.00 |
| | .0250 | 1/2 | 40 | SAW0250 | 134.70 | SAW0250-C3 | 175.00 |
| | .0312 (1/32) | 1/2 | 40 | SAW0312 | 134.70 | SAW0312-C3 | 175.00 |
| | .0312 (1/32) | 1/2 | 80 | SLH0312 | 134.70 | SLH0312-C3 | 176.50 |
| | .0400 | 1/2 | 40 | SAW0400 | 134.70 | SAW0400-C3 | 175.00 |
| | .0468 (3/64) | 1/2 | 40 | SAW0468 | 134.70 | SAW0468-C3 | 175.00 |
| | .0468 (3/64) | 1/2 | 80 | SLH0468 | 134.70 | SLH0468-C3 | 176.50 |
| | .0625 (1/16) | 1/2 | 40 | SAW0625 | 134.70 | SAW0625-C3 | 175.00 |
| | .0625 (1/16) | 1/2 | 80 | SLH0625 | 134.70 | SLH0625-C3 | 176.50 |
| | .0937 (3/32) | 1/2 | 40 | SAW0937 | 134.70 | SAW0937-C3 | 175.00 |
| | .0937 (3/32) | 1/2 | 80 | SLH0937 | 134.70 | SLH0937-C3 | 176.50 |
| | .1250 (1/8) | 1/2 | 40 | SAW1250 | 169.50 | SAW1250-C3 | 210.00 |
| | .1250 (1/8) | 1/2 | 80 | SLH1250 | 169.50 | SLH1250-C3 | 211.20 |
| 3 | .0200 | 1 | 72 | SAE0200 | 209.40 | SAE0200-C3 | 261.20 |
| | .0312 (1/32) | 1 | 72 | SAE0312 | 209.40 | SAE0312-C3 | 261.20 |
| | .0312 (1/32) | 1 | 100 | SLJ0312 | 209.40 | SLJ0312-C3 | 251.10 |
| | .0625 (1/16) | 1 | 72 | SAE0625 | 235.70 | SAE0625-C3 | 287.70 |
| | .0625 (1/16) | 1 | 100 | SLJ0625 | 235.70 | SLJ0625-C3 | 277.50 |
| | .0937 (3/32) | 1 | 72 | SAE0937 | 301.60 | SAE0937-C3 | 343.40 |
| | .0937 (3/32) | 1 | 100 | SLJ0937 | 301.60 | SLJ0937-C3 | 343.40 |
| | .1250 (1/8) | 1 | 72 | SAE1250 | 343.90 | SAE1250-C3 | 395.70 |
| | .1250 (1/8) | 1 | 100 | SLJ1250 | 343.90 | SLJ1250-C3 | 385.60 |
| | .1875 (3/16) | 1 | 72 | SAE1875 | 437.60 | SAE1875-C3 | 479.30 |
| | .2500 (1/4) | 1 | 72 | SAE2500 | 516.80 | SAE2500-C3 | 558.50 |
| 4 | .0312 (1/32) | 1 | 80 | SAF0312 | 299.70 | SAF0312-C3 | 341.40 |
| | .0312 (1/32) | 1 | 120 | SLK0312 | 299.70 | SLK0312-C3 | 341.40 |
| | .0625 (1/16) | 1 | 80 | SAF0625 | 306.50 | SAF0625-C3 | 353.80 |
| | .0625 (1/16) | 1 | 120 | SLK0625 | 306.50 | SLK0625-C3 | 348.20 |
| | .0937 (3/32) | 1 | 80 | SAF0937 | 354.20 | SAF0937-C3 | 395.90 |
| | .0937 (3/32) | 1 | 120 | SLK0937 | 354.20 | SLK0937-C3 | 395.90 |
| | .1250 (1/8) | 1 | 80 | SAF1250 | 427.80 | SAF1250-C3 | 494.50 |
| | .1250 (1/8) | 1 | 120 | SLK1250 | 427.80 | SLK1250-C3 | 469.50 |
| | .1875 (3/16) | 1 | 80 | SAF1875 | 554.60 | SAF1875-C3 | 596.30 |
| | .2500 (1/4) | 1 | 80 | SAF2500 | 688.90 | SAF2500-C3 | 730.60 |

For Saw Arbors, see page 570

NEW

# SLITTING SAWS

## Metric



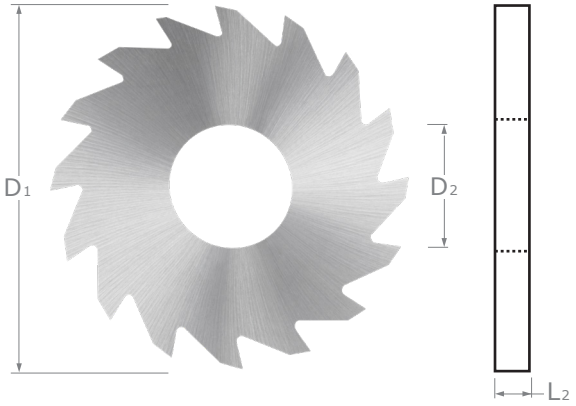

- All dimensions and tolerances in metric value
- Sides of saw are dished for clearance
- Cutting on OD only
- No keyway or hub
- For use with metric saw arbors
- Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | CENTER THICKNESS | INSIDE DIAMETER | NUMBER OF TEETH | UNCOATED | | AlTiN COATED | | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.13mm −.00mm | $L_2$ +.0064mm −.0064mm | $D_2$ +.012mm +.002mm | | TOOL # | USD$ | TOOL # | USD$ | |
| **25 mm** | .60 mm | 8 mm | 20 | SME0600 | 91.30 | SME0600-C3 | 120.60 | NEW |
| | .80 mm | 8 mm | 20 | SME0800 | 91.30 | SME0800-C3 | 120.60 | NEW |
| | 1.00 mm | 8 mm | 20 | SME1000 | 91.30 | SME1000-C3 | 120.60 | NEW |
| | 1.20 mm | 8 mm | 20 | SME1200 | 91.30 | SME1200-C3 | 120.60 | NEW |
| **50 mm** | .60 mm | 13 mm | 40 | SMQ0600 | 133.90 | SMQ0600-C3 | 175.60 | NEW |
| | 1.00 mm | 13 mm | 40 | SMQ1000 | 133.90 | SMQ1000-C3 | 175.60 | NEW |
| | 1.20 mm | 13 mm | 40 | SMQ1200 | 133.90 | SMQ1200-C3 | 175.60 | NEW |
| | 2.00 mm | 13 mm | 40 | SMQ2000 | 165.00 | SMQ2000-C3 | 206.70 | NEW |
| **80 mm** | 1.00 mm | 22 mm | 72 | SMS1000 | 300.00 | SMS1000-C3 | 341.70 | NEW |
| | 1.60 mm | 22 mm | 72 | SMS1600 | 314.50 | SMS1600-C3 | 356.20 | NEW |
| | 2.00 mm | 22 mm | 72 | SMS2000 | 328.00 | SMS2000-C3 | 369.70 | NEW |
| | 3.00 mm | 22 mm | 72 | SMS3000 | 340.50 | SMS3000-C3 | 382.20 | NEW |
| **100 mm** | 1.00 mm | 22 mm | 80 | SMT1000 | 345.70 | SMT1000-C3 | 387.40 | NEW |
| | 1.20 mm | 22 mm | 80 | SMT1200 | 338.40 | SMT1200-C3 | 380.10 | NEW |
| | 2.00 mm | 22 mm | 80 | SMT2000 | 334.20 | SMT2000-C3 | 375.90 | NEW |
| | 3.00 mm | 22 mm | 80 | SMT3000 | 402.70 | SMT3000-C3 | 444.40 | NEW |

For Saw Arbors, see page 570

# SLITTING SAWS

## For Non-Ferrous Materials



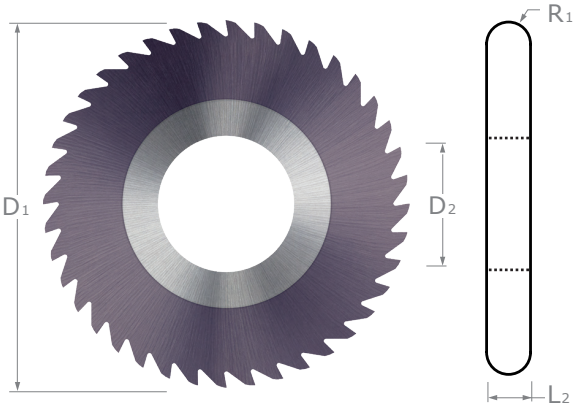

- Sides of saw have increased dish to minimize part contact
- Polished sides lessen saw binding in cut • Cutting on OD only • No keyway or hub
- For use with standard saw arbors • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | THICKNESS | INSIDE DIAMETER | NUMBER OF TEETH | UNCOATED | |
|---|---|---|---|---|---|
| $D_1$ +.005″ −.000″ | $L_2$ +.00025″ −.00025″ | $D_2$ +.0005″ +.0001″ | | TOOL # | USD$ |
| 1 | .0100 | 3/8 | 12 | SNA0100 | 77.60 |
| | .0156 (1/64) | 3/8 | 12 | SNA0156 | 76.80 |
| | .0200 | 3/8 | 12 | SNA0200 | 76.20 |
| | .0312 (1/32) | 3/8 | 12 | SNA0312 | 76.20 |
| | .0625 (1/16) | 3/8 | 12 | SNA0625 | 66.70 |
| 1-1/4 | .0156 (1/64) | 1/2 | 16 | SNB0156 | 89.10 |
| | .0200 | 1/2 | 16 | SNB0200 | 83.40 |
| | .0312 (1/32) | 1/2 | 16 | SNB0312 | 83.40 |
| | .0625 (1/16) | 1/2 | 16 | SNB0625 | 84.90 |
| 1-1/2 | .0120 | 1/2 | 16 | SNC0120 | 97.40 |
| | .0156 (1/64) | 1/2 | 16 | SNC0156 | 97.40 |
| | .0200 | 1/2 | 16 | SNC0200 | 86.10 |
| | .0312 (1/32) | 1/2 | 16 | SNC0312 | 86.10 |
| | .0400 | 1/2 | 16 | SNC0400 | 86.10 |
| | .0625 (1/16) | 1/2 | 16 | SNC0625 | 86.10 |
| 1-3/4 | .0200 | 1/2 | 24 | SND0200 | 104.40 |
| | .0312 (1/32) | 1/2 | 24 | SND0312 | 104.40 |
| | .0625 (1/16) | 1/2 | 24 | SND0625 | 111.60 |
| 2 | .0200 | 1/2 | 24 | SNE0200 | 137.30 |
| | .0312 (1/32) | 1/2 | 24 | SNE0312 | 134.70 |
| | .0400 | 1/2 | 24 | SNE0400 | 134.70 |
| | .0625 (1/16) | 1/2 | 24 | SNE0625 | 134.70 |
| | .0937 (3/32) | 1/2 | 24 | SNE0937 | 134.70 |
| | .1250 (1/8) | 1/2 | 24 | SNE1250 | 172.70 |
| 3 | .0312 (1/32) | 1 | 30 | SNF0312 | 209.40 |
| | .0625 (1/16) | 1 | 30 | SNF0625 | 235.70 |
| | .0937 (3/32) | 1 | 30 | SNF0937 | 301.60 |
| | .1250 (1/8) | 1 | 30 | SNF1250 | 343.90 |
| 4 | .0312 (1/32) | 1 | 36 | SNG0312 | 305.50 |
| | .0625 (1/16) | 1 | 36 | SNG0625 | 306.50 |
| | .0937 (3/32) | 1 | 36 | SNG0937 | 361.00 |
| | .1250 (1/8) | 1 | 36 | SNG1250 | 436.00 |

For Saw Arbors, see page 570

# SLITTING SAWS

## Full Radius

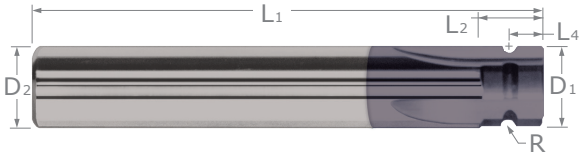



- Full radius profile
- Sides of saw are dished for clearance
- Cutting on radius only • No keyway or hub
- For use with standard saw arbors • Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | RADIUS | THICKNESS | INSIDE DIAMETER | NUMBER OF TEETH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.005''}$ | $R_1$ $^{+.002''}_{-.000''}$ | $L_2$ $^{+.0005''}_{-.0005''}$ | $D_2$ $^{+.0005''}_{+.0001''}$ | | TOOL # | USD$ | TOOL # | USD$ |
| 1 | .0100 | .0200 | 3/8 | 20 | SFR0200 | 183.70 | SFR0200-C3 | 213.00 |
| | .0156 (1/64) | .0312 (1/32) | 3/8 | 20 | SFR0312 | 183.70 | SFR0312-C3 | 213.00 |
| | .0234 | .0468 (3/64) | 3/8 | 20 | SFR0468 | 183.70 | SFR0468-C3 | 213.00 |
| | .0312 (1/32) | .0625 (1/16) | 3/8 | 20 | SFR0625 | 183.70 | SFR0625-C3 | 213.00 |
| 2 | .0156 (1/64) | .0312 (1/32) | 1/2 | 40 | SAK0312 | 287.20 | SAK0312-C3 | 328.90 |
| | .0234 | .0468 (3/64) | 1/2 | 40 | SAK0468 | 287.20 | SAK0468-C3 | 328.90 |
| | .0312 (1/32) | .0625 (1/16) | 1/2 | 40 | SAK0625 | 287.20 | SAK0625-C3 | 328.90 |
| | .0468 (3/64) | .0937 (3/32) | 1/2 | 40 | SAK0937 | 287.20 | SAK0937-C3 | 328.90 |
| | .0625 (1/16) | .1250 (1/8) | 1/2 | 40 | SAK1250 | 298.70 | SAK1250-C3 | 340.50 |
| 3 | .0156 (1/64) | .0312 (1/32) | 1 | 72 | SAH0312 | 402.20 | SAH0312-C3 | 444.00 |
| | .0234 | .0468 (3/64) | 1 | 72 | SAH0468 | 402.20 | SAH0468-C3 | 444.00 |
| | .0312 (1/32) | .0625 (1/16) | 1 | 72 | SAH0625 | 402.20 | SAH0625-C3 | 444.00 |
| | .0468 (3/64) | .0937 (3/32) | 1 | 72 | SAH0937 | 459.60 | SAH0937-C3 | 501.40 |
| | .0625 (1/16) | .1250 (1/8) | 1 | 72 | SAH1250 | 524.10 | SAH1250-C3 | 565.80 |
| 4 | .0234 | .0468 (3/64) | 1 | 80 | SAJ0468 | 466.70 | SAJ0468-C3 | 508.40 |
| | .0312 (1/32) | .0625 (1/16) | 1 | 80 | SAJ0625 | 466.70 | SAJ0625-C3 | 508.40 |
| | .0468 (3/64) | .0937 (3/32) | 1 | 80 | SAJ0937 | 539.00 | SAJ0937-C3 | 580.80 |
| | .0625 (1/16) | .1250 (1/8) | 1 | 80 | SAJ1250 | 651.80 | SAJ1250-C3 | 693.50 |

For Saw Arbors, see page 570

# CONCAVE RADIUS END MILLS




- Ground form relieved (can be re-ground without losing radius)
- 4 flutes
- Cutting on OD and radius only (non-end cutting)
- Solid carbide
- CNC ground in the USA

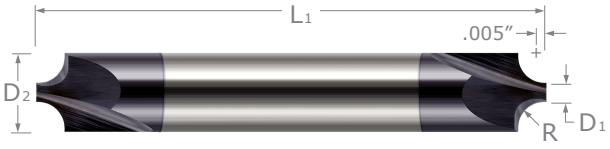
| RADIUS | CUTTER DIAMETER | LENGTH OF CUT | RADIUS CENTER | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| R +.001″ −.001″ | $D_1$ +.000″ −.002″ | $L_2$ +.060″ −.000″ | $L_4$ +.001″ −.001″ | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| 1/64 | 1/4 | .281 | .1406 | 1/4 | 2-1/2 | 45915 | 69.80 | 45915-C3 | 78.60 |
| 1/64 | 1/2 | .281 | .1406 | 1/2 | 3 | 32801 | 137.00 | 32801-C3 | 152.60 |
| .020 | 1/4 | .281 | .1450 | 1/4 | 2-1/2 | 45920 | 68.60 | 45920-C3 | 77.40 |
| 1/32 | 1/4 | .312 | .1562 | 1/4 | 2-1/2 | 45931 | 69.80 | 45931-C3 | 78.60 |
| 1/32 | 1/2 | .312 | .1562 | 1/2 | 3 | 32802 | 134.40 | 32802-C3 | 150.00 |
| 1 mm | 1/4 | .329 | .1644 | 1/4 | 2-1/2 | 4591M | 72.10 | 4591M-C3 | 81.00 |
| 1 mm | 1/2 | .329 | .1644 | 1/2 | 3 | 3281M | 144.20 | 3281M-C3 | 159.70 |
| 3/64 | 1/4 | .344 | .1719 | 1/4 | 2-1/2 | 45947 | 69.80 | 45947-C3 | 78.60 |
| 3/64 | 1/2 | .344 | .1719 | 1/2 | 3 | 32803 | 136.80 | 32803-C3 | 154.10 |
| 1/16 | 3/8 | .375 | .1875 | 3/8 | 2-1/2 | 45962 | 87.00 | 45962-C3 | 98.40 |
| 1/16 | 1/2 | .375 | .1875 | 1/2 | 3 | 32804 | 134.40 | 32804-C3 | 151.70 |
| 5/64 | 1/2 | .407 | .2034 | 1/2 | 3 | 32805 | 134.40 | 32805-C3 | 151.70 |
| 2 mm | 1/2 | .407 | .2044 | 1/2 | 3 | 3282M | 144.20 | 3282M-C3 | 159.70 |
| 3/32 | 1/2 | .437 | .2187 | 1/2 | 3 | 32806 | 136.80 | 32806-C3 | 154.10 |
| 7/64 | 5/8 | .469 | .2344 | 5/8 | 3-1/2 | 32807 | 175.30 | 32807-C3 | 192.50 |
| 1/8 | 5/8 | .500 | .2500 | 5/8 | 3-1/2 | 32808 | 172.20 | 32808-C3 | 189.50 |
| 5/32 | 3/4 | .562 | .2812 | 3/4 | 4 | 32810 | 290.10 | 32810-C3 | 308.90 |
| 3/16 | 1 | .624 | .3120 | 3/4 | 3-1/2 | 32812* | 235.20 | 32812-C3* | 256.70 |
| 1/4 | 1-1/4 | .750 | .3750 | 3/4 | 4 | 32816* | 276.40 | 32816-C3* | 298.00 |

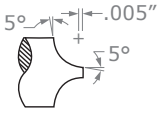
*Solid carbide head with steel shank

NEW SIZES!

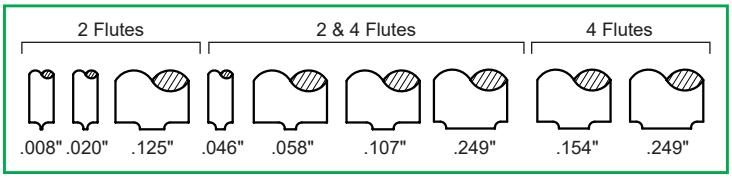
# CORNER ROUNDING END MILLS

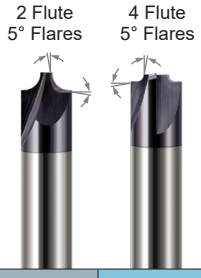
## 2 & 4 Flute – Flared




- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Double-ended
- Axial depth of cut ≈ radius plus .005″
- End cutting
- Solid carbide • CNC ground in the USA




| RADIUS | PILOT DIAMETER | FLUTES | SHANK DIAMETER | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| R +.0005″ −.0005″ | D1 | | D2 | L1 | | TOOL # | USD$ | TOOL # | USD$ |
| .003 | **.046** | 2 | 1/8 | 1-1/2 | | 17003 | 50.90 | 17003-C3 | 58.40 |
| .004 | **.046** | 2 | 1/8 | 1-1/2 | | 17004 | 50.90 | 17004-C3 | 58.40 |
| .005 | **.008** | 2 | 1/8 | 1-1/2 | | 67405 | 63.90 | 67405-C3 | 71.50 |
| .005 | **.020** | 2 | 1/8 | 1-1/2 | | 45305 | 54.90 | 45305-C3 | 62.40 |
| .005 | **.046** | 2 | 1/8 | 1-1/2 | | 17005 | 50.90 | 17005-C3 | 58.40 |
| .005 | **.046** | 2 | 3/16 | 4 | **LONG!** | 31605 | 90.80 | 31605-C3 | 98.00 |
| .005 | **.046** | 4 | 1/8 | 1-1/2 | | 806105 | 69.00 | 806105-C3 | 76.70 |
| .005 | **.058** | 4 | 1/8 | 1-1/2 | | 67605 | 69.00 | 67605-C3 | 76.70 |
| .005 | **.107** | 4 | 1/8 | 1-1/2 | | 68005 | 69.00 | 68005-C3 | 76.70 |
| .005 | **.249** | 4 | 3/8 | 2-1/2 | | 21005 | 80.70 | 21005-C3 | 92.70 |
| .006 | **.020** | 2 | 1/8 | 1-1/2 | | 45306 | 54.90 | 45306-C3 | 62.40 |
| .006 | **.046** | 2 | 1/8 | 1-1/2 | | 17006 | 50.90 | 17006-C3 | 58.40 |
| .006 | **.058** | 4 | 1/8 | 1-1/2 | | 67606 | 69.90 | 67606-C3 | 75.80 |
| .006 | **.107** | 4 | 1/8 | 1-1/2 | | 68006 | 69.90 | 68006-C3 | 77.30 |
| .007 | **.020** | 2 | 1/8 | 1-1/2 | | 45307 | 54.90 | 45307-C3 | 62.40 |
| .007 | **.046** | 2 | 1/8 | 1-1/2 | | 17007 | 50.90 | 17007-C3 | 58.40 |
| .007 | **.058** | 4 | 1/8 | 1-1/2 | | 67607 | 69.00 | 67607-C3 | 76.70 |
| .007 | **.107** | 4 | 1/8 | 1-1/2 | | 68007 | 69.00 | 68007-C3 | 76.70 |
| .008 | **.008** | 2 | 1/8 | 1-1/2 | | 67408 | 63.90 | 67408-C3 | 71.50 |
| .008 | **.020** | 2 | 1/8 | 1-1/2 | | 45308 | 54.90 | 45308-C3 | 62.40 |
| .008 | **.046** | 2 | 1/8 | 1-1/2 | | 17008 | 50.90 | 17008-C3 | 58.40 |
| .008 | **.046** | 2 | 3/16 | 4 | **LONG!** | 31608 | 90.80 | 31608-C3 | 98.00 |
| .008 | **.058** | 4 | 1/8 | 1-1/2 | | 67608 | 69.00 | 67608-C3 | 76.70 |
| .008 | **.249** | 4 | 3/8 | 2-1/2 | | 21008 | 80.70 | 21008-C3 | 92.10 |
| .009 | **.020** | 2 | 1/8 | 1-1/2 | | 45309 | 55.40 | 45309-C3 | 61.30 |
| .009 | **.046** | 2 | 1/8 | 1-1/2 | | 17009 | 50.90 | 17009-C3 | 58.40 |
| .010 | **.008** | 2 | 1/8 | 1-1/2 | | 67410 | 63.90 | 67410-C3 | 71.50 |
| .010 | **.020** | 2 | 1/8 | 1-1/2 | | 45310 | 54.90 | 45310-C3 | 62.40 |
| .010 | **.046** | 2 | 1/8 | 1-1/2 | | 17010 | 50.90 | 17010-C3 | 58.40 |
| .010 | **.046** | 2 | 3/16 | 4 | **LONG!** | 31610 | 90.80 | 31610-C3 | 101.30 |

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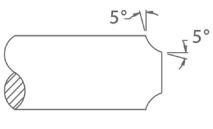
# CORNER ROUNDING END MILLS

## 2 & 4 Flute – Flared (cont.)

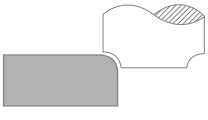
continued from previous page

| RADIUS | PILOT DIAMETER | FLUTES | SHANK DIAMETER | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| R +.0005″ −.0005″ | $D_1$ | | $D_2$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ |
| .010 | **.046** | 4 | 1/8 | 1-1/2 | | 806110 | 69.20 | 806110-C3 | 76.80 |
| .010 | **.058** | 4 | 1/8 | 1-1/2 | | 67610 | 69.00 | 67610-C3 | 76.70 |
| .010 | **.107** | 4 | 3/16 | 2 | | 68010 | 74.80 | 68010-C3 | 83.70 |
| .010 | **.125** | 2 | 3/16 | 2 | | 941510 | 74.80 | 941510-C3 | 83.70 |
| .010 | **.249** | 4 | 3/8 | 2-1/2 | | 21010 | 80.70 | 21010-C3 | 92.70 |
| .011 | **.020** | 2 | 1/8 | 1-1/2 | | 45311 | 55.40 | 45311-C3 | 61.30 |
| .011 | **.046** | 2 | 1/8 | 1-1/2 | | 17011 | 50.90 | 17011-C3 | 58.40 |
| .012 | **.020** | 2 | 1/8 | 1-1/2 | | 45312 | 54.90 | 45312-C3 | 62.40 |
| .012 | **.046** | 2 | 1/8 | 1-1/2 | | 17012 | 50.90 | 17012-C3 | 58.40 |
| .012 | **.107** | 4 | 3/16 | 2 | | 68012 | 74.80 | 68012-C3 | 83.70 |
| .013 | **.020** | 2 | 1/8 | 1-1/2 | | 45313 | 54.90 | 45313-C3 | 60.80 |
| .013 | **.046** | 2 | 1/8 | 1-1/2 | | 17013 | 50.90 | 17013-C3 | 58.40 |
| .014 | **.020** | 2 | 1/8 | 1-1/2 | | 45314 | 54.90 | 45314-C3 | 62.40 |
| .014 | **.046** | 2 | 1/8 | 1-1/2 | | 17014 | 50.90 | 17014-C3 | 58.40 |
| .015 (1/64) | **.008** | 2 | 1/8 | 1-1/2 | | 67415 | 63.90 | 67415-C3 | 71.50 |
| .015 (1/64) | **.020** | 2 | 1/8 | 1-1/2 | | 45315 | 54.90 | 45315-C3 | 62.40 |
| .015 (1/64) | **.046** | 2 | 1/8 | 1-1/2 | | 17015 | 50.90 | 17015-C3 | 58.40 |
| .015 (1/64) | **.046** | 2 | 3/16 | 4 | **LONG!** | 31615 | 90.80 | 31615-C3 | 101.30 |
| .015 (1/64) | **.046** | 4 | 1/8 | 1-1/2 | | 806115 | 69.00 | 806115-C3 | 76.70 |
| .015 (1/64) | **.058** | 2 | 1/8 | 1-1/2 | | 770515 | 50.90 | 770515-C3 | 58.40 |
| .015 (1/64) | **.058** | 4 | 1/8 | 1-1/2 | | 67615 | 69.00 | 67615-C3 | 76.70 |
| .015 (1/64) | **.107** | 4 | 3/16 | 2 | | 68015 | 74.80 | 68015-C3 | 83.70 |
| .015 (1/64) | **.125** | 2 | 3/16 | 2 | | 941515 | 74.80 | 941515-C3 | 83.70 |
| .015 (1/64) | **.249** | 2 | 3/8 | 2 | | 749015 | 77.20 | 749015-C3 | 88.00 |
| .015 (1/64) | **.249** | 4 | 3/8 | 2-1/2 | | 21015 | 80.70 | 21015-C3 | 92.70 |
| .018 | **.020** | 2 | 1/8 | 1-1/2 | | 45318 | 54.90 | 45318-C3 | 62.40 |
| .018 | **.046** | 2 | 1/8 | 1-1/2 | | 17018 | 50.90 | 17018-C3 | 58.40 |
| .018 | **.107** | 4 | 3/16 | 2 | | 68018 | 74.80 | 68018-C3 | 83.70 |
| .020 | **.008** | 2 | 1/8 | 1-1/2 | | 67420 | 63.90 | 67420-C3 | 71.50 |
| .020 | **.020** | 2 | 1/8 | 1-1/2 | | 45320 | 54.90 | 45320-C3 | 62.40 |
| .020 | **.046** | 2 | 1/8 | 1-1/2 | | 17020 | 50.90 | 17020-C3 | 58.40 |
| .020 | **.046** | 2 | 3/16 | 4 | **LONG!** | 31620 | 90.80 | 31620-C3 | 101.30 |
| .020 | **.046** | 4 | 1/8 | 1-1/2 | | 806120 | 69.00 | 806120-C3 | 76.70 |
| .020 | **.058** | 2 | 1/8 | 1-1/2 | | 770520 | 50.90 | 770520-C3 | 58.40 |
| .020 | **.058** | 4 | 1/8 | 1-1/2 | | 67620 | 69.00 | 67620-C3 | 76.70 |
| .020 | **.107** | 2 | 3/16 | 2 | | 748620 | 75.70 | 748620-C3 | 84.60 |
| .020 | **.107** | 4 | 3/16 | 2 | | 68020 | 74.80 | 68020-C3 | 82.50 |
| .020 | **.125** | 2 | 3/16 | 2 | | 941520 | 74.80 | 941520-C3 | 83.70 |
| .020 | **.249** | 4 | 3/8 | 2-1/2 | | 21020 | 80.70 | 21020-C3 | 92.70 |

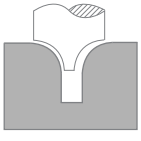
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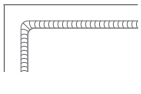

5° Flares at Shoulder and Pilot to Avoid Steps in Workpiece



Large Pilots for Profiling, Increasing Strength and Requiring Less Speed



Small Pilots for Narrow Slots and Holes



Small Pilots Allow Milling of Tight Inside Corners

NEW SIZES!

# CORNER ROUNDING END MILLS

## 2 & 4 Flute – Flared (cont.)

continued from previous page

| RADIUS | PILOT DIAMETER | FLUTES | SHANK DIAMETER | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| R +.0005″ −.0005″ | $D_1$ | | $D_2$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ |
| .022 | **.020** | 2 | 1/8 | 1-1/2 | | 45322 | 54.90 | 45322-C3 | 60.80 |
| .022 | **.046** | 2 | 1/8 | 1-1/2 | | 17022 | 50.90 | 17022-C3 | 58.40 |
| .022 | **.107** | 4 | 3/16 | 2 | | 68022 | 74.80 | 68022-C3 | 83.70 |
| .025 | **.008** | 2 | 1/8 | 1-1/2 | | 67425 | 64.50 | 67425-C3 | 72.00 |
| .025 | **.020** | 2 | 1/8 | 1-1/2 | | 45325 | 54.90 | 45325-C3 | 62.40 |
| .025 | **.046** | 2 | 1/8 | 1-1/2 | | 17025 | 50.90 | 17025-C3 | 58.40 |
| .025 | **.046** | 2 | 3/16 | 4 | **LONG!** | 31625 | 90.80 | 31625-C3 | 98.00 |
| .025 | **.058** | 4 | 1/8 | 1-1/2 | | 67625 | 69.00 | 67625-C3 | 76.70 |
| .025 | **.107** | 4 | 3/16 | 2 | | 68025 | 74.80 | 68025-C3 | 82.50 |
| .025 | **.125** | 2 | 3/16 | 2 | | 941525 | 74.80 | 941525-C3 | 83.70 |
| .025 | **.249** | 4 | 3/8 | 2-1/2 | | 21025 | 80.70 | 21025-C3 | 92.70 |
| .027 | **.046** | 2 | 1/8 | 1-1/2 | | 17027 | 50.90 | 17027-C3 | 58.40 |
| .027 | **.107** | 4 | 3/16 | 2 | | 68027 | 74.80 | 68027-C3 | 83.70 |
| .030 | **.008** | 2 | 1/8 | 1-1/2 | | 67430 | 63.90 | 67430-C3 | 71.50 |
| .030 | **.020** | 2 | 1/8 | 1-1/2 | | 45330 | 54.90 | 45330-C3 | 62.40 |
| .030 | **.046** | 2 | 1/8 | 1-1/2 | | 17030 | 50.90 | 17030-C3 | 58.40 |
| .030 | **.046** | 2 | 3/16 | 4 | **LONG!** | 31630 | 90.80 | 31630-C3 | 101.30 |
| .030 | **.046** | 4 | 1/8 | 1-1/2 | | 806130 | 69.00 | 806130-C3 | 76.70 |
| .030 | **.058** | 2 | 1/8 | 1-1/2 | | 756930 | 69.90 | 756930-C3 | 77.30 |
| .030 | **.058** | 4 | 1/8 | 1-1/2 | | 67630 | 69.00 | 67630-C3 | 76.70 |
| .030 | **.107** | 2 | 3/16 | 2 | | 748630 | 75.70 | 748630-C3 | 81.90 |
| .030 | **.107** | 4 | 3/16 | 2 | | 68030 | 74.80 | 68030-C3 | 82.50 |
| .030 | **.125** | 2 | 3/16 | 2 | | 941530 | 74.80 | 941530-C3 | 83.70 |
| .030 | **.249** | 2 | 3/8 | 2 | | 749030 | 85.10 | 749030-C3 | 95.90 |
| .030 | **.249** | 4 | 3/8 | 2-1/2 | | 21030 | 88.70 | 21030-C3 | 106.30 |
| .031 (1/32) | **.008** | 2 | 1/8 | 1-1/2 | | 67431 | 63.90 | 67431-C3 | 69.90 |
| .031 (1/32) | **.020** | 2 | 1/8 | 1-1/2 | | 45331 | 54.90 | 45331-C3 | 62.40 |
| .031 (1/32) | **.046** | 2 | 1/8 | 1-1/2 | | 17031 | 50.90 | 17031-C3 | 58.40 |
| .031 (1/32) | **.046** | 2 | 3/16 | 4 | **LONG!** | 31631 | 90.80 | 31631-C3 | 101.30 |
| .031 (1/32) | **.046** | 4 | 1/8 | 1-1/2 | | 806131 | 69.00 | 806131-C3 | 76.70 |
| .031 (1/32) | **.058** | 4 | 1/8 | 1-1/2 | | 67631 | 69.00 | 67631-C3 | 76.70 |
| .031 (1/32) | **.107** | 4 | 3/16 | 2 | | 68031 | 74.80 | 68031-C3 | 83.70 |
| .031 (1/32) | **.125** | 2 | 3/16 | 2 | | 941531 | 83.70 | 941531-C3 | 92.50 |
| .031 (1/32) | **.154** | 4 | 1/4 | 2 | | 946631 | 98.30 | 946631-C3 | 105.80 |
| .031 (1/32) | **.249** | 4 | 3/8 | 2-1/2 | | 21031 | 88.70 | 21031-C3 | 106.30 |
| .032 | **.046** | 2 | 1/8 | 1-1/2 | | 17032 | 50.90 | 17032-C3 | 58.40 |
| .032 | **.249** | 4 | 3/8 | 2-1/2 | | 21032 | 88.70 | 21032-C3 | 106.30 |
| .035 | **.020** | 2 | 1/8 | 1-1/2 | | 67835 | 54.90 | 67835-C3 | 60.80 |
| .035 | **.046** | 2 | 1/8 | 1-1/2 | | 17035 | 50.90 | 17035-C3 | 58.40 |
| .035 | **.046** | 2 | 3/16 | 4 | **LONG!** | 31635 | 90.80 | 31635-C3 | 98.00 |
| .035 | **.058** | 4 | 3/16 | 2 | | 67635 | 77.50 | 67635-C3 | 86.50 |
| .035 | **.125** | 2 | 1/4 | 2 | | 941535 | 76.80 | 941535-C3 | 85.80 |
| .035 | **.249** | 4 | 3/8 | 2-1/2 | | 21035 | 88.70 | 21035-C3 | 106.30 |
| .037 | **.107** | 4 | 3/16 | 2 | | 68037 | 75.70 | 68037-C3 | 81.90 |
| .039 (1 mm) | **.020** | 2 | 1/8 | 1-1/2 | | 67839 | 54.90 | 67839-C3 | 62.40 |
| .039 (1 mm) | **.046** | 2 | 1/8 | 1-1/2 | | 17039 | 50.90 | 17039-C3 | 58.40 |
| .039 (1 mm) | **.046** | 2 | 3/16 | 4 | **LONG!** | 31639 | 90.80 | 31639-C3 | 101.30 |
| .039 (1 mm) | **.046** | 4 | 1/8 | 1-1/2 | | 806139 | 69.00 | 806139-C3 | 76.70 |
| .039 (1 mm) | **.058** | 4 | 3/16 | 2 | | 67639 | 77.50 | 67639-C3 | 86.50 |

continued on next page

# CORNER ROUNDING END MILLS

## 2 & 4 Flute – Flared (cont.)

continued from previous page

| | RADIUS | PILOT DIAMETER | FLUTES | SHANK DIAMETER | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | R +.0005" −.0005" | $D_1$ | | $D_2$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ |
| | .039 (1 mm) | **.100** | 2 | 3/16 | 2 | | 45339 | 66.70 | 45339-C3 | 75.70 |
| | .039 (1 mm) | **.107** | 4 | 3/16 | 2 | | 68039 | 66.70 | 68039-C3 | 75.70 |
| | .039 (1 mm) | **.154** | 4 | 1/4 | 2 | | 946639 | 98.30 | 946639-C3 | 105.80 |
| | .039 (1 mm) | **.249** | 4 | 3/8 | 2-1/2 | | 21039 | 88.70 | 21039-C3 | 106.30 |
| | .040 | **.020** | 2 | 1/8 | 1-1/2 | | 45340 | 54.90 | 45340-C3 | 62.40 |
| | .040 | **.046** | 2 | 3/16 | 2 | | 17040 | 64.80 | 17040-C3 | 73.70 |
| | .040 | **.107** | 4 | 1/4 | 2 | | 68040 | 98.30 | 68040-C3 | 105.80 |
| NEW | .040 | .125 | 2 | 1/4 | 2 | | 941540 | 98.30 | 941540-C3 | 105.80 |
| | .040 | **.249** | 4 | 3/8 | 2-1/2 | | 21040 | 107.50 | 21040-C3 | 125.10 |
| | .043 | **.046** | 2 | 3/16 | 2 | | 17043 | 64.80 | 17043-C3 | 73.70 |
| | .043 | **.058** | 4 | 3/16 | 2 | | 67643 | 77.50 | 67643-C3 | 86.50 |
| | .043 | **.249** | 4 | 3/8 | 2-1/2 | | 21043 | 108.60 | 21043-C3 | 120.00 |
| | .045 | **.046** | 2 | 3/16 | 2 | | 17045 | 64.80 | 17045-C3 | 73.70 |
| | .045 | **.058** | 4 | 3/16 | 2 | | 67645 | 77.50 | 67645-C3 | 86.50 |
| | .047 (3/64) | **.020** | 2 | 1/8 | 1-1/2 | | 67847 | 54.90 | 67847-C3 | 62.40 |
| | .047 (3/64) | **.046** | 2 | 3/16 | 2 | | 17047 | 64.80 | 17047-C3 | 73.70 |
| | .047 (3/64) | **.046** | 2 | 3/16 | 4 | **LONG!** | 31647 | 90.80 | 31647-C3 | 98.00 |
| | .047 (3/64) | **.058** | 4 | 3/16 | 2 | | 67647 | 77.50 | 67647-C3 | 86.50 |
| | .047 (3/64) | **.107** | 4 | 1/4 | 2 | | 68047 | 98.30 | 68047-C3 | 105.80 |
| | .047 (3/64) | **.125** | 2 | 1/4 | 2 | | 45347 | 76.80 | 45347-C3 | 89.00 |
| | .047 (3/64) | **.249** | 4 | 3/8 | 2-1/2 | | 21047 | 107.50 | 21047-C3 | 125.10 |
| | .050 | **.020** | 2 | 1/8 | 1-1/2 | | 67850 | 54.90 | 67850-C3 | 62.40 |
| | .050 | **.046** | 2 | 3/16 | 2 | | 17050 | 64.80 | 17050-C3 | 73.70 |
| | .050 | **.046** | 2 | 1/4 | 4 | **LONG!** | 31650 | 108.00 | 31650-C3 | 116.60 |
| | .050 | **.058** | 4 | 3/16 | 2 | | 67650 | 77.50 | 67650-C3 | 86.50 |
| | .050 | **.107** | 4 | 1/4 | 2 | | 68050 | 98.30 | 68050-C3 | 105.80 |
| | .050 | **.125** | 2 | 1/4 | 2 | | 45350 | 76.80 | 45350-C3 | 89.00 |
| | .050 | **.249** | 4 | 3/8 | 2-1/2 | | 21050 | 107.50 | 21050-C3 | 125.10 |
| | .052 | **.107** | 4 | 1/4 | 2 | | 68052 | 99.10 | 68052-C3 | 106.60 |
| | .055 | **.046** | 2 | 3/16 | 2 | | 17055 | 64.80 | 17055-C3 | 73.70 |
| | .055 | **.058** | 4 | 3/16 | 2 | | 67655 | 77.50 | 67655-C3 | 83.80 |
| | .055 | **.107** | 4 | 1/4 | 2 | | 68055 | 98.30 | 68055-C3 | 105.80 |
| | .058 | **.107** | 4 | 1/4 | 2 | | 68058 | 98.30 | 68058-C3 | 105.80 |
| | .060 | **.020** | 2 | 3/16 | 2 | | 67860 | 67.40 | 67860-C3 | 76.30 |
| | .060 | **.046** | 2 | 3/16 | 2 | | 17060 | 64.80 | 17060-C3 | 73.70 |
| | .060 | **.046** | 2 | 1/4 | 4 | **LONG!** | 31660 | 108.00 | 31660-C3 | 118.30 |
| | .060 | **.046** | 4 | 3/16 | 2 | | 806060 | 73.90 | 806060-C3 | 82.90 |
| | .060 | **.058** | 2 | 3/16 | 2 | | 756960 | 65.60 | 756960-C3 | 74.50 |
| | .060 | **.058** | 4 | 3/16 | 2 | | 67660 | 77.50 | 67660-C3 | 86.50 |
| | .060 | **.107** | 2 | 1/4 | 2 | | 748660 | 77.60 | 748660-C3 | 89.80 |
| | .060 | **.107** | 4 | 1/4 | 2 | | 68060 | 98.30 | 68060-C3 | 105.80 |
| | .060 | **.125** | 2 | 1/4 | 2 | | 45360 | 76.80 | 45360-C3 | 89.00 |
| | .060 | **.154** | 4 | 5/16 | 2-1/2 | | 946660 | 113.30 | 946660-C3 | 128.00 |
| | .060 | **.249** | 4 | 1/2 | 3 | | 21060 | 120.00 | 21060-C3 | 138.10 |

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NEW SIZES!

# CORNER ROUNDING END MILLS

## 2 & 4 Flute – Flared (cont.)

continued from previous page

| RADIUS | PILOT DIAMETER | FLUTES | SHANK DIAMETER | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| R +.0005" −.0005" | D1 | | D2 | L1 | | TOOL # | USD$ | TOOL # | USD$ |
| .062 (1/16) | **.020** | 2 | 3/16 | 2 | | 67862 | 67.40 | 67862-C3 | 76.30 |
| .062 (1/16) | **.046** | 2 | 3/16 | 2 | | 17062 | 64.80 | 17062-C3 | 73.70 |
| .062 (1/16) | **.046** | 2 | 1/4 | 4 | **LONG!** | 31662 | 108.00 | 31662-C3 | 118.30 |
| .062 (1/16) | **.046** | 4 | 3/16 | 2 | | 806062 | 77.50 | 806062-C3 | 84.20 |
| .062 (1/16) | **.058** | 2 | 3/16 | 2 | | 770562 | 64.80 | 770562-C3 | 73.70 |
| .062 (1/16) | **.058** | 4 | 3/16 | 2 | | 67662 | 77.50 | 67662-C3 | 86.50 |
| .062 (1/16) | **.107** | 2 | 1/4 | 2 | | 748662 | 77.60 | 748662-C3 | 89.80 |
| .062 (1/16) | **.107** | 4 | 1/4 | 2 | | 68062 | 98.30 | 68062-C3 | 105.80 |
| .062 (1/16) | **.125** | 2 | 1/4 | 2 | | 45362 | 76.80 | 45362-C3 | 89.00 |
| .062 (1/16) | **.154** | 4 | 5/16 | 2-1/2 | | 946662 | 113.30 | 946662-C3 | 128.00 |
| .062 (1/16) | **.249** | 4 | 1/2 | 3 | | 21062 | 120.00 | 21062-C3 | 135.80 |
| .065 | **.046** | 2 | 3/16 | 2 | | 17065 | 64.80 | 17065-C3 | 73.70 |
| .070 | **.046** | 2 | 3/16 | 2 | | 17070 | 64.80 | 17070-C3 | 73.70 |
| .070 | **.058** | 4 | 1/4 | 2 | | 67670 | 98.30 | 67670-C3 | 105.80 |
| .070 | **.107** | 4 | 1/4 | 2 | | 68070 | 98.30 | 68070-C3 | 105.80 |
| .072 | **.046** | 2 | 1/4 | 2 | | 17072 | 74.40 | 17072-C3 | 86.60 |
| .072 | **.249** | 4 | 1/2 | 3 | | 21072 | 125.60 | 21072-C3 | 149.70 |
| .075 | **.046** | 2 | 1/4 | 2 | | 17075 | 74.40 | 17075-C3 | 86.60 |
| .078 (5/64) | **.020** | 2 | 3/16 | 2 | | 67878 | 74.80 | 67878-C3 | 83.70 |
| .078 (5/64) | **.046** | 2 | 1/4 | 2 | | 17078 | 74.40 | 17078-C3 | 86.60 |
| .078 (5/64) | **.046** | 2 | 1/4 | 4 | **LONG!** | 31678 | 108.00 | 31678-C3 | 116.60 |
| .078 (5/64) | **.046** | 4 | 1/4 | 2 | | 806078 | 98.30 | 806078-C3 | 105.80 |
| .078 (5/64) | **.058** | 4 | 1/4 | 2 | | 67678 | 98.30 | 67678-C3 | 105.80 |
| .078 (5/64) | **.107** | 4 | 5/16 | 2-1/2 | | 68078 | 113.30 | 68078-C3 | 128.00 |
| .078 (5/64) | **.125** | 2 | 5/16 | 2-1/2 | | 941578 | 113.30 | 941578-C3 | 123.00 |
| .078 (5/64) | **.154** | 4 | 5/16 | 2-1/2 | | 946678 | 113.30 | 946678-C3 | 128.00 |
| .078 (5/64) | **.249** | 4 | 1/2 | 3 | | 21078 | 125.60 | 21078-C3 | 149.70 |
| .080 | **.046** | 2 | 1/4 | 2 | | 17080 | 74.40 | 17080-C3 | 86.60 |
| .080 | **.058** | 4 | 1/4 | 2 | | 67680 | 98.30 | 67680-C3 | 105.80 |
| .080 | **.107** | 4 | 5/16 | 2-1/2 | | 68080 | 113.30 | 68080-C3 | 128.00 |
| .085 | **.046** | 2 | 1/4 | 2 | | 17085 | 74.40 | 17085-C3 | 86.60 |
| .089 | **.045** | 2 | 1/4 | 2 | | 17089 | 74.40 | 17089-C3 | 86.60 |
| .089 | **.107** | 4 | 5/16 | 2-1/2 | | 68089 | 114.50 | 68089-C3 | 124.10 |
| .089 | **.248** | 4 | 1/2 | 3 | | 21089 | 126.80 | 21089-C3 | 150.90 |
| .090 | **.045** | 2 | 1/4 | 2 | | 17090 | 74.40 | 17090-C3 | 86.60 |
| .090 | **.058** | 4 | 1/4 | 2 | | 67690 | 98.30 | 67690-C3 | 105.80 |
| .090 | **.107** | 4 | 5/16 | 2-1/2 | | 68090 | 113.30 | 68090-C3 | 128.00 |
| .093 (3/32) | **.045** | 2 | 1/4 | 2 | | 17093 | 74.40 | 17093-C3 | 86.60 |
| .093 (3/32) | **.045** | 2 | 5/16 | 4 | **LONG!** | 31693 | 142.30 | 31693-C3 | 152.70 |
| .093 (3/32) | **.046** | 4 | 1/4 | 2 | | 806093 | 98.30 | 806093-C3 | 105.80 |
| .093 (3/32) | **.058** | 4 | 1/4 | 2 | | 67693 | 98.30 | 67693-C3 | 105.80 |
| .093 (3/32) | **.107** | 4 | 5/16 | 2-1/2 | | 68093 | 113.30 | 68093-C3 | 128.00 |
| .093 (3/32) | **.125** | 2 | 5/16 | 2-1/2 | | 941593 | 114.50 | 941593-C3 | 124.10 |
| .093 (3/32) | **.154** | 4 | 3/8 | 2-1/2 | | 946693 | 139.00 | 946693-C3 | 156.60 |
| .093 (3/32) | **.248** | 4 | 1/2 | 3 | | 21093 | 127.90 | 21093-C3 | 152.00 |
| .095 | **.045** | 2 | 1/4 | 2 | | 17095 | 74.40 | 17095-C3 | 86.60 |

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# CORNER ROUNDING END MILLS

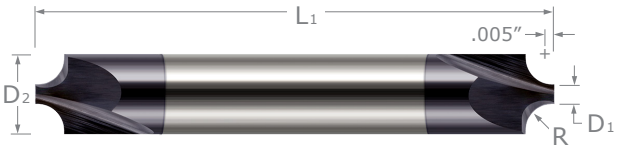
## 2 & 4 Flute – Flared (cont.)

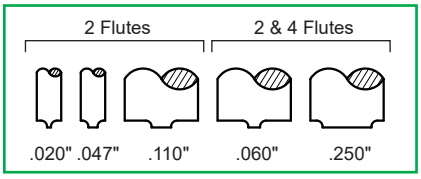
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| | RADIUS | PILOT DIAMETER | FLUTES | SHANK DIAMETER | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | R +.0005" −.0005" | $D_1$ | | $D_2$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ |
| | .100 | **.045** | 2 | 1/4 | 2 | | 17100 | 74.40 | 17100-C3 | 86.60 |
| | .100 | **.045** | 2 | 5/16 | 4 | **LONG!** | 31700 | 142.30 | 31700-C3 | 152.70 |
| | .100 | **.058** | 4 | 5/16 | 2-1/2 | | 77800 | 114.00 | 77800-C3 | 128.70 |
| | .100 | **.107** | 4 | 5/16 | 2-1/2 | | 68100 | 114.00 | 68100-C3 | 128.70 |
| | .100 | **.125** | 2 | 3/8 | 2-1/2 | | 941600 | 136.70 | 941600-C3 | 148.10 |
| | .100 | **.248** | 4 | 1/2 | 3 | | 21100 | 127.90 | 21100-C3 | 152.00 |
| | .109 (7/64) | **.058** | 2 | 5/16 | 2-1/2 | | 17109 | 114.00 | 17109-C3 | 128.70 |
| | .109 (7/64) | **.107** | 4 | 3/8 | 2-1/2 | | 68109 | 139.00 | 68109-C3 | 156.60 |
| | .118 (3 mm) | **.058** | 2 | 5/16 | 2-1/2 | | 17118 | 114.00 | 17118-C3 | 128.70 |
| | .118 (3 mm) | **.107** | 4 | 3/8 | 2-1/2 | | 68118 | 139.00 | 68118-C3 | 156.60 |
| | .118 (3 mm) | **.125** | 2 | 3/8 | 2-1/2 | | 941618 | 136.70 | 941618-C3 | 148.10 |
| | .118 (3 mm) | **.248** | 4 | 1/2 | 3 | | 21118 | 162.20 | 21118-C3 | 177.80 |
| | .125 (1/8) | **.046** | 2 | 5/16 | 2-1/2 | | 948425 | 110.50 | 948425-C3 | 125.20 |
| | .125 (1/8) | **.046** | 4 | 5/16 | 2-1/2 | | 805908 | 114.90 | 805908-C3 | 125.40 |
| | .125 (1/8) | **.058** | 2 | 5/16 | 2-1/2 | | 17125 | 114.00 | 17125-C3 | 128.70 |
| | .125 (1/8) | **.058** | 2 | 3/8 | 4 | **LONG!** | 31725 | 169.80 | 31725-C3 | 179.30 |
| | .125 (1/8) | **.058** | 4 | 5/16 | 2-1/2 | | 67708 | 114.00 | 67708-C3 | 128.70 |
| NEW | .125 (1/8) | .107 | 2 | 3/8 | 2-1/2 | | 748601 | 139.00 | 748601-C3 | 150.40 |
| | .125 (1/8) | **.107** | 4 | 3/8 | 2-1/2 | | 68125 | 139.00 | 68125-C3 | 156.60 |
| | .125 (1/8) | **.125** | 2 | 7/16 | 2-1/2 | | 941608 | 185.40 | 941608-C3 | 198.70 |
| | .125 (1/8) | **.154** | 4 | 7/16 | 2-1/2 | | 946725 | 185.40 | 946725-C3 | 198.70 |
| | .125 (1/8) | **.248** | 4 | 5/8 | 3-1/2 | | 21125 | 206.30 | 21125-C3 | 232.50 |
| | .140 (9/64) | **.058** | 2 | 3/8 | 2-1/2 | | 17140 | 136.70 | 17140-C3 | 154.30 |
| | .140 (9/64) | **.107** | 4 | 7/16 | 2-1/2 | | 68140 | 185.40 | 68140-C3 | 198.70 |
| | .156 (5/32) | **.058** | 2 | 3/8 | 2-1/2 | | 17156 | 136.70 | 17156-C3 | 154.30 |
| | .156 (5/32) | **.107** | 4 | 7/16 | 2-1/2 | | 68156 | 185.40 | 68156-C3 | 198.70 |
| | .156 (5/32) | **.248** | 4 | 5/8 | 3-1/2 | | 21156 | 227.00 | 21156-C3 | 253.10 |
| | .172 (11/64) | **.058** | 2 | 7/16 | 2-1/2 | | 17172 | 206.30 | 17172-C3 | 228.50 |
| | .187 (3/16) | **.058** | 2 | 7/16 | 2-1/2 | | 17187 | 206.30 | 17187-C3 | 228.50 |
| | .187 (3/16) | **.107** | 4 | 1/2 | 3 | | 68187 | 216.40 | 68187-C3 | 240.50 |
| | .187 (3/16) | **.125** | 2 | 5/8 | 3-1/2 | | 941612 | 249.00 | 941612-C3 | 266.50 |
| | .187 (3/16) | **.248** | 4 | 5/8 | 3-1/2 | | 21187 | 243.30 | 21187-C3 | 269.50 |
| | .197 (5 mm) | **.058** | 2 | 1/2 | 3 | | 17197 | 216.40 | 17197-C3 | 240.50 |
| | .197 (5 mm) | **.107** | 4 | 5/8 | 3-1/2 | | 68197 | 324.80 | 68197-C3 | 350.90 |
| | .219 (7/32) | **.058** | 2 | 1/2 | 3 | | 17219 | 218.40 | 17219-C3 | 234.00 |
| | .219 (7/32) | **.107** | 4 | 5/8 | 3-1/2 | | 68219 | 324.80 | 68219-C3 | 350.90 |
| | .236 (6 mm) | **.107** | 2 | 5/8 | 3-1/2 | | 17236 | 328.10 | 17236-C3 | 347.40 |
| | .236 (6 mm) | **.107** | 4 | 5/8 | 3-1/2 | | 68236 | 324.80 | 68236-C3 | 350.90 |
| | .250 (1/4) | **.058** | 2 | 5/8 | 3-1/2 | | 17199 | 328.10 | 17199-C3 | 354.30 |
| | .250 (1/4) | **.107** | 2 | 5/8 | 3-1/2 | | 17250 | 324.80 | 17250-C3 | 350.90 |
| | .250 (1/4) | **.107** | 4 | 5/8 | 3-1/2 | | 68250 | 324.80 | 68250-C3 | 350.90 |
| | .250 (1/4) | **.154** | 4 | 3/4 | 4 | | 946750 | 361.50 | 946750-C3 | 391.80 |
| | .250 (1/4) | **.247** | 4 | 3/4 | 4 | | 21250 | 361.50 | 21250-C3 | 391.80 |
| | .312 (5/16) | **.247** | 4 | 1 | 4 | | 21312 | 510.80 | 21312-C3 | 553.90 |
| | .375 (3/8) | **.246** | 4 | 1 | 4 | | 21375 | 557.60 | 21375-C3 | 600.80 |

# CORNER ROUNDING END MILLS

## 2 & 4 Flute – Unflared




- Unflared shoulder and pilot for full radius form
- Double-ended
- Axial depth of cut = radius plus .005″
- End cutting
- Solid carbide
- CNC ground in the USA




| RADIUS | PILOT DIA. | FLUTES | SHANK DIA. | OAL | | UNCOATED | | TiN COATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R +.0005″ −.0005″ | D1 | | D2 | L1 | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .005 | **.020** | 2 | 1/8 | 1-1/2 | | 932205 | 51.30 | | | 932205-C3 | 57.20 | | |
| .005 | **.047** | 2 | 1/8 | 1-1/2 | | 46005 | 39.50 | 46005-C1 | 43.50 | 46005-C3 | 45.50 | 46005-C4 | 58.40 |
| .008 | **.047** | 2 | 1/8 | 1-1/2 | | 46008 | 39.50 | 46008-C1 | 43.50 | 46008-C3 | 45.50 | | |
| .010 | **.020** | 2 | 1/8 | 1-1/2 | | 932210 | 51.30 | | | 932210-C3 | 58.70 | | |
| .010 | **.047** | 2 | 1/8 | 1-1/2 | | 46010 | 38.80 | 46010-C1 | 43.90 | 46010-C3 | 44.70 | 46010-C4 | 57.80 |
| .010 | **.060** | 4 | 1/8 | 1-1/2 | | 929910 | 62.20 | | | 929910-C3 | 69.60 | | |
| .010 | **.250** | 4 | 3/8 | 2-1/2 | | 44010 | 68.30 | | | 44010-C3 | 79.70 | | |
| .012 | **.047** | 2 | 1/8 | 1-1/2 | | 46012 | 39.50 | 46012-C1 | 44.50 | 46012-C3 | 45.50 | | |
| .015 (1/64) | **.020** | 2 | 1/8 | 1-1/2 | | 932215 | 51.30 | | | 932215-C3 | 58.70 | | |
| .015 (1/64) | **.047** | 2 | 1/8 | 1-1/2 | | 46015 | 38.80 | 46015-C1 | 43.90 | 46015-C3 | 44.70 | 46015-C4 | 57.80 |
| .015 (1/64) | **.047** | 2 | 3/16 | 4 | **LONG!** | 928015 | 80.70 | | | 928015-C3 | 87.80 | | |
| .015 (1/64) | **.060** | 4 | 1/8 | 1-1/2 | | 929915 | 62.20 | | | 929915-C3 | 69.60 | | |
| .015 (1/64) | **.250** | 4 | 3/8 | 2-1/2 | | 44015 | 68.30 | | | 44015-C3 | 81.00 | | |
| .018 | **.047** | 2 | 1/8 | 1-1/2 | | 46018 | 39.50 | 46018-C1 | 43.50 | 46018-C3 | 45.50 | | |
| .020 | **.020** | 2 | 1/8 | 1-1/2 | | 932220 | 51.30 | | | 932220-C3 | 58.70 | | |
| .020 | **.047** | 2 | 1/8 | 1-1/2 | | 46020 | 38.80 | 46020-C1 | 43.90 | 46020-C3 | 44.70 | 46020-C4 | 57.80 |
| .020 | **.047** | 2 | 3/16 | 4 | **LONG!** | 928020 | 79.00 | | | 928020-C3 | 86.20 | | |
| .020 | **.060** | 4 | 1/8 | 1-1/2 | | 929920 | 63.20 | | | 929920-C3 | 70.60 | | |
| .020 | **.250** | 4 | 3/8 | 2-1/2 | | 44020 | 68.30 | | | 44020-C3 | 81.00 | | |
| .022 | **.047** | 2 | 1/8 | 1-1/2 | | 46022 | 39.50 | 46022-C1 | 43.50 | 46022-C3 | 45.50 | | |
| .025 | **.020** | 2 | 1/8 | 1-1/2 | | 932225 | 51.30 | | | 932225-C3 | 57.20 | | |
| .025 | **.047** | 2 | 1/8 | 1-1/2 | | 46025 | 38.80 | 46025-C1 | 42.80 | 46025-C3 | 44.70 | 46025-C4 | 53.80 |
| .025 | **.250** | 4 | 3/8 | 2-1/2 | | 44025 | 68.30 | | | 44025-C3 | 81.00 | | |
| .027 | **.047** | 2 | 1/8 | 1-1/2 | | 46027 | 39.50 | 46027-C1 | 43.50 | 46027-C3 | 45.50 | | |
| .030 | **.047** | 2 | 1/8 | 1-1/2 | | 46030 | 39.50 | 46030-C1 | 44.50 | 46030-C3 | 45.50 | 46030-C4 | 58.40 |
| .030 | **.250** | 4 | 3/8 | 2-1/2 | | 44030 | 74.80 | | | 44030-C3 | 87.20 | | |
| .031 (1/32) | **.020** | 2 | 1/8 | 1-1/2 | | 932231 | 51.30 | | | 932231-C3 | 58.70 | | |
| .031 (1/32) | **.047** | 2 | 1/8 | 1-1/2 | | 46031 | 38.80 | 46031-C1 | 43.90 | 46031-C3 | 44.70 | 46031-C4 | 57.80 |
| .031 (1/32) | **.047** | 2 | 3/16 | 4 | **LONG!** | 928031 | 79.00 | | | 928031-C3 | 86.20 | | |
| .031 (1/32) | **.060** | 4 | 1/8 | 1-1/2 | | 929931 | 62.20 | | | 929931-C3 | 69.60 | | |
| .031 (1/32) | **.250** | 4 | 3/8 | 2-1/2 | | 44031 | 74.80 | | | 44031-C3 | 87.20 | | |
| .032 | **.047** | 2 | 1/8 | 1-1/2 | | 46032 | 43.90 | 46032-C1 | 47.90 | 46032-C3 | 49.80 | | |
| .035 | **.047** | 2 | 1/8 | 1-1/2 | | 46035 | 43.90 | 46035-C1 | 47.90 | 46035-C3 | 49.80 | | |
| .039 (1 mm) | **.020** | 2 | 1/8 | 1-1/2 | | 932239 | 44.70 | | | 932239-C3 | 50.70 | | |
| .039 (1 mm) | **.047** | 2 | 1/8 | 1-1/2 | | 46039 | 43.90 | 46039-C1 | 48.60 | 46039-C3 | 49.80 | 46039-C4 | 62.40 |
| .039 (1 mm) | **.060** | 4 | 3/16 | 2 | | 929939 | 63.20 | | | 929939-C3 | 72.00 | | |
| .039 (1 mm) | **.250** | 4 | 3/8 | 2-1/2 | | 44039 | 74.80 | | | 44039-C3 | 87.20 | | |

continued on next page

# CORNER ROUNDING END MILLS

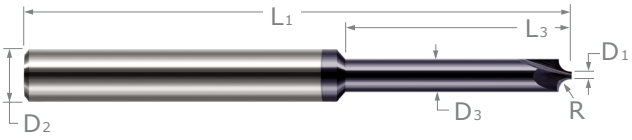
## 2 & 4 Flute – Unflared (cont.)

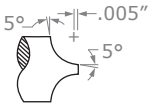
continued from previous page

| RADIUS | PILOT DIA. | FLUTES | SHANK DIA. | OAL | | UNCOATED | | TiN COATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R +.0005" −.0005" | $D_1$ | | $D_2$ | $L_1$ | | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .043 | **.047** | 2 | 3/16 | 2 | | 46043 | 52.20 | 46043-C1 | 56.70 | 46043-C3 | 58.40 | | |
| .047 (3/64) | **.047** | 2 | 3/16 | 2 | | 46047 | 51.30 | 46047-C1 | 55.70 | 46047-C3 | 60.20 | 46047-C4 | 68.00 |
| .047 (3/64) | **.250** | 4 | 3/8 | 2-1/2 | | 44047 | 76.30 | | | 44047-C3 | 87.70 | | |
| .050 | **.047** | 2 | 3/16 | 2 | | 46050 | 51.30 | 46050-C1 | 57.00 | 46050-C3 | 60.20 | 46050-C4 | 68.00 |
| .050 | **.250** | 4 | 3/8 | 2-1/2 | | 44050 | 74.80 | | | 44050-C3 | 87.20 | | |
| .055 | **.047** | 2 | 3/16 | 2 | | 46055 | 51.30 | 46055-C1 | 57.00 | 46055-C3 | 57.50 | | |
| .060 | **.047** | 2 | 3/16 | 2 | | 46060 | 53.00 | 46060-C1 | 58.60 | 46060-C3 | 61.80 | 46060-C4 | 79.10 |
| .060 | **.250** | 4 | 1/2 | 3 | | 44060 | 105.70 | | | 44060-C3 | 122.50 | | |
| .062 (1/16) | **.047** | 2 | 3/16 | 2 | | 46062 | 52.20 | 46062-C1 | 57.80 | 46062-C3 | 61.00 | 46062-C4 | 78.20 |
| .062 (1/16) | **.047** | 2 | 1/4 | 4 | **LONG!** | 928062 | 94.40 | | | 928062-C3 | 103.00 | | |
| .062 (1/16) | **.060** | 4 | 3/16 | 2 | | 929962 | 69.80 | | | 929962-C3 | 76.00 | | |
| .062 (1/16) | **.110** | 2 | 1/4 | 2 | | 793462 | 60.10 | | | 793462-C3 | 68.20 | | |
| .062 (1/16) | **.250** | 4 | 1/2 | 3 | | 44062 | 105.70 | | | 44062-C3 | 122.50 | | |
| .067 | **.047** | 2 | 3/16 | 2 | | 46067 | 53.00 | 46067-C1 | 57.50 | 46067-C3 | 61.80 | | |
| .072 | **.047** | 2 | 1/4 | 2 | | 46072 | 60.90 | 46072-C1 | 66.20 | 46072-C3 | 69.20 | | |
| .078 (5/64) | **.047** | 2 | 1/4 | 2 | | 46078 | 60.10 | 46078-C1 | 67.90 | 46078-C3 | 68.20 | 46078-C4 | 89.70 |
| .078 (5/64) | **.060** | 4 | 1/4 | 2 | | 929978 | 86.80 | | | 929978-C3 | 94.30 | | |
| .078 (5/64) | **.250** | 4 | 1/2 | 3 | | 44078 | 105.70 | | | 44078-C3 | 122.50 | | |
| .089 | **.047** | 2 | 1/4 | 2 | | 46089 | 60.90 | 46089-C1 | 66.20 | 46089-C3 | 69.20 | | |
| .093 (3/32) | **.047** | 2 | 1/4 | 2 | | 46093 | 60.90 | 46093-C1 | 68.80 | 46093-C3 | 69.20 | 46093-C4 | 90.70 |
| .093 (3/32) | **.047** | 2 | 5/16 | 4 | **LONG!** | 928093 | 112.70 | | | 928093-C3 | 129.00 | | |
| .093 (3/32) | **.060** | 4 | 1/4 | 2 | | 929993 | 86.80 | | | 929993-C3 | 98.70 | | |
| .093 (3/32) | **.110** | 2 | 5/16 | 2-1/2 | | 793493 | 93.30 | | | 793493-C3 | 103.00 | | |
| .093 (3/32) | **.250** | 4 | 1/2 | 3 | | 44093 | 119.00 | | | 44093-C3 | 135.20 | | |
| .100 | **.047** | 2 | 1/4 | 2 | | 46100 | 60.10 | 46100-C1 | 67.90 | 46100-C3 | 68.20 | 46100-C4 | 80.10 |
| .104 | **.060** | 2 | 5/16 | 2-1/2 | | 46104 | 84.80 | 46104-C1 | 91.70 | 46104-C3 | 99.20 | | |
| .109 (7/64) | **.060** | 2 | 5/16 | 2-1/2 | | 46109 | 83.50 | 46109-C1 | 90.30 | 46109-C3 | 97.80 | | |
| .118 (3 mm) | **.060** | 2 | 5/16 | 2-1/2 | | 46118 | 84.80 | 46118-C1 | 91.70 | 46118-C3 | 99.20 | 46118-C4 | 113.20 |
| .118 (3 mm) | **.250** | 4 | 1/2 | 3 | | 44118 | 119.00 | | | 44118-C3 | 135.20 | | |
| .125 (1/8) | **.060** | 2 | 5/16 | 2-1/2 | | 46125 | 84.80 | 46125-C1 | 94.10 | 46125-C3 | 99.20 | 46125-C4 | 110.30 |
| .125 (1/8) | **.060** | 2 | 3/8 | 4 | **LONG!** | 928125 | 168.30 | | | 928125-C3 | 187.00 | | |
| .125 (1/8) | **.110** | 2 | 3/8 | 3 | | 793508 | 139.20 | | | 793508-C3 | 153.70 | | |
| .125 (1/8) | **.250** | 4 | 5/8 | 3-1/2 | | 44125 | 174.50 | | | 44125-C3 | 193.80 | | |
| .140 (9/64) | **.060** | 2 | 3/8 | 2-1/2 | | 46140 | 97.50 | 46140-C1 | 105.60 | 46140-C3 | 114.80 | | |
| .156 (5/32) | **.060** | 2 | 3/8 | 2-1/2 | | 46156 | 105.40 | 46156-C1 | 116.20 | 46156-C3 | 122.50 | | |
| .156 (5/32) | **.250** | 4 | 5/8 | 3-1/2 | | 44156 | 187.70 | | | 44156-C3 | 207.00 | | |
| .172 (11/64) | **.060** | 2 | 7/16 | 2-1/2 | | 46172 | 173.20 | 46172-C1 | 182.60 | 46172-C3 | 195.10 | | |
| .187 (3/16) | **.060** | 2 | 7/16 | 2-1/2 | | 46187 | 178.50 | 46187-C1 | 189.60 | 46187-C3 | 200.30 | | |
| .187 (3/16) | **.250** | 4 | 5/8 | 3-1/2 | | 44187 | 205.20 | | | 44187-C3 | 224.50 | | |
| .197 (5 mm) | **.060** | 2 | 1/2 | 3 | | 46197 | 247.90 | 46197-C1 | 270.70 | 46197-C3 | 263.40 | | |
| .219 (7/32) | **.060** | 2 | 1/2 | 3 | | 46219 | 237.90 | 46219-C1 | 248.90 | 46219-C3 | 253.50 | | |
| .236 (6 mm) | **.110** | 2 | 5/8 | 3-1/2 | | 46236 | 317.70 | 46236-C1 | 331.30 | 46236-C3 | 337.00 | | |
| .250 (1/4) | **.060** | 4 | 5/8 | 3-1/2 | | 930016 | 334.90 | | | 930016-C3 | 360.40 | | |
| .250 (1/4) | **.110** | 2 | 5/8 | 3-1/2 | | 46250 | 317.70 | 46250-C1 | 343.40 | 46250-C3 | 343.40 | | |
| .250 (1/4) | **.250** | 4 | 3/4 | 4 | | 44250 | 333.20 | | | 44250-C3 | 362.80 | | |
| .312 (5/16) | **.250** | 2 | 1 | 4 | | 46312 | 493.60 | 46312-C1 | 517.00 | 46312-C3 | 536.00 | | |
| .375 (3/8) | **.250** | 2 | 1 | 4 | | 46375 | 538.00 | 46375-C1 | 561.50 | 46375-C3 | 571.20 | | |

# CORNER ROUNDING END MILLS

## Long Reach – Flared



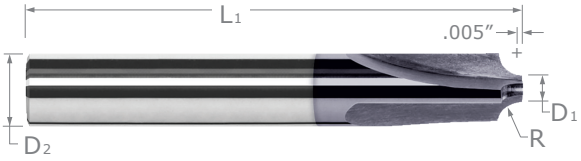



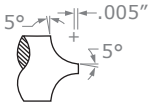

- **Reduced diameter for clearance along walls and in small features**
- Small pilot design for miniature holes, narrow slots and small inside corners
- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Axial depth of cut = radius plus .005″ • 2 flutes • Solid carbide
- CNC ground in the USA

| RADIUS | PILOT DIAMETER | NECK DIAMETER | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| R +.0005″ −.0005″ | D1 +.000″ −.001″ | D3 | L3 +.010″ −.000″ | D2 | L1 | 2 FL | USD$ | 2 FL | USD$ |
| .005 | .010 | .031 | .156 | 1/8 | 1-1/2 | 994605 | 47.40 | 994605-C3 | 53.40 |
| | .010 | .031 | .250 | 1/8 | 1-1/2 | 56905 | 47.40 | 56905-C3 | 53.40 |
| | .010 | .031 | .375 | 1/8 | 1-1/2 | 57305 | 49.00 | | |
| | .020 | .031 | .156 | 1/8 | 1-1/2 | 992205 | 47.40 | 992205-C3 | 53.40 |
| | .020 | .031 | .250 | 1/8 | 1-1/2 | 55705 | 47.40 | 55705-C3 | 53.40 |
| | .020 | .031 | .375 | 1/8 | 1-1/2 | 56005 | 49.40 | | |
| | .020 | .062 | .312 | 1/8 | 1-1/2 | 990905 | 47.40 | 990905-C3 | 53.40 |
| | .020 | .062 | .500 | 1/8 | 1-1/2 | 57505 | 47.40 | 57505-C3 | 53.40 |
| | .020 | .062 | .750 | 1/8 | 2 | 55305 | 49.00 | | |
| | .020 | .093 | .750 | 1/8 | 2 | 57405 | 54.60 | | |
| | .020 | .093 | 1.125 | 1/8 | 2 | 54305 | 55.10 | | |
| .008 | .010 | .031 | .156 | 1/8 | 1-1/2 | 994608 | 47.40 | 994608-C3 | 53.40 |
| | .010 | .031 | .250 | 1/8 | 1-1/2 | 56908 | 47.40 | | |
| | .010 | .031 | .375 | 1/8 | 1-1/2 | 57308 | 49.00 | 57308-C3 | 54.90 |
| .010 | .010 | .031 | .156 | 1/8 | 1-1/2 | 994610 | 47.40 | 994610-C3 | 53.40 |
| | .010 | .031 | .250 | 1/8 | 1-1/2 | 56910 | 47.40 | 56910-C3 | 53.40 |
| | .010 | .031 | .375 | 1/8 | 1-1/2 | 57310 | 49.00 | | |
| | .020 | .062 | .312 | 1/8 | 1-1/2 | 990910 | 47.40 | 990910-C3 | 53.40 |
| | .020 | .062 | .500 | 1/8 | 1-1/2 | 57510 | 47.40 | 57510-C3 | 53.40 |
| | .020 | .062 | .750 | 1/8 | 2 | 55310 | 49.00 | | |
| | .020 | .093 | .750 | 1/8 | 2 | 57410 | 54.60 | | |
| | .020 | .093 | 1.125 | 1/8 | 2 | 54310 | 54.60 | | |
| .015 | .020 | .062 | .312 | 1/8 | 1-1/2 | 990915 | 47.40 | 990915-C3 | 53.40 |
| | .020 | .062 | .500 | 1/8 | 1-1/2 | 57515 | 47.40 | 57515-C3 | 53.40 |
| | .020 | .062 | .750 | 1/8 | 2 | 55315 | 49.00 | 55315-C3 | 54.90 |
| | .020 | .093 | .750 | 1/8 | 2 | 57415 | 54.60 | 57415-C3 | 60.50 |
| | .020 | .093 | 1.125 | 1/8 | 2 | 54315 | 55.10 | | |
| .020 | .020 | .062 | .312 | 1/8 | 1-1/2 | 990920 | 47.40 | 990920-C3 | 53.40 |
| | .020 | .062 | .500 | 1/8 | 1-1/2 | 57520 | 47.40 | 57520-C3 | 53.40 |
| | .020 | .062 | .750 | 1/8 | 2 | 55320 | 49.00 | | |
| | .020 | .093 | .750 | 1/8 | 2 | 57420 | 54.60 | 57420-C3 | 60.50 |
| | .020 | .093 | 1.125 | 1/8 | 2 | 54320 | 54.60 | | |
| .025 | .020 | .093 | .750 | 1/8 | 2 | 57425 | 54.60 | 57425-C3 | 60.50 |
| | .020 | .093 | 1.125 | 1/8 | 2 | 54325 | 54.60 | | |
| .030 | .020 | .093 | .750 | 1/8 | 2 | 57430 | 54.60 | 57430-C3 | 60.50 |
| | .020 | .093 | 1.125 | 1/8 | 2 | 54330 | 54.60 | 54330-C3 | 60.50 |
| .031 | .020 | .093 | .750 | 1/8 | 2 | 57431 | 54.60 | 57431-C3 | 60.50 |
| | .020 | .093 | 1.125 | 1/8 | 2 | 54331 | 55.10 | | |

# CORNER ROUNDING END MILLS

## 3 Flute – Flared



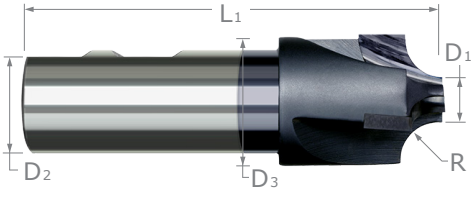



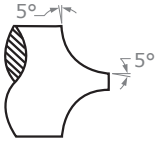

- Single end
- Cutting on radius, flares, and end only (not center cutting)
- 5° flares tangent at pilot and shoulder to avoid steps
- Axial depth of cut ≈ radius plus .005″
- 3 flutes
- Solid carbide
- CNC ground in the USA

| RADIUS | PILOT DIAMETER | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|
| R +.0005″ −.0005″ | D1 | D2 | L1 | 3 FL | USD$ | 3 FL | USD$ |
| .015 (1/64) | .046 | 1/8 | 1-1/2 | 760215 | 39.20 | 760215-C3 | 45.20 |
| .015 (1/64) | .058 | 1/8 | 1-1/2 | 933415 | 39.20 | 933415-C3 | 45.20 |
| .020 | .046 | 1/8 | 1-1/2 | 760220 | 39.20 | 760220-C3 | 45.20 |
| .020 | .058 | 1/8 | 1-1/2 | 933420 | 39.20 | 933420-C3 | 45.20 |
| .031 (1/32) | .046 | 1/8 | 1-1/2 | 760231 | 39.20 | 760231-C3 | 45.20 |
| .031 (1/32) | .058 | 1/8 | 1-1/2 | 933431 | 39.20 | 933431-C3 | 45.20 |
| .062 (1/16) | .058 | 3/16 | 2 | 933462 | 50.10 | 933462-C3 | 56.60 |
| .062 (1/16) | .154 | 5/16 | 2-1/2 | 928262 | 85.80 | 928262-C3 | 96.30 |
| .093 (3/32) | .058 | 1/4 | 2 | 933493 | 73.70 | 933493-C3 | 81.20 |
| .093 (3/32) | .154 | 3/8 | 2-1/2 | 928293 | 97.90 | 928293-C3 | 109.30 |
| .125 (1/8) | .058 | 5/16 | 2-1/2 | 933508 | 85.80 | 933508-C3 | 96.30 |
| .125 (1/8) | .248 | 5/8 | 3-1/2 | 973008 | 143.60 | 973008-C3 | 162.20 |
| .187 (3/16) | .058 | 7/16 | 2-1/2 | 933512 | 140.90 | 933512-C3 | 154.10 |
| .187 (3/16) | .248 | 5/8 | 3-1/2 | 973012 | 162.90 | 973012-C3 | 182.20 |

# CORNER ROUNDING END MILLS

## 3 Flute – Flared – Carbide Tipped



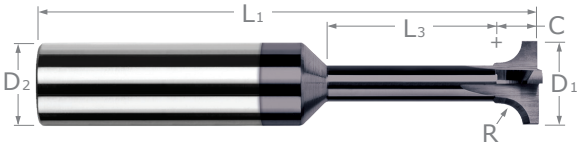



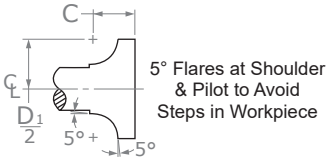

- Carbide tipped - cutting on radius and flares only
- 5° flares tangent to radius at pilot and shoulder to avoid steps
- 3 flutes
- Weldon flat
- CNC ground in the USA

| RADIUS | PILOT DIAMETER | HEAD DIAMETER | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| R | D1 | D3 | D2 | L1 | 3 FL | USD$ | 3 FL | USD$ |
| 1/4 | 13/32 | 1 | 3/4 | 3-1/4 | 45016 | 268.20 | 45016-C3 | 297.10 |
| 5/16 | 13/32 | 1-1/8 | 7/8 | 3-1/2 | 45020 | 274.90 | 45020-C3 | 298.30 |
| 3/8 | 13/32 | 1-1/4 | 7/8 | 3-3/4 | 45024 | 284.60 | 45024-C3 | 309.20 |
| 7/16 | 13/32 | 1-3/8 | 1 | 4 | 45028 | 318.90 | 45028-C3 | 347.90 |
| 1/2 | 13/32 | 1-1/2 | 1 | 4 | 45032 | 352.70 | 45032-C3 | 381.80 |
| 5/8 | 21/32 | 2 | 1-1/4 | 4-1/4 | 45040 | 437.60 | 45040-C3 | 489.00 |

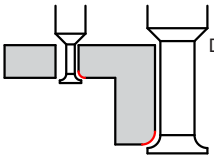
# CORNER ROUNDING END MILLS

## Back Corner Rounding End Mills – Flared




- Designed to mill radius on backside of workpiece
- 5° flares at neck and shoulder to avoid steps
- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Cutting on radius and flares only
- Solid carbide
- CNC ground in the USA




| RADIUS | HEAD DIAMETER | NECK DIAMETER | NECK LENGTH | RADIUS CENTER | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R +.0005″ −.0005″ | D1 +.000″ −.002″ | | L3 | C +.003″ −.001″* | | D2 | L1 | TOOL # | USD$ | TOOL # | USD$ |
| .005 | .030 | .017 | .062 | .025 | 3 | 1/8 | 1-1/2 | 57705 | 76.80 | 57705-C3 | 82.70 |
| .005 | .060 | .047 | .250 | .025 | 3 | 1/8 | 1-1/2 | 58005 | 76.80 | 58005-C3 | 82.70 |
| .005 | .115 | .102 | .875 | .025 | 3 | 1/8 | 2 | 59805 | 80.00 | 59805-C3 | 85.90 |
| .008 | .075 | .056 | .312 | .028 | 3 | 1/8 | 1-1/2 | 58708 | 76.80 | 58708-C3 | 82.70 |
| .008 | .187 | .144 | .500 | .070 | 3 | 3/16 | 2 | 16008 | 81.60 | 16008-C3 | 88.20 |
| .010 | .045 | .022 | .078 | .030 | 3 | 1/8 | 1-1/2 | 60910 | 76.80 | 60910-C3 | 82.70 |
| .010 | .075 | .052 | .281 | .030 | 3 | 1/8 | 1-1/2 | 58710 | 76.80 | 58710-C3 | 82.70 |
| .010 | .115 | .092 | .281 | .030 | 3 | 1/8 | 1-1/2 | 59810 | 76.80 | 59810-C3 | 82.70 |
| .010 | .187 | .140 | .500 | .072 | 3 | 3/16 | 2 | 16010 | 81.60 | 16010-C3 | 88.20 |
| .012 | .075 | .048 | .250 | .032 | 3 | 1/8 | 1-1/2 | 58712 | 76.80 | 58712-C3 | 82.70 |
| .015 (1/64) | .060 | .027 | .093 | .035 | 3 | 1/8 | 1-1/2 | 58515 | 76.80 | 58515-C3 | 82.70 |
| .015 (1/64) | .090 | .057 | .312 | .035 | 3 | 1/8 | 1-1/2 | 59715 | 76.80 | 59715-C3 | 82.70 |
| .015 (1/64) | .115 | .082 | .281 | .035 | 3 | 1/8 | 1-1/2 | 59815 | 76.80 | 59815-C3 | 82.70 |
| .015 (1/64) | .187 | .130 | .500 | .077 | 3 | 3/16 | 2 | 16015 | 81.60 | 16015-C3 | 88.20 |
| .015 (1/64) | .187 | .130 | 1.000 | .077 | 3 | 3/16 | 2-1/2 | 992815 | 82.90 | 992815-C3 | 89.60 |
| .020 | .075 | .032 | .109 | .040 | 3 | 1/8 | 1-1/2 | 59220 | 76.80 | 59220-C3 | 82.70 |
| .020 | .115 | .072 | .375 | .040 | 3 | 1/8 | 1-1/2 | 60420 | 76.80 | 60420-C3 | 82.70 |
| .020 | .187 | .120 | .500 | .082 | 3 | 3/16 | 2 | 16020 | 81.60 | 16020-C3 | 88.20 |
| .022 | .187 | .116 | .500 | .084 | 3 | 3/16 | 2 | 16022 | 81.60 | 16022-C3 | 88.20 |
| .025 | .090 | .037 | .125 | .055 | 3 | 1/8 | 1-1/2 | 60125 | 76.80 | 60125-C3 | 82.70 |
| .025 | .187 | .110 | .500 | .087 | 3 | 3/16 | 2 | 16025 | 81.60 | 16025-C3 | 88.20 |
| .027 | .187 | .106 | .500 | .089 | 3 | 3/16 | 2 | 16027 | 81.60 | 16027-C3 | 87.80 |
| .030 | .115 | .052 | .187 | .060 | 3 | 1/8 | 1-1/2 | 60630 | 76.80 | 60630-C3 | 82.70 |
| .030 | .187 | .100 | .500 | .092 | 3 | 3/16 | 2 | 16030 | 81.60 | 16030-C3 | 88.20 |
| .030 | .187 | .100 | 1.000 | .092 | 3 | 3/16 | 2-1/2 | 992830 | 82.90 | 992830-C3 | 89.60 |
| .031 (1/32) | .115 | .050 | .156 | .061 | 3 | 1/8 | 1-1/2 | 60631 | 76.80 | 60631-C3 | 82.70 |
| .031 (1/32) | .187 | .098 | .500 | .093 | 3 | 3/16 | 2 | 16031 | 81.60 | 16031-C3 | 88.20 |
| .031 (1/32) | .187 | .098 | 1.000 | .093 | 3 | 3/16 | 2-1/2 | 992831 | 82.90 | 992831-C3 | 89.60 |
| .035 | .250 | .153 | .500 | .097 | 3 | 1/4 | 2-1/2 | 16035 | 88.70 | 16035-C3 | 97.70 |
| .039 (1 mm) | .250 | .145 | .500 | .101 | 3 | 1/4 | 2-1/2 | 16039 | 88.70 | 16039-C3 | 97.70 |
| .039 (1 mm) | .250 | .145 | 1.000 | .101 | 3 | 1/4 | 2-1/2 | 992839 | 88.70 | 992839-C3 | 97.70 |

*Radius center is in the same plane as cutter OD (radial component of radius center = D1/2, see above drawing).

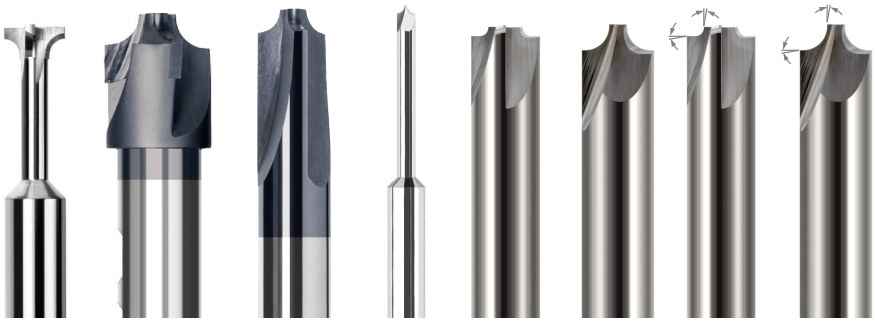
continued on next page

# CORNER ROUNDING END MILLS

## Back Corner Rounding End Mills – Flared (cont.)

continued from previous page

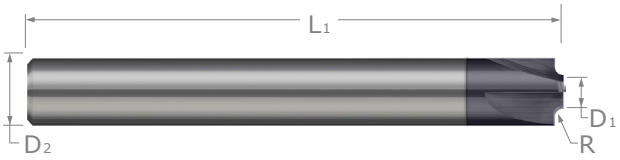
| RADIUS | HEAD DIAMETER | NECK DIAMETER | NECK LENGTH | RADIUS CENTER | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| R $^{+.0005''}_{-.0005''}$ | $D_1$ $^{+.000''}_{-.002''}$ | | $L_3$ | C $^{+.003''}_{-.001''}$* | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .040 | .250 | .143 | .500 | .102 | 3 | 1/4 | 2-1/2 | 16040 | 88.70 | 16040-C3 | 97.70 |
| .045 | .250 | .133 | .500 | .107 | 3 | 1/4 | 2-1/2 | 16045 | 88.70 | 16045-C3 | 97.70 |
| .047 (3/64) | .250 | .128 | .625 | .109 | 3 | 1/4 | 2-1/2 | 16047 | 88.70 | 16047-C3 | 97.70 |
| .047 (3/64) | .250 | .128 | 1.250 | .109 | 3 | 1/4 | 3 | 992847 | 97.90 | 992847-C3 | 106.00 |
| .050 | .250 | .122 | .375 | .112 | 3 | 1/4 | 2-1/2 | 985050 | 88.70 | 985050-C3 | 97.70 |
| .050 | .250 | .122 | .625 | .112 | 3 | 1/4 | 2-1/2 | 16050 | 88.70 | 16050-C3 | 97.70 |
| .050 | .250 | .122 | 1.250 | .112 | 3 | 1/4 | 3 | 992850 | 97.10 | 992850-C3 | 106.00 |
| .055 | .250 | .113 | .625 | .117 | 3 | 1/4 | 2-1/2 | 16055 | 88.70 | 16055-C3 | 96.80 |
| .060 | .312 | .164 | .437 | .122 | 3 | 5/16 | 2-1/2 | 985060 | 121.70 | 985060-C3 | 132.20 |
| .060 | .312 | .165 | .875 | .122 | 3 | 5/16 | 2-1/2 | 16060 | 121.70 | 16060-C3 | 132.20 |
| .062 (1/16) | .312 | .160 | .437 | .124 | 3 | 5/16 | 2-1/2 | 985062 | 121.70 | 985062-C3 | 132.20 |
| .062 (1/16) | .312 | .161 | .875 | .124 | 3 | 5/16 | 2-1/2 | 16062 | 121.70 | 16062-C3 | 132.20 |
| .062 (1/16) | .312 | .160 | 1.250 | .124 | 3 | 5/16 | 3 | 992862 | 128.60 | 992862-C3 | 139.00 |
| .070 | .375 | .207 | .875 | .132 | 3 | 3/8 | 2-1/2 | 16070 | 139.30 | 16070-C3 | 150.70 |
| .078 (5/64) | .375 | .191 | .500 | .171 | 3 | 3/8 | 2-1/2 | 985078 | 139.30 | 985078-C3 | 150.70 |
| .078 (5/64) | .375 | .191 | 1.000 | .171 | 3 | 3/8 | 2-1/2 | 16078 | 139.30 | 16078-C3 | 150.70 |
| .078 (5/64) | .375 | .191 | 1.500 | .171 | 3 | 3/8 | 3 | 992878 | 151.20 | 992878-C3 | 162.70 |
| .080 | .375 | .187 | 1.000 | .173 | 3 | 3/8 | 2-1/2 | 16080 | 139.30 | 16080-C3 | 150.70 |
| .090 | .375 | .167 | 1.000 | .183 | 3 | 3/8 | 2-1/2 | 16090 | 140.80 | 16090-C3 | 152.20 |
| .093 (3/32) | .375 | .161 | .500 | .186 | 3 | 3/8 | 2-1/2 | 985093 | 139.30 | 985093-C3 | 150.70 |
| .093 (3/32) | .375 | .161 | 1.000 | .186 | 3 | 3/8 | 2-1/2 | 16093 | 139.30 | 16093-C3 | 150.70 |
| .093 (3/32) | .375 | .161 | 1.500 | .186 | 3 | 3/8 | 3 | 992893 | 151.20 | 992893-C3 | 162.70 |
| .100 | .500 | .272 | .500 | .193 | 4 | 1/2 | 3 | 985100 | 200.90 | 985100-C3 | 216.40 |
| .100 | .500 | .272 | 1.000 | .193 | 4 | 1/2 | 3 | 16100 | 200.90 | 16100-C3 | 218.30 |
| .118 (3 mm) | .500 | .236 | 1.000 | .211 | 4 | 1/2 | 3 | 1613M | 200.90 | 1613M-C3 | 218.30 |
| .125 (1/8) | .500 | .222 | .500 | .218 | 4 | 1/2 | 3 | 985108 | 200.90 | 985108-C3 | 218.30 |
| .125 (1/8) | .500 | .222 | 1.000 | .218 | 4 | 1/2 | 3 | 16108 | 200.90 | 16108-C3 | 218.30 |
| .125 (1/8) | .500 | .222 | 1.500 | .218 | 4 | 1/2 | 3-1/2 | 992908 | 208.50 | 992908-C3 | 226.10 |
| .156 (5/32) | .625 | .284 | 1.000 | .250 | 4 | 5/8 | 3-1/2 | 16110 | 272.20 | 16110-C3 | 289.80 |
| .187 (3/16) | .625 | .222 | 1.000 | .281 | 4 | 5/8 | 3-1/2 | 16112 | 272.20 | 16112-C3 | 289.80 |
| .250 (1/4) | 1.000 | .471 | 1.500 | .376 | 4 | 1 | 4 | 16116 | 408.80 | 16116-C3 | 440.50 |

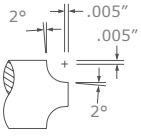


**Check Out All of Our Corner Rounding Solutions!**

# CORNER ROUNDING END MILLS

## 4 Flute – Flared – High Performance

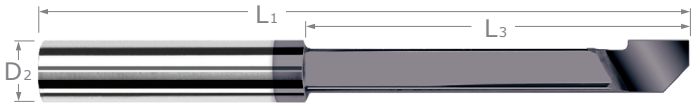


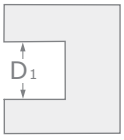




- Helically ground with positive rake for high performance and excellent part finish
- 2° flares for smooth transitions
- Radius center is offset .005″ from end of tool
- AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

| RADIUS | PILOT DIAMETER | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|
| R $^{+.0005″}_{-.0005″}$ | $D_1$ | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .020 | .058 | 1/8 | 1-1/2 | 728620 | 41.60 | 728620-C6 | 48.50 |
| .031 (1/32) | .058 | 1/8 | 1-1/2 | 728631 | 41.60 | 728631-C6 | 48.50 |
| .031 (1/32) | .107 | 3/16 | 2 | 712931 | 47.20 | 712931-C6 | 54.90 |
| .031 (1/32) | .125 | 1/4 | 2-1/2 | 712731 | 56.10 | 712731-C6 | 65.80 |
| .039 (1 mm) | .058 | 3/16 | 2 | 728639 | 47.20 | 728639-C6 | 54.90 |
| .047 (3/64) | .107 | 1/4 | 2 | 712947 | 55.50 | 712947-C6 | 64.70 |
| .047 (3/64) | .125 | 1/4 | 2-1/2 | 712747 | 56.10 | 712747-C6 | 65.80 |
| .062 (1/16) | .107 | 1/4 | 2 | 712962 | 55.50 | 712962-C6 | 64.70 |
| .062 (1/16) | .125 | 1/4 | 2-1/2 | 712762 | 56.10 | 712762-C6 | 65.80 |
| .078 (5/64) | .125 | 5/16 | 2-1/2 | 712778 | 100.90 | 712778-C6 | 112.60 |
| .078 (5/64) | .249 | 7/16 | 2-1/2 | 712578 | 101.80 | 712578-C6 | 118.00 |
| .093 (3/32) | .249 | 7/16 | 2-1/2 | 712593 | 106.20 | 712593-C6 | 122.40 |
| .100 | .249 | 1/2 | 3 | 712600 | 106.80 | 712600-C6 | 125.70 |
| .125 (1/8) | .249 | 1/2 | 3 | 712608 | 118.70 | 712608-C6 | 137.60 |

# BORING BARS



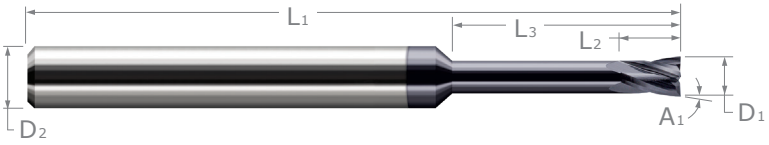

- Helical back rake flute improves accuracy and chip flow
- Square neck improves rigidity and has less deflection
- Tip is ground to sharp corner
- 70% stronger than round neck design
- Solid carbide
- CNC ground in the USA

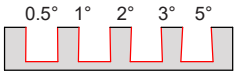
**Helical Back Rake Design!**

| MIN. BORE DIAMETER | MAX BORE DEPTH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|
| $D_1$ | $L_3$ | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .031 | **5/32** | 1/8 | 1-1/2 | 29030 | 40.80 | 29030-C3 | 46.70 |
| .036 | **5/32** | 1/8 | 1-1/2 | 29035 | 41.60 | | |
| .042 | **1/4** | 1/8 | 1-1/2 | 29040 | 37.40 | 29040-C3 | 43.30 |
| .052 | **5/16** | 1/8 | 1-1/2 | 29050 | 36.10 | 29050-C3 | 42.00 |
| .057 | **5/16** | 1/8 | 1-1/2 | 29055 | 36.10 | | |
| .062 | **3/8** | 1/8 | 1-1/2 | 29060 | 36.10 | 29060-C3 | 42.00 |
| .062 | **1/2** | 1/8 | 1-1/2 | 29060L | 38.20 | 29060L-C3 | 44.10 |
| .072 | **7/16** | 1/8 | 1-1/2 | 29070 | 36.10 | 29070-C3 | 42.00 |
| .082 | **1/2** | 1/8 | 1-1/2 | 29080 | 36.10 | | |
| .087 | **1/2** | 1/8 | 1-1/2 | 29085 | 36.10 | | |
| .087 | **5/8** | 1/8 | 2 | 29085L | 42.60 | 29085L-C3 | 48.50 |
| .092 | **1/2** | 1/8 | 1-1/2 | 29090 | 36.10 | 29090-C3 | 42.00 |
| .092 | **5/8** | 1/8 | 2 | 29090L | 42.60 | 29090L-C3 | 48.50 |
| .102 | **9/16** | 1/8 | 1-1/2 | 29100 | 36.10 | 29100-C3 | 42.00 |
| .102 | **5/8** | 1/8 | 2 | 29100L | 43.50 | 29100L-C3 | 49.40 |
| .112 | **9/16** | 1/8 | 1-1/2 | 29110 | 36.10 | 29110-C3 | 42.00 |
| .112 | **5/8** | 1/8 | 2 | 29110L | 42.60 | 29110L-C3 | 48.50 |
| .120 | **5/8** | 1/8 | 1-1/2 | 29120 | 36.10 | 29120-C3 | 42.00 |
| .120 | **3/4** | 1/8 | 2 | 29120L | 42.60 | 29120L-C3 | 48.50 |
| .135 | **3/4** | 5/32 | 2 | 29135 | 40.50 | 29135-C3 | 47.00 |
| .150 | **3/4** | 3/16 | 2 | 29150 | 41.60 | 29150-C3 | 48.10 |
| .150 | **1** | 3/16 | 2 | 29150L | 49.70 | 29150L-C3 | 56.10 |
| .150 | **1-1/2** | 3/16 | 2-1/2 | 29150XL | 53.00 | 29150XL-C3 | 59.70 |
| .180 | **1** | 3/16 | 2 | 29180 | 41.60 | 29180-C3 | 48.10 |
| .180 | **1-1/2** | 3/16 | 2-1/2 | 29180L | 50.40 | 29180L-C3 | 57.10 |
| .180 | **2** | 3/16 | 3 | 29180XL | 65.90 | 29180XL-C3 | 72.60 |
| .210 | **1** | 1/4 | 2 | 29210 | 43.40 | 29210-C3 | 52.10 |
| .210 | **1-1/2** | 1/4 | 2-1/2 | 29210L | 51.10 | 29210L-C3 | 59.80 |
| .210 | **2** | 1/4 | 3 | 29210XL | 62.90 | 29210XL-C3 | 71.70 |
| .240 | **1** | 1/4 | 2 | 29240 | 43.40 | 29240-C3 | 52.10 |
| .240 | **1-1/2** | 1/4 | 2-1/2 | 29240L | 51.10 | 29240L-C3 | 59.80 |
| .240 | **2** | 1/4 | 3 | 29240XL | 75.50 | 29240XL-C3 | 84.20 |
| .300 | **1** | 5/16 | 2-1/2 | 29300 | 105.10 | 29300-C3 | 115.40 |
| .360 | **2** | 3/8 | 3 | 29360 | 137.80 | 29360-C3 | 149.30 |

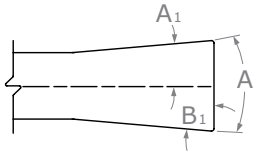
# BACKDRAFT CUTTERS

## Square




- Designed to clean up bottom corner of pockets while backdraft angle minimizes rubbing
- 4 helical flutes (20° helix)
- Center cutting
- Solid carbide
- CNC ground in the USA



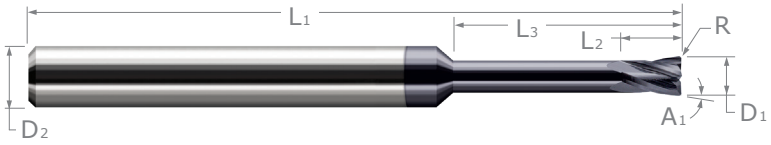

A = 180 - 2B1
B1 = 90 - (A/2)
B1= 90 - A1
A1= 90 - B1
A1= A/2
A= 2A1

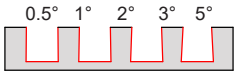
| ANGLES PER SIDE | CUTTER DIA. | LOC | NECK DIA. | OVERALL REACH | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ +0°15' −0°15' | $D_1$ +.0005" −.0005" | $L_2$ +.010" −.000" | | $L_3$ +.010" −.000" | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| **0.5°** | **.062** | .093 | .058 | .312 (5x) | 1/8 | 2-1/2 | 781362 | 62.30 | 781362-C3 | 68.20 |
| | **.093** | .139 | .088 | .500 (5x) | 1/8 | 2-1/2 | 781393 | 62.30 | 781393-C3 | 68.20 |
| **1°** | **.062** | .093 | .056 | .312 (5x) | 1/8 | 2-1/2 | 780762 | 62.30 | 780762-C3 | 68.20 |
| | **.093** | .139 | .086 | .500 (5x) | 1/8 | 2-1/2 | 780793 | 62.30 | 780793-C3 | 68.20 |
| **2°** | **.062** | .093 | .053 | .312 (5x) | 1/8 | 2-1/2 | 780162 | 62.30 | 780162-C3 | 68.20 |
| | **.093** | .139 | .081 | .500 (5x) | 1/8 | 2-1/2 | 780193 | 61.80 | 780193-C3 | 67.70 |
| **3°** | **.062** | .093 | .049 | .312 (5x) | 1/8 | 2-1/2 | 779562 | 61.80 | 779562-C3 | 67.70 |
| | **.093** | .139 | .075 | .500 (5x) | 1/8 | 2-1/2 | 779593 | 61.80 | 779593-C3 | 67.70 |
| **5°** | **.062** | .093 | .042 | .312 (5x) | 1/8 | 2-1/2 | 716162 | 61.80 | 716162-C3 | 67.70 |
| | **.093** | .139 | .065 | .500 (5x) | 1/8 | 2-1/2 | 716193 | 61.80 | 716193-C3 | 67.70 |

| $A_1$ +0°15' −0°15' | $D_1$ +.000" −.002" | $L_2$ +.030" −.000" | | $L_3$ +.030" −.000" | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|
| **0.5°** | **.125** | .187 | .117 | .625 (5x) | 1/8 | 2-1/2 | 781408 | 62.30 | 781408-C3 | 68.20 |
| | **.187** | .285 | .177 | 1.000 (5x) | 3/16 | 2-1/2 | 781412 | 67.40 | 781412-C3 | 74.00 |
| | **.250** | .375 | .238 | 1.250 (5x) | 1/4 | 2-1/2 | 781416 | 74.80 | 781416-C3 | 83.70 |
| **1°** | **.125** | .187 | .113 | .625 (5x) | 1/8 | 2-1/2 | 780808 | 62.30 | 780808-C3 | 68.20 |
| | **.187** | .285 | .172 | 1.000 (5x) | 3/16 | 2-1/2 | 780812 | 67.40 | 780812-C3 | 74.00 |
| | **.250** | .375 | .231 | 1.250 (5x) | 1/4 | 2-1/2 | 780816 | 74.80 | 780816-C3 | 83.70 |
| **2°** | **.125** | .187 | .105 | .625 (5x) | 1/8 | 2-1/2 | 780208 | 61.80 | 780208-C3 | 67.70 |
| | **.187** | .285 | .160 | 1.000 (5x) | 3/16 | 2-1/2 | 780212 | 67.40 | 780212-C3 | 74.00 |
| | **.250** | .375 | .217 | 1.250 (5x) | 1/4 | 2-1/2 | 780216 | 74.80 | 780216-C3 | 83.70 |
| **3°** | **.125** | .187 | .098 | .625 (5x) | 1/8 | 2-1/2 | 779608 | 61.80 | 779608-C3 | 67.70 |
| | **.187** | .285 | .149 | 1.000 (5x) | 3/16 | 2-1/2 | 779612 | 66.60 | 779612-C3 | 73.30 |
| | **.250** | .375 | .203 | 1.250 (5x) | 1/4 | 2-1/2 | 779616 | 74.80 | 779616-C3 | 83.70 |
| **5°** | **.125** | .187 | .083 | .625 (5x) | 1/8 | 2-1/2 | 716208 | 61.80 | 716208-C3 | 67.70 |
| | **.187** | .285 | .127 | 1.000 (5x) | 3/16 | 2-1/2 | 716212 | 66.60 | 716212-C3 | 73.30 |
| | **.250** | .375 | .175 | 1.250 (5x) | 1/4 | 2-1/2 | 716216 | 74.80 | 716216-C3 | 82.90 |

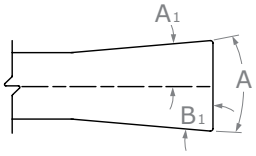
# BACKDRAFT CUTTERS

## Corner Radius




- Designed to clean up bottom corner of pockets while backdraft angle minimizes rubbing
- Corner radius for improved strength and wear resistance
- 4 helical flutes (20° helix)
- Center cutting
- Solid carbide
- CNC ground in the USA

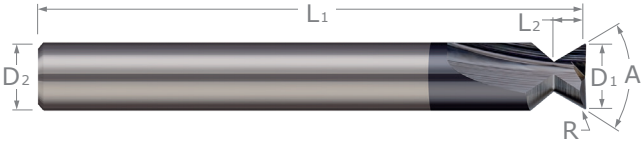


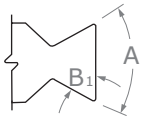

A = 180 - 2B1
B1 = 90 - (A/2)
B1= 90 - A1
A1= 90 - B1
A1= A/2
A= 2A1

| ANGLES PER SIDE | CUTTER DIA. | CORNER RADIUS | LOC | NECK DIA. | OVERALL REACH | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $A_1$ +0°15' −0°15' | $D_1$ +.0005" −.0005" | R +001" −001" | $L_2$ +.010" −.000" | | $L_3$ +.010" −.000" | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| **0.5°** | **.062** | .005 | .093 | .058 | .312 (5x) | 1/8 | 2-1/2 | 780962 | 62.60 | 780962-C3 | 68.50 |
| | **.093** | .005 | .139 | .088 | .500 (5x) | 1/8 | 2-1/2 | 780993 | 60.80 | 780993-C3 | 66.70 |
| **1°** | **.062** | .005 | .093 | .056 | .312 (5x) | 1/8 | 2-1/2 | 780362 | 63.80 | 780362-C3 | 69.80 |
| | **.093** | .005 | .139 | .086 | .500 (5x) | 1/8 | 2-1/2 | 780393 | 63.20 | 780393-C3 | 69.10 |
| **2°** | **.062** | .005 | .093 | .053 | .312 (5x) | 1/8 | 2-1/2 | 779762 | 63.80 | 779762-C3 | 69.80 |
| | **.093** | .005 | .139 | .081 | .500 (5x) | 1/8 | 2-1/2 | 779793 | 63.80 | 779793-C3 | 69.80 |
| **3°** | **.062** | .005 | .093 | .049 | .312 (5x) | 1/8 | 2-1/2 | 779162 | 63.20 | 779162-C3 | 69.10 |
| | **.093** | .005 | .139 | .075 | .500 (5x) | 1/8 | 2-1/2 | 779193 | 63.20 | 779193-C3 | 69.10 |
| **5°** | **.062** | .005 | .093 | .042 | .312 (5x) | 1/8 | 2-1/2 | 715962 | 63.20 | 715962-C3 | 69.10 |
| | **.093** | .005 | .139 | .065 | .500 (5x) | 1/8 | 2-1/2 | 715993 | 63.20 | 715993-C3 | 69.10 |

| $A_1$ +0°15' −0°15' | $D_1$ +.000" −.002" | R +001" −001" | $L_2$ +.030" −.000" | | $L_3$ +.030" −.000" | $D_2$ (h6) | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0.5°** | **.125** | .010 | .187 | .117 | .625 (5x) | 1/8 | 2-1/2 | 781208 | 63.80 | 781208-C3 | 69.80 |
| | **.187** | .010 | .285 | .177 | 1.000 (5x) | 3/16 | 2-1/2 | 781212 | 68.80 | 781212-C3 | 75.50 |
| | **.250** | .010 | .375 | .238 | 1.250 (5x) | 1/4 | 2-1/2 | 781216 | 77.60 | 781216-C3 | 85.70 |
| **1°** | **.125** | .010 | .187 | .113 | .625 (5x) | 1/8 | 2-1/2 | 780608 | 63.80 | 780608-C3 | 69.80 |
| | **.187** | .010 | .285 | .172 | 1.000 (5x) | 3/16 | 2-1/2 | 780612 | 68.80 | 780612-C3 | 75.50 |
| | **.250** | .010 | .375 | .231 | 1.250 (5x) | 1/4 | 2-1/2 | 780616 | 77.60 | 780616-C3 | 85.70 |
| **2°** | **.125** | .010 | .187 | .105 | .625 (5x) | 1/8 | 2-1/2 | 780008 | 63.80 | 780008-C3 | 69.80 |
| | **.187** | .010 | .285 | .160 | 1.000 (5x) | 3/16 | 2-1/2 | 780012 | 68.30 | 780012-C3 | 74.90 |
| | **.250** | .010 | .375 | .217 | 1.250 (5x) | 1/4 | 2-1/2 | 780016 | 77.60 | 780016-C3 | 85.70 |
| **3°** | **.125** | .010 | .187 | .098 | .625 (5x) | 1/8 | 2-1/2 | 779408 | 63.20 | 779408-C3 | 69.10 |
| | **.187** | .010 | .285 | .149 | 1.000 (5x) | 3/16 | 2-1/2 | 779412 | 68.30 | 779412-C3 | 74.90 |
| | **.250** | .010 | .375 | .203 | 1.250 (5x) | 1/4 | 2-1/2 | 779416 | 76.80 | 779416-C3 | 85.80 |
| **5°** | **.125** | .010 | .187 | .083 | .625 (5x) | 1/8 | 2-1/2 | 715808 | 63.20 | 715808-C3 | 69.10 |
| | **.187** | .010 | .285 | .127 | 1.000 (5x) | 3/16 | 2-1/2 | 715812 | 68.30 | 715812-C3 | 74.90 |
| | **.250** | .010 | .375 | .175 | 1.250 (5x) | 1/4 | 2-1/2 | 715816 | 76.80 | 715816-C3 | 84.90 |

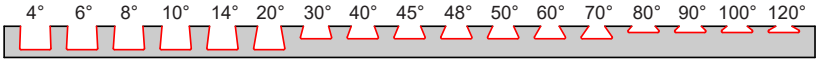
# DOVETAIL CUTTERS




B1 = 90 - (A / 2)
A = 180 - 2B1

- Offered with sharp corner, .003", .005", .010", .015", or .030" Corner Radius
- Solid carbide
- CNC ground in the USA




Stocked in Seventeen Included Angles!

| INCLUDED ANGLE | CUTTER DIA.* | LENGTH OF CUT | NECK DIA. | CORNER RADIUS | FLUTES | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ $^{+.000"}_{-.002"}$ | $L_2$ $^{+.020"}_{-.000"}$ | | R | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 4° | 1/16 | .125 | .054 | .005 | 2 | 1/8 | 1-1/2 | 930004 | 118.00 | 930004-C3 | 123.90 |
| | 3/32 | .187 | .081 | .010 | 2 | 1/8 | 1-1/2 | 991406 | 114.30 | 991406-C3 | 120.20 |
| | 1/8 | .250 | .108 | **SHARP!** | 2 | 1/8 | 1-1/2 | 883608 | 118.00 | 883608-C3 | 123.90 |
| | 1/8 | .250 | .108 | .010 | 2 | 1/8 | 1-1/2 | 991408 | 120.00 | 991408-C3 | 125.90 |
| | 3/16 | .375 | .161 | **SHARP!** | 2 | 3/16 | 2 | 883612 | 121.40 | 883612-C3 | 128.10 |
| | 3/16 | .375 | .162 | .010 | 2 | 3/16 | 2 | 991412 | 123.40 | 991412-C3 | 130.10 |
| | 1/4 | .500 | .215 | **SHARP!** | 2 | 1/4 | 2 | 883616 | 152.00 | 883616-C3 | 161.00 |
| | 1/4 | .500 | .216 | .010 | 2 | 1/4 | 2 | 991416 | 154.80 | 991416-C3 | 163.60 |
| | 3/8 | .750 | .323 | **SHARP!** | 3 | 3/8 | 2-1/2 | 883624 | 175.90 | 883624-C3 | 187.40 |
| | 3/8 | .750 | .323 | .010 | 3 | 3/8 | 2-1/2 | 991424 | 178.80 | 991424-C3 | 190.30 |
| | 1/2 | 1.000 | .431 | .010 | 3 | 1/2 | 3 | 991432 | 242.40 | 991432-C3 | 260.10 |
| 6° | 1/16 | .125 | .049 | .005 | 2 | 1/8 | 1-1/2 | 932304 | 118.00 | 932304-C3 | 123.90 |
| | 3/32 | .187 | .074 | .010 | 2 | 1/8 | 1-1/2 | 989206 | 114.30 | 989206-C3 | 120.20 |
| | 1/8 | .250 | .099 | **SHARP!** | 2 | 1/8 | 1-1/2 | 891208 | 115.90 | 891208-C3 | 121.90 |
| | 1/8 | .250 | .100 | .010 | 2 | 1/8 | 1-1/2 | 989208 | 118.00 | 989208-C3 | 123.90 |
| | 3/16 | .375 | .148 | **SHARP!** | 2 | 3/16 | 2 | 891212 | 119.20 | 891212-C3 | 125.40 |
| | 3/16 | .375 | .149 | .010 | 2 | 3/16 | 2 | 989212 | 121.10 | 989212-C3 | 127.90 |
| | 1/4 | .500 | .198 | **SHARP!** | 2 | 1/4 | 2 | 891216 | 150.50 | 891216-C3 | 159.50 |
| | 1/4 | .500 | .199 | .010 | 2 | 1/4 | 2 | 989216 | 153.00 | 989216-C3 | 161.90 |
| | 3/8 | .750 | .296 | **SHARP!** | 3 | 3/8 | 2-1/2 | 891224 | 173.70 | 891224-C3 | 185.10 |
| | 3/8 | .750 | .297 | .010 | 3 | 3/8 | 2-1/2 | 989224 | 176.40 | 989224-C3 | 187.80 |
| | 1/2 | 1.000 | .396 | .010 | 3 | 1/2 | 3 | 989232 | 239.10 | 989232-C3 | 254.60 |
| 8° | 1/8 | .218 | .096 | .010 | 2 | 1/8 | 1-1/2 | 984808 | 114.30 | 984808-C3 | 120.20 |
| | 3/16 | .281 | .150 | .010 | 2 | 3/16 | 2 | 984812 | 117.80 | 984812-C3 | 124.50 |
| | 1/4 | .375 | .199 | .010 | 2 | 1/4 | 2 | 984816 | 149.50 | 984816-C3 | 158.50 |
| 10° | 1/32 | .047 | .023 | **SHARP!** | 2 | 1/8 | 1-1/2 | 990102 | 108.70 | 990102-C3 | 114.60 |
| | 1/16 | .093 | .046 | **SHARP!** | 2 | 1/8 | 1-1/2 | 990104 | 108.70 | 990104-C3 | 114.60 |
| | 1/16 | .093 | .047 | .005 | 2 | 1/8 | 1-1/2 | 61504 | 110.80 | 61504-C3 | 116.70 |
| | 5/64 | .109 | .060 | .005 | 2 | 1/8 | 1-1/2 | 61505 | 110.80 | 61505-C3 | 116.70 |
| | 3/32 | .125 | .071 | **SHARP!** | 2 | 1/8 | 1-1/2 | 990106 | 105.30 | 990106-C3 | 111.20 |
| | 3/32 | .125 | .073 | .010 | 2 | 1/8 | 1-1/2 | 27006 | 107.20 | 27006-C3 | 113.10 |

*Diameter measured over radii (not to theoretical sharp corner).

continued on next page

# DOVETAIL CUTTERS

(cont.)

continued from previous page

| INCLUDED ANGLE | CUTTER DIA.* | LENGTH OF CUT | NECK DIA. | CORNER RADIUS | FLUTES | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.020″}_{-.000″}$ | | R | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 10° | 1/8 | .187 | .092 | SHARP! | 2 | 1/8 | 1-1/2 | 990108 | 105.30 | 990108-C3 | 111.20 |
| | 1/8 | .187 | .094 | .010 | 2 | 1/8 | 1-1/2 | 27008 | 107.20 | 27008-C3 | 113.10 |
| | 3/16 | .250 | .144 | SHARP! | 2 | 3/16 | 2 | 990112 | 108.40 | 990112-C3 | 115.10 |
| | 3/16 | .250 | .146 | .010 | 2 | 3/16 | 2 | 27012 | 110.50 | 27012-C3 | 117.20 |
| | 1/4 | .312 | .195 | SHARP! | 2 | 1/4 | 2 | 990116 | 137.60 | 990116-C3 | 146.50 |
| | 1/4 | .312 | .197 | .010 | 2 | 1/4 | 2 | 27016 | 140.30 | 27016-C3 | 149.30 |
| | 5/16 | .375 | .247 | SHARP! | 3 | 5/16 | 2-1/2 | 990120 | 145.60 | 990120-C3 | 155.30 |
| | 5/16 | .375 | .249 | .010 | 3 | 5/16 | 2-1/2 | 27020 | 148.00 | 27020-C3 | 158.60 |
| | 3/8 | .500 | .288 | SHARP! | 3 | 3/8 | 2-1/2 | 990124 | 156.60 | 990124-C3 | 168.10 |
| | 3/8 | .500 | .289 | .010 | 3 | 3/8 | 2-1/2 | 27024 | 159.40 | 27024-C3 | 170.90 |
| | 1/2 | .625 | .391 | SHARP! | 3 | 1/2 | 3 | 990132 | 217.30 | 990132-C3 | 235.00 |
| | 1/2 | .625 | .392 | .010 | 3 | 1/2 | 3 | 27032 | 221.00 | 27032-C3 | 238.60 |
| 14° | 1/16 | .093 | .040 | .005 | 2 | 1/8 | 1-1/2 | 873404 | 110.80 | 873404-C3 | 116.70 |
| | 3/32 | .125 | .065 | .010 | 2 | 1/8 | 1-1/2 | 979406 | 107.20 | 979406-C3 | 113.10 |
| | 1/8 | .187 | .082 | .010 | 2 | 1/8 | 1-1/2 | 979408 | 107.20 | 979408-C3 | 113.10 |
| | 3/16 | .250 | .129 | .010 | 2 | 3/16 | 2 | 979412 | 110.50 | 979412-C3 | 117.20 |
| | 1/4 | .312 | .176 | .010 | 2 | 1/4 | 2 | 979416 | 140.30 | 979416-C3 | 149.30 |
| | 5/16 | .375 | .223 | .010 | 3 | 5/16 | 2-1/2 | 979420 | 149.50 | 979420-C3 | 159.90 |
| | 3/8 | .500 | .255 | .010 | 3 | 3/8 | 2-1/2 | 979424 | 159.40 | 979424-C3 | 170.90 |
| | 1/2 | .625 | .349 | .010 | 3 | 1/2 | 3 | 979432 | 221.00 | 979432-C3 | 236.60 |
| 20° | 1/32 | .031 | .020 | SHARP! | 2 | 1/8 | 1-1/2 | 986002 | 89.20 | 986002-C3 | 95.10 |
| | 1/16 | .062 | .040 | SHARP! | 2 | 1/8 | 1-1/2 | 986004 | 89.20 | 986004-C3 | 95.10 |
| | 1/16 | .062 | .042 | .005 | 2 | 1/8 | 1-1/2 | 62304 | 90.80 | 62304-C3 | 96.70 |
| | 5/64 | .078 | .052 | .005 | 2 | 1/8 | 1-1/2 | 62305 | 90.80 | 62305-C3 | 96.70 |
| | 3/32 | .093 | .060 | SHARP! | 2 | 1/8 | 1-1/2 | 986006 | 85.30 | 986006-C3 | 91.20 |
| | 3/32 | .093 | .064 | .010 | 2 | 1/8 | 1-1/2 | 16406 | 87.30 | 16406-C3 | 93.20 |
| | 1/8 | .125 | .081 | SHARP! | 2 | 1/8 | 1-1/2 | 986008 | 85.60 | 986008-C3 | 91.60 |
| | 1/8 | .125 | .085 | .010 | 2 | 1/8 | 1-1/2 | 16408 | 87.30 | 16408-C3 | 93.20 |
| | 3/16 | .187 | .122 | SHARP! | 2 | 3/16 | 2 | 986012 | 89.10 | 986012-C3 | 95.40 |
| | 3/16 | .187 | .125 | .010 | 2 | 3/16 | 2 | 16412 | 90.30 | 16412-C3 | 96.90 |
| | 1/4 | .250 | .162 | SHARP! | 2 | 1/4 | 2 | 986016 | 112.10 | 986016-C3 | 120.90 |
| | 1/4 | .250 | .163 | .005 | 2 | 1/4 | 2 | 62316 | 114.20 | 62316-C3 | 123.00 |
| | 1/4 | .250 | .166 | .010 | 2 | 1/4 | 2 | 16416 | 114.20 | 16416-C3 | 123.00 |
| | 5/16 | .312 | .202 | SHARP! | 3 | 5/16 | 2-1/2 | 986020 | 122.50 | 986020-C3 | 132.70 |
| | 5/16 | .312 | .206 | .010 | 3 | 5/16 | 2-1/2 | 16420 | 124.90 | 16420-C3 | 135.20 |
| | 3/8 | .375 | .243 | SHARP! | 3 | 3/8 | 2-1/2 | 986024 | 129.10 | 986024-C3 | 140.50 |
| | 3/8 | .375 | .247 | .010 | 3 | 3/8 | 2-1/2 | 16424 | 131.20 | 16424-C3 | 142.60 |
| | 1/2 | .500 | .324 | SHARP! | 3 | 1/2 | 3 | 986032 | 177.60 | 986032-C3 | 194.90 |
| | 1/2 | .500 | .328 | .010 | 3 | 1/2 | 3 | 16432 | 180.90 | 16432-C3 | 198.30 |
| | 5/8 | .625 | .409 | .010 | 4 | 5/8 | 3 | 16440 | 207.30 | 16440-C3 | 224.60 |
| | 3/4 | .750 | .489 | .010 | 4 | 3/4 | 3 | 16448 | 218.90 | 16448-C3 | 237.40 |

*Diameter measured over radii (not to theoretical sharp corner).

continued on next page

# DOVETAIL CUTTERS

(cont.)

continued from previous page

| INCLUDED ANGLE | CUTTER DIA.* | LENGTH OF CUT | NECK DIA. | CORNER RADIUS | FLUTES | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.020″}_{-.000″}$ | | R | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 30° | 1/32 | .020 | .020 | SHARP! | 2 | 1/8 | 1-1/2 | 983302 | 90.80 | 983302-C3 | 96.70 |
| | 1/16 | .040 | .041 | SHARP! | 2 | 1/8 | 1-1/2 | 983304 | 89.20 | 983304-C3 | 95.10 |
| | 1/16 | .045 | .041 | .005 | 2 | 1/8 | 1-1/2 | 63404 | 90.80 | 63404-C3 | 96.70 |
| | 5/64 | .055 | .052 | .005 | 2 | 1/8 | 1-1/2 | 63405 | 90.80 | 63405-C3 | 96.70 |
| | 3/32 | .062 | .060 | SHARP! | 2 | 1/8 | 1-1/2 | 983306 | 85.30 | 983306-C3 | 91.20 |
| | 3/32 | .078 | .057 | .010 | 2 | 1/8 | 1-1/2 | 16506 | 87.30 | 16506-C3 | 93.20 |
| | 1/8 | .082 | .081 | SHARP! | 2 | 1/8 | 1-1/2 | 983308 | 85.60 | 983308-C3 | 91.60 |
| | 1/8 | .093 | .081 | .010 | 2 | 1/8 | 1-1/2 | 16508 | 87.30 | 16508-C3 | 93.20 |
| | 3/16 | .125 | .121 | SHARP! | 2 | 3/16 | 2 | 983312 | 87.00 | 983312-C3 | 93.40 |
| | 3/16 | .125 | .127 | .010 | 2 | 3/16 | 2 | 16512 | 88.60 | 16512-C3 | 95.10 |
| | 1/4 | .156 | .166 | SHARP! | 2 | 1/4 | 2 | 983316 | 110.10 | 983316-C3 | 119.00 |
| | 1/4 | .156 | .172 | .010 | 2 | 1/4 | 2 | 16516 | 112.10 | 16516-C3 | 120.90 |
| | 5/16 | .218 | .196 | SHARP! | 3 | 5/16 | 2-1/2 | 983320 | 122.60 | 983320-C3 | 132.80 |
| | 5/16 | .187 | .218 | .010 | 3 | 5/16 | 2-1/2 | 16520 | 122.60 | 16520-C3 | 132.80 |
| | 3/8 | .250 | .241 | SHARP! | 3 | 3/8 | 2-1/2 | 983324 | 126.70 | 983324-C3 | 138.20 |
| | 3/8 | .250 | .243 | .005 | 3 | 3/8 | 2-1/2 | 63424 | 129.10 | 63424-C3 | 140.50 |
| | 3/8 | .250 | .247 | .010 | 3 | 3/8 | 2-1/2 | 16524 | 129.10 | 16524-C3 | 140.50 |
| | 1/2 | .312 | .333 | SHARP! | 3 | 1/2 | 3 | 983332 | 174.50 | 983332-C3 | 191.80 |
| | 1/2 | .312 | .339 | .010 | 3 | 1/2 | 3 | 16532 | 177.60 | 16532-C3 | 194.90 |
| | 5/8 | .375 | .430 | .010 | 4 | 5/8 | 3 | 16540 | 204.10 | 16540-C3 | 221.20 |
| | 3/4 | .500 | .488 | .010 | 4 | 3/4 | 3 | 16548 | 215.80 | 16548-C3 | 234.40 |
| 40° | 1/16 | .035 | .037 | SHARP! | 2 | 1/8 | 1-1/2 | 977804 | 89.20 | 977804-C3 | 95.10 |
| | 1/16 | .040 | .037 | .005 | 2 | 1/8 | 1-1/2 | 64604 | 90.80 | 64604-C3 | 96.70 |
| | 5/64 | .050 | .046 | .005 | 2 | 1/8 | 1-1/2 | 64605 | 90.80 | 64605-C3 | 96.70 |
| | 3/32 | .062 | .056 | .010 | 2 | 1/8 | 1-1/2 | 28506 | 87.30 | 28506-C3 | 93.20 |
| | 1/8 | .078 | .068 | SHARP! | 2 | 1/8 | 1-1/2 | 977808 | 85.60 | 977808-C3 | 91.60 |
| | 1/8 | .093 | .066 | .010 | 2 | 1/8 | 1-1/2 | 28508 | 87.30 | 28508-C3 | 93.20 |
| | 3/16 | .109 | .108 | SHARP! | 2 | 3/16 | 2 | 977812 | 89.10 | 977812-C3 | 95.40 |
| | 3/16 | .125 | .101 | .005 | 2 | 3/16 | 2 | 64612 | 90.30 | 64612-C3 | 96.90 |
| | 3/16 | .125 | .105 | .010 | 2 | 3/16 | 2 | 28512 | 90.30 | 28512-C3 | 96.90 |
| | 1/4 | .156 | .136 | SHARP! | 2 | 1/4 | 2 | 977816 | 112.10 | 977816-C3 | 120.90 |
| | 1/4 | .156 | .145 | .010 | 2 | 1/4 | 2 | 28516 | 114.20 | 28516-C3 | 123.00 |
| | 5/16 | .187 | .176 | SHARP! | 3 | 5/16 | 2-1/2 | 977820 | 122.50 | 977820-C3 | 132.70 |
| | 5/16 | .187 | .185 | .010 | 3 | 5/16 | 2-1/2 | 28520 | 124.90 | 28520-C3 | 135.20 |
| | 3/8 | .218 | .216 | SHARP! | 3 | 3/8 | 2-1/2 | 977824 | 129.10 | 977824-C3 | 140.50 |
| | 3/8 | .250 | .202 | .010 | 3 | 3/8 | 2-1/2 | 28524 | 131.20 | 28524-C3 | 142.60 |
| | 1/2 | .312 | .273 | SHARP! | 3 | 1/2 | 3 | 977832 | 177.60 | 977832-C3 | 194.90 |
| | 1/2 | .312 | .281 | .010 | 3 | 1/2 | 3 | 28532 | 180.90 | 28532-C3 | 198.30 |
| | 5/8 | .375 | .361 | .010 | 4 | 5/8 | 3 | 28540 | 207.30 | 28540-C3 | 225.30 |
| | 3/4 | .500 | .395 | .010 | 4 | 3/4 | 3 | 28548 | 218.90 | 28548-C3 | 237.40 |
| 45° | 1/8 | .093 | .058 | .010 | 2 | 1/8 | 1-1/2 | 928408 | 97.70 | 928408-C3 | 103.60 |
| | 3/16 | .125 | .094 | .010 | 2 | 3/16 | 2 | 928412 | 101.00 | 928412-C3 | 107.60 |
| | 1/4 | .156 | .121 | SHARP! | 2 | 1/4 | 2 | 874516 | 124.20 | 874516-C3 | 133.10 |
| | 1/4 | .156 | .131 | .010 | 2 | 1/4 | 2 | 928416 | 126.10 | 928416-C3 | 135.10 |
| | 3/8 | .250 | .168 | SHARP! | 3 | 3/8 | 2-1/2 | 874524 | 143.70 | 874524-C3 | 155.10 |
| | 3/8 | .250 | .178 | .010 | 3 | 3/8 | 2-1/2 | 928424 | 145.60 | 928424-C3 | 157.00 |
| | 1/2 | .312 | .242 | SHARP! | 3 | 1/2 | 3 | 874532 | 197.10 | 874532-C3 | 214.60 |
| | 1/2 | .312 | .251 | .010 | 3 | 1/2 | 3 | 928432 | 200.20 | 928432-C3 | 217.80 |

*Diameter measured over radii (not to theoretical sharp corner).

continued on next page

# DOVETAIL CUTTERS

(cont.)

continued from previous page

| INCLUDED ANGLE | CUTTER DIA.* | LENGTH OF CUT | NECK DIA. | CORNER RADIUS | FLUTES | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.020″}_{-.000″}$ | | R | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 48° | 1/16 | .035 | .036 | .005 | 2 | 1/8 | 1-1/2 | 896504 | 88.60 | 896504-C3 | 94.60 |
| | 5/64 | .045 | .043 | .005 | 2 | 1/8 | 1-1/2 | 896505 | 88.60 | 896505-C3 | 94.60 |
| | 3/32 | .050 | .059 | .010 | 2 | 1/8 | 1-1/2 | 16606 | 84.30 | 16606-C3 | 90.20 |
| | 1/8 | .070 | .063 | **SHARP!** | 2 | 1/8 | 1-1/2 | 973108 | 82.50 | 973108-C3 | 88.40 |
| | 1/8 | .093 | .053 | .010 | 2 | 1/8 | 1-1/2 | 16608 | 84.30 | 16608-C3 | 90.20 |
| | 3/16 | .109 | .090 | **SHARP!** | 2 | 3/16 | 2 | 973112 | 86.80 | 973112-C3 | 93.20 |
| | 3/16 | .125 | .087 | .010 | 2 | 3/16 | 2 | 16612 | 88.30 | 16612-C3 | 94.90 |
| | 1/4 | .156 | .111 | **SHARP!** | 2 | 1/4 | 2 | 973116 | 109.20 | 973116-C3 | 116.70 |
| | 1/4 | .156 | .122 | .010 | 2 | 1/4 | 2 | 16616 | 111.30 | 16616-C3 | 119.90 |
| | 5/16 | .187 | .157 | .010 | 3 | 5/16 | 2-1/2 | 16620 | 122.10 | 16620-C3 | 132.30 |
| | 3/8 | .250 | .152 | **SHARP!** | 3 | 3/8 | 2-1/2 | 973124 | 128.50 | 973124-C3 | 139.90 |
| | 3/8 | .250 | .163 | .010 | 3 | 3/8 | 2-1/2 | 16624 | 128.20 | 16624-C3 | 139.60 |
| | 1/2 | .312 | .222 | **SHARP!** | 3 | 1/2 | 3 | 973132 | 177.20 | 973132-C3 | 192.80 |
| | 1/2 | .312 | .233 | .010 | 3 | 1/2 | 3 | 16632 | 176.80 | 16632-C3 | 192.30 |
| 50° | 1/8 | .093 | .050 | .010 | 2 | 1/8 | 1-1/2 | 926208 | 88.70 | 926208-C3 | 94.70 |
| | 3/16 | .125 | .082 | .010 | 2 | 3/16 | 2 | 926212 | 93.20 | 926212-C3 | 99.90 |
| | 1/4 | .156 | .116 | .010 | 2 | 1/4 | 2 | 926216 | 120.80 | 926216-C3 | 129.80 |
| | 3/8 | .250 | .153 | .010 | 3 | 3/8 | 2-1/2 | 926224 | 138.40 | 926224-C3 | 149.80 |
| | 1/2 | .312 | .220 | .010 | 3 | 1/2 | 3 | 926232 | 192.20 | 926232-C3 | 209.80 |
| 60° | 1/32 | .014 | .015 | **SHARP!** | 2 | 1/8 | 1-1/2 | 995202 | 85.00 | 995202-C3 | 90.90 |
| | 1/16 | .028 | .030 | **SHARP!** | 2 | 1/8 | 1-1/2 | 995204 | 87.00 | 995204-C3 | 92.90 |
| | 1/16 | .032 | .028 | .003 | 2 | 1/8 | 1-1/2 | 811404 | 90.30 | 811404-C3 | 96.20 |
| | 1/16 | .032 | .032 | .005 | 2 | 1/8 | 1-1/2 | 65104 | 88.60 | 65104-C3 | 94.60 |
| | 5/64 | .035 | .038 | **SHARP!** | 2 | 1/8 | 1-1/2 | 995205 | 87.00 | 995205-C3 | 92.90 |
| | 5/64 | .040 | .039 | .005 | 2 | 1/8 | 1-1/2 | 65105 | 88.60 | 65105-C3 | 94.60 |
| | 3/32 | .040 | .047 | **SHARP!** | 2 | 1/8 | 1-1/2 | 995206 | 82.50 | 995206-C3 | 88.40 |
| | 3/32 | .045 | .056 | .010 | 2 | 1/8 | 1-1/2 | 16706 | 84.30 | 16706-C3 | 90.20 |
| | .118 (3 mm) | .053 | .057 | **SHARP!** | 2 | 1/8 | 1-1/2 | 995296 | 87.90 | 995296-C3 | 93.80 |
| | .118 (3 mm) | .059 | .065 | .010 | 2 | 1/8 | 1-1/2 | 16796 | 89.90 | 16796-C3 | 95.80 |
| | 1/8 | .056 | .060 | **SHARP!** | 2 | 1/8 | 1-1/2 | 995208 | 82.50 | 995208-C3 | 88.40 |
| | 1/8 | .062 | .056 | .003 | 2 | 1/8 | 1-1/2 | 811408 | 84.30 | 811408-C3 | 90.20 |
| | 1/8 | .062 | .061 | **.005** | 2 | 1/8 | 1-1/2 | 65108 | 84.30 | 65108-C3 | 90.20 |
| | 1/8 | .062 | .068 | .010 | 2 | 1/8 | 1-1/2 | 16708 | 84.30 | 16708-C3 | 90.20 |
| | 9/64 | .063 | .063 | **SHARP!** | 2 | 3/16 | 2 | 995209 | 92.10 | 995209-C3 | 98.30 |
| | 9/64 | .070 | .074 | .010 | 2 | 3/16 | 2 | 16709 | 93.90 | 16709-C3 | 100.20 |
| | 5/32 | .070 | .075 | **SHARP!** | 2 | 3/16 | 2 | 995210 | 86.80 | 995210-C3 | 93.00 |
| | 5/32 | .078 | .073 | .005 | 2 | 3/16 | 2 | 65110 | 90.10 | 65110-C3 | 96.60 |
| | 5/32 | .078 | .081 | .010 | 2 | 3/16 | 2 | 16710 | 88.30 | 16710-C3 | 94.90 |
| | 3/16 | .085 | .089 | **SHARP!** | 2 | 3/16 | 2 | 995212 | 86.80 | 995212-C3 | 93.20 |
| | 3/16 | .093 | .083 | .003 | 2 | 3/16 | 2 | 811412 | 88.30 | 811412-C3 | 94.90 |
| | 3/16 | .093 | .087 | .005 | 2 | 3/16 | 2 | 65112 | 88.30 | 65112-C3 | 94.90 |
| | 3/16 | .093 | .095 | .010 | 2 | 3/16 | 2 | 16712 | 88.30 | 16712-C3 | 94.90 |
| | 3/16 | .109 | .104 | .030 | 2 | 3/16 | 2 | 845112 | 88.30 | 845112-C3 | 94.90 |

*Diameter measured over radii (not to theoretical sharp corner).

continued on next page

# DOVETAIL CUTTERS

(cont.)

continued from previous page

| INCLUDED ANGLE | CUTTER DIA.* | LENGTH OF CUT | NECK DIA. | CORNER RADIUS | FLUTES | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.020″}_{-.000″}$ | | R | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 60° | 1/4 | .118 | .114 | SHARP! | 2 | 1/4 | 2 | 995216 | 107.20 | 995216-C3 | 116.00 |
| | 1/4 | .125 | .109 | .003 | 2 | 1/4 | 2 | 811416 | 109.20 | 811416-C3 | 117.90 |
| | 1/4 | .125 | .113 | .005 | 2 | 1/4 | 2 | 65116 | 109.20 | 65116-C3 | 117.90 |
| | 1/4 | .125 | .120 | .010 | 2 | 1/4 | 2 | 16716 | 109.20 | 16716-C3 | 117.90 |
| | 1/4 | .125 | .126 | .015 | 2 | 1/4 | 2 | 738016 | 109.20 | 738016-C3 | 117.90 |
| | 1/4 | .140 | .131 | .030 | 2 | 1/4 | 2 | 845116 | 109.20 | 845116-C3 | 117.90 |
| | 5/16 | .141 | .150 | SHARP! | 3 | 5/16 | 2-1/2 | 995220 | 117.50 | 995220-C3 | 127.70 |
| | 5/16 | .156 | .138 | .005 | 3 | 5/16 | 2-1/2 | 65120 | 119.60 | 65120-C3 | 129.20 |
| | 5/16 | .156 | .147 | .010 | 3 | 5/16 | 2-1/2 | 16720 | 119.60 | 16720-C3 | 129.80 |
| | 3/8 | .156 | .195 | SHARP! | 3 | 3/8 | 2-1/2 | 995224 | 122.60 | 995224-C3 | 134.00 |
| | 3/8 | .187 | .166 | .005 | 3 | 3/8 | 2-1/2 | 65124 | 125.20 | 65124-C3 | 136.60 |
| | 3/8 | .187 | .174 | .010 | 3 | 3/8 | 2-1/2 | 16724 | 125.20 | 16724-C3 | 136.60 |
| | 3/8 | .187 | .181 | .015 | 3 | 3/8 | 2-1/2 | 738024 | 125.20 | 738024-C3 | 136.60 |
| | 3/8 | .187 | .203 | .030 | 3 | 3/8 | 2-1/2 | 845124 | 125.00 | 845124-C3 | 136.40 |
| | 7/16 | .187 | .222 | SHARP! | 3 | 7/16 | 2-3/4 | 995228 | 132.70 | 995228-C3 | 145.90 |
| | 7/16 | .218 | .200 | .010 | 3 | 7/16 | 2-3/4 | 16728 | 135.80 | 16728-C3 | 150.30 |
| | 1/2 | .218 | .248 | SHARP! | 3 | 1/2 | 3 | 995232 | 170.50 | 995232-C3 | 187.80 |
| | 1/2 | .250 | .219 | .005 | 3 | 1/2 | 3 | 65132 | 173.90 | 65132-C3 | 188.10 |
| | 1/2 | .250 | .226 | .010 | 3 | 1/2 | 3 | 16732 | 173.90 | 16732-C3 | 191.10 |
| | 1/2 | .250 | .233 | .015 | 3 | 1/2 | 3 | 738032 | 173.90 | 738032-C3 | 191.10 |
| | 1/2 | .250 | .255 | .030 | 3 | 1/2 | 3 | 845132 | 171.30 | 845132-C3 | 185.50 |
| | 5/8 | .281 | .301 | SHARP! | 4 | 5/8 | 3 | 995240 | 255.00 | 995240-C3 | 273.10 |
| | 5/8 | .312 | .279 | .010 | 4 | 5/8 | 3 | 16740 | 258.30 | 16740-C3 | 276.30 |
| | 3/4 | .343 | .354 | SHARP! | 4 | 3/4 | 3 | 995248 | 306.40 | 995248-C3 | 327.80 |
| | 3/4 | .375 | .332 | .010 | 4 | 3/4 | 3 | 16748 | 309.60 | 16748-C3 | 328.30 |
| | 1 | .500 | .437 | .010 | 4 | 1 | 4 | 16764 | 559.70 | 16764-C3 | 592.90 |
| 70° | 1/4 | .109 | .116 | .010 | 2 | 1/4 | 2 | 832316 | 120.80 | 832316-C3 | 129.80 |
| | 1/2 | .218 | .213 | .010 | 3 | 1/2 | 3 | 832332 | 192.20 | 832332-C3 | 209.80 |
| 80° | 1/4 | .093 | .117 | .010 | 2 | 1/4 | 2 | 827916 | 120.80 | 827916-C3 | 129.80 |
| | 1/2 | .187 | .209 | .010 | 3 | 1/2 | 3 | 827932 | 192.20 | 827932-C3 | 209.80 |
| 90° | 1/32 | .008 | .015 | SHARP! | 2 | 1/8 | 1-1/2 | 992002 | 88.60 | 992002-C3 | 94.60 |
| | 1/16 | .023 | .030 | .005 | 2 | 1/8 | 1-1/2 | 66304 | 88.60 | 66304-C3 | 94.60 |
| | 5/64 | .027 | .038 | .005 | 2 | 1/8 | 1-1/2 | 66305 | 88.60 | 66305-C3 | 94.60 |
| | 3/32 | .025 | .043 | SHARP! | 2 | 1/8 | 1-1/2 | 992006 | 82.50 | 992006-C3 | 88.40 |
| | 3/32 | .031 | .059 | .010 | 2 | 1/8 | 1-1/2 | 16806 | 84.30 | 16806-C3 | 90.20 |
| | 1/8 | .034 | .057 | SHARP! | 2 | 1/8 | 1-1/2 | 992008 | 81.20 | 992008-C3 | 87.10 |
| | 1/8 | .040 | .059 | .005 | 2 | 1/8 | 1-1/2 | 66308 | 83.00 | 66308-C3 | 89.00 |
| | 1/8 | .040 | .073 | .010 | 2 | 1/8 | 1-1/2 | 16808 | 83.00 | 16808-C3 | 89.00 |
| | 5/32 | .047 | .090 | .010 | 2 | 3/16 | 2 | 16810 | 88.30 | 16810-C3 | 94.90 |
| | 3/16 | .052 | .084 | SHARP! | 2 | 3/16 | 2 | 992012 | 86.80 | 992012-C3 | 93.20 |
| | 3/16 | .047 | .122 | .010 | 2 | 3/16 | 2 | 16812 | 88.30 | 16812-C3 | 94.90 |
| | 1/4 | .068 | .114 | SHARP! | 2 | 1/4 | 2 | 992016 | 107.20 | 992016-C3 | 116.00 |
| | 1/4 | .062 | .140 | .005 | 2 | 1/4 | 2 | 66316 | 109.20 | 66316-C3 | 117.90 |
| | 1/4 | .063 | .154 | .010 | 2 | 1/4 | 2 | 16816 | 109.20 | 16816-C3 | 117.90 |
| | 5/16 | .085 | .143 | SHARP! | 3 | 5/16 | 2-1/2 | 992020 | 117.50 | 992020-C3 | 127.70 |
| | 5/16 | .093 | .155 | .010 | 3 | 5/16 | 2-1/2 | 16820 | 119.60 | 16820-C3 | 129.80 |

*Diameter measured over radii (not to theoretical sharp corner).

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# DOVETAIL CUTTERS

(cont.)

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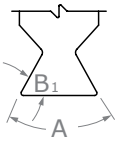
| INCLUDED ANGLE | CUTTER DIA.* | LENGTH OF CUT | NECK DIA. | CORNER RADIUS | FLUTES | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.020″}_{-.000″}$ | | R | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 90° | 3/8 | .105 | .165 | **SHARP!** | 3 | 3/8 | 2-1/2 | 992024 | 122.60 | 992024-C3 | 134.00 |
| | 3/8 | .109 | .171 | .005 | 3 | 3/8 | 2-1/2 | 66324 | 125.20 | 66324-C3 | 136.60 |
| | 3/8 | .125 | .153 | .010 | 3 | 3/8 | 2-1/2 | 16824 | 125.20 | 16824-C3 | 136.60 |
| | 3/8 | .125 | .164 | .015 | 3 | 3/8 | 2-1/2 | 737924 | 125.20 | 737924-C3 | 136.60 |
| | 7/16 | .141 | .185 | .010 | 3 | 7/16 | 2-3/4 | 16828 | 135.80 | 16828-C3 | 150.30 |
| | 1/2 | .141 | .218 | **SHARP!** | 3 | 1/2 | 3 | 992032 | 170.50 | 992032-C3 | 187.80 |
| | 1/2 | .156 | .202 | .005 | 3 | 1/2 | 3 | 66332 | 173.90 | 66332-C3 | 188.10 |
| | 1/2 | .156 | .216 | .010 | 3 | 1/2 | 3 | 16832 | 173.90 | 16832-C3 | 191.10 |
| | 1/2 | .156 | .227 | .015 | 3 | 1/2 | 3 | 737932 | 173.90 | 737932-C3 | 191.10 |
| | 1/2 | .172 | .241 | .030 | 3 | 1/2 | 3 | 833932 | 173.90 | 833932-C3 | 188.10 |
| | 5/8 | .187 | .279 | .010 | 4 | 5/8 | 3 | 16840 | 258.30 | 16840-C3 | 276.30 |
| | 3/4 | .218 | .342 | .010 | 4 | 3/4 | 3 | 16848 | 309.60 | 16848-C3 | 328.30 |
| 100° | 1/8 | .040 | .065 | .010 | 2 | 1/8 | 1-1/2 | 964408 | 92.20 | 964408-C3 | 98.10 |
| | 3/16 | .047 | .110 | .010 | 2 | 3/16 | 2 | 964412 | 96.80 | 964412-C3 | 103.10 |
| | 1/4 | .062 | .137 | .010 | 2 | 1/4 | 2 | 964416 | 120.80 | 964416-C3 | 128.30 |
| | 3/8 | .093 | .188 | .010 | 3 | 3/8 | 2-1/2 | 964424 | 138.20 | 964424-C3 | 149.60 |
| | 1/2 | .125 | .237 | .010 | 3 | 1/2 | 3 | 964432 | 193.80 | 964432-C3 | 211.50 |
| 120° | 1/8 | .031 | .042 | **SHARP!** | 2 | 1/8 | 1-1/2 | 721708 | 89.10 | 721708-C3 | 95.00 |
| | 1/8 | .039 | .045 | .010 | 2 | 1/8 | 1-1/2 | 959908 | 91.20 | 959908-C3 | 97.20 |
| | 3/16 | .047 | .079 | .010 | 2 | 3/16 | 2 | 959912 | 95.90 | 959912-C3 | 102.50 |
| | 1/4 | .062 | .090 | .010 | 2 | 1/4 | 2 | 959916 | 120.80 | 959916-C3 | 129.80 |
| | 3/8 | .082 | .104 | **SHARP!** | 3 | 3/8 | 2-1/2 | 721724 | 136.00 | 721724-C3 | 147.40 |
| | 3/8 | .093 | .107 | .010 | 3 | 3/8 | 2-1/2 | 959924 | 138.20 | 959924-C3 | 149.60 |
| | 1/2 | .100 | .174 | **SHARP!** | 3 | 1/2 | 3 | 721732 | 189.90 | 721732-C3 | 205.40 |
| | 1/2 | .109 | .177 | .010 | 3 | 1/2 | 3 | 959932 | 192.00 | 959932-C3 | 209.60 |

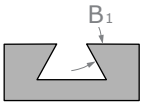
*Diameter measured over radii (not to theoretical sharp corner).

# DOVETAIL CUTTERS

## Sight Groove Dovetail Cutters

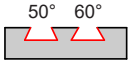



Off the Shoulder Angle
$B_1 = 90 - (A / 2)$
$A = 180 - 2B_1$

- Designed for milling dovetail grooves for Sight Attachments
- Diameters match common brand standards
- Offered with sharp corner
- Solid carbide
- CNC ground in the USA

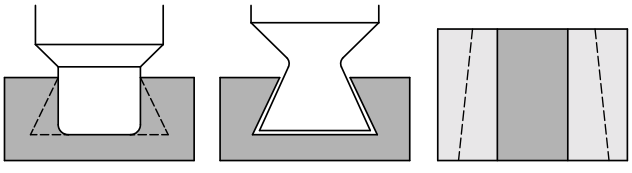



Stocked in Two Included Angles!

| INCL. ANGLE | CUTTER DIA.* | LENGTH OF CUT | NECK DIA. | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.020″}_{-.000″}$ | | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 50° | .330 | .093 | .242 | 3 | 3/8 | 2-1/2 | 806833 | 137.00 | 806833-C3 | 148.40 |
| | .344 | .125 | .226 | 3 | 3/8 | 2-1/2 | 806834 | 135.80 | 806834-C3 | 147.20 |
| | .495 | .250 | .261 | 3 | 1/2 | 3 | 806849 | 191.30 | 806849-C3 | 206.90 |
| 60° | .300 | .093 | .191 | 3 | 5/16 | 2-1/2 | 806730 | 120.80 | 806730-C3 | 131.30 |
| | .359 | .125 | .213 | 3 | 3/8 | 2-1/2 | 806735 | 126.20 | 806735-C3 | 137.60 |

### RECOMMENDED SIGHT GROOVE DOVETAIL MILLING TECHNIQUES

- Use an endmill that is smaller than the top of the groove width to slot.
- With required dovetail, mill groove down the centerline of slot to shape the rest of the dovetail groove
- Since most sights are press fitted, filing or additional adjustments may be required to ensure proper sight fit.
  - Angle the dovetail cutter slightly to create a slightly larger width on one side of the groove.
  - Dovetail should finish on same location on other side of the groove to create a trapezoidal shaped slot.
  - The sight itself can be adjusted by using an appropriate file to shape male dovetail until desired fitting.

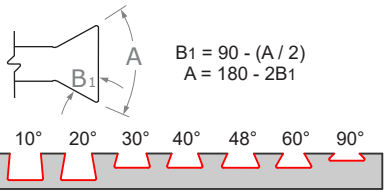


Mill Slot | Mill on Center | Angle Dovetail to Widen One Side

# DOVETAIL CUTTERS

## Long Reach




Stocked in Seven Included Angles!

- Reduced neck for long reach machining
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA

| INCL. ANGLE | CUTTER DIA.* | LENGTH OF CUT | NECK DIA. | NECK LENGTH | CORNER RADIUS | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ $^{+.000″}_{-.002″}$ | $L_2$ $^{+.020″}_{-.000″}$ | | $L_3$ $^{+.030″}_{-.000″}$ | R | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 10° | 1/8 | .187 | .094 | .125 | .010 | 2 | 1/8 | 1-1/2 | 899108 | 122.40 | 899108-C3 | 128.30 |
| | 1/4 | .312 | .197 | .250 | .010 | 2 | 1/4 | 2 | 899116 | 155.70 | 899116-C3 | 164.80 |
| | 1/2 | .625 | .392 | .250 | .010 | 3 | 1/2 | 3 | 899132 | 236.40 | 899132-C3 | 251.90 |
| 20° | 1/8 | .125 | .085 | .125 | .010 | 2 | 1/8 | 1-1/2 | 877408 | 107.10 | 877408-C3 | 113.00 |
| | 1/4 | .250 | .166 | .250 | .010 | 2 | 1/4 | 2 | 877416 | 135.80 | 877416-C3 | 144.60 |
| | 1/2 | .500 | .328 | .250 | .010 | 3 | 1/2 | 3 | 877432 | 208.20 | 877432-C3 | 223.80 |
| 30° | 1/16 | .045 | .041 | .062 | .005 | 2 | 1/8 | 1-1/2 | 849904 | 110.80 | 849904-C3 | 116.70 |
| | 3/32 | .078 | .057 | .093 | .010 | 2 | 1/8 | 1-1/2 | 914806 | 107.10 | 914806-C3 | 113.00 |
| | 1/8 | .093 | .081 | .125 | .010 | 2 | 1/8 | 1-1/2 | 914808 | 107.10 | 914808-C3 | 113.00 |
| | 3/16 | .125 | .127 | .187 | .010 | 2 | 3/16 | 2 | 914812 | 111.00 | 914812-C3 | 117.70 |
| | 1/4 | .156 | .172 | .250 | .010 | 2 | 1/4 | 2 | 914816 | 133.50 | 914816-C3 | 142.40 |
| | 3/8 | .250 | .247 | .250 | .010 | 3 | 3/8 | 2-1/2 | 914824 | 199.60 | 914824-C3 | 211.00 |
| | 1/2 | .312 | .339 | .250 | .010 | 3 | 1/2 | 3 | 914832 | 202.90 | 914832-C3 | 218.50 |
| 40° | 1/8 | .093 | .066 | .125 | .010 | 2 | 1/8 | 1-1/2 | 864008 | 110.80 | 864008-C3 | 116.70 |
| | 1/4 | .156 | .145 | .250 | .010 | 2 | 1/4 | 2 | 864016 | 133.50 | 864016-C3 | 142.40 |
| | 1/2 | .312 | .281 | .250 | .010 | 3 | 1/2 | 3 | 864032 | 202.90 | 864032-C3 | 220.40 |
| 48° | 1/8 | .093 | .053 | .125 | .010 | 2 | 1/8 | 1-1/2 | 760108 | 111.90 | 760108-C3 | 117.80 |
| 60° | 1/16 | .032 | .032 | .062 | .005 | 2 | 1/8 | 1-1/2 | 865504 | 107.50 | 865504-C3 | 113.50 |
| | 3/32 | .045 | .056 | .093 | .010 | 2 | 1/8 | 1-1/2 | 925306 | 103.70 | 925306-C3 | 109.60 |
| | 1/8 | .056 | .060 | .125 | **SHARP!** | 2 | 1/8 | 1-1/2 | 865908 | 102.00 | 865908-C3 | 108.00 |
| | 1/8 | .062 | .068 | .125 | .010 | 2 | 1/8 | 1-1/2 | 925308 | 103.70 | 925308-C3 | 109.60 |
| | 3/16 | .093 | .095 | .187 | .010 | 2 | 3/16 | 2 | 925312 | 108.30 | 925312-C3 | 115.00 |
| | 1/4 | .118 | .114 | .250 | **SHARP!** | 2 | 1/4 | 2 | 865916 | 128.60 | 865916-C3 | 137.50 |
| | 1/4 | .125 | .120 | .250 | .010 | 2 | 1/4 | 2 | 925316 | 130.50 | 925316-C3 | 139.50 |
| | 3/8 | .156 | .194 | .250 | **SHARP!** | 3 | 3/8 | 2-1/2 | 721624 | 143.70 | 721624-C3 | 155.10 |
| | 3/8 | .187 | .174 | .250 | .010 | 3 | 3/8 | 2-1/2 | 925324 | 145.60 | 925324-C3 | 157.00 |
| | 1/2 | .218 | .248 | .250 | **SHARP!** | 3 | 1/2 | 3 | 865932 | 194.90 | 865932-C3 | 212.40 |
| | 1/2 | .250 | .226 | .250 | .010 | 3 | 1/2 | 3 | 925332 | 197.90 | 925332-C3 | 215.60 |
| 90° | 1/16 | .023 | .030 | .062 | .005 | 2 | 1/8 | 1-1/2 | 885704 | 107.50 | 885704-C3 | 113.50 |
| | 3/32 | .031 | .059 | .093 | .010 | 2 | 1/8 | 1-1/2 | 931006 | 103.70 | 931006-C3 | 109.60 |
| | 1/8 | .034 | .057 | .125 | **SHARP!** | 2 | 1/8 | 1-1/2 | 884608 | 102.00 | 884608-C3 | 108.00 |
| | 1/8 | .040 | .073 | .125 | .010 | 2 | 1/8 | 1-1/2 | 931008 | 102.20 | 931008-C3 | 108.20 |
| | 3/16 | .052 | .084 | .187 | **SHARP!** | 2 | 3/16 | 2 | 884612 | 106.30 | 884612-C3 | 113.00 |
| | 3/16 | .047 | .122 | .187 | .010 | 2 | 3/16 | 2 | 931012 | 108.30 | 931012-C3 | 115.00 |
| | 1/4 | .068 | .114 | .250 | **SHARP!** | 2 | 1/4 | 2 | 884616 | 128.60 | 884616-C3 | 137.50 |
| | 1/4 | .062 | .154 | .250 | .010 | 2 | 1/4 | 2 | 931016 | 130.50 | 931016-C3 | 139.50 |
| | 1/4 | .068 | .111 | .375 | **SHARP!** | 2 | 1/4 | 2 | 721416 | 131.50 | 721416-C3 | 139.00 |
| | 3/8 | .105 | .165 | .250 | **SHARP!** | 3 | 3/8 | 2-1/2 | 884624 | 143.70 | 884624-C3 | 155.10 |
| | 3/8 | .109 | .171 | .250 | .005 | 3 | 3/8 | 2-1/2 | 885724 | 145.60 | 885724-C3 | 157.00 |
| | 3/8 | .125 | .153 | .250 | .010 | 3 | 3/8 | 2-1/2 | 931024 | 145.60 | 931024-C3 | 157.00 |
| | 1/2 | .141 | .218 | .250 | **SHARP!** | 3 | 1/2 | 3 | 884632 | 194.90 | 884632-C3 | 212.40 |
| | 1/2 | .156 | .202 | .250 | .005 | 3 | 1/2 | 3 | 885732 | 197.90 | 885732-C3 | 213.50 |
| | 1/2 | .156 | .216 | .250 | .010 | 3 | 1/2 | 3 | 931032 | 197.90 | 931032-C3 | 215.60 |
| | 1/2 | .156 | .216 | .375 | .010 | 3 | 1/2 | 3 | 721532 | 199.00 | 721532-C3 | 214.60 |

*Diameter measured over radii (not to theoretical sharp corner).

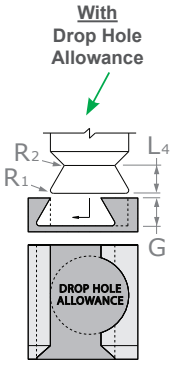
# DOVETAIL CUTTERS

## Parker Hannifin O-Ring Dovetail Cutters

## With Drop Hole Allowance

Designed to Parker Hannifin O-Ring Standards




- **Designed for milling full dovetail grooves with drop hole allowance**
- Designed to the standards suggested by the O-Ring Division of Parker Hannifin Corporation (ORD 5700/USA, ORD 5700)
- Undersized cutter design allows climb milling on both faces of groove for improved finish
- Mills both top and bottom radii
- 24° per side, 48° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

| O-RING X-SECTION | CUTTER DIA.* | GLAND DEPTH | CORNER RADIUS | NECK DIA.* | NECK RADIUS | RADIUS CENTER | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.000''}_{-.002''}$ | G | $R_1$ $^{+.001''}_{-.001''}$ | | $R_2$ $^{+.001''}_{-.001''}$ | $L_4$ $^{+.001''}_{-.001''}$ | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .070 | .079 | .051 | .015 | .054 | .005 | .047 | 1/8 | 1-1/2 | 23807† | 86.60 | 23807-C3† | 92.50 | 23807-C8† | 95.20 |
| .070 | .084 | .054 | .015 | .056 | .005 | .050 | 1/8 | 1-1/2 | 56307Δ | 86.60 | 56307-C3Δ | 92.50 | 56307-C8Δ | 95.20 |
| .103 | .135 | .082 | .015 | .088 | .010 | .073 | 3/16 | 2 | 23814 | 90.00 | 23814-C3 | 96.50 | 23814-C8 | 98.60 |
| .139 | .172 | .112 | .031 | .116 | .010 | .103 | 3/16 | 2 | 23821 | 90.00 | 23821-C3 | 96.50 | 23821-C8 | 98.60 |
| .210 | .284 | .172 | .031 | .179 | .015 | .158 | 5/16 | 2-1/2 | 23828 | 119.10 | 23828-C3 | 129.40 | 23828-C8 | 138.90 |
| .275 | .362 | .232 | .062 | .237 | .015 | .219 | 3/8 | 2-1/2 | 23835 | 137.80 | 23835-C3 | 149.30 | 23835-C8 | 162.10 |
| .375 | .488 | .317 | .093 | .327 | .020 | .299 | 1/2 | 3 | 23842 | 176.80 | 23842-C3 | 194.10 | 23842-C8 | 195.10 |

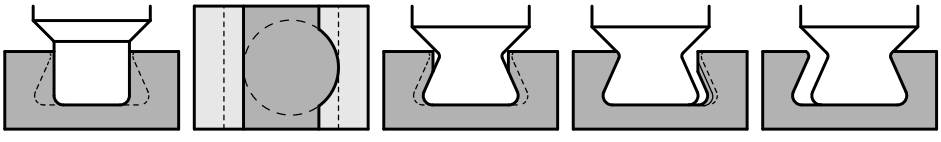
*Diameter measured over radii (not to theoretical sharp corner). †Meets ORD 5700/USA spec. ΔMeets ORD 5700 spec. All other tools meet BOTH specifications.

## RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

### With Drop Hole Allowance

- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Mill off-center drop hole.
- Insert O-Ring Cutter through drop hole at full axial depth and mill single pass down center of groove. Please note that cutter is contacting both sides of part and it may be necessary to reduce the feed rate (up to 40%).
- Mill multiple passes with descending radial stepover on one side of part.
- Mill multiple passes with descending radial stepover on other side of part.

For Radial Calculations, scan the QR code or visit harveytool.com/resources




## O-Ring Slotting End Mills



See page 461

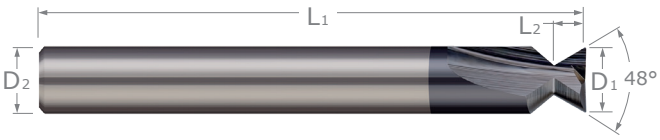
- Ideal for slotting o-ring dovetail grooves!
- Achieve the right slot width and shape without radial stepovers!

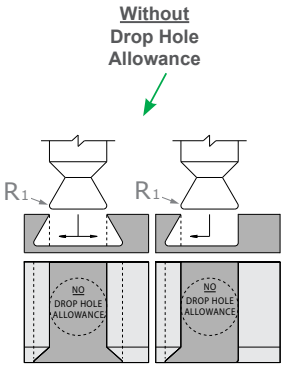
# DOVETAIL CUTTERS

## Parker Hannifin O-Ring Dovetail Cutters

## Without Drop Hole Allowance

Designed to Parker Hannifin O-Ring Standards




- **Designed for milling half dovetails or full dovetails with no drop hole allowance**
- Designed to the standards suggested by the O-Ring Division of Parker Hannifin Corporation (tools meet both specs: ORD 5700/USA, ORD 5700)
- Mills bottom radius only
- 24° per side, 48° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

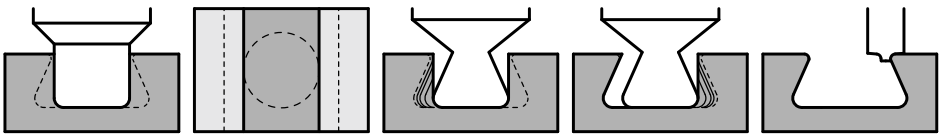
| O-RING X-SECTION | CUTTER DIA.* | LOC | CORNER RADIUS | NECK DIA.** | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.000″ | $R_1$ +.001″ −.001″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .070 | .055 | .054 | .015 | .023 | 1/8 | 1-1/2 | 23907 | 84.50 | 23907-C3 | 90.40 | 23907-C8 | 93.20 |
| .103 | .083 | .085 | .015 | .024 | 1/8 | 1-1/2 | 23914 | 84.50 | 23914-C3 | 90.40 | 23914-C8 | 93.20 |
| .139 | .113 | .115 | .031 | .044 | 1/8 | 1-1/2 | 23921 | 84.50 | 23921-C3 | 90.40 | 23921-C8 | 93.20 |
| .210 | .171 | .176 | .031 | .048 | 3/16 | 2 | 23928 | 87.90 | 23928-C3 | 94.50 | 23928-C8 | 96.50 |
| .275 | .231 | .238 | .062 | .086 | 1/4 | 2 | 23935 | 115.40 | 23935-C3 | 124.10 | 23935-C8 | 124.90 |
| .375 | .315 | .323 | .093 | .128 | 3/8 | 2-1/2 | 23942 | 134.70 | 23942-C3 | 146.20 | 23942-C8 | 150.50 |

*Diameter measured over radii (not to theoretical sharp corner). **Diameter at length of cut.

## RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

### Without Drop Hole Allowance

- **Tools are very fragile. Reduced neck profile and small o-ring groove size result in weakened tool for this difficult application. Always reconsider the potential to use the WITH drop hole allowance.**
- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Insert O-Ring Cutter into slot at full axial depth.
- Mill multiple passes with descending radial stepover on one side of part.
- Mill multiple passes with descending radial stepover on other side of part.
- These tools are able to mill both Full and Half O-Ring grooves. As such, a corner radius at the top of the part must be machined for final groove form (see series 170xx).




## O-Ring Corner Rounding End Mills



See page 461

- Ideal for creating radius on top part of o-ring dovetail groove!
- Design ensures smooth, blended form on part!

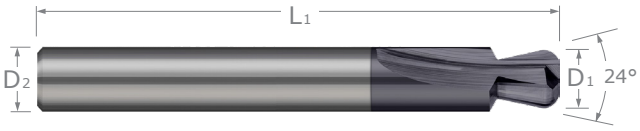
For Radial Calculations, scan the QR code or visit harveytool.com/resources

# DOVETAIL CUTTERS

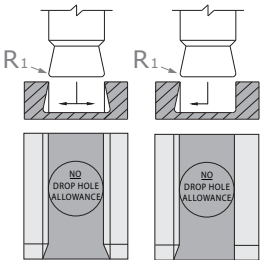
## Parker Hannifin O-Ring Dovetail Roughers

## Without Drop Hole Allowan

Designed to Parker Hannifin O-Ring Standards




Without Drop Hole Allowance




- **Designed for partial milling of half dovetails or full dovetails with no drop hole allowance**
- Designed to reduce stress and minimize breakage when milling O-Ring grooves without drop hole allowance
- Over 90% increase in neck diameter thickness compared to standard O-Ring Dovetails
- 12° per side, 24° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

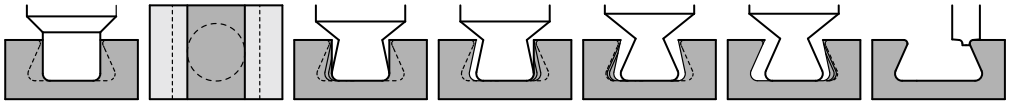
| O-RING X-SECTION | CUTTER DIA.* | LENGTH OF CUT | CORNER RADIUS | NECK DIA.** | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.002″ | $L_2$ +.020″ −.001″ | $R_1$ +.001″ −.001″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| .070 | .055 | .054 | .015 | .039 | 1/8 | 1-1/2 | 715207 | 87.00 | 715207-C3 | 92.90 | 715207-C8 | 94.70 |
| .103 | .083 | .085 | .015 | .054 | 1/8 | 1-1/2 | 715214 | 87.00 | 715214-C3 | 92.90 | 715214-C8 | 94.70 |
| .139 | .113 | .115 | .031 | .079 | 1/8 | 1-1/2 | 715221 | 87.00 | 715221-C3 | 92.90 | 715221-C8 | 94.70 |
| .210 | .171 | .176 | .031 | .111 | 3/16 | 2 | 715228 | 90.50 | 715228-C3 | 96.70 | 715228-C8 | 99.10 |
| .275 | .231 | .238 | .062 | .159 | 1/4 | 2 | 715235 | 118.90 | 715235-C3 | 126.30 | 715235-C8 | 129.30 |
| .375 | .315 | .323 | .093 | .221 | 3/8 | 2-1/2 | 715242 | 138.80 | 715242-C3 | 150.20 | 715242-C8 | 154.60 |

*Diameter measured over radii (not to theoretical sharp corner). ** Diameter at Length of Cut

## RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

### Without Drop Hole Allowance

- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Insert O-Ring Rougher into slot at full axial depth.
- Mill multiple passes with descending radial stepover on both sides of part.
- Insert O-Ring Cutter (see series 239xx) into roughed out slot at full axial depth.
- Proceed with standard O-Ring milling technique.




## O-Ring Slotting End Mills



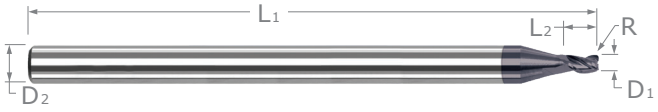
See page 458

- Ideal for slotting o-ring dovetail grooves!
- Achieve the right slot width and shape without radial stepovers!

For Radial Calculations, scan the QR code or visit harveytool.com/resources

# DOVETAIL CUTTERS

## O-Ring Slotting End Mills



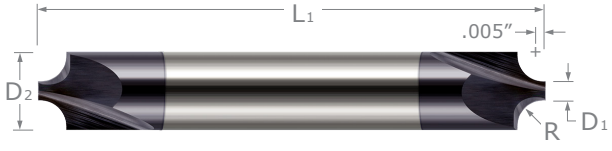

**Ideal for Slotting O-Ring Dovetail Grooves!**

- Optimized for O-Ring grooves
- Diameters designed to gland width opening
- Stub flute length for improved strength
- Corner radius to match Parker Hannifin standards
- High helix and optimized geometry for improved performance
- 3 Flutes • Center cutting
- Solid carbide • CNC ground in the USA

| CUTTER DIAMETER | CORNER RADIUS | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.000''}_{-.001''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| .055 | .015 | .065 | 1/8 | 1-1/2 | 56510 | 31.10 | 56510-C3 | 37.10 | 56510-C8 | 40.20 |
| .085 | .015 | .100 | 1/8 | 1-1/2 | 56520 | 31.10 | 56520-C3 | 37.10 | 56520-C8 | 40.20 |
| .115 | .031 | .140 | 1/8 | 1-1/2 | 56530 | 31.10 | 56530-C3 | 37.10 | 56530-C8 | 40.20 |
| $D_1$ $^{+.000''}_{-.002''}$ | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ | 3 FL | USD$ |
| .176 | .031 | .210 | 3/16 | 2 | 56540 | 34.70 | 56540-C3 | 41.40 | 56540-C8 | 43.30 |
| .236 | .062 | .280 | 1/4 | 2-1/2 | 56550 | 46.10 | 56550-C3 | 54.90 | 56550-C8 | 57.20 |
| .323 | .093 | .380 | 3/8 | 2-1/2 | 56560 | 65.70 | 56560-C3 | 77.10 | 56560-C8 | 81.50 |

# DOVETAIL CUTTERS

## O-Ring Corner Rounding End Mills




**For Creating Radius on Top Part of O-Ring Dovetail Groove**

- Radius matches Parker Hannifin standards
- Double-ended
- Flares are tangent to radius
- Design ensures smooth, blended form on part
- Depth of cut = radius plus .005"
- 2 flutes
- Solid carbide
- CNC ground in the USA

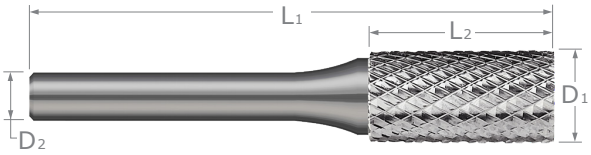



5° Flares At Shoulder and Pilot to Avoid Steps in Workpiece

| O-RING X-SECTION | RADIUS | PILOT DIAMETER | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| | R $^{+.0005''}_{-.0005''}$ | $D_1$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| .070 | .005 | .046 | 1/8 | 1-1/2 | 17005 | 50.90 | 17005-C3 | 58.40 |
| .103 | .010 | .046 | 1/8 | 1-1/2 | 17010 | 50.90 | 17010-C3 | 58.40 |
| .139 | .010 | .046 | 1/8 | 1-1/2 | 17010 | 50.90 | 17010-C3 | 58.40 |
| .210 | .015 | .046 | 1/8 | 1-1/2 | 17015 | 50.90 | 17015-C3 | 58.40 |
| .275 | .015 | .046 | 1/8 | 1-1/2 | 17015 | 50.90 | 17015-C3 | 58.40 |
| .375 | .020 | .046 | 1/8 | 1-1/2 | 17020 | 50.90 | 17020-C3 | 58.40 |

# BURS

## Cylindrical – SA Double Cut

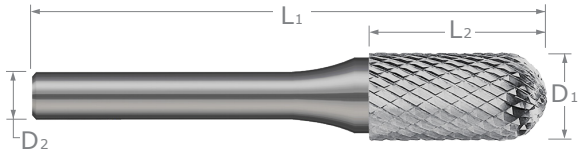



- General purpose cylindrical shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

| STANDARD SIZE | CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | |
|---|---|---|---|---|---|---|
| | $D_1$ $^{+.010''}_{-.010''}$ | $L_2$ $^{+.060''}_{-.060''}$ | $D_2$ | $L_1$ | TOOL # | USD$ |
| SA-41 | .062 (1/16) | 1/4 | 1/8 | 1-1/2 | 710704 | 7.70 |
| SA-11 | .125 (1/8) | 1/2 | 1/4 | 2 | 710708 | 15.10 |
| SA-43 | .125 (1/8) | 9/16 | 1/8 | 1-1/2 | 710608 | 7.70 |
| SA-14 | .187 (3/16) | 5/8 | 1/4 | 2 | 710712 | 18.10 |
| SA-51 | .250 (1/4) | 1/2 | 1/8 | 2 | 710816 | 11.20 |
| SA-1 | .250 (1/4) | 5/8 | 1/4 | 2 | 710716 | 12.80 |
| SA-2 | .312 (5/16) | 3/4 | 1/4 | 2-1/2 | 710720 | 23.60 |
| SA-3 | .375 (3/8) | 3/4 | 1/4 | 2-1/2 | 710824 | 15.80 |
| SA-5 | .500 (1/2) | 1 | 1/4 | 2-3/4 | 710832 | 25.20 |
| SA-6 | .625 (5/8) | 1 | 1/4 | 2-3/4 | 710840 | 36.30 |

# BURS

## Cylindrical Ball Nose – SC Double Cut

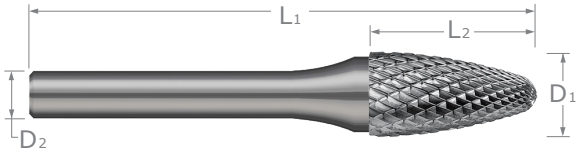



- General purpose cylindrical ball nose shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

| STANDARD SIZE | CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | |
|---|---|---|---|---|---|---|
| | $D_1$ $^{+.010''}_{-.010''}$ | $L_2$ $^{+.060''}_{-.060''}$ | $D_2$ | $L_1$ | TOOL # | USD$ |
| SC-42 | .125 (1/8) | 9/16 | 1/8 | 1-1/2 | 708008 | 7.70 |
| SC-53 | .187 (3/16) | 1/2 | 1/8 | 2 | 708112 | 16.60 |
| SC-14 | .187 (3/16) | 5/8 | 1/4 | 2 | 708012 | 20.90 |
| SC-51 | .250 (1/4) | 1/2 | 1/8 | 2 | 708216 | 11.40 |
| SC-1 | .250 (1/4) | 5/8 | 1/4 | 1-3/4 | 708116 | 15.30 |
| SC-2 | .312 (5/16) | 3/4 | 1/4 | 2-1/2 | 708120 | 25.40 |
| SC-3 | .375 (3/8) | 3/4 | 1/4 | 2-1/2 | 708224 | 18.30 |
| SC-3L | .375 (3/8) | 1 | 1/4 | 2-1/2 | 708124 | 26.60 |
| SC-5 | .500 (1/2) | 1 | 1/4 | 2-3/4 | 708232 | 28.60 |
| SC-6 | .625 (5/8) | 1 | 1/4 | 2-3/4 | 708240 | 42.50 |

# BURS

## Round Nose Tree – SF Double Cut

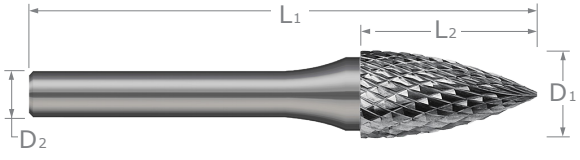



- General purpose round nose tree shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

| STANDARD SIZE | CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | |
|---|---|---|---|---|---|---|
| | $D_1$ $^{+.010''}_{-.010''}$ | $L_2$ $^{+.060''}_{-.060''}$ | $D_2$ | $L_1$ | TOOL # | USD$ |
| SF-42 | .125 (1/8) | 1/2 | 1/8 | 1-1/2 | 707708 | 7.70 |
| SF-53 | .187 (3/16) | 1/2 | 1/8 | 2 | 707812 | 16.60 |
| SF-51 | .250 (1/4) | 1/2 | 1/8 | 2 | 707816 | 11.20 |
| SF-1 | .250 (1/4) | 5/8 | 1/4 | 2 | 707716 | 16.40 |
| SF-3 | .375 (3/8) | 3/4 | 1/4 | 2-1/2 | 707824 | 18.30 |
| SF-13 | .500 (1/2) | 3/4 | 1/4 | 2-1/2 | 707932 | 40.80 |
| SF-5 | .500 (1/2) | 1 | 1/4 | 2-3/4 | 707832 | 27.60 |

# BURS

## Pointed Tree – SG Double Cut




- General purpose pointed tree shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

| STANDARD SIZE | CUTTER DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | |
|---|---|---|---|---|---|---|
| | $D_1$ $^{+.010''}_{-.010''}$ | $L_2$ $^{+.060''}_{-.060''}$ | $D_2$ | $L_1$ | TOOL # | USD$ |
| SG-43 | .125 (1/8) | 3/8 | 1/8 | 1-1/2 | 707408 | 7.70 |
| SG-44 | .125 (1/8) | 1/2 | 1/8 | 1-1/2 | 707308 | 10.50 |
| SG-51 | .250 (1/4) | 1/2 | 1/8 | 2 | 707516 | 11.20 |
| SG-1 | .250 (1/4) | 5/8 | 1/4 | 2 | 707416 | 16.70 |
| SG-2 | .312 (5/16) | 3/4 | 1/4 | 2-1/2 | 707520 | 26.60 |
| SG-3 | .375 (3/8) | 3/4 | 1/4 | 2-1/2 | 707524 | 18.80 |
| SG-13 | .500 (1/2) | 3/4 | 1/4 | 2-1/2 | 707632 | 40.30 |
| SG-5 | .500 (1/2) | 1 | 1/4 | 2-3/4 | 707532 | 27.60 |

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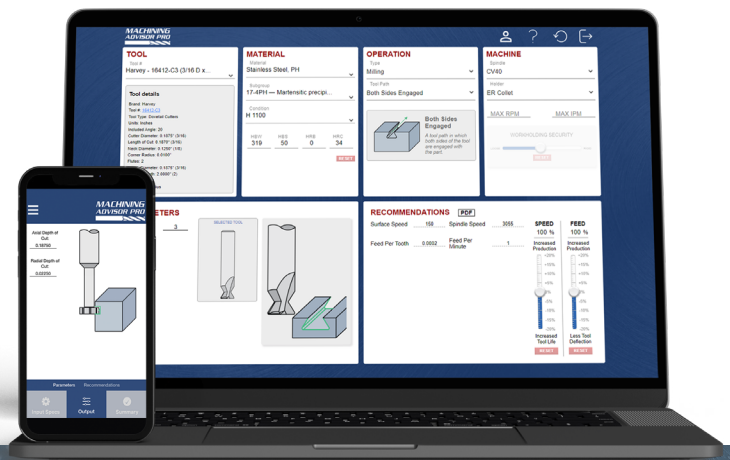
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Ryan S.
Shop Owner, Avella, PA

# HOLEMAKING & THREADING


**Miniature High Performance Drills** . . . . .  466

Hardened Steels mm & in . . . . .  466

Prehardened Steels mm & in New Sizes! . . . . .  479

Aluminum Alloys mm & in . . . . .  495

PCD Diamond – Double Angle – Metric . . . . .  509

Composites – Double Angle mm & in . . . . .  510

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Deep Hole – Coolant Through – Metric . . . . .  520

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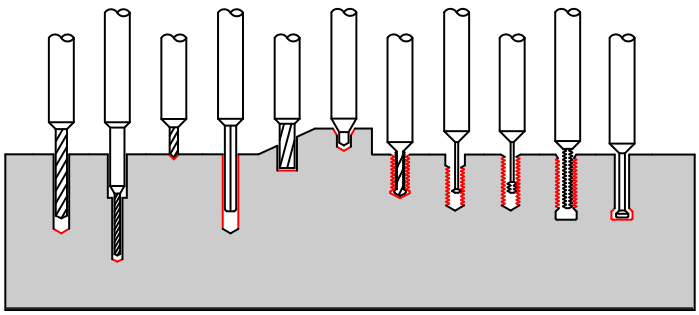
**Thread Milling Cutters** . . . . .  548

Single Form . . . . .  548

Tri-Form . . . . .  556

Multi-Form mm & in New Sizes! . . . . .  557

Thread Relief Cutters . . . . .  565

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# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels






**Available for 3x, 5x, 8x Hole Depths!**

- Optimized for drilling hardened tool, die, and mold steels 46Rc to 68Rc with outstanding performance in high temperature alloys and difficult-to-machine steels
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- Double margin design for exceptional hole accuracy and finish
- 140° point angle
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA



Double Margin Design for Exceptional Hole Accuracy

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.005" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0100 | #87 | .254 mm | | 1.20 mm | (3x) | 3 mm | 50 mm | CSG0100-C6 | 47.00 |
| .0100 | #87 | .254 mm | .048 | | (3x) | 1/8 | 1-1/2 | FDW0100-C6 | 47.00 |
| .0100 | #87 | .254 mm | | 1.70 mm | (5x) | 3 mm | 50 mm | BGN0100-C6 | 50.10 |
| .0100 | #87 | .254 mm | .068 | | (5x) | 1/8 | 1-1/2 | GBS0100-C6 | 50.10 |
| .0100 | #87 | .254 mm | .096 | | (8x) | 1/8 | 2 | HGD0100-C6 | 52.20 |
| .0110 | #85 | .279 mm | | 1.35 mm | (3x) | 3 mm | 50 mm | CSG0110-C6 | 47.00 |
| .0120 | #83 | .304 mm | | 1.45 mm | (3x) | 3 mm | 50 mm | CSG0120-C6 | 47.00 |
| .0130 | #81 | .330 mm | | 1.55 mm | (3x) | 3 mm | 50 mm | CSG0130-C6 | 47.00 |
| .0144 | #79 | .368 mm | | 1.75 mm | (3x) | 3 mm | 50 mm | CSG0144-C6 | 47.00 |
| .0150 | | .381 mm | | 1.80 mm | (3x) | 3 mm | 50 mm | CSG0150-C6 | 47.00 |
| .0150 | | .381 mm | | 2.60 mm | (5x) | 3 mm | 50 mm | BGN0150-C6 | 50.10 |
| .0150 | | .381 mm | | 3.70 mm | (8x) | 3 mm | 50 mm | ARY0150-C6 | 52.20 |
| .0156 (1/64) | | .396 mm | .074 | | (3x) | 1/8 | 1-1/2 | FDW0156-C6 | 47.00 |
| .0156 (1/64) | | .396 mm | | 1.90 mm | (3x) | 3 mm | 50 mm | CSG0156-C6 | 47.00 |
| .0156 (1/64) | | .396 mm | .104 | | (5x) | 1/8 | 2 | GBS0156-C6 | 50.10 |
| .0156 (1/64) | | .396 mm | | 2.70 mm | (5x) | 3 mm | 50 mm | BGN0156-C6 | 50.10 |
| .0156 (1/64) | | .396 mm | .152 | | (8x) | 1/8 | 2 | HGD0156-C6 | 52.20 |
| .0156 (1/64) | | .396 mm | | 3.90 mm | (8x) | 3 mm | 50 mm | ARY0156-C6 | 52.20 |
| .0156 (1/64) | | .396 mm | | 4.70 mm | (10x) | 3 mm | 50 mm | DXT0156-C6 | 55.20 |
| .0156 (1/64) | | .396 mm | | 5.40 mm | (12x) | 3 mm | 50 mm | EFG0156-C6 | 58.40 |
| .0160 | #78 | .406 mm | | 2.00 mm | (3x) | 3 mm | 50 mm | CSG0160-C6 | 47.00 |
| .0160 | #78 | .406 mm | | 2.70 mm | (5x) | 3 mm | 50 mm | BGN0160-C6 | 50.10 |
| .0160 | #78 | .406 mm | | 4.00 mm | (8x) | 3 mm | 50 mm | ARY0160-C6 | 52.20 |
| .0160 | #78 | .406 mm | | 5.60 mm | (12x) | 3 mm | 50 mm | EFG0160-C6 | 58.40 |
| .0170 | | .431 mm | | 2.10 mm | (3x) | 3 mm | 50 mm | CSG0170-C6 | 47.00 |
| .0170 | | .431 mm | | 4.20 mm | (8x) | 3 mm | 50 mm | ARY0170-C6 | 52.20 |
| .0180 | #77 | .457 mm | | 2.20 mm | (3x) | 3 mm | 50 mm | CSG0180-C6 | 47.00 |
| .0180 | #77 | .457 mm | | 3.10 mm | (5x) | 3 mm | 50 mm | BGN0180-C6 | 50.10 |
| .0180 | #77 | .457 mm | | 4.50 mm | (8x) | 3 mm | 50 mm | ARY0180-C6 | 52.20 |
| .0180 | #77 | .457 mm | | 6.20 mm | (12x) | 3 mm | 50 mm | EFG0180-C6 | 58.40 |
| .0190 | | .482 mm | | 2.30 mm | (3x) | 3 mm | 50 mm | CSG0190-C6 | 45.50 |
| .0190 | | .482 mm | | 4.70 mm | (8x) | 3 mm | 50 mm | ARY0190-C6 | 50.60 |
| .0196 | | .500 mm | | 2.40 mm | (3x) | 3 mm | 50 mm | CSG0196-C6 | 45.50 |
| .0196 | | .500 mm | | 3.40 mm | (5x) | 3 mm | 50 mm | BGN0196-C6 | 47.90 |
| .0196 | | .500 mm | | 4.90 mm | (8x) | 3 mm | 50 mm | ARY0196-C6 | 50.60 |
| .0196 | | .500 mm | | 5.80 mm | (10x) | 3 mm | 50 mm | DXT0196-C6 | 53.60 |
| .0196 | | .500 mm | | 6.80 mm | (12x) | 3 mm | 50 mm | EFG0196-C6 | 56.60 |

continued on next page

# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.005" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0200 | #76 | .508 mm | | 2.40 mm | (3x) | 3 mm | 50 mm | CSG0200-C6 | 45.50 |
| .0200 | #76 | .508 mm | .096 | | (3x) | 1/8 | 2 | FDW0200-C6 | 45.50 |
| .0200 | #76 | .508 mm | | 3.40 mm | (5x) | 3 mm | 50 mm | BGN0200-C6 | 47.90 |
| .0200 | #76 | .508 mm | .136 | | (5x) | 1/8 | 2 | GBS0200-C6 | 47.90 |
| .0200 | #76 | .508 mm | .192 | | (8x) | 1/8 | 2 | HGD0200-C6 | 50.60 |
| .0200 | #76 | .508 mm | | 5.00 mm | (8x) | 3 mm | 50 mm | ARY0200-C6 | 50.60 |
| .0200 | #76 | .508 mm | | 6.00 mm | (10x) | 3 mm | 50 mm | DXT0200-C6 | 53.60 |
| .0200 | #76 | .508 mm | | 7.00 mm | (12x) | 3 mm | 50 mm | EFG0200-C6 | 56.60 |
| .0210 | #75 | .533 mm | | 2.50 mm | (3x) | 3 mm | 50 mm | CSG0210-C6 | 45.50 |
| .0210 | #75 | .533 mm | | 3.60 mm | (5x) | 3 mm | 50 mm | BGN0210-C6 | 47.90 |
| .0210 | #75 | .533 mm | | 5.20 mm | (8x) | 3 mm | 50 mm | ARY0210-C6 | 50.60 |
| .0210 | #75 | .533 mm | | 7.40 mm | (12x) | 3 mm | 50 mm | EFG0210-C6 | 56.60 |
| .0220 | | .558 mm | | 2.70 mm | (3x) | 3 mm | 50 mm | CSG0220-C6 | 45.50 |
| .0220 | | .558 mm | | 5.40 mm | (8x) | 3 mm | 50 mm | ARY0220-C6 | 50.60 |
| .0225 | #74 | .571 mm | | 2.70 mm | (3x) | 3 mm | 50 mm | CSG0225-C6 | 45.50 |
| .0225 | #74 | .571 mm | .108 | | (3x) | 1/8 | 2 | FDW0225-C6 | 45.50 |
| .0225 | #74 | .571 mm | .152 | | (5x) | 1/8 | 2 | GBS0225-C6 | 47.90 |
| .0225 | #74 | .571 mm | | 3.90 mm | (5x) | 3 mm | 50 mm | BGN0225-C6 | 47.90 |
| .0225 | #74 | .571 mm | .216 | | (8x) | 1/8 | 2 | HGD0225-C6 | 50.60 |
| .0225 | #74 | .571 mm | | 5.60 mm | (8x) | 3 mm | 50 mm | ARY0225-C6 | 50.60 |
| .0225 | #74 | .571 mm | | 7.80 mm | (12x) | 3 mm | 50 mm | EFG0225-C6 | 56.60 |
| .0230 | | .584 mm | | 2.80 mm | (3x) | 3 mm | 50 mm | CSG0230-C6 | 45.50 |
| .0230 | | .584 mm | | 5.60 mm | (8x) | 3 mm | 50 mm | ARY0230-C6 | 50.60 |
| .0236 | | .600 mm | | 2.90 mm | (3x) | 3 mm | 50 mm | CSG0236-C6 | 45.50 |
| .0236 | | .600 mm | | 5.80 mm | (8x) | 3 mm | 50 mm | ARY0236-C6 | 50.60 |
| .0240 | #73 | .609 mm | | 2.90 mm | (3x) | 3 mm | 50 mm | CSG0240-C6 | 45.50 |
| .0240 | #73 | .609 mm | | 4.20 mm | (5x) | 3 mm | 50 mm | BGN0240-C6 | 47.90 |
| .0240 | #73 | .609 mm | | 6.00 mm | (8x) | 3 mm | 50 mm | ARY0240-C6 | 50.60 |
| .0240 | #73 | .609 mm | | 8.40 mm | (12x) | 3 mm | 50 mm | EFG0240-C6 | 56.60 |
| .0250 | #72 | .635 mm | | 3.00 mm | (3x) | 3 mm | 50 mm | CSG0250-C6 | 45.50 |
| .0250 | #72 | .635 mm | .120 | | (3x) | 1/8 | 2 | FDW0250-C6 | 45.50 |
| .0250 | #72 | .635 mm | | 4.20 mm | (5x) | 3 mm | 50 mm | BGN0250-C6 | 47.90 |
| .0250 | #72 | .635 mm | .168 | | (5x) | 1/8 | 2 | GBS0250-C6 | 47.90 |
| .0250 | #72 | .635 mm | .240 | | (8x) | 1/8 | 2 | HGD0250-C6 | 50.60 |
| .0250 | #72 | .635 mm | | 6.20 mm | (8x) | 3 mm | 50 mm | ARY0250-C6 | 50.60 |
| .0250 | #72 | .635 mm | | 8.80 mm | (12x) | 3 mm | 50 mm | EFG0250-C6 | 56.60 |
| .0260 | #71 | .660 mm | | 3.10 mm | (3x) | 3 mm | 50 mm | CSG0260-C6 | 45.50 |
| .0260 | #71 | .660 mm | .124 | | (3x) | 1/8 | 2 | FDW0260-C6 | 45.50 |
| .0260 | #71 | .660 mm | | 4.40 mm | (5x) | 3 mm | 50 mm | BGN0260-C6 | 47.90 |
| .0260 | #71 | .660 mm | .176 | | (5x) | 1/8 | 2 | GBS0260-C6 | 47.90 |
| .0260 | #71 | .660 mm | | 6.40 mm | (8x) | 3 mm | 50 mm | ARY0260-C6 | 50.60 |
| .0260 | #71 | .660 mm | .256 | | (8x) | 1/8 | 2 | HGD0260-C6 | 50.60 |
| .0260 | #71 | .660 mm | | 9.00 mm | (12x) | 3 mm | 50 mm | EFG0260-C6 | 56.60 |
| .0270 | | .685 mm | | 3.30 mm | (3x) | 3 mm | 50 mm | CSG0270-C6 | 45.50 |
| .0270 | | .685 mm | | 6.60 mm | (8x) | 3 mm | 50 mm | ARY0270-C6 | 50.60 |
| .0275 | | .700 mm | | 3.30 mm | (3x) | 3 mm | 50 mm | CSG0275-C6 | 45.50 |
| .0275 | | .700 mm | | 6.80 mm | (8x) | 3 mm | 50 mm | ARY0275-C6 | 50.60 |

continued on next page

# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.005"}_{-.000"}$ | $L_2$ $^{+.25mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0280 | #70 | .711 mm | | 3.40 mm | (3x) | 3 mm | 50 mm | CSG0280-C6 | 45.50 |
| .0280 | #70 | .711 mm | | 4.80 mm | (5x) | 3 mm | 50 mm | BGN0280-C6 | 47.90 |
| .0280 | #70 | .711 mm | | 7.00 mm | (8x) | 3 mm | 50 mm | ARY0280-C6 | 50.60 |
| .0280 | #70 | .711 mm | | 9.80 mm | (12x) | 3 mm | 50 mm | EFG0280-C6 | 56.60 |
| .0292 | #69 | .741 mm | | 3.50 mm | (3x) | 3 mm | 50 mm | CSG0292-C6 | 45.50 |
| .0292 | #69 | .741 mm | | 5.00 mm | (5x) | 3 mm | 50 mm | BGN0292-C6 | 47.90 |
| .0292 | #69 | .741 mm | | 7.20 mm | (8x) | 3 mm | 50 mm | ARY0292-C6 | 50.60 |
| .0292 | #69 | .741 mm | | 10.00 mm | (12x) | 3 mm | 50 mm | EFG0292-C6 | 56.60 |
| .0300 | | .762 mm | | 3.60 mm | (3x) | 3 mm | 50 mm | CSG0300-C6 | 46.10 |
| .0300 | | .762 mm | | 5.20 mm | (5x) | 3 mm | 50 mm | BGN0300-C6 | 48.60 |
| .0300 | | .762 mm | | 7.40 mm | (8x) | 3 mm | 50 mm | ARY0300-C6 | 50.60 |
| .0300 | | .762 mm | | 9.00 mm | (10x) | 3 mm | 50 mm | DXT0300-C6 | 53.60 |
| .0310 | #68 | .787 mm | | 3.70 mm | (3x) | 3 mm | 50 mm | CSG0310-C6 | 46.10 |
| .0310 | #68 | .787 mm | | 5.40 mm | (5x) | 3 mm | 50 mm | BGN0310-C6 | 48.60 |
| .0310 | #68 | .787 mm | | 7.60 mm | (8x) | 3 mm | 50 mm | ARY0310-C6 | 50.60 |
| .0310 | #68 | .787 mm | | 11.00 mm | (12x) | 3 mm | 50 mm | EFG0310-C6 | 57.80 |
| .0312 (1/32) | | .793 mm | .148 | | (3x) | 1/8 | 2 | FDW0312-C6 | 46.10 |
| .0312 (1/32) | | .793 mm | | 3.80 mm | (3x) | 3 mm | 50 mm | CSG0312-C6 | 46.10 |
| .0312 (1/32) | | .793 mm | .208 | | (5x) | 1/8 | 2 | GBS0312-C6 | 48.60 |
| .0312 (1/32) | | .793 mm | | 5.40 mm | (5x) | 3 mm | 50 mm | BGN0312-C6 | 48.60 |
| .0312 (1/32) | | .793 mm | .304 | | (8x) | 1/8 | 2 | HGD0312-C6 | 51.50 |
| .0312 (1/32) | | .793 mm | | 7.80 mm | (8x) | 3 mm | 50 mm | ARY0312-C6 | 51.50 |
| .0312 (1/32) | | .793 mm | | 9.40 mm | (10x) | 3 mm | 50 mm | DXT0312-C6 | 54.60 |
| .0312 (1/32) | | .793 mm | | 11.00 mm | (12x) | 3 mm | 50 mm | EFG0312-C6 | 57.80 |
| .0315 | | .800 mm | | 3.80 mm | (3x) | 3 mm | 50 mm | CSG0315-C6 | 46.10 |
| .0315 | | .800 mm | | 7.80 mm | (8x) | 3 mm | 50 mm | ARY0315-C6 | 51.50 |
| .0320 | #67 | .812 mm | .152 | | (3x) | 1/8 | 2 | FDW0320-C6 | 46.10 |
| .0320 | #67 | .812 mm | | 3.90 mm | (3x) | 3 mm | 50 mm | CSG0320-C6 | 46.10 |
| .0320 | #67 | .812 mm | | 5.40 mm | (5x) | 3 mm | 50 mm | BGN0320-C6 | 48.60 |
| .0320 | #67 | .812 mm | .216 | | (5x) | 1/8 | 2 | GBS0320-C6 | 48.60 |
| .0320 | #67 | .812 mm | .312 | | (8x) | 1/8 | 2 | HGD0320-C6 | 51.50 |
| .0320 | #67 | .812 mm | | 8.00 mm | (8x) | 3 mm | 50 mm | ARY0320-C6 | 51.50 |
| .0320 | #67 | .812 mm | | 11.00 mm | (12x) | 3 mm | 50 mm | EFG0320-C6 | 57.80 |
| .0330 | #66 | .838 mm | | 4.00 mm | (3x) | 3 mm | 50 mm | CSG0330-C6 | 46.10 |
| .0330 | #66 | .838 mm | | 5.60 mm | (5x) | 3 mm | 50 mm | BGN0330-C6 | 48.60 |
| .0330 | #66 | .838 mm | | 8.20 mm | (8x) | 3 mm | 50 mm | ARY0330-C6 | 51.50 |
| .0330 | #66 | .838 mm | | 11.50 mm | (12x) | 3 mm | 50 mm | EFG0330-C6 | 57.80 |
| .0350 | #65 | .889 mm | | 4.20 mm | (3x) | 3 mm | 50 mm | CSG0350-C6 | 46.10 |
| .0350 | #65 | .889 mm | .168 | | (3x) | 1/8 | 2 | FDW0350-C6 | 46.10 |
| .0350 | #65 | .889 mm | | 6.00 mm | (5x) | 3 mm | 50 mm | BGN0350-C6 | 48.60 |
| .0350 | #65 | .889 mm | .240 | | (5x) | 1/8 | 2 | GBS0350-C6 | 48.60 |
| .0350 | #65 | .889 mm | | 8.60 mm | (8x) | 3 mm | 50 mm | ARY0350-C6 | 51.50 |
| .0350 | #65 | .889 mm | .340 | | (8x) | 1/8 | 2 | HGD0350-C6 | 51.50 |
| .0350 | #65 | .889 mm | | 10.50 mm | (10x) | 3 mm | 50 mm | DXT0350-C6 | 54.60 |
| .0350 | #65 | .889 mm | | 12.00 mm | (12x) | 3 mm | 50 mm | EFG0350-C6 | 57.80 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.005" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0354 | | .900 mm | | 4.20 mm | (3x) | 3 mm | 50 mm | CSG0354-C6 | 46.10 |
| .0354 | | .900 mm | | 6.00 mm | (5x) | 3 mm | 50 mm | BGN0354-C6 | 48.60 |
| .0354 | | .900 mm | | 8.80 mm | (8x) | 3 mm | 50 mm | ARY0354-C6 | 51.50 |
| .0360 | #64 | .914 mm | | 4.40 mm | (3x) | 3 mm | 50 mm | CSG0360-C6 | 46.10 |
| .0360 | #64 | .914 mm | | 6.20 mm | (5x) | 3 mm | 50 mm | BGN0360-C6 | 48.60 |
| .0360 | #64 | .914 mm | | 9.00 mm | (8x) | 3 mm | 50 mm | ARY0360-C6 | 51.50 |
| .0360 | #64 | .914 mm | | 12.50 mm | (12x) | 3 mm | 50 mm | EFG0360-C6 | 57.80 |
| .0370 | #63 | .939 mm | | 4.40 mm | (3x) | 3 mm | 50 mm | CSG0370-C6 | 46.10 |
| .0370 | #63 | .939 mm | | 6.40 mm | (5x) | 3 mm | 50 mm | BGN0370-C6 | 48.60 |
| .0370 | #63 | .939 mm | | 7.40 mm | (6x) | 3 mm | 50 mm | CZS0370-C6 | 49.50 |
| .0370 | #63 | .939 mm | | 9.20 mm | (8x) | 3 mm | 50 mm | ARY0370-C6 | 51.50 |
| .0370 | #63 | .939 mm | | 13.00 mm | (12x) | 3 mm | 50 mm | EFG0370-C6 | 57.80 |
| .0380 | #62 | .965 mm | | 4.60 mm | (3x) | 3 mm | 50 mm | CSG0380-C6 | 46.10 |
| .0380 | #62 | .965 mm | | 6.60 mm | (5x) | 3 mm | 50 mm | BGN0380-C6 | 48.60 |
| .0380 | #62 | .965 mm | | 9.40 mm | (8x) | 3 mm | 50 mm | ARY0380-C6 | 51.50 |
| .0380 | #62 | .965 mm | | 13.50 mm | (12x) | 3 mm | 50 mm | EFG0380-C6 | 57.80 |
| .0390 | #61 | .990 mm | | 4.80 mm | (3x) | 3 mm | 50 mm | CSG0390-C6 | 46.10 |
| .0390 | #61 | .990 mm | | 6.60 mm | (5x) | 3 mm | 50 mm | BGN0390-C6 | 48.60 |
| .0390 | #61 | .990 mm | | 9.60 mm | (8x) | 3 mm | 50 mm | ARY0390-C6 | 51.50 |
| .0390 | #61 | .990 mm | | 13.50 mm | (12x) | 3 mm | 50 mm | EFG0390-C6 | 57.80 |
| .0393 | | 1.000 mm | | 4.80 mm | (3x) | 3 mm | 50 mm | CSG0393-C6 | 50.20 |
| .0393 | | 1.000 mm | | 6.80 mm | (5x) | 3 mm | 50 mm | BGN0393-C6 | 52.80 |
| .0393 | | 1.000 mm | | 9.80 mm | (8x) | 3 mm | 50 mm | ARY0393-C6 | 55.10 |
| .0393 | | 1.000 mm | | 12.00 mm | (10x) | 3 mm | 50 mm | DXT0393-C6 | 58.60 |
| .0393 | | 1.000 mm | | 14.00 mm | (12x) | 3 mm | 50 mm | EFG0393-C6 | 62.10 |
| .0400 | #60 | 1.016 mm | | 4.80 mm | (3x) | 3 mm | 50 mm | CSG0400-C6 | 50.20 |
| .0400 | #60 | 1.016 mm | .192 | | (3x) | 1/8 | 2 | FDW0400-C6 | 50.20 |
| .0400 | #60 | 1.016 mm | | 6.80 mm | (5x) | 3 mm | 50 mm | BGN0400-C6 | 52.80 |
| .0400 | #60 | 1.016 mm | .272 | | (5x) | 1/8 | 2 | GBS0400-C6 | 52.80 |
| .0400 | #60 | 1.016 mm | | 10.00 mm | (8x) | 3 mm | 50 mm | ARY0400-C6 | 55.10 |
| .0400 | #60 | 1.016 mm | .400 | | (8x) | 1/8 | 2 | HGD0400-C6 | 55.10 |
| .0400 | #60 | 1.016 mm | | 14.00 mm | (12x) | 3 mm | 50 mm | EFG0400-C6 | 62.10 |
| .0410 | #59 | 1.041 mm | | 5.00 mm | (3x) | 3 mm | 50 mm | CSG0410-C6 | 50.20 |
| .0410 | #59 | 1.041 mm | | 7.00 mm | (5x) | 3 mm | 50 mm | BGN0410-C6 | 52.80 |
| .0410 | #59 | 1.041 mm | | 10.00 mm | (8x) | 3 mm | 50 mm | ARY0410-C6 | 55.10 |
| .0410 | #59 | 1.041 mm | | 14.50 mm | (12x) | 3 mm | 50 mm | EFG0410-C6 | 62.10 |
| .0420 | #58 | 1.066 mm | | 5.00 mm | (3x) | 3 mm | 50 mm | CSG0420-C6 | 50.20 |
| .0420 | #58 | 1.066 mm | | 7.20 mm | (5x) | 3 mm | 50 mm | BGN0420-C6 | 52.80 |
| .0420 | #58 | 1.066 mm | | 10.50 mm | (8x) | 3 mm | 50 mm | ARY0420-C6 | 55.10 |
| .0420 | #58 | 1.066 mm | | 14.50 mm | (12x) | 3 mm | 50 mm | EFG0420-C6 | 62.10 |
| .0430 | #57 | 1.092 mm | | 5.20 mm | (3x) | 3 mm | 50 mm | CSG0430-C6 | 50.20 |
| .0430 | #57 | 1.092 mm | | 7.40 mm | (5x) | 3 mm | 50 mm | BGN0430-C6 | 52.80 |
| .0430 | #57 | 1.092 mm | | 10.50 mm | (8x) | 3 mm | 50 mm | ARY0430-C6 | 55.10 |
| .0430 | #57 | 1.092 mm | | 15.00 mm | (12x) | 3 mm | 50 mm | EFG0430-C6 | 62.10 |
| .0450 | | 1.143 mm | | 5.40 mm | (3x) | 3 mm | 50 mm | CSG0450-C6 | 50.20 |
| .0450 | | 1.143 mm | | 7.80 mm | (5x) | 3 mm | 50 mm | BGN0450-C6 | 52.80 |
| .0450 | | 1.143 mm | | 11.00 mm | (8x) | 3 mm | 50 mm | ARY0450-C6 | 55.10 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.005" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0465 | #56 | 1.181 mm | | 5.60 mm | (3x) | 3 mm | 50 mm | CSG0465-C6 | 50.20 |
| .0465 | #56 | 1.181 mm | .224 | | (3x) | 1/8 | 2 | FDW0465-C6 | 50.20 |
| .0465 | #56 | 1.181 mm | .312 | | (5x) | 1/8 | 2 | GBS0465-C6 | 52.80 |
| .0465 | #56 | 1.181 mm | | 8.00 mm | (5x) | 3 mm | 50 mm | BGN0465-C6 | 52.80 |
| .0465 | #56 | 1.181 mm | | 11.50 mm | (8x) | 3 mm | 50 mm | ARY0465-C6 | 55.10 |
| .0465 | #56 | 1.181 mm | .460 | | (8x) | 1/8 | 2 | HGD0465-C6 | 55.10 |
| .0465 | #56 | 1.181 mm | | 14.00 mm | (10x) | 3 mm | 50 mm | DXT0465-C6 | 58.60 |
| .0465 | #56 | 1.181 mm | | 16.00 mm | (12x) | 3 mm | 63 mm | EFG0465-C6 | 62.10 |
| .0468 (3/64) | | 1.190 mm | | 5.60 mm | (3x) | 3 mm | 50 mm | CSG0468-C6 | 50.20 |
| .0468 (3/64) | | 1.190 mm | .224 | | (3x) | 1/8 | 2 | FDW0468-C6 | 50.20 |
| .0468 (3/64) | | 1.190 mm | | 8.00 mm | (5x) | 3 mm | 50 mm | BGN0468-C6 | 52.80 |
| .0468 (3/64) | | 1.190 mm | .320 | | (5x) | 1/8 | 2 | GBS0468-C6 | 52.80 |
| .0468 (3/64) | | 1.190 mm | | 9.00 mm | (6x) | 3 mm | 50 mm | CZS0468-C6 | 53.70 |
| .0468 (3/64) | | 1.190 mm | | 11.50 mm | (8x) | 3 mm | 50 mm | ARY0468-C6 | 55.10 |
| .0468 (3/64) | | 1.190 mm | .460 | | (8x) | 1/8 | 2 | HGD0468-C6 | 55.10 |
| .0468 (3/64) | | 1.190 mm | | 14.00 mm | (10x) | 3 mm | 50 mm | DXT0468-C6 | 58.60 |
| .0468 (3/64) | | 1.190 mm | | 16.50 mm | (12x) | 3 mm | 63 mm | EFG0468-C6 | 62.10 |
| .0492 | | 1.250 mm | | 6.00 mm | (3x) | 3 mm | 50 mm | CSG0492-C6 | 50.20 |
| .0492 | | 1.250 mm | | 12.00 mm | (8x) | 3 mm | 50 mm | ARY0492-C6 | 59.10 |
| .0492 | | 1.250 mm | | 17.00 mm | (12x) | 3 mm | 63 mm | EFG0492-C6 | 63.50 |
| .0500 | | 1.270 mm | | 6.00 mm | (3x) | 3 mm | 50 mm | CSG0500-C6 | 50.20 |
| .0500 | | 1.270 mm | .240 | | (3x) | 1/8 | 2 | FDW0500-C6 | 50.20 |
| .0500 | | 1.270 mm | | 8.50 mm | (5x) | 3 mm | 50 mm | BGN0500-C6 | 52.80 |
| .0500 | | 1.270 mm | .340 | | (5x) | 1/8 | 2 | GBS0500-C6 | 52.80 |
| .0500 | | 1.270 mm | .480 | | (8x) | 1/8 | 2 | HGD0500-C6 | 55.10 |
| .0500 | | 1.270 mm | | 12.50 mm | (8x) | 3 mm | 50 mm | ARY0500-C6 | 55.10 |
| .0500 | | 1.270 mm | | 15.00 mm | (10x) | 3 mm | 50 mm | DXT0500-C6 | 58.60 |
| .0500 | | 1.270 mm | | 17.50 mm | (12x) | 3 mm | 63 mm | EFG0500-C6 | 62.10 |
| .0520 | #55 | 1.320 mm | | 6.20 mm | (3x) | 3 mm | 50 mm | CSG0520-C6 | 50.20 |
| .0520 | #55 | 1.320 mm | .248 | | (3x) | 1/8 | 2 | FDW0520-C6 | 50.20 |
| .0520 | #55 | 1.320 mm | | 9.00 mm | (5x) | 3 mm | 50 mm | BGN0520-C6 | 52.80 |
| .0520 | #55 | 1.320 mm | .360 | | (5x) | 1/8 | 2 | GBS0520-C6 | 52.80 |
| .0520 | #55 | 1.320 mm | .500 | | (8x) | 1/8 | 2 | HGD0520-C6 | 55.10 |
| .0520 | #55 | 1.320 mm | | 13.00 mm | (8x) | 3 mm | 50 mm | ARY0520-C6 | 55.10 |
| .0520 | #55 | 1.320 mm | | 18.00 mm | (12x) | 3 mm | 63 mm | EFG0520-C6 | 62.10 |
| .0550 | #54 | 1.397 mm | | 6.60 mm | (3x) | 3 mm | 50 mm | CSG0550-C6 | 50.20 |
| .0550 | #54 | 1.397 mm | .264 | | (3x) | 1/8 | 2 | FDW0550-C6 | 50.20 |
| .0550 | #54 | 1.397 mm | | 9.50 mm | (5x) | 3 mm | 50 mm | BGN0550-C6 | 52.80 |
| .0550 | #54 | 1.397 mm | .380 | | (5x) | 1/8 | 2 | GBS0550-C6 | 52.80 |
| .0550 | #54 | 1.397 mm | | 13.50 mm | (8x) | 3 mm | 50 mm | ARY0550-C6 | 55.10 |
| .0550 | #54 | 1.397 mm | .540 | | (8x) | 1/8 | 2 | HGD0550-C6 | 55.10 |
| .0550 | #54 | 1.397 mm | | 16.50 mm | (10x) | 3 mm | 63 mm | DXT0550-C6 | 60.40 |
| .0550 | #54 | 1.397 mm | | 19.00 mm | (12x) | 3 mm | 63 mm | EFG0550-C6 | 62.10 |
| .0590 | | 1.500 mm | | 7.20 mm | (3x) | 3 mm | 50 mm | CSG0590-C6 | 54.10 |
| .0590 | | 1.500 mm | | 10.00 mm | (5x) | 3 mm | 50 mm | BGN0590-C6 | 56.70 |
| .0590 | | 1.500 mm | | 14.50 mm | (8x) | 3 mm | 50 mm | ARY0590-C6 | 59.10 |
| .0590 | | 1.500 mm | | 17.50 mm | (10x) | 3 mm | 63 mm | DXT0590-C6 | 62.50 |
| .0590 | | 1.500 mm | | 21.00 mm | (12x) | 3 mm | 63 mm | EFG0590-C6 | 66.00 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.005" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0595 | #53 | 1.511 mm | | 7.20 mm | (3x) | 3 mm | 50 mm | CSG0595-C6 | 54.10 |
| .0595 | #53 | 1.511 mm | | 10.00 mm | (5x) | 3 mm | 50 mm | BGN0595-C6 | 56.70 |
| .0595 | #53 | 1.511 mm | | 14.50 mm | (8x) | 3 mm | 50 mm | ARY0595-C6 | 59.10 |
| .0595 | #53 | 1.511 mm | | 21.00 mm | (12x) | 3 mm | 63 mm | EFG0595-C6 | 66.00 |
| .0600 | | 1.524 mm | | 7.20 mm | (3x) | 3 mm | 50 mm | CSG0600-C6 | 54.10 |
| .0600 | | 1.524 mm | | 10.50 mm | (5x) | 3 mm | 50 mm | BGN0600-C6 | 56.70 |
| .0600 | | 1.524 mm | | 15.00 mm | (8x) | 3 mm | 50 mm | ARY0600-C6 | 59.10 |
| .0600 | | 1.524 mm | | 21.00 mm | (12x) | 3 mm | 63 mm | EFG0600-C6 | 66.00 |
| .0625 (1/16) | | 1.587 mm | .296 | | (3x) | 1/8 | 2 | FDW0625-C6 | 54.10 |
| .0625 (1/16) | | 1.587 mm | | 7.60 mm | (3x) | 3 mm | 50 mm | CSG0625-C6 | 54.10 |
| .0625 (1/16) | | 1.587 mm | | 10.50 mm | (5x) | 3 mm | 50 mm | BGN0625-C6 | 56.70 |
| .0625 (1/16) | | 1.587 mm | .420 | | (5x) | 1/8 | 2 | GBS0625-C6 | 56.70 |
| .0625 (1/16) | | 1.587 mm | | 12.50 mm | (6x) | 3 mm | 50 mm | CZS0625-C6 | 57.50 |
| .0625 (1/16) | | 1.587 mm | .600 | | (8x) | 1/8 | 2 | HGD0625-C6 | 59.10 |
| .0625 (1/16) | | 1.587 mm | | 15.50 mm | (8x) | 3 mm | 50 mm | ARY0625-C6 | 59.10 |
| .0625 (1/16) | | 1.587 mm | | 18.50 mm | (10x) | 3 mm | 63 mm | DXT0625-C6 | 62.50 |
| .0625 (1/16) | | 1.587 mm | | 22.00 mm | (12x) | 3 mm | 63 mm | EFG0625-C6 | 66.00 |
| .0635 | #52 | 1.612 mm | | 7.60 mm | (3x) | 3 mm | 50 mm | CSG0635-C6 | 54.10 |
| .0635 | #52 | 1.612 mm | | 11.00 mm | (5x) | 3 mm | 50 mm | BGN0635-C6 | 56.70 |
| .0635 | #52 | 1.612 mm | | 15.50 mm | (8x) | 3 mm | 50 mm | ARY0635-C6 | 59.10 |
| .0635 | #52 | 1.612 mm | | 22.00 mm | (12x) | 3 mm | 63 mm | EFG0635-C6 | 66.00 |
| .0670 | #51 | 1.701 mm | | 8.00 mm | (3x) | 3 mm | 50 mm | CSG0670-C6 | 54.10 |
| .0670 | #51 | 1.701 mm | | 11.50 mm | (5x) | 3 mm | 50 mm | BGN0670-C6 | 56.70 |
| .0670 | #51 | 1.701 mm | | 16.50 mm | (8x) | 3 mm | 63 mm | ARY0670-C6 | 59.10 |
| .0670 | #51 | 1.701 mm | | 20.00 mm | (10x) | 3 mm | 63 mm | DXT0669-C6 | 62.60 |
| .0670 | #51 | 1.701 mm | | 23.00 mm | (12x) | 3 mm | 63 mm | EFG0670-C6 | 66.00 |
| .0700 | #50 | 1.778 mm | | 8.50 mm | (3x) | 3 mm | 50 mm | CSG0700-C6 | 54.10 |
| .0700 | #50 | 1.778 mm | .340 | | (3x) | 1/8 | 2 | FDW0700-C6 | 54.10 |
| .0700 | #50 | 1.778 mm | | 12.00 mm | (5x) | 3 mm | 50 mm | BGN0700-C6 | 56.70 |
| .0700 | #50 | 1.778 mm | .480 | | (5x) | 1/8 | 2 | GBS0700-C6 | 56.70 |
| .0700 | #50 | 1.778 mm | | 14.00 mm | (6x) | 3 mm | 50 mm | CZS0700-C6 | 57.50 |
| .0700 | #50 | 1.778 mm | .680 | | (8x) | 1/8 | 2-1/2 | HGD0700-C6 | 59.10 |
| .0700 | #50 | 1.778 mm | | 17.50 mm | (8x) | 3 mm | 63 mm | ARY0700-C6 | 59.10 |
| .0700 | #50 | 1.778 mm | | 21.00 mm | (10x) | 3 mm | 63 mm | DXT0700-C6 | 62.60 |
| .0700 | #50 | 1.778 mm | | 24.00 mm | (12x) | 3 mm | 63 mm | EFG0700-C6 | 66.00 |
| .0730 | #49 | 1.854 mm | | 9.00 mm | (3x) | 3 mm | 50 mm | CSG0730-C6 | 54.10 |
| .0730 | #49 | 1.854 mm | | 12.50 mm | (5x) | 3 mm | 50 mm | BGN0730-C6 | 56.70 |
| .0730 | #49 | 1.854 mm | | 18.00 mm | (8x) | 3 mm | 63 mm | ARY0730-C6 | 59.10 |
| .0730 | #49 | 1.854 mm | | 22.00 mm | (10x) | 3 mm | 63 mm | DXT0729-C6 | 62.60 |
| .0730 | #49 | 1.854 mm | | 25.00 mm | (12x) | 3 mm | 63 mm | EFG0730-C6 | 66.00 |
| .0760 | #48 | 1.930 mm | | 9.00 mm | (3x) | 3 mm | 50 mm | CSG0760-C6 | 54.10 |
| .0760 | #48 | 1.930 mm | | 13.00 mm | (5x) | 3 mm | 50 mm | BGN0760-C6 | 56.70 |
| .0760 | #48 | 1.930 mm | | 19.00 mm | (8x) | 3 mm | 63 mm | ARY0760-C6 | 59.10 |
| .0760 | #48 | 1.930 mm | | 27.00 mm | (12x) | 3 mm | 63 mm | EFG0760-C6 | 66.00 |
| .0781 (5/64) | | 1.984 mm | | 9.50 mm | (3x) | 3 mm | 50 mm | CSG0781-C6 | 54.10 |
| .0781 (5/64) | | 1.984 mm | .380 | | (3x) | 1/8 | 2 | FDW0781-C6 | 54.10 |
| .0781 (5/64) | | 1.984 mm | .520 | | (5x) | 1/8 | 2 | GBS0781-C6 | 56.70 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.005"}_{-.000"}$ | $L_2$ $^{+.25mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0781 (5/64) | | 1.984 mm | | 13.50 mm | (5x) | 3 mm | 50 mm | BGN0781-C6 | 56.70 |
| .0781 (5/64) | | 1.984 mm | .760 | | (8x) | 1/8 | 2-1/2 | HGD0781-C6 | 59.10 |
| .0781 (5/64) | | 1.984 mm | | 19.50 mm | (8x) | 3 mm | 63 mm | ARY0781-C6 | 59.10 |
| .0781 (5/64) | | 1.984 mm | | 23.00 mm | (10x) | 3 mm | 63 mm | DXT0781-C6 | 62.50 |
| .0781 (5/64) | | 1.984 mm | | 27.00 mm | (12x) | 3 mm | 63 mm | EFG0781-C6 | 66.00 |
| .0785 | #47 | 1.993 mm | | 9.50 mm | (3x) | 3 mm | 50 mm | CSG0785-C6 | 57.90 |
| .0785 | #47 | 1.993 mm | | 13.50 mm | (5x) | 3 mm | 50 mm | BGN0785-C6 | 61.20 |
| .0785 | #47 | 1.993 mm | | 19.50 mm | (8x) | 3 mm | 63 mm | ARY0785-C6 | 59.10 |
| .0785 | #47 | 1.993 mm | | 27.00 mm | (12x) | 3 mm | 63 mm | EFG0785-C6 | 71.50 |
| .0787 | | 2.000 mm | | 9.50 mm | (3x) | 4 mm | 50 mm | CSG0787-C6 | 57.90 |
| .0787 | | 2.000 mm | | 13.50 mm | (5x) | 4 mm | 50 mm | BGN0787-C6 | 61.20 |
| .0787 | | 2.000 mm | | 19.50 mm | (8x) | 4 mm | 63 mm | ARY0787-C6 | 64.40 |
| .0787 | | 2.000 mm | | 24.00 mm | (10x) | 4 mm | 63 mm | DXT0787-C6 | 68.00 |
| .0787 | | 2.000 mm | | 28.00 mm | (12x) | 4 mm | 63 mm | EFG0787-C6 | 71.50 |
| .0800 | | 2.032 mm | | 9.50 mm | (3x) | 4 mm | 50 mm | CSG0800-C6 | 57.90 |
| .0800 | | 2.032 mm | .380 | | (3x) | 3/16 | 2 | FDW0800-C6 | 57.90 |
| .0800 | | 2.032 mm | | 13.50 mm | (5x) | 4 mm | 50 mm | BGN0800-C6 | 61.20 |
| .0800 | | 2.032 mm | .540 | | (5x) | 3/16 | 2 | GBS0800-C6 | 61.20 |
| .0800 | | 2.032 mm | | 20.00 mm | (8x) | 4 mm | 63 mm | ARY0800-C6 | 64.40 |
| .0800 | | 2.032 mm | .800 | | (8x) | 3/16 | 2-1/2 | HGD0800-C6 | 64.40 |
| .0810 | #46 | 2.057 mm | | 10.00 mm | (3x) | 4 mm | 50 mm | CSG0810-C6 | 57.90 |
| .0810 | #46 | 2.057 mm | | 14.00 mm | (5x) | 4 mm | 50 mm | BGN0810-C6 | 61.20 |
| .0810 | #46 | 2.057 mm | | 20.00 mm | (8x) | 4 mm | 63 mm | ARY0810-C6 | 64.40 |
| .0810 | #46 | 2.057 mm | | 28.00 mm | (12x) | 4 mm | 63 mm | EFG0810-C6 | 71.50 |
| .0820 | #45 | 2.082 mm | | 10.00 mm | (3x) | 4 mm | 50 mm | CSG0820-C6 | 57.90 |
| .0820 | #45 | 2.082 mm | | 14.00 mm | (5x) | 4 mm | 50 mm | BGN0820-C6 | 61.20 |
| .0820 | #45 | 2.082 mm | | 20.00 mm | (8x) | 4 mm | 63 mm | ARY0820-C6 | 64.40 |
| .0820 | #45 | 2.082 mm | | 29.00 mm | (12x) | 4 mm | 75 mm | EFG0820-C6 | 71.50 |
| .0860 | #44 | 2.184 mm | .400 | | (3x) | 3/16 | 2 | FDW0860-C6 | 57.90 |
| .0860 | #44 | 2.184 mm | | 10.50 mm | (3x) | 4 mm | 50 mm | CSG0860-C6 | 57.90 |
| .0860 | #44 | 2.184 mm | | 14.50 mm | (5x) | 4 mm | 50 mm | BGN0860-C6 | 61.20 |
| .0860 | #44 | 2.184 mm | .580 | | (5x) | 3/16 | 2-1/2 | GBS0860-C6 | 61.20 |
| .0860 | #44 | 2.184 mm | | 21.00 mm | (8x) | 4 mm | 63 mm | ARY0860-C6 | 64.40 |
| .0860 | #44 | 2.184 mm | .840 | | (8x) | 3/16 | 2-1/2 | HGD0860-C6 | 64.40 |
| .0860 | #44 | 2.184 mm | | 30.00 mm | (12x) | 4 mm | 75 mm | EFG0860-C6 | 71.50 |
| .0890 | #43 | 2.260 mm | | 10.50 mm | (3x) | 4 mm | 50 mm | CSG0890-C6 | 57.90 |
| .0890 | #43 | 2.260 mm | .420 | | (3x) | 3/16 | 2 | FDW0890-C6 | 57.90 |
| .0890 | #43 | 2.260 mm | | 15.00 mm | (5x) | 4 mm | 50 mm | BGN0890-C6 | 61.20 |
| .0890 | #43 | 2.260 mm | .600 | | (5x) | 3/16 | 2-1/2 | GBS0890-C6 | 61.20 |
| .0890 | #43 | 2.260 mm | | 22.00 mm | (8x) | 4 mm | 63 mm | ARY0890-C6 | 64.40 |
| .0890 | #43 | 2.260 mm | .880 | | (8x) | 3/16 | 2-1/2 | HGD0890-C6 | 64.40 |
| .0890 | #43 | 2.260 mm | | 31.00 mm | (12x) | 4 mm | 75 mm | EFG0890-C6 | 71.50 |
| .0900 | | 2.286 mm | | 11.00 mm | (3x) | 4 mm | 50 mm | CSG0900-C6 | 57.90 |
| .0900 | | 2.286 mm | | 15.00 mm | (5x) | 4 mm | 50 mm | BGN0900-C6 | 61.20 |
| .0900 | | 2.286 mm | | 22.00 mm | (8x) | 4 mm | 63 mm | ARY0900-C6 | 64.40 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.005"}_{-.000"}$ | $L_2$ $^{+.25mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0935 | #42 | 2.374 mm | | 11.50 mm | (3x) | 4 mm | 50 mm | CSG0935-C6 | 57.90 |
| .0935 | #42 | 2.374 mm | | 16.00 mm | (5x) | 4 mm | 63 mm | BGN0935-C6 | 61.20 |
| .0935 | #42 | 2.374 mm | | 23.00 mm | (8x) | 4 mm | 63 mm | ARY0935-C6 | 64.40 |
| .0935 | #42 | 2.374 mm | | 33.00 mm | (12x) | 4 mm | 75 mm | EFG0935-C6 | 71.50 |
| .0937 (3/32) | | 2.381 mm | .440 | | (3x) | 3/16 | 2 | FDW0937-C6 | 57.90 |
| .0937 (3/32) | | 2.381 mm | | 11.50 mm | (3x) | 4 mm | 50 mm | CSG0937-C6 | 57.90 |
| .0937 (3/32) | | 2.381 mm | | 16.00 mm | (5x) | 4 mm | 63 mm | BGN0937-C6 | 61.20 |
| .0937 (3/32) | | 2.381 mm | .640 | | (5x) | 3/16 | 2-1/2 | GBS0937-C6 | 61.20 |
| .0937 (3/32) | | 2.381 mm | | 18.00 mm | (6x) | 4 mm | 63 mm | CZS0937-C6 | 62.30 |
| .0937 (3/32) | | 2.381 mm | | 23.00 mm | (8x) | 4 mm | 63 mm | ARY0937-C6 | 64.40 |
| .0937 (3/32) | | 2.381 mm | .920 | | (8x) | 3/16 | 2-1/2 | HGD0937-C6 | 64.40 |
| .0937 (3/32) | | 2.381 mm | | 28.00 mm | (10x) | 4 mm | 63 mm | DXT0937-C6 | 68.00 |
| .0937 (3/32) | | 2.381 mm | | 33.00 mm | (12x) | 4 mm | 75 mm | EFG0937-C6 | 71.50 |
| .0960 | #41 | 2.438 mm | | 11.50 mm | (3x) | 4 mm | 50 mm | CSG0960-C6 | 57.90 |
| .0960 | #41 | 2.438 mm | .460 | | (3x) | 3/16 | 2 | FDW0960-C6 | 57.90 |
| .0960 | #41 | 2.438 mm | | 16.00 mm | (5x) | 4 mm | 63 mm | BGN0960-C6 | 61.20 |
| .0960 | #41 | 2.438 mm | .640 | | (5x) | 3/16 | 2-1/2 | GBS0960-C6 | 61.20 |
| .0960 | #41 | 2.438 mm | .920 | | (8x) | 3/16 | 2-1/2 | HGD0960-C6 | 64.40 |
| .0960 | #41 | 2.438 mm | | 24.00 mm | (8x) | 4 mm | 63 mm | ARY0960-C6 | 64.40 |
| .0960 | #41 | 2.438 mm | | 34.00 mm | (12x) | 4 mm | 75 mm | EFG0960-C6 | 71.50 |
| .0980 | #40 | 2.489 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | CSG0980-C6 | 57.90 |
| .0980 | #40 | 2.489 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BGN0980-C6 | 61.20 |
| .0980 | #40 | 2.489 mm | | 24.00 mm | (8x) | 4 mm | 63 mm | ARY0980-C6 | 64.40 |
| .0980 | #40 | 2.489 mm | | 34.00 mm | (12x) | 4 mm | 75 mm | EFG0980-C6 | 71.50 |
| .0984 | | 2.500 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | CSG0984-C6 | 61.30 |
| .0984 | | 2.500 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BGN0984-C6 | 65.10 |
| .0984 | | 2.500 mm | | 24.00 mm | (8x) | 4 mm | 63 mm | ARY0984-C6 | 68.50 |
| .0984 | | 2.500 mm | | 34.00 mm | (12x) | 4 mm | 75 mm | EFG0984-C6 | 73.90 |
| .0995 | #39 | 2.527 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | CSG0995-C6 | 61.30 |
| .0995 | #39 | 2.527 mm | .480 | | (3x) | 3/16 | 2 | FDW0995-C6 | 61.30 |
| .0995 | #39 | 2.527 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BGN0995-C6 | 65.10 |
| .0995 | #39 | 2.527 mm | .680 | | (5x) | 3/16 | 2-1/2 | GBS0995-C6 | 65.10 |
| .0995 | #39 | 2.527 mm | .960 | | (8x) | 3/16 | 2-1/2 | HGD0995-C6 | 68.50 |
| .0995 | #39 | 2.527 mm | | 25.00 mm | (8x) | 4 mm | 63 mm | ARY0995-C6 | 68.50 |
| .0995 | #39 | 2.527 mm | | 35.00 mm | (12x) | 4 mm | 75 mm | EFG0995-C6 | 75.90 |
| .1000 | | 2.540 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | CSG1000-C6 | 61.30 |
| .1000 | | 2.540 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BGN1000-C6 | 65.10 |
| .1000 | | 2.540 mm | | 25.00 mm | (8x) | 4 mm | 63 mm | ARY1000-C6 | 68.50 |
| .1015 | #38 | 2.578 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | CSG1015-C6 | 61.30 |
| .1015 | #38 | 2.578 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BGN1015-C6 | 65.10 |
| .1015 | #38 | 2.578 mm | | 25.00 mm | (8x) | 4 mm | 63 mm | ARY1015-C6 | 68.50 |
| .1015 | #38 | 2.578 mm | | 35.00 mm | (12x) | 4 mm | 75 mm | EFG1015-C6 | 75.90 |
| .1040 | #37 | 2.641 mm | | 12.50 mm | (3x) | 4 mm | 50 mm | CSG1040-C6 | 61.30 |
| .1040 | #37 | 2.641 mm | | 18.00 mm | (5x) | 4 mm | 63 mm | BGN1040-C6 | 65.10 |
| .1040 | #37 | 2.641 mm | | 26.00 mm | (8x) | 4 mm | 63 mm | ARY1040-C6 | 68.50 |
| .1040 | #37 | 2.641 mm | | 36.00 mm | (12x) | 4 mm | 75 mm | EFG1040-C6 | 75.90 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.005" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .1065 | #36 | 2.705 mm | | 13.00 mm | (3x) | 4 mm | 50 mm | CSG1065-C6 | 61.30 |
| .1065 | #36 | 2.705 mm | | 18.00 mm | (5x) | 4 mm | 63 mm | BGN1065-C6 | 65.10 |
| .1065 | #36 | 2.705 mm | | 26.00 mm | (8x) | 4 mm | 63 mm | ARY1065-C6 | 68.50 |
| .1065 | #36 | 2.705 mm | | 37.00 mm | (12x) | 4 mm | 75 mm | EFG1065-C6 | 75.90 |
| .1093 (7/64) | | 2.778 mm | | 13.00 mm | (3x) | 4 mm | 50 mm | CSG1093-C6 | 61.30 |
| .1093 (7/64) | | 2.778 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BGN1093-C6 | 65.10 |
| .1093 (7/64) | | 2.778 mm | | 27.00 mm | (8x) | 4 mm | 63 mm | ARY1093-C6 | 68.50 |
| .1093 (7/64) | | 2.778 mm | | 33.00 mm | (10x) | 4 mm | 75 mm | DXT1093-C6 | 72.10 |
| .1093 (7/64) | | 2.778 mm | | 38.00 mm | (12x) | 4 mm | 75 mm | EFG1093-C6 | 75.90 |
| .1100 | #35 | 2.794 mm | .520 | | (3x) | 3/16 | 2 | FDW1100-C6 | 61.30 |
| .1100 | #35 | 2.794 mm | | 13.50 mm | (3x) | 4 mm | 50 mm | CSG1100-C6 | 61.30 |
| .1100 | #35 | 2.794 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BGN1100-C6 | 65.10 |
| .1100 | #35 | 2.794 mm | .760 | | (5x) | 3/16 | 2-1/2 | GBS1100-C6 | 65.10 |
| .1100 | #35 | 2.794 mm | 1.040 | | (8x) | 3/16 | 2-1/2 | HGD1100-C6 | 68.50 |
| .1100 | #35 | 2.794 mm | | 27.00 mm | (8x) | 4 mm | 63 mm | ARY1100-C6 | 68.50 |
| .1100 | #35 | 2.794 mm | | 38.00 mm | (12x) | 4 mm | 75 mm | EFG1100-C6 | 75.90 |
| .1110 | #34 | 2.819 mm | | 13.50 mm | (3x) | 4 mm | 50 mm | CSG1110-C6 | 61.30 |
| .1110 | #34 | 2.819 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BGN1110-C6 | 65.10 |
| .1110 | #34 | 2.819 mm | | 27.00 mm | (8x) | 4 mm | 63 mm | ARY1110-C6 | 68.50 |
| .1110 | #34 | 2.819 mm | | 39.00 mm | (12x) | 4 mm | 75 mm | EFG1110-C6 | 75.90 |
| .1130 | #33 | 2.870 mm | | 13.50 mm | (3x) | 4 mm | 50 mm | CSG1130-C6 | 61.30 |
| .1130 | #33 | 2.870 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BGN1130-C6 | 65.10 |
| .1130 | #33 | 2.870 mm | | 28.00 mm | (8x) | 4 mm | 63 mm | ARY1130-C6 | 68.50 |
| .1130 | #33 | 2.870 mm | | 39.00 mm | (12x) | 4 mm | 75 mm | EFG1130-C6 | 75.90 |
| .1160 | #32 | 2.946 mm | | 14.00 mm | (3x) | 4 mm | 50 mm | CSG1160-C6 | 61.30 |
| .1160 | #32 | 2.946 mm | .560 | | (3x) | 3/16 | 2 | FDW1160-C6 | 61.30 |
| .1160 | #32 | 2.946 mm | | 20.00 mm | (5x) | 4 mm | 63 mm | BGN1160-C6 | 65.10 |
| .1160 | #32 | 2.946 mm | .800 | | (5x) | 3/16 | 2-1/2 | GBS1160-C6 | 65.10 |
| .1160 | #32 | 2.946 mm | 1.120 | | (8x) | 3/16 | 3 | HGD1160-C6 | 68.50 |
| .1160 | #32 | 2.946 mm | | 29.00 mm | (8x) | 4 mm | 63 mm | ARY1160-C6 | 68.50 |
| .1160 | #32 | 2.946 mm | | 40.00 mm | (12x) | 4 mm | 75 mm | EFG1160-C6 | 75.90 |
| .1181 | | 3.000 mm | | 14.50 mm | (3x) | 4 mm | 50 mm | CSG1181-C6 | 62.80 |
| .1181 | | 3.000 mm | | 20.00 mm | (5x) | 4 mm | 63 mm | BGN1181-C6 | 66.10 |
| .1181 | | 3.000 mm | | 23.00 mm | (6x) | 4 mm | 63 mm | CZS1181-C6 | 67.40 |
| .1181 | | 3.000 mm | | 29.00 mm | (8x) | 4 mm | 63 mm | ARY1181-C6 | 69.90 |
| .1181 | | 3.000 mm | | 35.00 mm | (10x) | 4 mm | 75 mm | DXT1181-C6 | 73.30 |
| .1181 | | 3.000 mm | | 42.00 mm | (12x) | 4 mm | 100 mm | EFG1181-C6 | 77.20 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.030" −.000" | $L_2$ +.75mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .1200 | #31 | 3.048 mm | | 14.50 mm | (3x) | 6 mm | 63 mm | CSG1200-C6 | 70.40 |
| .1200 | #31 | 3.048 mm | .580 | | (3x) | 3/16 | 2-1/2 | FDW1200-C6 | 70.40 |
| .1200 | #31 | 3.048 mm | .800 | | (5x) | 3/16 | 2-1/2 | GBS1200-C6 | 61.10 |
| .1200 | #31 | 3.048 mm | | 21.00 mm | (5x) | 6 mm | 63 mm | BGN1200-C6 | 61.10 |
| .1200 | #31 | 3.048 mm | | 30.00 mm | (8x) | 6 mm | 75 mm | ARY1200-C6 | 78.50 |
| .1200 | #31 | 3.048 mm | 1.200 | | (8x) | 3/16 | 3 | HGD1200-C6 | 78.50 |
| .1200 | #31 | 3.048 mm | | 42.00 mm | (12x) | 6 mm | 100 mm | EFG1200-C6 | 86.10 |
| .1250 (1/8) | | 3.175 mm | | 15.00 mm | (3x) | 6 mm | 63 mm | CSG1250-C6 | 70.40 |
| .1250 (1/8) | | 3.175 mm | .600 | | (3x) | 3/16 | 2-1/2 | FDW1250-C6 | 70.40 |
| .1250 (1/8) | | 3.175 mm | | 21.00 mm | (5x) | 6 mm | 63 mm | BGN1250-C6 | 73.90 |
| .1250 (1/8) | | 3.175 mm | .840 | | (5x) | 3/16 | 2-1/2 | GBS1250-C6 | 73.90 |
| .1250 (1/8) | | 3.175 mm | 1.200 | | (8x) | 3/16 | 3 | HGD1250-C6 | 78.50 |
| .1250 (1/8) | | 3.175 mm | | 31.00 mm | (8x) | 6 mm | 75 mm | ARY1250-C6 | 78.50 |
| .1250 (1/8) | | 3.175 mm | | 37.00 mm | (10x) | 6 mm | 100 mm | DXT1250-C6 | 82.20 |
| .1250 (1/8) | | 3.175 mm | | 44.00 mm | (12x) | 6 mm | 100 mm | EFG1250-C6 | 86.10 |
| .1285 | #30 | 3.263 mm | .610 | | (3x) | 1/4 | 2-1/2 | FDW1285-C6 | 70.40 |
| .1285 | #30 | 3.263 mm | | 16.00 mm | (3x) | 6 mm | 63 mm | CSG1285-C6 | 70.40 |
| .1285 | #30 | 3.263 mm | .880 | | (5x) | 1/4 | 2-1/2 | GBS1285-C6 | 73.90 |
| .1285 | #30 | 3.263 mm | | 32.00 mm | (8x) | 6 mm | 75 mm | ARY1285-C6 | 78.50 |
| .1285 | #30 | 3.263 mm | 1.280 | | (8x) | 1/4 | 3 | HGD1285-C6 | 78.50 |
| .1360 | #29 | 3.454 mm | | 16.00 mm | (3x) | 6 mm | 63 mm | CSG1360-C6 | 70.40 |
| .1360 | #29 | 3.454 mm | | 23.00 mm | (5x) | 6 mm | 63 mm | BGN1360-C6 | 73.90 |
| .1360 | #29 | 3.454 mm | | 34.00 mm | (8x) | 6 mm | 75 mm | ARY1360-C6 | 78.50 |
| .1360 | #29 | 3.454 mm | | 48.00 mm | (12x) | 6 mm | 100 mm | EFG1360-C6 | 86.10 |
| .1405 | #28 | 3.568 mm | | 17.00 mm | (3x) | 6 mm | 63 mm | CSG1405-C6 | 70.40 |
| .1405 | #28 | 3.568 mm | | 35.00 mm | (8x) | 6 mm | 75 mm | ARY1405-C6 | 78.50 |
| .1406 (9/64) | | 3.571 mm | | 17.00 mm | (3x) | 6 mm | 63 mm | CSG1406-C6 | 70.40 |
| .1406 (9/64) | | 3.571 mm | | 24.00 mm | (5x) | 6 mm | 75 mm | BGN1406-C6 | 73.90 |
| .1406 (9/64) | | 3.571 mm | | 35.00 mm | (8x) | 6 mm | 75 mm | ARY1406-C6 | 78.50 |
| .1406 (9/64) | | 3.571 mm | | 50.00 mm | (12x) | 6 mm | 100 mm | EFG1406-C6 | 86.10 |
| .1440 | #27 | 3.657 mm | | 17.00 mm | (3x) | 6 mm | 63 mm | CSG1440-C6 | 70.40 |
| .1440 | #27 | 3.657 mm | | 36.00 mm | (8x) | 6 mm | 100 mm | ARY1440-C6 | 78.50 |
| .1470 | #26 | 3.733 mm | | 18.00 mm | (3x) | 6 mm | 63 mm | CSG1470-C6 | 70.40 |
| .1470 | #26 | 3.733 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BGN1470-C6 | 73.90 |
| .1470 | #26 | 3.733 mm | | 36.00 mm | (8x) | 6 mm | 100 mm | ARY1470-C6 | 78.50 |
| .1470 | #26 | 3.733 mm | | 52.00 mm | (12x) | 6 mm | 100 mm | EFG1470-C6 | 86.10 |
| .1495 | #25 | 3.797 mm | | 18.00 mm | (3x) | 6 mm | 63 mm | CSG1495-C6 | 70.40 |
| .1495 | #25 | 3.797 mm | | 37.00 mm | (8x) | 6 mm | 100 mm | ARY1495-C6 | 78.50 |
| .1520 | #24 | 3.860 mm | | 18.00 mm | (3x) | 6 mm | 63 mm | CSG1520-C6 | 70.40 |
| .1520 | #24 | 3.860 mm | | 38.00 mm | (8x) | 6 mm | 100 mm | ARY1520-C6 | 78.50 |
| .1540 | #23 | 3.911 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | CSG1540-C6 | 70.40 |
| .1540 | #23 | 3.911 mm | | 38.00 mm | (8x) | 6 mm | 100 mm | ARY1540-C6 | 78.50 |
| .1562 (5/32) | | 3.968 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | CSG1562-C6 | 70.40 |
| .1562 (5/32) | | 3.968 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BGN1562-C6 | 73.90 |
| .1562 (5/32) | | 3.968 mm | | 39.00 mm | (8x) | 6 mm | 100 mm | ARY1562-C6 | 78.50 |
| .1562 (5/32) | | 3.968 mm | | 54.00 mm | (12x) | 6 mm | 100 mm | EFG1562-C6 | 86.10 |

continued on next page

# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.030"}_{-.000"}$ | $L_2$ $^{+.75mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .1570 | #22 | 3.987 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | CSG1570-C6 | 70.40 |
| .1570 | #22 | 3.987 mm | | 39.00 mm | (8x) | 6 mm | 100 mm | ARY1570-C6 | 78.50 |
| .1574 | | 4.000 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | CSG1574-C6 | 70.40 |
| .1574 | | 4.000 mm | | 28.00 mm | (5x) | 6 mm | 75 mm | BGN1574-C6 | 73.90 |
| .1574 | | 4.000 mm | | 39.00 mm | (8x) | 6 mm | 100 mm | ARY1574-C6 | 78.50 |
| .1590 | #21 | 4.038 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | CSG1590-C6 | 70.40 |
| .1590 | #21 | 4.038 mm | | 28.00 mm | (5x) | 6 mm | 75 mm | BGN1590-C6 | 73.90 |
| .1590 | #21 | 4.038 mm | | 39.00 mm | (8x) | 6 mm | 100 mm | ARY1590-C6 | 78.50 |
| .1590 | #21 | 4.038 mm | | 56.00 mm | (12x) | 6 mm | 100 mm | EFG1590-C6 | 86.10 |
| .1610 | #20 | 4.089 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | CSG1610-C6 | 70.40 |
| .1610 | #20 | 4.089 mm | | 40.00 mm | (8x) | 6 mm | 100 mm | ARY1610-C6 | 78.50 |
| .1660 | #19 | 4.216 mm | | 20.00 mm | (3x) | 6 mm | 63 mm | CSG1660-C6 | 70.40 |
| .1660 | #19 | 4.216 mm | | 42.00 mm | (8x) | 6 mm | 100 mm | ARY1660-C6 | 78.50 |
| .1695 | #18 | 4.305 mm | | 20.00 mm | (3x) | 6 mm | 63 mm | CSG1695-C6 | 70.40 |
| .1695 | #18 | 4.305 mm | | 42.00 mm | (8x) | 6 mm | 100 mm | ARY1695-C6 | 78.50 |
| .1718 (11/64) | | 4.365 mm | | 21.00 mm | (3x) | 6 mm | 63 mm | CSG1718-C6 | 70.40 |
| .1718 (11/64) | | 4.365 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BGN1718-C6 | 73.90 |
| .1718 (11/64) | | 4.365 mm | | 42.00 mm | (8x) | 6 mm | 100 mm | ARY1718-C6 | 78.50 |
| .1730 | #17 | 4.394 mm | | 21.00 mm | (3x) | 6 mm | 63 mm | CSG1730-C6 | 70.40 |
| .1730 | #17 | 4.394 mm | | 42.00 mm | (8x) | 6 mm | 100 mm | ARY1730-C6 | 78.50 |
| .1770 | #16 | 4.495 mm | | 21.00 mm | (3x) | 6 mm | 63 mm | CSG1770-C6 | 70.40 |
| .1770 | #16 | 4.495 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BGN1770-C6 | 73.90 |
| .1770 | #16 | 4.495 mm | | 44.00 mm | (8x) | 6 mm | 100 mm | ARY1770-C6 | 78.50 |
| .1770 | #16 | 4.495 mm | | 62.00 mm | (12x) | 6 mm | 125 mm | EFG1770-C6 | 86.10 |
| .1800 | #15 | 4.572 mm | | 22.00 mm | (3x) | 6 mm | 63 mm | CSG1800-C6 | 70.40 |
| .1800 | #15 | 4.572 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BGN1800-C6 | 73.90 |
| .1800 | #15 | 4.572 mm | | 44.00 mm | (8x) | 6 mm | 100 mm | ARY1800-C6 | 78.50 |
| .1800 | #15 | 4.572 mm | | 62.00 mm | (12x) | 6 mm | 125 mm | EFG1800-C6 | 86.10 |
| .1820 | #14 | 4.622 mm | | 22.00 mm | (3x) | 6 mm | 63 mm | CSG1820-C6 | 70.40 |
| .1820 | #14 | 4.622 mm | | 46.00 mm | (8x) | 6 mm | 100 mm | ARY1820-C6 | 78.50 |
| .1850 | #13 | 4.700 mm | | 22.00 mm | (3x) | 6 mm | 63 mm | CSG1850-C6 | 70.40 |
| .1850 | #13 | 4.700 mm | | 46.00 mm | (8x) | 6 mm | 100 mm | ARY1850-C6 | 78.50 |
| .1875 (3/16) | | 4.762 mm | .890 | | (3x) | 1/4 | 2-1/2 | FDW1875-C6 | 70.40 |
| .1875 (3/16) | | 4.762 mm | | 23.00 mm | (3x) | 6 mm | 63 mm | CSG1875-C6 | 70.40 |
| .1875 (3/16) | | 4.762 mm | | 32.00 mm | (5x) | 6 mm | 75 mm | BGN1875-C6 | 73.90 |
| .1875 (3/16) | | 4.762 mm | 1.280 | | (5x) | 1/4 | 3 | GBS1875-C6 | 73.90 |
| .1875 (3/16) | | 4.762 mm | | 46.00 mm | (8x) | 6 mm | 100 mm | ARY1875-C6 | 78.50 |
| .1875 (3/16) | | 4.762 mm | 1.840 | | (8x) | 1/4 | 3-1/2 | HGD1875-C6 | 78.50 |
| .1875 (3/16) | | 4.762 mm | | 66.00 mm | (12x) | 6 mm | 125 mm | EFG1875-C6 | 86.10 |
| .1890 | #12 | 4.800 mm | | 23.00 mm | (3x) | 6 mm | 63 mm | CSG1890-C6 | 70.40 |
| .1890 | #12 | 4.800 mm | | 46.00 mm | (8x) | 6 mm | 100 mm | ARY1890-C6 | 78.50 |
| .1910 | #11 | 4.851 mm | | 23.00 mm | (3x) | 6 mm | 63 mm | CSG1910-C6 | 70.40 |
| .1910 | #11 | 4.851 mm | | 48.00 mm | (8x) | 6 mm | 100 mm | ARY1910-C6 | 78.50 |
| .1935 | #10 | 4.914 mm | | 23.00 mm | (3x) | 6 mm | 63 mm | CSG1935-C6 | 70.40 |
| .1935 | #10 | 4.914 mm | | 48.00 mm | (8x) | 6 mm | 100 mm | ARY1935-C6 | 78.50 |

continued on next page

# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.030"}_{-.000"}$ | $L_2$ $^{+.75mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .1960 | #9 | 4.978 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | CSG1960-C6 | 70.40 |
| .1960 | #9 | 4.978 mm | | 48.00 mm | (8x) | 6 mm | 100 mm | ARY1960-C6 | 78.50 |
| .1968 | | 5.000 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | CSG1968-C6 | 70.40 |
| .1968 | | 5.000 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BGN1968-C6 | 73.90 |
| .1968 | | 5.000 mm | | 48.00 mm | (8x) | 6 mm | 100 mm | ARY1968-C6 | 78.50 |
| .1990 | #8 | 5.054 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | CSG1990-C6 | 70.40 |
| .1990 | #8 | 5.054 mm | | 50.00 mm | (8x) | 6 mm | 100 mm | ARY1990-C6 | 78.50 |
| .2009 | #7 | 5.105 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | CSG2009-C6 | 70.40 |
| .2009 | #7 | 5.105 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BGN2009-C6 | 73.90 |
| .2009 | #7 | 5.105 mm | | 50.00 mm | (8x) | 6 mm | 100 mm | ARY2009-C6 | 78.50 |
| .2031 (13/64) | | 5.159 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | CSG2031-C6 | 70.40 |
| .2031 (13/64) | | 5.159 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BGN2031-C6 | 73.90 |
| .2031 (13/64) | | 5.159 mm | | 50.00 mm | (8x) | 6 mm | 100 mm | ARY2031-C6 | 78.50 |
| .2040 | #6 | 5.181 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | CSG2040-C6 | 70.40 |
| .2040 | #6 | 5.181 mm | | 50.00 mm | (8x) | 6 mm | 100 mm | ARY2040-C6 | 78.50 |
| .2055 | #5 | 5.219 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | CSG2055-C6 | 70.40 |
| .2055 | #5 | 5.219 mm | | 50.00 mm | (8x) | 6 mm | 100 mm | ARY2055-C6 | 78.50 |
| .2090 | #4 | 5.308 mm | | 26.00 mm | (3x) | 6 mm | 75 mm | CSG2090-C6 | 70.40 |
| .2090 | #4 | 5.308 mm | | 52.00 mm | (8x) | 6 mm | 100 mm | ARY2090-C6 | 78.50 |
| .2129 | #3 | 5.410 mm | | 26.00 mm | (3x) | 6 mm | 75 mm | CSG2129-C6 | 70.40 |
| .2129 | #3 | 5.410 mm | | 36.00 mm | (5x) | 6 mm | 75 mm | BGN2129-C6 | 73.90 |
| .2129 | #3 | 5.410 mm | | 52.00 mm | (8x) | 6 mm | 100 mm | ARY2129-C6 | 78.50 |
| .2187 (7/32) | | 5.556 mm | | 26.00 mm | (3x) | 6 mm | 75 mm | CSG2187-C6 | 70.40 |
| .2187 (7/32) | | 5.556 mm | | 38.00 mm | (5x) | 6 mm | 100 mm | BGN2187-C6 | 73.90 |
| .2187 (7/32) | | 5.556 mm | | 54.00 mm | (8x) | 6 mm | 100 mm | ARY2187-C6 | 78.50 |
| .2210 | #2 | 5.613 mm | | 26.00 mm | (3x) | 6 mm | 75 mm | CSG2210-C6 | 70.40 |
| .2210 | #2 | 5.613 mm | | 54.00 mm | (8x) | 6 mm | 100 mm | ARY2210-C6 | 78.50 |
| .2280 | #1 | 5.791 mm | | 28.00 mm | (3x) | 6 mm | 75 mm | CSG2280-C6 | 70.40 |
| .2280 | #1 | 5.791 mm | | 56.00 mm | (8x) | 6 mm | 100 mm | ARY2280-C6 | 78.50 |
| .2340 | A | 5.943 mm | | 28.00 mm | (3x) | 6 mm | 75 mm | CSG2340-C6 | 70.40 |
| .2340 | A | 5.943 mm | | 58.00 mm | (8x) | 6 mm | 100 mm | ARY2340-C6 | 78.50 |
| .2343 (15/64) | | 5.953 mm | | 28.00 mm | (3x) | 6 mm | 75 mm | CSG2343-C6 | 70.40 |
| .2343 (15/64) | | 5.953 mm | | 40.00 mm | (5x) | 6 mm | 100 mm | BGN2343-C6 | 73.90 |
| .2343 (15/64) | | 5.953 mm | | 58.00 mm | (8x) | 6 mm | 100 mm | ARY2343-C6 | 78.50 |
| .2362 | | 6.000 mm | | 28.00 mm | (3x) | 6 mm | 75 mm | CSG2362-C6 | 70.40 |
| .2362 | | 6.000 mm | | 40.00 mm | (5x) | 6 mm | 100 mm | BGN2362-C6 | 73.90 |
| .2362 | | 6.000 mm | | 58.00 mm | (8x) | 6 mm | 100 mm | ARY2362-C6 | 78.50 |
| .2380 | B | 6.045 mm | | 28.00 mm | (3x) | 8 mm | 75 mm | CSG2380-C6 | 72.90 |
| .2380 | B | 6.045 mm | | 58.00 mm | (8x) | 8 mm | 100 mm | ARY2380-C6 | 80.70 |
| .2420 | C | 6.146 mm | | 30.00 mm | (3x) | 8 mm | 75 mm | CSG2420-C6 | 72.90 |
| .2420 | C | 6.146 mm | | 60.00 mm | (8x) | 8 mm | 100 mm | ARY2420-C6 | 80.70 |
| .2460 | D | 6.248 mm | | 30.00 mm | (3x) | 8 mm | 75 mm | CSG2460-C6 | 72.90 |
| .2460 | D | 6.248 mm | | 60.00 mm | (8x) | 8 mm | 100 mm | ARY2460-C6 | 80.70 |

continued on next page

# MINIATURE HIGH PERFORMANCE DRILLS

## Hardened Steels (cont.)



continued from previous page

| DRILL DIAMETER inch | wire | metric | FLUTE LENGTH inch | metric | hole depth | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED 2 FL | USD$ |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.030" −.000" | $L_2$ +.75mm −.00mm | | $D_2$ (h6) | L1 | | |
| .2500 (1/4) | E | 6.350 mm | | 30.00 mm | (3x) | 8 mm | 75 mm | CSG2500-C6 | 72.90 |
| .2500 (1/4) | E | 6.350 mm | 1.188 | | (3x) | 1/4 | 3 | FDW2500-C6 | 72.90 |
| .2500 (1/4) | E | 6.350 mm | | 42.00 mm | (5x) | 8 mm | 100 mm | BGN2500-C6 | 76.30 |
| .2500 (1/4) | E | 6.350 mm | 1.680 | | (5x) | 1/4 | 3-1/2 | GBS2500-C6 | 76.30 |
| .2500 (1/4) | E | 6.350 mm | 2.400 | | (8x) | 1/4 | 4 | HGD2500-C6 | 80.70 |
| .2500 (1/4) | E | 6.350 mm | | 62.00 mm | (8x) | 8 mm | 125 mm | ARY2500-C6 | 80.70 |
| .2570 | F | 6.528 mm | | 32.00 mm | (3x) | 8 mm | 75 mm | CSG2570-C6 | 81.00 |
| .2812 | | 7.142 mm | | 34.00 mm | (3x) | 8 mm | 75 mm | CSG2812-C6 | 81.00 |
| .3125 (5/16) | | 7.937 mm | | 38.00 mm | (3x) | 8 mm | 100 mm | CSG3125-C6 | 81.00 |
| .3150 | | 8.000 mm | | 38.00 mm | (3x) | 8 mm | 100 mm | CSG3150-C6 | 81.00 |
| .3750 (3/8) | | 9.525 mm | | 46.00 mm | (3x) | 10 mm | 100 mm | CSG3750-C6 | 133.50 |

## SPEEDS & FEEDS (Miniature High Performance Drills – Hardened Steels)

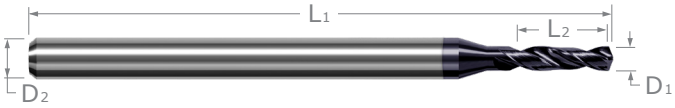
**Important Note:** Values in table are in inches and are based on 3x and 5x drill lengths. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%. For 12x, reduce to 65%). Pecking cycles are recommended to avoid chip pacing and breakage. For materials at 38-45 Rc, initial peck depth should be 1-2x Diameter with each subsequent peck at .5-1x Diameter. For higher hardness materials, peck depths should be .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

| Material | Hardness | SFM | Chip Load IPR (Inches Per Revolution) By Drill Diameter .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .375 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hardened Steels | 38-45 Rc | 150 | .00029 | .00060 | .00090 | .00119 | .00150 | .00179 | .00240 | .00359 | .00480 | .00720 |
| | 46-55 Rc | 90 | .00022 | .00045 | .00068 | .00089 | .00112 | .00134 | .00180 | .00269 | .00360 | .00540 |
| | 56-68 Rc | 40 | .00014 | .00030 | .00045 | .00060 | .00075 | .00089 | .00120 | .00180 | .00240 | .00360 |

NEW SIZES!

# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels




**Available for 3x, 5x, 8x 10x, and 12x Hole Depths!**

- Optimized for drilling prehardened medium alloy steels, stainless steels, and tool steels up to 45Rc
- Specialized flute shape for improved chip evacuation and maximum rigidity
- 140° point angle
- AlTiN coating for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



Specialized Flute Shape for Improved Chip Evacuation



| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0078 | | .200 mm | | .95 mm | (3x) | 3 mm | 50 mm | DHE0078-C3 | 47.00 |
| .0078 | | .200 mm | | 1.35 mm | (5x) | 3 mm | 50 mm | BVT0078-C3 | 49.90 |
| .0079 | #92 | .201 mm | | 1.35 mm | (5x) | 3 mm | 50 mm | BVT0079-C3 | 49.90 |
| .0083 | #91 | .210 mm | | 1.00 mm | (3x) | 3 mm | 50 mm | DHE0083-C3 | 47.00 |
| .0083 | #91 | .210 mm | | 1.40 mm | (5x) | 3 mm | 50 mm | BVT0083-C3 | 49.90 |
| .0087 | #90 | .221 mm | | 1.05 mm | (3x) | 3 mm | 50 mm | DHE0087-C3 | 47.00 |
| .0087 | #90 | .221 mm | | 1.50 mm | (5x) | 3 mm | 50 mm | BVT0087-C3 | 49.90 |
| .0091 | #89 | .231 mm | | 1.10 mm | (3x) | 3 mm | 50 mm | DHE0091-C3 | 47.00 |
| .0091 | #89 | .231 mm | | 1.55 mm | (5x) | 3 mm | 50 mm | BVT0091-C3 | 49.90 |
| .0095 | #88 | .241 mm | | 1.15 mm | (3x) | 3 mm | 50 mm | DHE0095-C3 | 47.00 |
| .0095 | #88 | .241 mm | | 1.65 mm | (5x) | 3 mm | 50 mm | BVT0095-C3 | 49.90 |
| .0100 | #87 | .254 mm | | 1.20 mm | (3x) | 3 mm | 50 mm | DHE0100-C3 | 45.90 |
| .0100 | #87 | .254 mm | .048 | | (3x) | 1/8 | 2 | FKB0100-C3 | 45.90 |
| .0100 | #87 | .254 mm | | 1.70 mm | (5x) | 3 mm | 50 mm | BVT0100-C3 | 48.40 |
| .0100 | #87 | .254 mm | .068 | | (5x) | 1/8 | 1-1/2 | GKT0100-C3 | 48.40 |
| .0100 | #87 | .254 mm | .096 | | (8x) | 1/8 | 2 | HDV0100-C3 | 53.50 |
| .0100 | #87 | .254 mm | | 2.50 mm | (8x) | 3 mm | 50 mm | ADS0100-C3 | 53.50 |
| .0100 | #87 | .254 mm | | 3.00 mm | (10x) | 3 mm | 50 mm | EXP0100-C3 | 56.60 |
| .0100 | #87 | .254 mm | | 3.50 mm | (12x) | 3 mm | 50 mm | CHT0100-C3 | 60.20 |
| .0105 | #86 | .266 mm | | 1.25 mm | (3x) | 3 mm | 50 mm | DHE0105-C3 | 45.90 |
| .0105 | #86 | .266 mm | | 1.80 mm | (5x) | 3 mm | 50 mm | BVT0105-C3 | 48.40 |
| .0105 | #86 | .266 mm | | 2.60 mm | (8x) | 3 mm | 50 mm | ADS0105-C3 | 53.50 |
| .0105 | #86 | .266 mm | | 3.70 mm | (12x) | 3 mm | 50 mm | CHT0105-C3 | 60.20 |
| .0110 | #85 | .279 mm | | 1.35 mm | (3x) | 3 mm | 50 mm | DHE0110-C3 | 45.90 |
| .0110 | #85 | .279 mm | | 1.90 mm | (5x) | 3 mm | 50 mm | BVT0110-C3 | 48.40 |
| .0110 | #85 | .279 mm | | 2.70 mm | (8x) | 3 mm | 50 mm | ADS0110-C3 | 53.50 |
| .0110 | #85 | .279 mm | | 3.30 mm | (10x) | 3 mm | 50 mm | EXP0110-C3 | 56.60 |
| .0110 | #85 | .279 mm | | 3.80 mm | (12x) | 3 mm | 50 mm | CHT0110-C3 | 60.20 |
| .0115 | #84 | .292 mm | | 1.40 mm | (3x) | 3 mm | 50 mm | DHE0115-C3 | 45.90 |
| .0115 | #84 | .292 mm | | 2.00 mm | (5x) | 3 mm | 50 mm | BVT0115-C3 | 48.40 |
| .0115 | #84 | .292 mm | | 2.80 mm | (8x) | 3 mm | 50 mm | ADS0115-C3 | 53.50 |
| .0115 | #84 | .292 mm | | 4.00 mm | (12x) | 3 mm | 50 mm | CHT0115-C3 | 60.20 |
| .0118 | | .300 mm | | 2.00 mm | (5x) | 3 mm | 50 mm | BVT0118-C3 | 48.40 |
| .0118 | | .300 mm | | 4.10 mm | (12x) | 3 mm | 50 mm | CHT0118-C3 | 60.20 |

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NEW SIZES!

# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0120 | #83 | .304 mm | | 1.45 mm | (3x) | 3 mm | 50 mm | DHE0120-C3 | 45.90 |
| .0120 | #83 | .304 mm | | 2.10 mm | (5x) | 3 mm | 50 mm | BVT0120-C3 | 48.40 |
| .0120 | #83 | .304 mm | | 3.00 mm | (8x) | 3 mm | 50 mm | ADS0120-C3 | 53.50 |
| .0120 | #83 | .304 mm | | 3.60 mm | (10x) | 3 mm | 50 mm | EXP0120-C3 | 56.60 |
| .0120 | #83 | .304 mm | | 4.20 mm | (12x) | 3 mm | 50 mm | CHT0120-C3 | 60.20 |
| .0125 | #82 | .317 mm | | 1.50 mm | (3x) | 3 mm | 50 mm | DHE0125-C3 | 45.90 |
| .0125 | #82 | .317 mm | | 2.10 mm | (5x) | 3 mm | 50 mm | BVT0125-C3 | 48.40 |
| .0125 | #82 | .317 mm | | 3.10 mm | (8x) | 3 mm | 50 mm | ADS0125-C3 | 53.50 |
| .0125 | #82 | .317 mm | | 4.40 mm | (12x) | 3 mm | 50 mm | CHT0125-C3 | 60.20 |
| .0130 | #81 | .330 mm | | 1.55 mm | (3x) | 3 mm | 50 mm | DHE0130-C3 | 45.90 |
| .0130 | #81 | .330 mm | | 2.20 mm | (5x) | 3 mm | 50 mm | BVT0130-C3 | 48.40 |
| .0130 | #81 | .330 mm | | 3.20 mm | (8x) | 3 mm | 50 mm | ADS0130-C3 | 53.50 |
| .0130 | #81 | .330 mm | | 3.90 mm | (10x) | 3 mm | 50 mm | EXP0130-C3 | 56.60 |
| .0130 | #81 | .330 mm | | 4.50 mm | (12x) | 3 mm | 50 mm | CHT0130-C3 | 60.20 |
| .0135 | #80 | .342 mm | | 1.65 mm | (3x) | 3 mm | 50 mm | DHE0135-C3 | 45.90 |
| .0135 | #80 | .342 mm | | 2.30 mm | (5x) | 3 mm | 50 mm | BVT0135-C3 | 48.40 |
| .0135 | #80 | .342 mm | | 3.30 mm | (8x) | 3 mm | 50 mm | ADS0135-C3 | 53.50 |
| .0135 | #80 | .342 mm | | 4.70 mm | (12x) | 3 mm | 50 mm | CHT0135-C3 | 60.20 |
| .0140 | | .355 mm | | 1.70 mm | (3x) | 3 mm | 50 mm | DHE0140-C3 | 45.90 |
| .0140 | | .355 mm | | 2.40 mm | (5x) | 3 mm | 50 mm | BVT0140-C3 | 48.40 |
| .0140 | | .355 mm | | 3.50 mm | (8x) | 3 mm | 50 mm | ADS0140-C3 | 53.50 |
| .0140 | | .355 mm | | 4.90 mm | (12x) | 3 mm | 50 mm | CHT0140-C3 | 60.20 |
| .0144 | #79 | .368 mm | | 1.75 mm | (3x) | 3 mm | 50 mm | DHE0144-C3 | 45.90 |
| .0144 | #79 | .368 mm | | 2.50 mm | (5x) | 3 mm | 50 mm | BVT0144-C3 | 48.40 |
| .0144 | #79 | .368 mm | | 3.60 mm | (8x) | 3 mm | 50 mm | ADS0144-C3 | 53.50 |
| .0144 | #79 | .368 mm | | 4.30 mm | (10x) | 3 mm | 50 mm | EXP0144-C3 | 56.60 |
| .0144 | #79 | .368 mm | | 5.00 mm | (12x) | 3 mm | 50 mm | CHT0144-C3 | 60.20 |
| .0150 | | .381 mm | | 1.80 mm | (3x) | 3 mm | 50 mm | DHE0150-C3 | 45.90 |
| .0150 | | .381 mm | | 2.60 mm | (5x) | 3 mm | 50 mm | BVT0150-C3 | 48.40 |
| .0150 | | .381 mm | | 3.70 mm | (8x) | 3 mm | 50 mm | ADS0150-C3 | 53.50 |
| .0150 | | .381 mm | | 5.20 mm | (12x) | 3 mm | 50 mm | CHT0150-C3 | 60.20 |
| .0156 (1/64) | | .396 mm | .074 | | (3x) | 1/8 | 1-1/2 | FKB0156-C3 | 45.90 |
| .0156 (1/64) | | .396 mm | | 1.90 mm | (3x) | 3 mm | 50 mm | DHE0156-C3 | 45.90 |
| .0156 (1/64) | | .396 mm | .104 | | (5x) | 1/8 | 2 | GKT0156-C3 | 48.40 |
| .0156 (1/64) | | .396 mm | | 2.70 mm | (5x) | 3 mm | 50 mm | BVT0156-C3 | 48.40 |
| .0156 (1/64) | | .396 mm | .152 | | (8x) | 1/8 | 2 | HDV0156-C3 | 53.50 |
| .0156 (1/64) | | .396 mm | | 3.90 mm | (8x) | 3 mm | 50 mm | ADS0156-C3 | 53.50 |
| .0156 (1/64) | | .396 mm | | 4.70 mm | (10x) | 3 mm | 50 mm | EXP0156-C3 | 56.60 |
| .0156 (1/64) | | .396 mm | | 5.40 mm | (12x) | 3 mm | 50 mm | CHT0156-C3 | 60.20 |
| .0157 | | .400 mm | | 2.70 mm | (5x) | 3 mm | 50 mm | BVT0157-C3 | 48.40 |
| .0157 | | .400 mm | | 5.60 mm | (12x) | 3 mm | 50 mm | CHT0157-C3 | 60.20 |
| .0160 | #78 | .406 mm | | 2.00 mm | (3x) | 3 mm | 50 mm | DHE0160-C3 | 45.90 |
| .0160 | #78 | .406 mm | | 2.70 mm | (5x) | 3 mm | 50 mm | BVT0160-C3 | 48.40 |
| .0160 | #78 | .406 mm | | 4.00 mm | (8x) | 3 mm | 50 mm | ADS0160-C3 | 53.50 |
| .0160 | #78 | .406 mm | | 4.80 mm | (10x) | 3 mm | 50 mm | EXP0160-C3 | 56.60 |
| .0160 | #78 | .406 mm | | 5.60 mm | (12x) | 3 mm | 50 mm | CHT0160-C3 | 60.20 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)

continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0170 | | .431 mm | | 2.10 mm | (3x) | 3 mm | 50 mm | DHE0170-C3 | 45.90 |
| .0170 | | .431 mm | | 2.90 mm | (5x) | 3 mm | 50 mm | BVT0170-C3 | 48.40 |
| .0170 | | .431 mm | | 4.20 mm | (8x) | 3 mm | 50 mm | ADS0170-C3 | 53.50 |
| .0170 | | .431 mm | | 6.00 mm | (12x) | 3 mm | 50 mm | CHT0170-C3 | 60.20 |
| .0180 | #77 | .457 mm | | 2.20 mm | (3x) | 3 mm | 50 mm | DHE0180-C3 | 45.90 |
| .0180 | #77 | .457 mm | | 3.10 mm | (5x) | 3 mm | 50 mm | BVT0180-C3 | 48.40 |
| .0180 | #77 | .457 mm | | 4.50 mm | (8x) | 3 mm | 50 mm | ADS0180-C3 | 53.90 |
| .0180 | #77 | .457 mm | | 5.40 mm | (10x) | 3 mm | 50 mm | EXP0180-C3 | 56.60 |
| .0180 | #77 | .457 mm | | 6.20 mm | (12x) | 3 mm | 50 mm | CHT0180-C3 | 60.20 |
| .0190 | | .482 mm | | 2.30 mm | (3x) | 3 mm | 50 mm | DHE0190-C3 | 45.90 |
| .0190 | | .482 mm | | 3.30 mm | (5x) | 3 mm | 50 mm | BVT0190-C3 | 48.40 |
| .0190 | | .482 mm | | 4.70 mm | (8x) | 3 mm | 50 mm | ADS0190-C3 | 53.50 |
| .0190 | | .482 mm | | 6.60 mm | (12x) | 3 mm | 50 mm | CHT0190-C3 | 60.20 |
| .0196 | | .500 mm | | 2.40 mm | (3x) | 3 mm | 50 mm | DHE0196-C3 | 45.30 |
| .0196 | | .500 mm | | 3.40 mm | (5x) | 3 mm | 50 mm | BVT0196-C3 | 47.70 |
| .0196 | | .500 mm | | 4.90 mm | (8x) | 3 mm | 50 mm | ADS0196-C3 | 53.90 |
| .0196 | | .500 mm | | 5.80 mm | (10x) | 3 mm | 50 mm | EXP0196-C3 | 56.80 |
| .0196 | | .500 mm | | 6.80 mm | (12x) | 3 mm | 50 mm | CHT0196-C3 | 58.80 |
| .0200 | #76 | .508 mm | | 2.40 mm | (3x) | 3 mm | 50 mm | DHE0200-C3 | 45.30 |
| .0200 | #76 | .508 mm | .096 | | (3x) | 1/8 | 2 | FKB0200-C3 | 45.30 |
| .0200 | #76 | .508 mm | | 3.40 mm | (5x) | 3 mm | 50 mm | BVT0200-C3 | 47.70 |
| .0200 | #76 | .508 mm | .136 | | (5x) | 1/8 | 2 | GKT0200-C3 | 47.70 |
| .0200 | #76 | .508 mm | .192 | | (8x) | 1/8 | 2 | HDV0200-C3 | 53.90 |
| .0200 | #76 | .508 mm | | 5.00 mm | (8x) | 3 mm | 50 mm | ADS0200-C3 | 53.90 |
| .0200 | #76 | .508 mm | | 6.00 mm | (10x) | 3 mm | 50 mm | EXP0200-C3 | 56.80 |
| .0200 | #76 | .508 mm | | 7.00 mm | (12x) | 3 mm | 50 mm | CHT0200-C3 | 58.80 |
| .0210 | #75 | .533 mm | | 2.50 mm | (3x) | 3 mm | 50 mm | DHE0210-C3 | 45.30 |
| .0210 | #75 | .533 mm | | 3.60 mm | (5x) | 3 mm | 50 mm | BVT0210-C3 | 47.70 |
| .0210 | #75 | .533 mm | | 5.20 mm | (8x) | 3 mm | 50 mm | ADS0210-C3 | 53.90 |
| .0210 | #75 | .533 mm | | 6.20 mm | (10x) | 3 mm | 50 mm | EXP0210-C3 | 56.80 |
| .0210 | #75 | .533 mm | | 7.40 mm | (12x) | 3 mm | 50 mm | CHT0210-C3 | 58.80 |
| .0220 | | .558 mm | | 2.70 mm | (3x) | 3 mm | 50 mm | DHE0220-C3 | 45.30 |
| .0220 | | .558 mm | | 3.80 mm | (5x) | 3 mm | 50 mm | BVT0220-C3 | 47.70 |
| .0220 | | .558 mm | | 5.40 mm | (8x) | 3 mm | 50 mm | ADS0220-C3 | 53.90 |
| .0220 | | .558 mm | | 7.60 mm | (12x) | 3 mm | 50 mm | CHT0220-C3 | 58.80 |
| .0225 | #74 | .571 mm | | 2.70 mm | (3x) | 3 mm | 50 mm | DHE0225-C3 | 45.30 |
| .0225 | #74 | .571 mm | .108 | | (3x) | 1/8 | 2 | FKB0225-C3 | 45.30 |
| .0225 | #74 | .571 mm | .152 | | (5x) | 1/8 | 2 | GKT0225-C3 | 47.70 |
| .0225 | #74 | .571 mm | | 3.90 mm | (5x) | 3 mm | 50 mm | BVT0225-C3 | 47.70 |
| .0225 | #74 | .571 mm | .216 | | (8x) | 1/8 | 2 | HDV0225-C3 | 53.90 |
| .0225 | #74 | .571 mm | | 5.60 mm | (8x) | 3 mm | 50 mm | ADS0225-C3 | 53.90 |
| .0225 | #74 | .571 mm | | 6.80 mm | (10x) | 3 mm | 50 mm | EXP0225-C3 | 56.80 |
| .0225 | #74 | .571 mm | | 7.80 mm | (12x) | 3 mm | 50 mm | CHT0225-C3 | 58.80 |
| .0230 | | .584 mm | | 2.80 mm | (3x) | 3 mm | 50 mm | DHE0230-C3 | 45.30 |
| .0230 | | .584 mm | | 3.90 mm | (5x) | 3 mm | 50 mm | BVT0230-C3 | 47.70 |
| .0230 | | .584 mm | | 5.60 mm | (8x) | 3 mm | 50 mm | ADS0230-C3 | 53.90 |
| .0230 | | .584 mm | | 8.00 mm | (12x) | 3 mm | 50 mm | CHT0230-C3 | 58.80 |

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NEW SIZES!

# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)



continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.010"}_{-.000"}$ | $L_2$ $^{+.25mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0236 | | .600 mm | | 4.00 mm | (5x) | 3 mm | 50 mm | BVT0236-C3 | 47.70 |
| .0236 | | .600 mm | | 8.20 mm | (12x) | 3 mm | 50 mm | CHT0236-C3 | 58.80 |
| .0240 | #73 | .609 mm | | 2.90 mm | (3x) | 3 mm | 50 mm | DHE0240-C3 | 45.30 |
| .0240 | #73 | .609 mm | | 4.20 mm | (5x) | 3 mm | 50 mm | BVT0240-C3 | 47.70 |
| .0240 | #73 | .609 mm | | 6.00 mm | (8x) | 3 mm | 50 mm | ADS0240-C3 | 53.90 |
| .0240 | #73 | .609 mm | | 7.20 mm | (10x) | 3 mm | 50 mm | EXP0240-C3 | 56.80 |
| .0240 | #73 | .609 mm | | 8.40 mm | (12x) | 3 mm | 50 mm | CHT0240-C3 | 58.80 |
| .0250 | #72 | .635 mm | | 3.00 mm | (3x) | 3 mm | 50 mm | DHE0250-C3 | 45.30 |
| .0250 | #72 | .635 mm | .120 | | (3x) | 1/8 | 2 | FKB0250-C3 | 45.30 |
| .0250 | #72 | .635 mm | | 4.20 mm | (5x) | 3 mm | 50 mm | BVT0250-C3 | 47.70 |
| .0250 | #72 | .635 mm | .168 | | (5x) | 1/8 | 2 | GKT0250-C3 | 47.70 |
| .0250 | #72 | .635 mm | .240 | | (8x) | 1/8 | 2 | HDV0250-C3 | 53.90 |
| .0250 | #72 | .635 mm | | 6.20 mm | (8x) | 3 mm | 50 mm | ADS0250-C3 | 53.90 |
| .0250 | #72 | .635 mm | | 7.40 mm | (10x) | 3 mm | 50 mm | EXP0250-C3 | 56.80 |
| .0250 | #72 | .635 mm | | 8.80 mm | (12x) | 3 mm | 50 mm | CHT0250-C3 | 58.80 |
| .0260 | #71 | .660 mm | | 3.10 mm | (3x) | 3 mm | 50 mm | DHE0260-C3 | 45.30 |
| .0260 | #71 | .660 mm | .124 | | (3x) | 1/8 | 2 | FKB0260-C3 | 45.30 |
| .0260 | #71 | .660 mm | | 4.40 mm | (5x) | 3 mm | 50 mm | BVT0260-C3 | 47.70 |
| .0260 | #71 | .660 mm | .176 | | (5x) | 1/8 | 2 | GKT0260-C3 | 47.70 |
| .0260 | #71 | .660 mm | | 6.40 mm | (8x) | 3 mm | 50 mm | ADS0260-C3 | 53.90 |
| .0260 | #71 | .660 mm | .256 | | (8x) | 1/8 | 2 | HDV0260-C3 | 53.90 |
| .0260 | #71 | .660 mm | | 7.80 mm | (10x) | 3 mm | 50 mm | EXP0260-C3 | 56.80 |
| .0260 | #71 | .660 mm | | 9.00 mm | (12x) | 3 mm | 50 mm | CHT0260-C3 | 58.80 |
| .0270 | | .685 mm | | 3.30 mm | (3x) | 3 mm | 50 mm | DHE0270-C3 | 45.30 |
| .0270 | | .685 mm | | 4.60 mm | (5x) | 3 mm | 50 mm | BVT0270-C3 | 47.70 |
| .0270 | | .685 mm | | 6.60 mm | (8x) | 3 mm | 50 mm | ADS0270-C3 | 53.90 |
| .0270 | | .685 mm | | 9.40 mm | (12x) | 3 mm | 50 mm | CHT0270-C3 | 58.80 |
| .0275 | | .700 mm | | 4.80 mm | (5x) | 3 mm | 50 mm | BVT0275-C3 | 47.70 |
| .0275 | | .700 mm | | 9.60 mm | (12x) | 3 mm | 50 mm | CHT0275-C3 | 58.80 |
| .0280 | #70 | .711 mm | | 3.40 mm | (3x) | 3 mm | 50 mm | DHE0280-C3 | 45.30 |
| .0280 | #70 | .711 mm | | 4.80 mm | (5x) | 3 mm | 50 mm | BVT0280-C3 | 47.70 |
| .0280 | #70 | .711 mm | | 7.00 mm | (8x) | 3 mm | 50 mm | ADS0280-C3 | 53.90 |
| .0280 | #70 | .711 mm | | 8.40 mm | (10x) | 3 mm | 50 mm | EXP0280-C3 | 56.80 |
| .0280 | #70 | .711 mm | | 9.80 mm | (12x) | 3 mm | 50 mm | CHT0280-C3 | 58.80 |
| .0292 | #69 | .741 mm | | 3.50 mm | (3x) | 3 mm | 50 mm | DHE0292-C3 | 45.30 |
| .0292 | #69 | .741 mm | | 5.00 mm | (5x) | 3 mm | 50 mm | BVT0292-C3 | 47.70 |
| .0292 | #69 | .741 mm | | 7.20 mm | (8x) | 3 mm | 50 mm | ADS0292-C3 | 53.90 |
| .0292 | #69 | .741 mm | | 8.80 mm | (10x) | 3 mm | 50 mm | EXP0292-C3 | 56.80 |
| .0292 | #69 | .741 mm | | 10.00 mm | (12x) | 3 mm | 50 mm | CHT0292-C3 | 58.80 |
| .0300 | | .762 mm | | 3.60 mm | (3x) | 3 mm | 50 mm | DHE0300-C3 | 45.30 |
| .0300 | | .762 mm | | 5.20 mm | (5x) | 3 mm | 50 mm | BVT0300-C3 | 47.70 |
| .0300 | | .762 mm | | 7.40 mm | (8x) | 3 mm | 50 mm | ADS0300-C3 | 53.90 |
| .0300 | | .762 mm | | 10.50 mm | (12x) | 3 mm | 50 mm | CHT0300-C3 | 58.80 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)

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| | DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | inch | wire | metric | inch | metric | hole depth | | | | |
| | $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| | .0310 | #68 | .787 mm | | 3.70 mm | (3x) | 3 mm | 50 mm | DHE0310-C3 | 45.90 |
| | .0310 | #68 | .787 mm | | 5.40 mm | (5x) | 3 mm | 50 mm | BVT0310-C3 | 48.20 |
| | .0310 | #68 | .787 mm | | 7.60 mm | (8x) | 3 mm | 50 mm | ADS0310-C3 | 53.90 |
| | .0310 | #68 | .787 mm | | 9.20 mm | (10x) | 3 mm | 50 mm | EXP0310-C3 | 56.80 |
| | .0310 | #68 | .787 mm | | 11.00 mm | (12x) | 3 mm | 50 mm | CHT0310-C3 | 60.30 |
| | .0312 (1/32) | | .793 mm | .148 | | (3x) | 1/8 | 2 | FKB0312-C3 | 45.90 |
| | .0312 (1/32) | | .793 mm | | 3.80 mm | (3x) | 3 mm | 50 mm | DHE0312-C3 | 45.90 |
| | .0312 (1/32) | | .793 mm | .208 | | (5x) | 1/8 | 2 | GKT0312-C3 | 48.20 |
| | .0312 (1/32) | | .793 mm | | 5.40 mm | (5x) | 3 mm | 50 mm | BVT0312-C3 | 48.20 |
| | .0312 (1/32) | | .793 mm | .304 | | (8x) | 1/8 | 2 | HDV0312-C3 | 53.90 |
| | .0312 (1/32) | | .793 mm | | 7.80 mm | (8x) | 3 mm | 50 mm | ADS0312-C3 | 53.90 |
| | .0312 (1/32) | | .793 mm | | 9.40 mm | (10x) | 3 mm | 50 mm | EXP0312-C3 | 56.80 |
| | .0312 (1/32) | | .793 mm | | 11.00 mm | (12x) | 3 mm | 50 mm | CHT0312-C3 | 60.30 |
| NEW | .0315 | | .800 mm | | 3.80 mm | (3x) | 3 mm | 50 mm | DHE0315-C3 | 45.90 |
| | .0315 | | .800 mm | | 5.40 mm | (5x) | 3 mm | 50 mm | BVT0315-C3 | 48.20 |
| | .0315 | | .800 mm | | 11.00 mm | (12x) | 3 mm | 50 mm | CHT0315-C3 | 60.30 |
| | .0320 | #67 | .812 mm | .152 | | (3x) | 1/8 | 2 | FKB0320-C3 | 45.90 |
| | .0320 | #67 | .812 mm | | 3.90 mm | (3x) | 3 mm | 50 mm | DHE0320-C3 | 45.90 |
| | .0320 | #67 | .812 mm | | 5.40 mm | (5x) | 3 mm | 50 mm | BVT0320-C3 | 48.20 |
| | .0320 | #67 | .812 mm | .216 | | (5x) | 1/8 | 2 | GKT0320-C3 | 48.20 |
| | .0320 | #67 | .812 mm | .312 | | (8x) | 1/8 | 2 | HDV0320-C3 | 53.90 |
| | .0320 | #67 | .812 mm | | 8.00 mm | (8x) | 3 mm | 50 mm | ADS0320-C3 | 53.90 |
| | .0320 | #67 | .812 mm | | 9.60 mm | (10x) | 3 mm | 50 mm | EXP0320-C3 | 56.80 |
| | .0320 | #67 | .812 mm | | 11.00 mm | (12x) | 3 mm | 50 mm | CHT0320-C3 | 60.30 |
| | .0330 | #66 | .838 mm | | 4.00 mm | (3x) | 3 mm | 50 mm | DHE0330-C3 | 45.90 |
| | .0330 | #66 | .838 mm | | 5.60 mm | (5x) | 3 mm | 50 mm | BVT0330-C3 | 48.20 |
| | .0330 | #66 | .838 mm | | 8.20 mm | (8x) | 3 mm | 50 mm | ADS0330-C3 | 53.90 |
| | .0330 | #66 | .838 mm | | 9.80 mm | (10x) | 3 mm | 50 mm | EXP0330-C3 | 56.80 |
| | .0330 | #66 | .838 mm | | 11.50 mm | (12x) | 3 mm | 50 mm | CHT0330-C3 | 60.30 |
| | .0350 | #65 | .889 mm | | 4.20 mm | (3x) | 3 mm | 50 mm | DHE0350-C3 | 45.90 |
| | .0350 | #65 | .889 mm | .168 | | (3x) | 1/8 | 2 | FKB0350-C3 | 45.90 |
| | .0350 | #65 | .889 mm | | 6.00 mm | (5x) | 3 mm | 50 mm | BVT0350-C3 | 48.20 |
| | .0350 | #65 | .889 mm | .240 | | (5x) | 1/8 | 2 | GKT0350-C3 | 48.20 |
| | .0350 | #65 | .889 mm | | 8.60 mm | (8x) | 3 mm | 50 mm | ADS0350-C3 | 53.90 |
| | .0350 | #65 | .889 mm | .340 | | (8x) | 1/8 | 2 | HDV0350-C3 | 53.90 |
| | .0350 | #65 | .889 mm | | 10.50 mm | (10x) | 3 mm | 50 mm | EXP0350-C3 | 56.80 |
| | .0350 | #65 | .889 mm | | 12.00 mm | (12x) | 3 mm | 50 mm | CHT0350-C3 | 60.30 |
| NEW | .0354 | | .900 mm | | 4.20 mm | (3x) | 3 mm | 50 mm | DHE0354-C3 | 45.90 |
| | .0354 | | .900 mm | | 6.00 mm | (5x) | 3 mm | 50 mm | BVT0354-C3 | 45.90 |
| | .0354 | | .900 mm | | 12.50 mm | (12x) | 3 mm | 50 mm | CHT0354-C3 | 60.30 |
| | .0360 | #64 | .914 mm | | 4.40 mm | (3x) | 3 mm | 50 mm | DHE0360-C3 | 45.90 |
| | .0360 | #64 | .914 mm | | 6.20 mm | (5x) | 3 mm | 50 mm | BVT0360-C3 | 48.20 |
| | .0360 | #64 | .914 mm | | 9.00 mm | (8x) | 3 mm | 50 mm | ADS0360-C3 | 53.90 |
| | .0360 | #64 | .914 mm | | 10.50 mm | (10x) | 3 mm | 50 mm | EXP0360-C3 | 56.80 |
| | .0360 | #64 | .914 mm | | 12.50 mm | (12x) | 3 mm | 50 mm | CHT0360-C3 | 60.30 |

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NEW SIZES!

# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0370 | #63 | .939 mm | | 4.40 mm | (3x) | 3 mm | 50 mm | DHE0370-C3 | 45.90 |
| .0370 | #63 | .939 mm | | 6.40 mm | (5x) | 3 mm | 50 mm | BVT0370-C3 | 48.20 |
| .0370 | #63 | .939 mm | | 9.20 mm | (8x) | 3 mm | 50 mm | ADS0370-C3 | 53.90 |
| .0370 | #63 | .939 mm | | 11.00 mm | (10x) | 3 mm | 50 mm | EXP0370-C3 | 56.80 |
| .0370 | #63 | .939 mm | | 13.00 mm | (12x) | 3 mm | 50 mm | CHT0370-C3 | 60.30 |
| .0380 | #62 | .965 mm | | 4.60 mm | (3x) | 3 mm | 50 mm | DHE0380-C3 | 45.90 |
| .0380 | #62 | .965 mm | | 6.60 mm | (5x) | 3 mm | 50 mm | BVT0380-C3 | 48.20 |
| .0380 | #62 | .965 mm | | 9.40 mm | (8x) | 3 mm | 50 mm | ADS0380-C3 | 53.90 |
| .0380 | #62 | .965 mm | | 11.50 mm | (10x) | 3 mm | 50 mm | EXP0380-C3 | 56.80 |
| .0380 | #62 | .965 mm | | 13.50 mm | (12x) | 3 mm | 50 mm | CHT0380-C3 | 60.30 |
| .0390 | #61 | .990 mm | | 4.80 mm | (3x) | 3 mm | 50 mm | DHE0390-C3 | 45.90 |
| .0390 | #61 | .990 mm | | 6.60 mm | (5x) | 3 mm | 50 mm | BVT0390-C3 | 48.20 |
| .0390 | #61 | .990 mm | | 9.60 mm | (8x) | 3 mm | 50 mm | ADS0390-C3 | 53.90 |
| .0390 | #61 | .990 mm | | 11.50 mm | (10x) | 3 mm | 50 mm | EXP0390-C3 | 56.80 |
| .0390 | #61 | .990 mm | | 13.50 mm | (12x) | 3 mm | 50 mm | CHT0390-C3 | 60.30 |
| .0393 | | 1.000 mm | | 4.80 mm | (3x) | 3 mm | 50 mm | DHE0393-C3 | 50.20 |
| .0393 | | 1.000 mm | | 6.80 mm | (5x) | 3 mm | 50 mm | BVT0393-C3 | 52.80 |
| .0393 | | 1.000 mm | | 9.80 mm | (8x) | 3 mm | 50 mm | ADS0393-C3 | 57.70 |
| .0393 | | 1.000 mm | | 12.00 mm | (10x) | 3 mm | 50 mm | EXP0393-C3 | 61.00 |
| .0393 | | 1.000 mm | | 14.00 mm | (12x) | 3 mm | 50 mm | CHT0393-C3 | 64.70 |
| .0400 | #60 | 1.016 mm | | 4.80 mm | (3x) | 3 mm | 50 mm | DHE0400-C3 | 50.20 |
| .0400 | #60 | 1.016 mm | .192 | | (3x) | 1/8 | 2 | FKB0400-C3 | 50.20 |
| .0400 | #60 | 1.016 mm | | 6.80 mm | (5x) | 3 mm | 50 mm | BVT0400-C3 | 52.80 |
| .0400 | #60 | 1.016 mm | .272 | | (5x) | 1/8 | 2 | GKT0400-C3 | 52.80 |
| .0400 | #60 | 1.016 mm | | 10.00 mm | (8x) | 3 mm | 50 mm | ADS0400-C3 | 57.70 |
| .0400 | #60 | 1.016 mm | .400 | | (8x) | 1/8 | 2 | HDV0400-C3 | 57.70 |
| .0400 | #60 | 1.016 mm | | 12.00 mm | (10x) | 3 mm | 50 mm | EXP0400-C3 | 61.00 |
| .0400 | #60 | 1.016 mm | | 14.00 mm | (12x) | 3 mm | 50 mm | CHT0400-C3 | 64.70 |
| .0410 | #59 | 1.041 mm | | 5.00 mm | (3x) | 3 mm | 50 mm | DHE0410-C3 | 50.20 |
| .0410 | #59 | 1.041 mm | | 7.00 mm | (5x) | 3 mm | 50 mm | BVT0410-C3 | 52.80 |
| .0410 | #59 | 1.041 mm | | 10.00 mm | (8x) | 3 mm | 50 mm | ADS0410-C3 | 57.70 |
| .0410 | #59 | 1.041 mm | | 12.00 mm | (10x) | 3 mm | 50 mm | EXP0410-C3 | 61.00 |
| .0410 | #59 | 1.041 mm | | 14.50 mm | (12x) | 3 mm | 50 mm | CHT0410-C3 | 64.70 |
| .0420 | #58 | 1.066 mm | | 5.00 mm | (3x) | 3 mm | 50 mm | DHE0420-C3 | 50.20 |
| .0420 | #58 | 1.066 mm | | 7.20 mm | (5x) | 3 mm | 50 mm | BVT0420-C3 | 52.80 |
| .0420 | #58 | 1.066 mm | | 10.50 mm | (8x) | 3 mm | 50 mm | ADS0420-C3 | 57.70 |
| .0420 | #58 | 1.066 mm | | 12.50 mm | (10x) | 3 mm | 50 mm | EXP0420-C3 | 61.00 |
| .0420 | #58 | 1.066 mm | | 14.50 mm | (12x) | 3 mm | 50 mm | CHT0420-C3 | 64.70 |
| .0430 | #57 | 1.092 mm | | 5.20 mm | (3x) | 3 mm | 50 mm | DHE0430-C3 | 50.20 |
| .0430 | #57 | 1.092 mm | | 7.40 mm | (5x) | 3 mm | 50 mm | BVT0430-C3 | 52.80 |
| .0430 | #57 | 1.092 mm | | 10.50 mm | (8x) | 3 mm | 50 mm | ADS0430-C3 | 57.70 |
| .0430 | #57 | 1.092 mm | | 13.00 mm | (10x) | 3 mm | 50 mm | EXP0430-C3 | 61.00 |
| .0430 | #57 | 1.092 mm | | 15.00 mm | (12x) | 3 mm | 50 mm | CHT0430-C3 | 64.70 |
| .0450 | | 1.143 mm | | 7.80 mm | (5x) | 3 mm | 50 mm | BVT0450-C3 | 52.80 |
| .0450 | | 1.143 mm | | 15.50 mm | (12x) | 3 mm | 50 mm | CHT0450-C3 | 64.70 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)

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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0465 | #56 | 1.181 mm | | 5.60 mm | (3x) | 3 mm | 50 mm | DHE0465-C3 | 50.20 |
| .0465 | #56 | 1.181 mm | .224 | | (3x) | 1/8 | 2 | FKB0465-C3 | 50.20 |
| .0465 | #56 | 1.181 mm | .312 | | (5x) | 1/8 | 2 | GKT0465-C3 | 52.80 |
| .0465 | #56 | 1.181 mm | | 8.00 mm | (5x) | 3 mm | 50 mm | BVT0465-C3 | 52.80 |
| .0465 | #56 | 1.181 mm | | 11.50 mm | (8x) | 3 mm | 50 mm | ADS0465-C3 | 57.70 |
| .0465 | #56 | 1.181 mm | .460 | | (8x) | 1/8 | 2 | HDV0465-C3 | 57.70 |
| .0465 | #56 | 1.181 mm | | 14.00 mm | (10x) | 3 mm | 50 mm | EXP0465-C3 | 61.00 |
| .0465 | #56 | 1.181 mm | | 16.00 mm | (12x) | 3 mm | 63 mm | CHT0465-C3 | 64.70 |
| .0468 (3/64) | | 1.190 mm | | 5.60 mm | (3x) | 3 mm | 50 mm | DHE0468-C3 | 50.20 |
| .0468 (3/64) | | 1.190 mm | .224 | | (3x) | 1/8 | 2 | FKB0468-C3 | 50.20 |
| .0468 (3/64) | | 1.190 mm | | 8.00 mm | (5x) | 3 mm | 50 mm | BVT0468-C3 | 52.80 |
| .0468 (3/64) | | 1.190 mm | .320 | | (5x) | 1/8 | 2 | GKT0468-C3 | 52.80 |
| .0468 (3/64) | | 1.190 mm | | 11.50 mm | (8x) | 3 mm | 50 mm | ADS0468-C3 | 57.70 |
| .0468 (3/64) | | 1.190 mm | .460 | | (8x) | 1/8 | 2 | HDV0468-C3 | 57.70 |
| .0468 (3/64) | | 1.190 mm | | 14.00 mm | (10x) | 3 mm | 50 mm | EXP0468-C3 | 61.00 |
| .0468 (3/64) | | 1.190 mm | | 16.50 mm | (12x) | 3 mm | 63 mm | CHT0468-C3 | 64.70 |
| .0492 | | 1.250 mm | | 8.50 mm | (5x) | 3 mm | 50 mm | BVT0492-C3 | 52.80 |
| .0492 | | 1.250 mm | | 12.00 mm | (8x) | 3 mm | 50 mm | ADS0492-C3 | 57.70 |
| .0492 | | 1.250 mm | | 17.00 mm | (12x) | 3 mm | 63 mm | CHT0492-C3 | 64.70 |
| .0500 | | 1.270 mm | | 6.00 mm | (3x) | 3 mm | 50 mm | DHE0500-C3 | 50.20 |
| .0500 | | 1.270 mm | .240 | | (3x) | 1/8 | 2 | FKB0500-C3 | 50.20 |
| .0500 | | 1.270 mm | | 8.50 mm | (5x) | 3 mm | 50 mm | BVT0500-C3 | 52.80 |
| .0500 | | 1.270 mm | .340 | | (5x) | 1/8 | 2 | GKT0500-C3 | 52.80 |
| .0500 | | 1.270 mm | .480 | | (8x) | 1/8 | 2 | HDV0500-C3 | 57.70 |
| .0500 | | 1.270 mm | | 12.50 mm | (8x) | 3 mm | 50 mm | ADS0500-C3 | 57.70 |
| .0500 | | 1.270 mm | | 15.00 mm | (10x) | 3 mm | 50 mm | EXP0500-C3 | 61.00 |
| .0500 | | 1.270 mm | | 17.50 mm | (12x) | 3 mm | 63 mm | CHT0500-C3 | 64.70 |
| .0520 | #55 | 1.320 mm | | 6.20 mm | (3x) | 3 mm | 50 mm | DHE0520-C3 | 50.20 |
| .0520 | #55 | 1.320 mm | .248 | | (3x) | 1/8 | 2 | FKB0520-C3 | 50.20 |
| .0520 | #55 | 1.320 mm | | 9.00 mm | (5x) | 3 mm | 50 mm | BVT0520-C3 | 52.80 |
| .0520 | #55 | 1.320 mm | .360 | | (5x) | 1/8 | 2 | GKT0520-C3 | 52.80 |
| .0520 | #55 | 1.320 mm | .500 | | (8x) | 1/8 | 2 | HDV0520-C3 | 57.70 |
| .0520 | #55 | 1.320 mm | | 13.00 mm | (8x) | 3 mm | 50 mm | ADS0520-C3 | 57.70 |
| .0520 | #55 | 1.320 mm | | 15.50 mm | (10x) | 3 mm | 50 mm | EXP0520-C3 | 61.00 |
| .0520 | #55 | 1.320 mm | | 18.00 mm | (12x) | 3 mm | 63 mm | CHT0520-C3 | 64.70 |
| .0550 | #54 | 1.397 mm | | 6.60 mm | (3x) | 3 mm | 50 mm | DHE0550-C3 | 50.20 |
| .0550 | #54 | 1.397 mm | .264 | | (3x) | 1/8 | 2 | FKB0550-C3 | 50.20 |
| .0550 | #54 | 1.397 mm | | 9.50 mm | (5x) | 3 mm | 50 mm | BVT0550-C3 | 52.80 |
| .0550 | #54 | 1.397 mm | .380 | | (5x) | 1/8 | 2 | GKT0550-C3 | 52.80 |
| .0550 | #54 | 1.397 mm | | 13.50 mm | (8x) | 3 mm | 50 mm | ADS0550-C3 | 57.70 |
| .0550 | #54 | 1.397 mm | .540 | | (8x) | 1/8 | 2 | HDV0550-C3 | 57.70 |
| .0550 | #54 | 1.397 mm | | 16.50 mm | (10x) | 3 mm | 63 mm | EXP0550-C3 | 61.00 |
| .0550 | #54 | 1.397 mm | | 19.00 mm | (12x) | 3 mm | 63 mm | CHT0550-C3 | 64.70 |

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NEW SIZES!

# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | | |
|---|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ | |
| .0590 | | 1.500 mm | | 7.20 mm | (3x) | 3 mm | 50 mm | DHE0590-C3 | 54.40 | |
| .0590 | | 1.500 mm | | 10.00 mm | (5x) | 3 mm | 50 mm | BVT0590-C3 | 56.80 | |
| .0590 | | 1.500 mm | | 14.50 mm | (8x) | 3 mm | 50 mm | ADS0590-C3 | 61.90 | |
| .0590 | | 1.500 mm | | 17.50 mm | (10x) | 3 mm | 63 mm | EXP0590-C3 | 65.60 | |
| .0590 | | 1.500 mm | | 21.00 mm | (12x) | 3 mm | 63 mm | CHT0590-C3 | 69.20 | |
| .0595 | #53 | 1.511 mm | | 7.20 mm | (3x) | 3 mm | 50 mm | DHE0595-C3 | 54.40 | |
| .0595 | #53 | 1.511 mm | | 10.00 mm | (5x) | 3 mm | 50 mm | BVT0595-C3 | 56.80 | |
| .0595 | #53 | 1.511 mm | | 14.50 mm | (8x) | 3 mm | 50 mm | ADS0595-C3 | 61.90 | |
| .0595 | #53 | 1.511 mm | | 18.00 mm | (10x) | 3 mm | 63 mm | EXP0595-C3 | 65.60 | |
| .0595 | #53 | 1.511 mm | | 21.00 mm | (12x) | 3 mm | 63 mm | CHT0595-C3 | 69.20 | |
| .0600 | | 1.524 mm | | 7.20 mm | (3x) | 3 mm | 50 mm | DHE0600-C3 | 54.40 | NEW |
| .0600 | | 1.524 mm | | 10.50 mm | (5x) | 3 mm | 50 mm | BVT0600-C3 | 56.80 | |
| .0600 | | 1.524 mm | | 15.00 mm | (8x) | 3 mm | 50 mm | ADS0600-C3 | 61.90 | NEW |
| .0600 | | 1.524 mm | | 21.00 mm | (12x) | 3 mm | 63 mm | CHT0600-C3 | 69.20 | |
| .0625 (1/16) | | 1.587 mm | .296 | | (3x) | 1/8 | 2 | FKB0625-C3 | 54.40 | |
| .0625 (1/16) | | 1.587 mm | | 7.60 mm | (3x) | 3 mm | 50 mm | DHE0625-C3 | 54.40 | |
| .0625 (1/16) | | 1.587 mm | | 10.50 mm | (5x) | 3 mm | 50 mm | BVT0625-C3 | 56.80 | |
| .0625 (1/16) | | 1.587 mm | .420 | | (5x) | 1/8 | 2 | GKT0625-C3 | 56.80 | |
| .0625 (1/16) | | 1.587 mm | .600 | | (8x) | 1/8 | 2 | HDV0625-C3 | 61.90 | |
| .0625 (1/16) | | 1.587 mm | | 15.50 mm | (8x) | 3 mm | 50 mm | ADS0625-C3 | 61.90 | |
| .0625 (1/16) | | 1.587 mm | | 18.50 mm | (10x) | 3 mm | 63 mm | EXP0625-C3 | 65.60 | |
| .0625 (1/16) | | 1.587 mm | | 22.00 mm | (12x) | 3 mm | 63 mm | CHT0625-C3 | 69.20 | |
| .0635 | #52 | 1.612 mm | | 7.60 mm | (3x) | 3 mm | 50 mm | DHE0635-C3 | 54.40 | |
| .0635 | #52 | 1.612 mm | | 11.00 mm | (5x) | 3 mm | 50 mm | BVT0635-C3 | 56.80 | |
| .0635 | #52 | 1.612 mm | | 15.50 mm | (8x) | 3 mm | 50 mm | ADS0635-C3 | 61.90 | |
| .0635 | #52 | 1.612 mm | | 19.00 mm | (10x) | 3 mm | 63 mm | EXP0635-C3 | 65.60 | |
| .0635 | #52 | 1.612 mm | | 22.00 mm | (12x) | 3 mm | 63 mm | CHT0635-C3 | 69.20 | |
| .0670 | #51 | 1.701 mm | | 8.00 mm | (3x) | 3 mm | 50 mm | DHE0670-C3 | 54.40 | |
| .0670 | #51 | 1.701 mm | | 11.50 mm | (5x) | 3 mm | 50 mm | BVT0670-C3 | 56.80 | |
| .0670 | #51 | 1.701 mm | | 16.50 mm | (8x) | 3 mm | 63 mm | ADS0670-C3 | 61.90 | |
| .0670 | #51 | 1.701 mm | | 20.00 mm | (10x) | 3 mm | 63 mm | EXP0670-C3 | 65.60 | |
| .0670 | #51 | 1.701 mm | | 23.00 mm | (12x) | 3 mm | 63 mm | CHT0670-C3 | 69.20 | |
| .0700 | #50 | 1.778 mm | | 8.50 mm | (3x) | 3 mm | 50 mm | DHE0700-C3 | 54.40 | |
| .0700 | #50 | 1.778 mm | .340 | | (3x) | 1/8 | 2 | FKB0700-C3 | 54.40 | |
| .0700 | #50 | 1.778 mm | | 12.00 mm | (5x) | 3 mm | 50 mm | BVT0700-C3 | 56.80 | |
| .0700 | #50 | 1.778 mm | .480 | | (5x) | 1/8 | 2 | GKT0700-C3 | 56.80 | |
| .0700 | #50 | 1.778 mm | .680 | | (8x) | 1/8 | 2-1/2 | HDV0700-C3 | 61.90 | |
| .0700 | #50 | 1.778 mm | | 17.50 mm | (8x) | 3 mm | 63 mm | ADS0700-C3 | 61.90 | |
| .0700 | #50 | 1.778 mm | | 21.00 mm | (10x) | 3 mm | 63 mm | EXP0700-C3 | 65.60 | |
| .0700 | #50 | 1.778 mm | | 24.00 mm | (12x) | 3 mm | 63 mm | CHT0700-C3 | 69.20 | |
| .0730 | #49 | 1.854 mm | | 9.00 mm | (3x) | 3 mm | 50 mm | DHE0730-C3 | 54.40 | |
| .0730 | #49 | 1.854 mm | | 12.50 mm | (5x) | 3 mm | 50 mm | BVT0730-C3 | 56.80 | |
| .0730 | #49 | 1.854 mm | | 18.00 mm | (8x) | 3 mm | 63 mm | ADS0730-C3 | 61.90 | |
| .0730 | #49 | 1.854 mm | | 22.00 mm | (10x) | 3 mm | 63 mm | EXP0730-C3 | 65.60 | |
| .0730 | #49 | 1.854 mm | | 25.00 mm | (12x) | 3 mm | 63 mm | CHT0730-C3 | 69.20 | |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)

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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0760 | #48 | 1.930 mm | | 9.00 mm | (3x) | 3 mm | 50 mm | DHE0760-C3 | 54.40 |
| .0760 | #48 | 1.930 mm | | 13.00 mm | (5x) | 3 mm | 50 mm | BVT0760-C3 | 56.80 |
| .0760 | #48 | 1.930 mm | | 19.00 mm | (8x) | 3 mm | 63 mm | ADS0760-C3 | 61.90 |
| .0760 | #48 | 1.930 mm | | 23.00 mm | (10x) | 3 mm | 63 mm | EXP0760-C3 | 65.60 |
| .0760 | #48 | 1.930 mm | | 27.00 mm | (12x) | 3 mm | 63 mm | CHT0760-C3 | 69.20 |
| .0781 (5/64) | | 1.984 mm | | 9.50 mm | (3x) | 3 mm | 50 mm | DHE0781-C3 | 54.40 |
| .0781 (5/64) | | 1.984 mm | .380 | | (3x) | 1/8 | 2 | FKB0781-C3 | 54.40 |
| .0781 (5/64) | | 1.984 mm | .520 | | (5x) | 1/8 | 2 | GKT0781-C3 | 56.80 |
| .0781 (5/64) | | 1.984 mm | | 13.50 mm | (5x) | 3 mm | 50 mm | BVT0781-C3 | 56.80 |
| .0781 (5/64) | | 1.984 mm | .760 | | (8x) | 1/8 | 2-1/2 | HDV0781-C3 | 61.90 |
| .0781 (5/64) | | 1.984 mm | | 19.50 mm | (8x) | 3 mm | 63 mm | ADS0781-C3 | 61.90 |
| .0781 (5/64) | | 1.984 mm | | 23.00 mm | (10x) | 3 mm | 63 mm | EXP0781-C3 | 63.80 |
| .0781 (5/64) | | 1.984 mm | | 27.00 mm | (12x) | 3 mm | 63 mm | CHT0781-C3 | 69.20 |
| .0785 | #47 | 1.993 mm | | 9.50 mm | (3x) | 3 mm | 50 mm | DHE0785-C3 | 54.40 |
| .0785 | #47 | 1.993 mm | | 13.50 mm | (5x) | 3 mm | 50 mm | BVT0785-C3 | 56.80 |
| .0785 | #47 | 1.993 mm | | 19.50 mm | (8x) | 3 mm | 63 mm | ADS0785-C3 | 61.90 |
| .0785 | #47 | 1.993 mm | | 23.00 mm | (10x) | 3 mm | 63 mm | EXP0785-C3 | 65.60 |
| .0785 | #47 | 1.993 mm | | 27.00 mm | (12x) | 3 mm | 63 mm | CHT0785-C3 | 69.20 |
| .0787 | | 2.000 mm | | 9.50 mm | (3x) | 4 mm | 50 mm | DHE0787-C3 | 54.40 |
| .0787 | | 2.000 mm | | 13.50 mm | (5x) | 4 mm | 50 mm | BVT0787-C3 | 61.40 |
| .0787 | | 2.000 mm | | 19.50 mm | (8x) | 4 mm | 63 mm | ADS0787-C3 | 66.40 |
| .0787 | | 2.000 mm | | 24.00 mm | (10x) | 4 mm | 63 mm | EXP0787-C3 | 70.40 |
| .0787 | | 2.000 mm | | 28.00 mm | (12x) | 4 mm | 63 mm | CHT0787-C3 | 74.10 |
| .0800 | | 2.032 mm | | 9.50 mm | (3x) | 4 mm | 50 mm | DHE0800-C3 | 54.40 |
| .0800 | | 2.032 mm | .380 | | (3x) | 3/16 | 2 | FKB0800-C3 | 54.40 |
| .0800 | | 2.032 mm | | 13.50 mm | (5x) | 4 mm | 50 mm | BVT0800-C3 | 61.40 |
| .0800 | | 2.032 mm | .540 | | (5x) | 3/16 | 2 | GKT0800-C3 | 61.40 |
| .0800 | | 2.032 mm | .800 | | (8x) | 3/16 | 2-1/2 | HDV0800-C3 | 66.40 |
| .0800 | | 2.032 mm | | 28.00 mm | (12x) | 4 mm | 63 mm | CHT0800-C3 | 74.10 |
| .0810 | #46 | 2.057 mm | | 10.00 mm | (3x) | 4 mm | 50 mm | DHE0810-C3 | 54.40 |
| .0810 | #46 | 2.057 mm | | 14.00 mm | (5x) | 4 mm | 50 mm | BVT0810-C3 | 61.40 |
| .0810 | #46 | 2.057 mm | | 20.00 mm | (8x) | 4 mm | 63 mm | ADS0810-C3 | 66.40 |
| .0810 | #46 | 2.057 mm | | 24.00 mm | (10x) | 4 mm | 63 mm | EXP0810-C3 | 70.40 |
| .0810 | #46 | 2.057 mm | | 28.00 mm | (12x) | 4 mm | 63 mm | CHT0810-C3 | 74.10 |
| .0820 | #45 | 2.082 mm | | 10.00 mm | (3x) | 4 mm | 50 mm | DHE0820-C3 | 54.40 |
| .0820 | #45 | 2.082 mm | | 14.00 mm | (5x) | 4 mm | 50 mm | BVT0820-C3 | 61.40 |
| .0820 | #45 | 2.082 mm | | 20.00 mm | (8x) | 4 mm | 63 mm | ADS0820-C3 | 66.40 |
| .0820 | #45 | 2.082 mm | | 24.00 mm | (10x) | 4 mm | 63 mm | EXP0820-C3 | 70.40 |
| .0820 | #45 | 2.082 mm | | 29.00 mm | (12x) | 4 mm | 75 mm | CHT0820-C3 | 74.10 |
| .0860 | #44 | 2.184 mm | .400 | | (3x) | 3/16 | 2 | FKB0860-C3 | 54.40 |
| .0860 | #44 | 2.184 mm | | 10.50 mm | (3x) | 4 mm | 50 mm | DHE0860-C3 | 54.40 |
| .0860 | #44 | 2.184 mm | | 14.50 mm | (5x) | 4 mm | 50 mm | BVT0860-C3 | 61.40 |
| .0860 | #44 | 2.184 mm | .580 | | (5x) | 3/16 | 2-1/2 | GKT0860-C3 | 61.40 |
| .0860 | #44 | 2.184 mm | | 21.00 mm | (8x) | 4 mm | 63 mm | ADS0860-C3 | 66.40 |
| .0860 | #44 | 2.184 mm | .840 | | (8x) | 3/16 | 2-1/2 | HDV0860-C3 | 66.40 |
| .0860 | #44 | 2.184 mm | | 26.00 mm | (10x) | 4 mm | 63 mm | EXP0860-C3 | 70.40 |
| .0860 | #44 | 2.184 mm | | 30.00 mm | (12x) | 4 mm | 75 mm | CHT0860-C3 | 74.10 |

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NEW SIZES!

# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0890 | #43 | 2.260 mm | | 10.50 mm | (3x) | 4 mm | 50 mm | DHE0890-C3 | 54.40 |
| .0890 | #43 | 2.260 mm | .420 | | (3x) | 3/16 | 2 | FKB0890-C3 | 54.40 |
| .0890 | #43 | 2.260 mm | | 15.00 mm | (5x) | 4 mm | 50 mm | BVT0890-C3 | 61.40 |
| .0890 | #43 | 2.260 mm | .600 | | (5x) | 3/16 | 2-1/2 | GKT0890-C3 | 61.40 |
| .0890 | #43 | 2.260 mm | | 22.00 mm | (8x) | 4 mm | 63 mm | ADS0890-C3 | 66.40 |
| .0890 | #43 | 2.260 mm | .880 | | (8x) | 3/16 | 2-1/2 | HDV0890-C3 | 66.40 |
| .0890 | #43 | 2.260 mm | | 27.00 mm | (10x) | 4 mm | 63 mm | EXP0890-C3 | 70.40 |
| .0890 | #43 | 2.260 mm | | 31.00 mm | (12x) | 4 mm | 75 mm | CHT0890-C3 | 74.10 |
| .0900 | | 2.286 mm | | 15.00 mm | (5x) | 4 mm | 50 mm | BVT0900-C3 | 61.40 |
| .0900 | | 2.286 mm | | 31.00 mm | (12x) | 4 mm | 75 mm | CHT0900-C3 | 74.10 |
| .0935 | #42 | 2.374 mm | | 11.50 mm | (3x) | 4 mm | 50 mm | DHE0935-C3 | 54.40 |
| .0935 | #42 | 2.374 mm | | 16.00 mm | (5x) | 4 mm | 63 mm | BVT0935-C3 | 61.40 |
| .0935 | #42 | 2.374 mm | | 23.00 mm | (8x) | 4 mm | 63 mm | ADS0935-C3 | 66.40 |
| .0935 | #42 | 2.374 mm | | 28.00 mm | (10x) | 4 mm | 63 mm | EXP0935-C3 | 70.40 |
| .0935 | #42 | 2.374 mm | | 33.00 mm | (12x) | 4 mm | 75 mm | CHT0935-C3 | 74.10 |
| .0937 (3/32) | | 2.381 mm | .440 | | (3x) | 3/16 | 2 | FKB0937-C3 | 58.20 |
| .0937 (3/32) | | 2.381 mm | | 11.50 mm | (3x) | 4 mm | 50 mm | DHE0937-C3 | 58.20 |
| .0937 (3/32) | | 2.381 mm | | 16.00 mm | (5x) | 4 mm | 63 mm | BVT0937-C3 | 61.40 |
| .0937 (3/32) | | 2.381 mm | .640 | | (5x) | 3/16 | 2-1/2 | GKT0937-C3 | 61.40 |
| .0937 (3/32) | | 2.381 mm | | 23.00 mm | (8x) | 4 mm | 63 mm | ADS0937-C3 | 66.40 |
| .0937 (3/32) | | 2.381 mm | .920 | | (8x) | 3/16 | 2-1/2 | HDV0937-C3 | 66.40 |
| .0937 (3/32) | | 2.381 mm | | 28.00 mm | (10x) | 4 mm | 63 mm | EXP0937-C3 | 70.40 |
| .0937 (3/32) | | 2.381 mm | | 33.00 mm | (12x) | 4 mm | 75 mm | CHT0937-C3 | 73.90 |
| .0960 | #41 | 2.438 mm | | 11.50 mm | (3x) | 4 mm | 50 mm | DHE0960-C3 | 58.20 |
| .0960 | #41 | 2.438 mm | .460 | | (3x) | 3/16 | 2 | FKB0960-C3 | 58.20 |
| .0960 | #41 | 2.438 mm | | 16.00 mm | (5x) | 4 mm | 63 mm | BVT0960-C3 | 61.40 |
| .0960 | #41 | 2.438 mm | .640 | | (5x) | 3/16 | 2-1/2 | GKT0960-C3 | 61.40 |
| .0960 | #41 | 2.438 mm | .920 | | (8x) | 3/16 | 2-1/2 | HDV0960-C3 | 66.40 |
| .0960 | #41 | 2.438 mm | | 24.00 mm | (8x) | 4 mm | 63 mm | ADS0960-C3 | 66.40 |
| .0960 | #41 | 2.438 mm | | 29.00 mm | (10x) | 4 mm | 75 mm | EXP0960-C3 | 70.40 |
| .0960 | #41 | 2.438 mm | | 34.00 mm | (12x) | 4 mm | 75 mm | CHT0960-C3 | 73.90 |
| .0980 | #40 | 2.489 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | DHE0980-C3 | 58.20 |
| .0980 | #40 | 2.489 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BVT0980-C3 | 61.40 |
| .0980 | #40 | 2.489 mm | | 24.00 mm | (8x) | 4 mm | 63 mm | ADS0980-C3 | 66.40 |
| .0980 | #40 | 2.489 mm | | 29.00 mm | (10x) | 4 mm | 75 mm | EXP0980-C3 | 70.40 |
| .0980 | #40 | 2.489 mm | | 34.00 mm | (12x) | 4 mm | 75 mm | CHT0980-C3 | 73.90 |
| .0984 | | 2.500 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | DHE0984-C3 | 61.60 |
| .0984 | | 2.500 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BVT0984-C3 | 65.40 |
| .0984 | | 2.500 mm | | 24.00 mm | (8x) | 4 mm | 63 mm | ADS0984-C3 | 70.50 |
| .0984 | | 2.500 mm | | 29.00 mm | (10x) | 4 mm | 75 mm | EXP0984-C3 | 74.10 |
| .0984 | | 2.500 mm | | 34.00 mm | (12x) | 4 mm | 75 mm | CHT0984-C3 | 78.00 |
| .0995 | #39 | 2.527 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | DHE0995-C3 | 61.60 |
| .0995 | #39 | 2.527 mm | .480 | | (3x) | 3/16 | 2 | FKB0995-C3 | 61.60 |
| .0995 | #39 | 2.527 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BVT0995-C3 | 65.40 |
| .0995 | #39 | 2.527 mm | .680 | | (5x) | 3/16 | 2-1/2 | GKT0995-C3 | 65.40 |
| .0995 | #39 | 2.527 mm | .960 | | (8x) | 3/16 | 2-1/2 | HDV0995-C3 | 70.50 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)

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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .0995 | #39 | 2.527 mm | | 25.00 mm | (8x) | 4 mm | 63 mm | ADS0995-C3 | 70.50 |
| .0995 | #39 | 2.527 mm | | 30.00 mm | (10x) | 4 mm | 75 mm | EXP0995-C3 | 74.10 |
| .0995 | #39 | 2.527 mm | | 35.00 mm | (12x) | 4 mm | 75 mm | CHT0995-C3 | 78.00 |
| .1000 | | 2.540 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | DHE1000-C3 | 61.60 |
| .1000 | | 2.540 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BVT1000-C3 | 65.40 |
| .1000 | | 2.540 mm | | 25.00 mm | (8x) | 4 mm | 63 mm | ADS1000-C3 | 70.50 |
| .1000 | | 2.540 mm | | 30.00 mm | (10x) | 4 mm | 75 mm | EXP1000-C3 | 74.10 |
| .1000 | | 2.540 mm | | 35.00 mm | (12x) | 4 mm | 75 mm | CHT1000-C3 | 78.00 |
| .1015 | #38 | 2.578 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | DHE1015-C3 | 61.60 |
| .1015 | #38 | 2.578 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BVT1015-C3 | 65.40 |
| .1015 | #38 | 2.578 mm | | 25.00 mm | (8x) | 4 mm | 63 mm | ADS1015-C3 | 70.50 |
| .1015 | #38 | 2.578 mm | | 30.00 mm | (10x) | 4 mm | 75 mm | EXP1015-C3 | 74.10 |
| .1015 | #38 | 2.578 mm | | 35.00 mm | (12x) | 4 mm | 75 mm | CHT1015-C3 | 78.00 |
| .1040 | #37 | 2.641 mm | | 12.50 mm | (3x) | 4 mm | 50 mm | DHE1040-C3 | 61.60 |
| .1040 | #37 | 2.641 mm | | 18.00 mm | (5x) | 4 mm | 63 mm | BVT1040-C3 | 65.40 |
| .1040 | #37 | 2.641 mm | | 26.00 mm | (8x) | 4 mm | 63 mm | ADS1040-C3 | 70.50 |
| .1040 | #37 | 2.641 mm | | 31.00 mm | (10x) | 4 mm | 75 mm | EXP1040-C3 | 74.10 |
| .1040 | #37 | 2.641 mm | | 36.00 mm | (12x) | 4 mm | 75 mm | CHT1040-C3 | 78.00 |
| .1065 | #36 | 2.705 mm | | 13.00 mm | (3x) | 4 mm | 50 mm | DHE1065-C3 | 61.60 |
| .1065 | #36 | 2.705 mm | | 18.00 mm | (5x) | 4 mm | 63 mm | BVT1065-C3 | 65.40 |
| .1065 | #36 | 2.705 mm | | 26.00 mm | (8x) | 4 mm | 63 mm | ADS1065-C3 | 70.50 |
| .1065 | #36 | 2.705 mm | | 32.00 mm | (10x) | 4 mm | 75 mm | EXP1065-C3 | 74.10 |
| .1065 | #36 | 2.705 mm | | 37.00 mm | (12x) | 4 mm | 75 mm | CHT1065-C3 | 78.00 |
| .1093 (7/64) | | 2.778 mm | | 13.00 mm | (3x) | 4 mm | 50 mm | DHE1093-C3 | 61.60 |
| .1093 (7/64) | | 2.778 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BVT1093-C3 | 65.40 |
| .1093 (7/64) | | 2.778 mm | | 27.00 mm | (8x) | 4 mm | 63 mm | ADS1093-C3 | 70.50 |
| .1093 (7/64) | | 2.778 mm | | 33.00 mm | (10x) | 4 mm | 75 mm | EXP1093-C3 | 74.10 |
| .1093 (7/64) | | 2.778 mm | | 38.00 mm | (12x) | 4 mm | 75 mm | CHT1093-C3 | 78.00 |
| .1100 | #35 | 2.794 mm | .520 | | (3x) | 3/16 | 2 | FKB1100-C3 | 61.60 |
| .1100 | #35 | 2.794 mm | | 13.50 mm | (3x) | 4 mm | 50 mm | DHE1100-C3 | 61.60 |
| .1100 | #35 | 2.794 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BVT1100-C3 | 65.40 |
| .1100 | #35 | 2.794 mm | .760 | | (5x) | 3/16 | 2-1/2 | GKT1100-C3 | 65.40 |
| .1100 | #35 | 2.794 mm | 1.040 | | (8x) | 3/16 | 2-1/2 | HDV1100-C3 | 70.50 |
| .1100 | #35 | 2.794 mm | | 27.00 mm | (8x) | 4 mm | 63 mm | ADS1100-C3 | 70.50 |
| .1100 | #35 | 2.794 mm | | 33.00 mm | (10x) | 4 mm | 75 mm | EXP1100-C3 | 74.10 |
| .1100 | #35 | 2.794 mm | | 38.00 mm | (12x) | 4 mm | 75 mm | CHT1100-C3 | 78.00 |
| .1110 | #34 | 2.819 mm | | 13.50 mm | (3x) | 4 mm | 50 mm | DHE1110-C3 | 61.60 |
| .1110 | #34 | 2.819 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BVT1110-C3 | 65.40 |
| .1110 | #34 | 2.819 mm | | 27.00 mm | (8x) | 4 mm | 63 mm | ADS1110-C3 | 70.50 |
| .1110 | #34 | 2.819 mm | | 33.00 mm | (10x) | 4 mm | 75 mm | EXP1110-C3 | 74.10 |
| .1110 | #34 | 2.819 mm | | 39.00 mm | (12x) | 4 mm | 75 mm | CHT1110-C3 | 78.00 |
| .1130 | #33 | 2.870 mm | | 13.50 mm | (3x) | 4 mm | 50 mm | DHE1130-C3 | 61.60 |
| .1130 | #33 | 2.870 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BVT1130-C3 | 65.40 |
| .1130 | #33 | 2.870 mm | | 28.00 mm | (8x) | 4 mm | 63 mm | ADS1130-C3 | 70.50 |
| .1130 | #33 | 2.870 mm | | 34.00 mm | (10x) | 4 mm | 75 mm | EXP1130-C3 | 74.10 |
| .1130 | #33 | 2.870 mm | | 39.00 mm | (12x) | 4 mm | 75 mm | CHT1130-C3 | 78.00 |

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NEW SIZES!

# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .1160 | #32 | 2.946 mm | | 14.00 mm | (3x) | 4 mm | 50 mm | DHE1160-C3 | 61.60 |
| .1160 | #32 | 2.946 mm | .560 | | (3x) | 3/16 | 2 | FKB1160-C3 | 61.60 |
| .1160 | #32 | 2.946 mm | | 20.00 mm | (5x) | 4 mm | 63 mm | BVT1160-C3 | 65.40 |
| .1160 | #32 | 2.946 mm | .800 | | (5x) | 3/16 | 2-1/2 | GKT1160-C3 | 65.40 |
| .1160 | #32 | 2.946 mm | 1.120 | | (8x) | 3/16 | 3 | HDV1160-C3 | 78.60 |
| .1160 | #32 | 2.946 mm | | 40.00 mm | (12x) | 4 mm | 75 mm | CHT1160-C3 | 78.00 |
| .1181 | | 3.000 mm | | 14.50 mm | (3x) | 4 mm | 50 mm | DHE1181-C3 | 61.60 |
| .1181 | | 3.000 mm | | 20.00 mm | (5x) | 4 mm | 63 mm | BVT1181-C3 | 65.40 |
| .1181 | | 3.000 mm | | 29.00 mm | (8x) | 4 mm | 63 mm | ADS1181-C3 | 70.50 |
| .1181 | | 3.000 mm | | 35.00 mm | (10x) | 4 mm | 75 mm | EXP1181-C3 | 74.10 |
| .1181 | | 3.000 mm | | 42.00 mm | (12x) | 4 mm | 100 mm | CHT1181-C3 | 78.00 |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.030" −.000" | $L_2$ +.75mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .1200 | #31 | 3.048 mm | | 14.50 mm | (3x) | 6 mm | 63 mm | DHE1200-C3 | 69.00 |
| .1200 | #31 | 3.048 mm | .580 | | (3x) | 3/16 | 2-1/2 | FKB1200-C3 | 69.00 |
| .1200 | #31 | 3.048 mm | .800 | | (5x) | 3/16 | 2-1/2 | GKT1200-C3 | 73.10 |
| .1200 | #31 | 3.048 mm | | 21.00 mm | (5x) | 6 mm | 63 mm | BVT1200-C3 | 73.10 |
| .1200 | #31 | 3.048 mm | | 30.00 mm | (8x) | 6 mm | 75 mm | ADS1200-C3 | 78.60 |
| .1200 | #31 | 3.048 mm | 1.200 | | (8x) | 3/16 | 3 | HDV1200-C3 | 78.60 |
| .1200 | #31 | 3.048 mm | | 36.00 mm | (10x) | 6 mm | 100 mm | EXP1200-C3 | 82.40 |
| .1200 | #31 | 3.048 mm | | 42.00 mm | (12x) | 6 mm | 100 mm | CHT1200-C3 | 86.20 |
| .1240 | | 3.149 mm | | 21.00 mm | (5x) | 6 mm | 63 mm | BVT1240-C3 | 73.10 |
| .1240 | | 3.149 mm | | 44.00 mm | (12x) | 6 mm | 100 mm | CHT1240-C3 | 86.20 |
| .1250 (1/8) | | 3.175 mm | | 15.00 mm | (3x) | 6 mm | 63 mm | DHE1250-C3 | 69.00 |
| .1250 (1/8) | | 3.175 mm | .600 | | (3x) | 3/16 | 2-1/2 | FKB1250-C3 | 69.00 |
| .1250 (1/8) | | 3.175 mm | | 21.00 mm | (5x) | 6 mm | 63 mm | BVT1250-C3 | 73.10 |
| .1250 (1/8) | | 3.175 mm | .840 | | (5x) | 3/16 | 2-1/2 | GKT1250-C3 | 73.10 |
| .1250 (1/8) | | 3.175 mm | 1.200 | | (8x) | 3/16 | 3 | HDV1250-C3 | 78.60 |
| .1250 (1/8) | | 3.175 mm | | 31.00 mm | (8x) | 6 mm | 75 mm | ADS1250-C3 | 78.60 |
| .1250 (1/8) | | 3.175 mm | | 37.00 mm | (10x) | 6 mm | 100 mm | EXP1250-C3 | 82.40 |
| .1250 (1/8) | | 3.175 mm | | 44.00 mm | (12x) | 6 mm | 100 mm | CHT1250-C3 | 86.20 |
| .1260 | | 3.200 mm | | 22.00 mm | (5x) | 6 mm | 63 mm | BVT1260-C3 | 73.10 |
| .1260 | | 3.200 mm | | 44.00 mm | (12x) | 6 mm | 100 mm | CHT1260-C3 | 86.20 |
| .1285 | #30 | 3.263 mm | .610 | | (3x) | 1/4 | 2-1/2 | FKB1285-C3 | 69.00 |
| .1285 | #30 | 3.263 mm | | 22.00 mm | (5x) | 6 mm | 63 mm | BVT1285-C3 | 73.10 |
| .1285 | #30 | 3.263 mm | .880 | | (5x) | 1/4 | 2-1/2 | GKT1285-C3 | 73.10 |
| .1285 | #30 | 3.263 mm | 1.280 | | (8x) | 1/4 | 3 | HDV1285-C3 | 78.60 |
| .1285 | #30 | 3.263 mm | | 44.00 mm | (12x) | 6 mm | 100 mm | CHT1285-C3 | 86.20 |
| .1360 | #29 | 3.454 mm | | 16.00 mm | (3x) | 6 mm | 63 mm | DHE1360-C3 | 69.00 |
| .1360 | #29 | 3.454 mm | | 23.00 mm | (5x) | 6 mm | 63 mm | BVT1360-C3 | 73.10 |
| .1360 | #29 | 3.454 mm | | 34.00 mm | (8x) | 6 mm | 75 mm | ADS1360-C3 | 78.60 |
| .1360 | #29 | 3.454 mm | | 40.00 mm | (10x) | 6 mm | 100 mm | EXP1360-C3 | 82.40 |
| .1360 | #29 | 3.454 mm | | 48.00 mm | (12x) | 6 mm | 100 mm | CHT1360-C3 | 86.20 |
| .1405 | #28 | 3.568 mm | | 24.00 mm | (5x) | 6 mm | 75 mm | BVT1405-C3 | 73.10 |
| .1405 | #28 | 3.568 mm | | 50.00 mm | (12x) | 6 mm | 100 mm | CHT1405-C3 | 86.20 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)

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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.030" −.000" | $L_2$ +.75mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .1406 (9/64) | | 3.571 mm | | 17.00 mm | (3x) | 6 mm | 63 mm | DHE1406-C3 | 69.00 |
| .1406 (9/64) | | 3.571 mm | | 24.00 mm | (5x) | 6 mm | 75 mm | BVT1406-C3 | 73.10 |
| .1406 (9/64) | | 3.571 mm | | 35.00 mm | (8x) | 6 mm | 75 mm | ADS1406-C3 | 78.60 |
| .1406 (9/64) | | 3.571 mm | | 42.00 mm | (10x) | 6 mm | 100 mm | EXP1406-C3 | 82.40 |
| .1406 (9/64) | | 3.571 mm | | 50.00 mm | (12x) | 6 mm | 100 mm | CHT1406-C3 | 86.20 |
| .1417 | | 3.600 mm | | 24.00 mm | (5x) | 6 mm | 75 mm | BVT1417-C3 | 73.10 |
| .1417 | | 3.600 mm | | 50.00 mm | (12x) | 6 mm | 100 mm | CHT1417-C3 | 86.20 |
| .1440 | #27 | 3.657 mm | | 24.00 mm | (5x) | 6 mm | 75 mm | BVT1440-C3 | 73.10 |
| .1440 | #27 | 3.657 mm | | 50.00 mm | (12x) | 6 mm | 100 mm | CHT1440-C3 | 86.20 |
| .1470 | #26 | 3.733 mm | | 18.00 mm | (3x) | 6 mm | 63 mm | DHE1470-C3 | 69.00 |
| .1470 | #26 | 3.733 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BVT1470-C3 | 73.10 |
| .1470 | #26 | 3.733 mm | | 36.00 mm | (8x) | 6 mm | 100 mm | ADS1470-C3 | 78.60 |
| .1470 | #26 | 3.733 mm | | 44.00 mm | (10x) | 6 mm | 100 mm | EXP1470-C3 | 82.40 |
| .1470 | #26 | 3.733 mm | | 52.00 mm | (12x) | 6 mm | 100 mm | CHT1470-C3 | 86.20 |
| .1495 | #25 | 3.797 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BVT1495-C3 | 73.10 |
| .1495 | #25 | 3.797 mm | | 52.00 mm | (12x) | 6 mm | 100 mm | CHT1495-C3 | 86.20 |
| .1520 | #24 | 3.860 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BVT1520-C3 | 73.10 |
| .1520 | #24 | 3.860 mm | | 54.00 mm | (12x) | 6 mm | 100 mm | CHT1520-C3 | 86.20 |
| .1540 | #23 | 3.911 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BVT1540-C3 | 73.10 |
| .1540 | #23 | 3.911 mm | | 54.00 mm | (12x) | 6 mm | 100 mm | CHT1540-C3 | 86.20 |
| .1562 (5/32) | | 3.968 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | DHE1562-C3 | 69.00 |
| .1562 (5/32) | | 3.968 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BVT1562-C3 | 73.10 |
| .1562 (5/32) | | 3.968 mm | | 39.00 mm | (8x) | 6 mm | 100 mm | ADS1562-C3 | 78.60 |
| .1562 (5/32) | | 3.968 mm | | 46.00 mm | (10x) | 6 mm | 100 mm | EXP1562-C3 | 82.40 |
| .1562 (5/32) | | 3.968 mm | | 54.00 mm | (12x) | 6 mm | 100 mm | CHT1562-C3 | 86.20 |
| .1570 | #22 | 3.987 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BVT1570-C3 | 73.10 |
| .1570 | #22 | 3.987 mm | | 54.00 mm | (12x) | 6 mm | 100 mm | CHT1570-C3 | 86.20 |
| .1574 | | 4.000 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | DHE1574-C3 | 69.00 |
| .1574 | | 4.000 mm | | 28.00 mm | (5x) | 6 mm | 75 mm | BVT1574-C3 | 73.10 |
| .1574 | | 4.000 mm | | 39.00 mm | (8x) | 6 mm | 100 mm | ADS1574-C3 | 78.60 |
| .1574 | | 4.000 mm | | 48.00 mm | (10x) | 6 mm | 100 mm | EXP1574-C3 | 82.40 |
| .1574 | | 4.000 mm | | 56.00 mm | (12x) | 6 mm | 100 mm | CHT1574-C3 | 86.20 |
| .1590 | #21 | 4.038 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | DHE1590-C3 | 69.00 |
| .1590 | #21 | 4.038 mm | | 28.00 mm | (5x) | 6 mm | 75 mm | BVT1590-C3 | 73.10 |
| .1590 | #21 | 4.038 mm | | 39.00 mm | (8x) | 6 mm | 100 mm | ADS1590-C3 | 78.60 |
| .1590 | #21 | 4.038 mm | | 48.00 mm | (10x) | 6 mm | 100 mm | EXP1590-C3 | 82.40 |
| .1590 | #21 | 4.038 mm | | 56.00 mm | (12x) | 6 mm | 100 mm | CHT1590-C3 | 86.20 |
| .1610 | #20 | 4.089 mm | | 28.00 mm | (5x) | 6 mm | 75 mm | BVT1610-C3 | 73.10 |
| .1610 | #20 | 4.089 mm | | 56.00 mm | (12x) | 6 mm | 100 mm | CHT1610-C3 | 86.20 |
| .1660 | #19 | 4.216 mm | | 28.00 mm | (5x) | 6 mm | 75 mm | BVT1660-C3 | 73.10 |
| .1660 | #19 | 4.216 mm | | 58.00 mm | (12x) | 6 mm | 100 mm | CHT1660-C3 | 86.20 |
| .1695 | #18 | 4.305 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BVT1695-C3 | 73.10 |
| .1695 | #18 | 4.305 mm | | 60.00 mm | (12x) | 6 mm | 100 mm | CHT1695-C3 | 86.20 |

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NEW SIZES!

# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.030" −.000" | $L_2$ +.75mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .1718 (11/64) | | 4.365 mm | | 21.00 mm | (3x) | 6 mm | 63 mm | DHE1718-C3 | 69.00 |
| .1718 (11/64) | | 4.365 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BVT1718-C3 | 73.10 |
| .1718 (11/64) | | 4.365 mm | | 42.00 mm | (8x) | 6 mm | 100 mm | ADS1718-C3 | 78.60 |
| .1718 (11/64) | | 4.365 mm | | 52.00 mm | (10x) | 6 mm | 100 mm | EXP1718-C3 | 82.40 |
| .1718 (11/64) | | 4.365 mm | | 60.00 mm | (12x) | 6 mm | 100 mm | CHT1718-C3 | 86.20 |
| .1730 | #17 | 4.394 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BVT1730-C3 | 73.10 |
| .1730 | #17 | 4.394 mm | | 60.00 mm | (12x) | 6 mm | 100 mm | CHT1730-C3 | 86.20 |
| .1770 | #16 | 4.495 mm | | 21.00 mm | (3x) | 6 mm | 63 mm | DHE1770-C3 | 69.00 |
| .1770 | #16 | 4.495 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BVT1770-C3 | 73.10 |
| .1770 | #16 | 4.495 mm | | 44.00 mm | (8x) | 6 mm | 100 mm | ADS1770-C3 | 78.60 |
| .1770 | #16 | 4.495 mm | | 52.00 mm | (10x) | 6 mm | 100 mm | EXP1770-C3 | 82.40 |
| .1770 | #16 | 4.495 mm | | 62.00 mm | (12x) | 6 mm | 125 mm | CHT1770-C3 | 86.20 |
| .1800 | #15 | 4.572 mm | | 22.00 mm | (3x) | 6 mm | 63 mm | DHE1800-C3 | 69.00 |
| .1800 | #15 | 4.572 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BVT1800-C3 | 73.10 |
| .1800 | #15 | 4.572 mm | | 44.00 mm | (8x) | 6 mm | 100 mm | ADS1800-C3 | 78.60 |
| .1800 | #15 | 4.572 mm | | 54.00 mm | (10x) | 6 mm | 100 mm | EXP1800-C3 | 82.40 |
| .1800 | #15 | 4.572 mm | | 62.00 mm | (12x) | 6 mm | 125 mm | CHT1800-C3 | 86.20 |
| .1820 | #14 | 4.622 mm | | 32.00 mm | (5x) | 6 mm | 75 mm | BVT1820-C3 | 73.10 |
| .1820 | #14 | 4.622 mm | | 64.00 mm | (12x) | 6 mm | 125 mm | CHT1820-C3 | 86.20 |
| .1850 | #13 | 4.700 mm | | 32.00 mm | (5x) | 6 mm | 75 mm | BVT1850-C3 | 73.10 |
| .1850 | #13 | 4.700 mm | | 64.00 mm | (12x) | 6 mm | 125 mm | CHT1850-C3 | 86.20 |
| .1875 (3/16) | | 4.762 mm | .890 | | (3x) | 1/4 | 2-1/2 | FKB1875-C3 | 69.00 |
| .1875 (3/16) | | 4.762 mm | | 23.00 mm | (3x) | 6 mm | 63 mm | DHE1875-C3 | 69.00 |
| .1875 (3/16) | | 4.762 mm | | 32.00 mm | (5x) | 6 mm | 75 mm | BVT1875-C3 | 73.10 |
| .1875 (3/16) | | 4.762 mm | 1.280 | | (5x) | 1/4 | 3 | GKT1875-C3 | 73.10 |
| .1875 (3/16) | | 4.762 mm | | 46.00 mm | (8x) | 6 mm | 100 mm | ADS1875-C3 | 78.60 |
| .1875 (3/16) | | 4.762 mm | 1.840 | | (8x) | 1/4 | 3-1/2 | HDV1875-C3 | 78.60 |
| .1875 (3/16) | | 4.762 mm | | 56.00 mm | (10x) | 6 mm | 100 mm | EXP1875-C3 | 82.40 |
| .1875 (3/16) | | 4.762 mm | | 66.00 mm | (12x) | 6 mm | 125 mm | CHT1875-C3 | 86.20 |
| .1890 | #12 | 4.800 mm | | 32.00 mm | (5x) | 6 mm | 75 mm | BVT1890-C3 | 73.10 |
| .1890 | #12 | 4.800 mm | | 66.00 mm | (12x) | 6 mm | 125 mm | CHT1890-C3 | 86.20 |
| .1910 | #11 | 4.851 mm | | 32.00 mm | (5x) | 6 mm | 75 mm | BVT1910-C3 | 73.10 |
| .1910 | #11 | 4.851 mm | | 66.00 mm | (12x) | 6 mm | 125 mm | CHT1910-C3 | 86.20 |
| .1935 | #10 | 4.914 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BVT1935-C3 | 73.10 |
| .1935 | #10 | 4.914 mm | | 68.00 mm | (12x) | 6 mm | 125 mm | CHT1935-C3 | 86.20 |
| .1960 | #9 | 4.978 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BVT1960-C3 | 73.10 |
| .1960 | #9 | 4.978 mm | | 68.00 mm | (12x) | 6 mm | 125 mm | CHT1960-C3 | 86.20 |
| .1968 | | 5.000 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | DHE1968-C3 | 69.00 |
| .1968 | | 5.000 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BVT1968-C3 | 73.10 |
| .1968 | | 5.000 mm | | 48.00 mm | (8x) | 6 mm | 100 mm | ADS1968-C3 | 78.60 |
| .1968 | | 5.000 mm | | 58.00 mm | (10x) | 6 mm | 100 mm | EXP1968-C3 | 82.40 |
| .1968 | | 5.000 mm | | 68.00 mm | (12x) | 6 mm | 125 mm | CHT1968-C3 | 86.20 |
| .1990 | #8 | 5.054 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BVT1990-C3 | 73.10 |
| .1990 | #8 | 5.054 mm | | 70.00 mm | (12x) | 6 mm | 125 mm | CHT1990-C3 | 86.20 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)

continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.030"}_{-.000"}$ | $L_2$ $^{+.75mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .2009 | #7 | 5.105 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | DHE2009-C3 | 69.00 |
| .2009 | #7 | 5.105 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BVT2009-C3 | 73.10 |
| .2009 | #7 | 5.105 mm | | 50.00 mm | (8x) | 6 mm | 100 mm | ADS2009-C3 | 78.60 |
| .2009 | #7 | 5.105 mm | | 60.00 mm | (10x) | 6 mm | 100 mm | EXP2009-C3 | 82.40 |
| .2009 | #7 | 5.105 mm | | 70.00 mm | (12x) | 6 mm | 125 mm | CHT2009-C3 | 86.20 |
| .2031 (13/64) | | 5.159 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | DHE2031-C3 | 69.00 |
| .2031 (13/64) | | 5.159 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BVT2031-C3 | 73.10 |
| .2031 (13/64) | | 5.159 mm | | 50.00 mm | (8x) | 6 mm | 100 mm | ADS2031-C3 | 78.60 |
| .2031 (13/64) | | 5.159 mm | | 60.00 mm | (10x) | 6 mm | 100 mm | EXP2031-C3 | 82.40 |
| .2031 (13/64) | | 5.159 mm | | 70.00 mm | (12x) | 6 mm | 125 mm | CHT2031-C3 | 86.20 |
| .2040 | #6 | 5.181 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BVT2040-C3 | 73.10 |
| .2040 | #6 | 5.181 mm | | 72.00 mm | (12x) | 6 mm | 125 mm | CHT2040-C3 | 86.20 |
| .2055 | #5 | 5.219 mm | | 36.00 mm | (5x) | 6 mm | 75 mm | BVT2055-C3 | 73.10 |
| .2055 | #5 | 5.219 mm | | 72.00 mm | (12x) | 6 mm | 125 mm | CHT2055-C3 | 86.20 |
| .2090 | #4 | 5.308 mm | | 36.00 mm | (5x) | 6 mm | 75 mm | BVT2090-C3 | 73.10 |
| .2090 | #4 | 5.308 mm | | 72.00 mm | (12x) | 6 mm | 125 mm | CHT2090-C3 | 86.20 |
| .2129 | #3 | 5.410 mm | | 26.00 mm | (3x) | 6 mm | 75 mm | DHE2129-C3 | 69.00 |
| .2129 | #3 | 5.410 mm | | 36.00 mm | (5x) | 6 mm | 75 mm | BVT2129-C3 | 73.10 |
| .2129 | #3 | 5.410 mm | | 52.00 mm | (8x) | 6 mm | 100 mm | ADS2129-C3 | 78.60 |
| .2129 | #3 | 5.410 mm | | 64.00 mm | (10x) | 6 mm | 125 mm | EXP2129-C3 | 82.40 |
| .2129 | #3 | 5.410 mm | | 74.00 mm | (12x) | 6 mm | 125 mm | CHT2129-C3 | 86.20 |
| .2165 | | 5.500 mm | | 38.00 mm | (5x) | 6 mm | 100 mm | BVT2165-C3 | 73.10 |
| .2165 | | 5.500 mm | | 76.00 mm | (12x) | 6 mm | 125 mm | CHT2165-C3 | 86.20 |
| .2187 (7/32) | | 5.556 mm | | 26.00 mm | (3x) | 6 mm | 75 mm | DHE2187-C3 | 69.00 |
| .2187 (7/32) | | 5.556 mm | | 38.00 mm | (5x) | 6 mm | 100 mm | BVT2187-C3 | 73.10 |
| .2187 (7/32) | | 5.556 mm | | 54.00 mm | (8x) | 6 mm | 100 mm | ADS2187-C3 | 78.60 |
| .2187 (7/32) | | 5.556 mm | | 66.00 mm | (10x) | 6 mm | 125 mm | EXP2187-C3 | 82.40 |
| .2187 (7/32) | | 5.556 mm | | 76.00 mm | (12x) | 6 mm | 125 mm | CHT2187-C3 | 86.20 |
| .2205 | | 5.600 mm | | 38.00 mm | (5x) | 6 mm | 100 mm | BVT2205-C3 | 73.10 |
| .2205 | | 5.600 mm | | 78.00 mm | (12x) | 6 mm | 125 mm | CHT2205-C3 | 86.20 |
| .2210 | #2 | 5.613 mm | | 38.00 mm | (5x) | 6 mm | 100 mm | BVT2210-C3 | 73.10 |
| .2210 | #2 | 5.613 mm | | 78.00 mm | (12x) | 6 mm | 125 mm | CHT2210-C3 | 86.20 |
| .2280 | #1 | 5.791 mm | | 40.00 mm | (5x) | 6 mm | 100 mm | BVT2280-C3 | 73.10 |
| .2280 | #1 | 5.791 mm | | 80.00 mm | (12x) | 6 mm | 125 mm | CHT2280-C3 | 86.20 |
| .2340 | A | 5.943 mm | | 40.00 mm | (5x) | 6 mm | 100 mm | BVT2340-C3 | 73.10 |
| .2340 | A | 5.943 mm | | 82.00 mm | (12x) | 6 mm | 125 mm | CHT2340-C3 | 86.20 |
| .2343 (15/64) | | 5.953 mm | | 28.00 mm | (3x) | 6 mm | 75 mm | DHE2343-C3 | 69.00 |
| .2343 (15/64) | | 5.953 mm | | 40.00 mm | (5x) | 6 mm | 100 mm | BVT2343-C3 | 73.10 |
| .2343 (15/64) | | 5.953 mm | | 58.00 mm | (8x) | 6 mm | 100 mm | ADS2343-C3 | 78.60 |
| .2343 (15/64) | | 5.953 mm | | 70.00 mm | (10x) | 6 mm | 125 mm | EXP2343-C3 | 82.40 |
| .2343 (15/64) | | 5.953 mm | | 82.00 mm | (12x) | 6 mm | 125 mm | CHT2343-C3 | 86.20 |
| .2362 | | 6.000 mm | | 28.00 mm | (3x) | 6 mm | 75 mm | DHE2362-C3 | 69.00 |
| .2362 | | 6.000 mm | | 40.00 mm | (5x) | 6 mm | 100 mm | BVT2362-C3 | 73.10 |
| .2362 | | 6.000 mm | | 58.00 mm | (8x) | 6 mm | 100 mm | ADS2362-C3 | 78.60 |
| .2362 | | 6.000 mm | | 70.00 mm | (10x) | 6 mm | 125 mm | EXP2362-C3 | 82.40 |
| .2362 | | 6.000 mm | | 82.00 mm | (12x) | 6 mm | 125 mm | CHT2362-C3 | 86.20 |

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NEW SIZES!

# MINIATURE HIGH PERFORMANCE DRILLS

## Prehardened Steels (cont.)



continued from previous page

| DRILL DIAMETER inch | wire | metric | FLUTE LENGTH inch | metric | hole depth | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.030" −.000" | $L_2$ +.75mm −.00mm | | $D_2$ (h6) | L1 | 2 FL | USD$ |
| .2380 | B | 6.045 mm | | 40.00 mm | (5x) | 8 mm | 100 mm | BVT2380-C3 | 75.70 |
| .2380 | B | 6.045 mm | | 84.00 mm | (12x) | 8 mm | 125 mm | CHT2380-C3 | 89.00 |
| .2420 | C | 6.146 mm | | 30.00 mm | (3x) | 8 mm | 75 mm | DHE2420-C3 | 71.60 NEW |
| .2420 | C | 6.146 mm | | 42.00 mm | (5x) | 8 mm | 100 mm | BVT2420-C3 | 75.70 |
| .2420 | C | 6.146 mm | | 84.00 mm | (12x) | 8 mm | 125 mm | CHT2420-C3 | 89.00 |
| .2460 | D | 6.248 mm | | 42.00 mm | (5x) | 8 mm | 100 mm | BVT2460-C3 | 75.70 |
| .2460 | D | 6.248 mm | | 86.00 mm | (12x) | 8 mm | 150 mm | CHT2460-C3 | 89.00 |
| .2500 (1/4) | E | 6.350 mm | | 30.00 mm | (3x) | 8 mm | 75 mm | DHE2500-C3 | 69.00 |
| .2500 (1/4) | E | 6.350 mm | 1.188 | | (3x) | 1/4 | 3 | FKB2500-C3 | 69.00 |
| .2500 (1/4) | E | 6.350 mm | | 42.00 mm | (5x) | 8 mm | 100 mm | BVT2500-C3 | 73.10 |
| .2500 (1/4) | E | 6.350 mm | 1.680 | | (5x) | 1/4 | 3-1/2 | GKT2500-C3 | 73.10 |
| .2500 (1/4) | E | 6.350 mm | 2.400 | | (8x) | 1/4 | 4 | HDV2500-C3 | 78.60 |
| .2500 (1/4) | E | 6.350 mm | | 62.00 mm | (8x) | 8 mm | 125 mm | ADS2500-C3 | 78.60 |
| .2500 (1/4) | E | 6.350 mm | | 74.00 mm | (10x) | 8 mm | 125 mm | EXP2500-C3 | 82.40 |
| .2500 (1/4) | E | 6.350 mm | | 88.00 mm | (12x) | 8 mm | 150 mm | CHT2500-C3 | 86.20 |
| .2570 | F | 6.528 mm | | 32.00 mm | (3x) | 8 mm | 75 mm | DHE2570-C3 | 69.00 |
| .2812 (9/32) | | 7.142 mm | | 34.00 mm | (3x) | 8 mm | 75 mm | DHE2812-C3 | 69.00 |
| .3125 (5/16) | | 7.937 mm | | 38.00 mm | (3x) | 8 mm | 100 mm | DHE3125-C3 | 70.90 |
| .3150 | | 8.000 mm | | 38.00 mm | (3x) | 8 mm | 100 mm | DHE3150-C3 | 70.90 |
| .3750 (3/8) | | 9.525 mm | | 46.00 mm | (3x) | 10 mm | 100 mm | DHE3750-C3 | 85.50 |

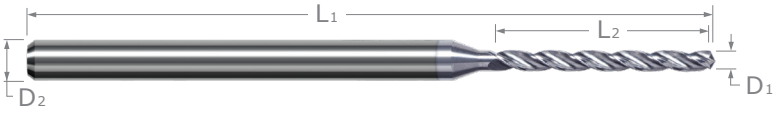
## SPEEDS & FEEDS (Miniature High Performance Drills – Prehardened Steels)

**Important Note:** Values in table are in inches and are based on 3x and 5x drill lengths and a material hardness of 29-37 Rc. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%; for 12x, reduce to 65%). For ferrous materials at 38-45 Rc, reduce IPR (for 3x and 5x, reduce to 80%; for 8x and 10x, reduce to 60%; for 12x, reduce to 52%). Pecking cycles are recommended to avoid chip packing and breakage. For materials at 29-37 Rc, initial peck depth should be 2-3x Diameter with each subsequent peck at 1-2x Diameter. For materials at 38-45 Rc, initial peck depth should be 1-2x Diameter with each subsequent peck at .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

| Material (Hardness: 29-37 Rc) | SFM | Chip Load IPR (Inches Per Revolution) By Drill Diameter .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .375 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Carbon Steels** Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx | 240 | .00063 | .00130 | .00197 | .00260 | .00328 | .00391 | .00525 | .00785 | .01050 | .01575 |
| 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx | 150 | .00058 | .00119 | .00180 | .00238 | .00300 | .00357 | .00480 | .00718 | .00960 | .01440 |
| **Stainless Steels** 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe | 180 | .00063 | .00130 | .00197 | .00260 | .00328 | .00391 | .00525 | .00785 | .01050 | .01575 |
| 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502 | 150 | .00058 | .00119 | .00180 | .00238 | .00300 | .00357 | .00480 | .00718 | .00960 | .01440 |
| 414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7 | 125 | .00036 | .00074 | .00113 | .00149 | .00187 | .00223 | .00300 | .00449 | .00600 | .00900 |
| **Tool Steels** A, L, O, P, W series | 125 | .00058 | .00119 | .00180 | .00238 | .00300 | .00357 | .00480 | .00718 | .00960 | .01440 |
| D, H, M, T, S series | 90 | .00036 | .00074 | .00113 | .00149 | .00187 | .00223 | .00300 | .00449 | .00600 | .00900 |
| **Titanium Alloys** | 100 | .00036 | .00074 | .00113 | .00149 | .00187 | .00223 | .00300 | .00449 | .00600 | .00900 |
| **High Temp Alloys** Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy | 70 | .00036 | .00074 | .00113 | .00149 | .00187 | .00223 | .00300 | .00449 | .00600 | .00900 |

# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys




**Available for 3x, 5x, 8x 10x, and 12x Hole Depths!**

- Optimized for drilling aluminum and aluminum alloys with excellent performance in unfilled plastics, copper, brass, and bronze alloys
- Specialized 3 flute design for maximized chip flow, hole accuracy, and finish
- 130° point angle
- Polished flute valleys and TiB2 coating prevent built-up edge and extend tool life
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



Special 3 Flute Design to Maximize Chip Flow, Hole Accuracy, and Finish



| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .0150 | | .381 mm | | 1.80 mm | (3x) | 3 mm | 50 mm | AVA0150-C8 | 49.70 |
| .0150 | | .381 mm | | 2.60 mm | (5x) | 3 mm | 50 mm | BAF0150-C8 | 53.90 |
| .0150 | | .381 mm | | 5.20 mm | (12x) | 3 mm | 50 mm | DQW0150-C8 | 65.90 |
| .0156 (1/64) | | .396 mm | | 1.90 mm | (3x) | 3 mm | 50 mm | AVA0156-C8 | 49.70 |
| .0156 (1/64) | | .396 mm | | 2.70 mm | (5x) | 3 mm | 50 mm | BAF0156-C8 | 53.90 |
| .0156 (1/64) | | .396 mm | | 3.90 mm | (8x) | 3 mm | 50 mm | CBG0156-C8 | 59.10 |
| .0156 (1/64) | | .396 mm | | 4.70 mm | (10x) | 3 mm | 50 mm | ERY0156-C8 | 62.50 |
| .0156 (1/64) | | .396 mm | | 5.40 mm | (12x) | 3 mm | 50 mm | DQW0156-C8 | 65.90 |
| .0160 | #78 | .406 mm | | 2.00 mm | (3x) | 3 mm | 50 mm | AVA0160-C8 | 49.70 |
| .0160 | #78 | .406 mm | | 2.70 mm | (5x) | 3 mm | 50 mm | BAF0160-C8 | 53.90 |
| .0160 | #78 | .406 mm | | 4.00 mm | (8x) | 3 mm | 50 mm | CBG0160-C8 | 59.10 |
| .0160 | #78 | .406 mm | | 4.80 mm | (10x) | 3 mm | 50 mm | ERY0160-C8 | 62.50 |
| .0160 | #78 | .406 mm | | 5.60 mm | (12x) | 3 mm | 50 mm | DQW0160-C8 | 65.90 |
| .0170 | | .431 mm | | 2.90 mm | (5x) | 3 mm | 50 mm | BAF0170-C8 | 53.90 |
| .0170 | | .431 mm | | 6.00 mm | (12x) | 3 mm | 50 mm | DQW0170-C8 | 65.90 |
| .0180 | #77 | .457 mm | | 2.20 mm | (3x) | 3 mm | 50 mm | AVA0180-C8 | 49.70 |
| .0180 | #77 | .457 mm | | 3.10 mm | (5x) | 3 mm | 50 mm | BAF0180-C8 | 53.90 |
| .0180 | #77 | .457 mm | | 4.50 mm | (8x) | 3 mm | 50 mm | CBG0180-C8 | 59.10 |
| .0180 | #77 | .457 mm | | 5.40 mm | (10x) | 3 mm | 50 mm | ERY0180-C8 | 62.50 |
| .0180 | #77 | .457 mm | | 6.20 mm | (12x) | 3 mm | 50 mm | DQW0180-C8 | 65.90 |
| .0190 | | .482 mm | | 3.30 mm | (5x) | 3 mm | 50 mm | BAF0190-C8 | 53.90 |
| .0190 | | .482 mm | | 6.60 mm | (12x) | 3 mm | 50 mm | DQW0190-C8 | 65.90 |
| .0196 | | .500 mm | | 2.40 mm | (3x) | 3 mm | 50 mm | AVA0196-C8 | 49.00 |
| .0196 | | .500 mm | | 3.40 mm | (5x) | 3 mm | 50 mm | BAF0196-C8 | 53.20 |
| .0196 | | .500 mm | | 4.90 mm | (8x) | 3 mm | 50 mm | CBG0196-C8 | 58.50 |
| .0196 | | .500 mm | | 5.80 mm | (10x) | 3 mm | 50 mm | ERY0196-C8 | 61.60 |
| .0196 | | .500 mm | | 6.80 mm | (12x) | 3 mm | 50 mm | DQW0196-C8 | 65.10 |
| .0200 | #76 | .508 mm | | 2.40 mm | (3x) | 3 mm | 50 mm | AVA0200-C8 | 49.00 |
| .0200 | #76 | .508 mm | | 3.40 mm | (5x) | 3 mm | 50 mm | BAF0200-C8 | 53.20 |
| .0200 | #76 | .508 mm | | 5.00 mm | (8x) | 3 mm | 50 mm | CBG0200-C8 | 58.50 |
| .0200 | #76 | .508 mm | | 6.00 mm | (10x) | 3 mm | 50 mm | ERY0200-C8 | 61.60 |
| .0200 | #76 | .508 mm | | 7.00 mm | (12x) | 3 mm | 50 mm | DQW0200-C8 | 65.10 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.010"}_{-.000"}$ | $L_2$ $^{+.25mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .0210 | #75 | .533 mm | | 2.50 mm | (3x) | 3 mm | 50 mm | AVA0210-C8 | 49.00 |
| .0210 | #75 | .533 mm | | 3.60 mm | (5x) | 3 mm | 50 mm | BAF0210-C8 | 53.20 |
| .0210 | #75 | .533 mm | | 5.20 mm | (8x) | 3 mm | 50 mm | CBG0210-C8 | 58.50 |
| .0210 | #75 | .533 mm | | 6.20 mm | (10x) | 3 mm | 50 mm | ERY0210-C8 | 61.60 |
| .0210 | #75 | .533 mm | | 7.40 mm | (12x) | 3 mm | 50 mm | DQW0210-C8 | 65.10 |
| .0220 | | .558 mm | | 3.80 mm | (5x) | 3 mm | 50 mm | BAF0220-C8 | 53.20 |
| .0220 | | .558 mm | | 7.60 mm | (12x) | 3 mm | 50 mm | DQW0220-C8 | 65.10 |
| .0225 | #74 | .571 mm | | 2.70 mm | (3x) | 3 mm | 50 mm | AVA0225-C8 | 50.60 |
| .0225 | #74 | .571 mm | | 3.90 mm | (5x) | 3 mm | 50 mm | BAF0225-C8 | 53.20 |
| .0225 | #74 | .571 mm | | 5.60 mm | (8x) | 3 mm | 50 mm | CBG0225-C8 | 58.50 |
| .0225 | #74 | .571 mm | | 6.80 mm | (10x) | 3 mm | 50 mm | ERY0225-C8 | 61.60 |
| .0225 | #74 | .571 mm | | 7.80 mm | (12x) | 3 mm | 50 mm | DQW0225-C8 | 65.10 |
| .0230 | | .584 mm | | 3.90 mm | (5x) | 3 mm | 50 mm | BAF0230-C8 | 53.20 |
| .0230 | | .584 mm | | 8.00 mm | (12x) | 3 mm | 50 mm | DQW0230-C8 | 65.10 |
| .0236 | | .600 mm | | 4.00 mm | (5x) | 3 mm | 50 mm | BAF0236-C8 | 53.20 |
| .0236 | | .600 mm | | 8.20 mm | (12x) | 3 mm | 50 mm | DQW0236-C8 | 65.10 |
| .0236 | | .600 mm | | 10.00 mm | (15x) | 3 mm | 50 mm | FAE0236-C8 | 76.70 |
| .0240 | #73 | .609 mm | | 2.90 mm | (3x) | 3 mm | 50 mm | AVA0240-C8 | 49.00 |
| .0240 | #73 | .609 mm | | 4.20 mm | (5x) | 3 mm | 50 mm | BAF0240-C8 | 53.20 |
| .0240 | #73 | .609 mm | | 6.00 mm | (8x) | 3 mm | 50 mm | CBG0240-C8 | 58.50 |
| .0240 | #73 | .609 mm | | 7.20 mm | (10x) | 3 mm | 50 mm | ERY0240-C8 | 61.60 |
| .0240 | #73 | .609 mm | | 8.40 mm | (12x) | 3 mm | 50 mm | DQW0240-C8 | 65.10 |
| .0250 | #72 | .635 mm | | 3.00 mm | (3x) | 3 mm | 50 mm | AVA0250-C8 | 49.00 |
| .0250 | #72 | .635 mm | | 4.20 mm | (5x) | 3 mm | 50 mm | BAF0250-C8 | 53.20 |
| .0250 | #72 | .635 mm | | 6.20 mm | (8x) | 3 mm | 50 mm | CBG0250-C8 | 58.50 |
| .0250 | #72 | .635 mm | | 7.40 mm | (10x) | 3 mm | 50 mm | ERY0250-C8 | 61.60 |
| .0250 | #72 | .635 mm | | 8.80 mm | (12x) | 3 mm | 50 mm | DQW0250-C8 | 65.10 |
| .0260 | #71 | .660 mm | | 3.10 mm | (3x) | 3 mm | 50 mm | AVA0260-C8 | 49.00 |
| .0260 | #71 | .660 mm | | 4.40 mm | (5x) | 3 mm | 50 mm | BAF0260-C8 | 53.20 |
| .0260 | #71 | .660 mm | | 6.40 mm | (8x) | 3 mm | 50 mm | CBG0260-C8 | 58.50 |
| .0260 | #71 | .660 mm | | 7.80 mm | (10x) | 3 mm | 50 mm | ERY0260-C8 | 61.60 |
| .0260 | #71 | .660 mm | | 9.00 mm | (12x) | 3 mm | 50 mm | DQW0260-C8 | 65.10 |
| .0270 | | .685 mm | | 4.60 mm | (5x) | 3 mm | 50 mm | BAF0270-C8 | 53.20 |
| .0270 | | .685 mm | | 9.40 mm | (12x) | 3 mm | 50 mm | DQW0270-C8 | 65.10 |
| .0270 | | .685 mm | | 11.40 mm | (15x) | 3 mm | 50 mm | FAE0270-C8 | 76.70 |
| .0275 | | .700 mm | | 4.80 mm | (5x) | 3 mm | 50 mm | BAF0275-C8 | 53.20 |
| .0275 | | .700 mm | | 9.60 mm | (12x) | 3 mm | 50 mm | DQW0275-C8 | 65.10 |
| .0280 | #70 | .711 mm | | 3.40 mm | (3x) | 3 mm | 50 mm | AVA0280-C8 | 49.00 |
| .0280 | #70 | .711 mm | | 4.80 mm | (5x) | 3 mm | 50 mm | BAF0280-C8 | 53.20 |
| .0280 | #70 | .711 mm | | 7.00 mm | (8x) | 3 mm | 50 mm | CBG0280-C8 | 58.50 |
| .0280 | #70 | .711 mm | | 8.40 mm | (10x) | 3 mm | 50 mm | ERY0280-C8 | 61.60 |
| .0280 | #70 | .711 mm | | 9.80 mm | (12x) | 3 mm | 50 mm | DQW0280-C8 | 65.10 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)

continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .0292 | #69 | .741 mm | | 3.50 mm | (3x) | 3 mm | 50 mm | AVA0292-C8 | 50.60 |
| .0292 | #69 | .741 mm | | 5.00 mm | (5x) | 3 mm | 50 mm | BAF0292-C8 | 53.20 |
| .0292 | #69 | .741 mm | | 7.20 mm | (8x) | 3 mm | 50 mm | CBG0292-C8 | 58.50 |
| .0292 | #69 | .741 mm | | 8.80 mm | (10x) | 3 mm | 50 mm | ERY0292-C8 | 61.60 |
| .0292 | #69 | .741 mm | | 10.00 mm | (12x) | 3 mm | 50 mm | DQW0292-C8 | 65.10 |
| .0300 | | .762 mm | | 5.20 mm | (5x) | 3 mm | 50 mm | BAF0300-C8 | 53.20 |
| .0300 | | .762 mm | | 10.50 mm | (12x) | 3 mm | 50 mm | DQW0300-C8 | 65.10 |
| .0310 | #68 | .787 mm | | 3.70 mm | (3x) | 3 mm | 50 mm | AVA0310-C8 | 49.00 |
| .0310 | #68 | .787 mm | | 5.40 mm | (5x) | 3 mm | 50 mm | BAF0310-C8 | 53.20 |
| .0310 | #68 | .787 mm | | 7.60 mm | (8x) | 3 mm | 50 mm | CBG0310-C8 | 58.50 |
| .0310 | #68 | .787 mm | | 9.20 mm | (10x) | 3 mm | 50 mm | ERY0310-C8 | 62.20 |
| .0310 | #68 | .787 mm | | 11.00 mm | (12x) | 3 mm | 50 mm | DQW0310-C8 | 65.90 |
| .0310 | #68 | .787 mm | | 13.20 mm | (15x) | 3 mm | 50 mm | FAE0310-C8 | 77.10 |
| .0312 (1/32) | | .793 mm | .148 | | (3x) | 1/8 | 2 | FSD0312-C8 | 49.00 |
| .0312 (1/32) | | .793 mm | | 3.80 mm | (3x) | 3 mm | 50 mm | AVA0312-C8 | 49.00 |
| .0312 (1/32) | | .793 mm | .208 | | (5x) | 1/8 | 2 | GNB0312-C8 | 53.20 |
| .0312 (1/32) | | .793 mm | | 5.40 mm | (5x) | 3 mm | 50 mm | BAF0312-C8 | 53.20 |
| .0312 (1/32) | | .793 mm | .304 | | (8x) | 1/8 | 2 | HYX0312-C8 | 58.50 |
| .0312 (1/32) | | .793 mm | | 7.80 mm | (8x) | 3 mm | 50 mm | CBG0312-C8 | 58.50 |
| .0312 (1/32) | | .793 mm | | 9.40 mm | (10x) | 3 mm | 50 mm | ERY0312-C8 | 62.20 |
| .0312 (1/32) | | .793 mm | | 11.00 mm | (12x) | 3 mm | 50 mm | DQW0312-C8 | 65.90 |
| .0315 | | .800 mm | | 5.40 mm | (5x) | 3 mm | 50 mm | BAF0315-C8 | 53.20 |
| .0315 | | .800 mm | | 11.00 mm | (12x) | 3 mm | 50 mm | DQW0315-C8 | 65.90 |
| .0320 | #67 | .812 mm | .152 | | (3x) | 1/8 | 2 | FSD0320-C8 | 49.00 |
| .0320 | #67 | .812 mm | | 3.90 mm | (3x) | 3 mm | 50 mm | AVA0320-C8 | 49.00 |
| .0320 | #67 | .812 mm | | 5.40 mm | (5x) | 3 mm | 50 mm | BAF0320-C8 | 53.20 |
| .0320 | #67 | .812 mm | .216 | | (5x) | 1/8 | 2 | GNB0320-C8 | 53.20 |
| .0320 | #67 | .812 mm | .312 | | (8x) | 1/8 | 2 | HYX0320-C8 | 58.50 |
| .0320 | #67 | .812 mm | | 8.00 mm | (8x) | 3 mm | 50 mm | CBG0320-C8 | 58.50 |
| .0320 | #67 | .812 mm | | 9.60 mm | (10x) | 3 mm | 50 mm | ERY0320-C8 | 62.20 |
| .0320 | #67 | .812 mm | | 11.00 mm | (12x) | 3 mm | 50 mm | DQW0320-C8 | 65.90 |
| .0330 | #66 | .838 mm | | 4.00 mm | (3x) | 3 mm | 50 mm | AVA0330-C8 | 49.00 |
| .0330 | #66 | .838 mm | | 5.60 mm | (5x) | 3 mm | 50 mm | BAF0330-C8 | 53.20 |
| .0330 | #66 | .838 mm | | 8.20 mm | (8x) | 3 mm | 50 mm | CBG0330-C8 | 58.50 |
| .0330 | #66 | .838 mm | | 9.80 mm | (10x) | 3 mm | 50 mm | ERY0330-C8 | 62.20 |
| .0330 | #66 | .838 mm | | 11.50 mm | (12x) | 3 mm | 50 mm | DQW0330-C8 | 65.90 |
| .0350 | #65 | .889 mm | | 4.20 mm | (3x) | 3 mm | 50 mm | AVA0350-C8 | 49.00 |
| .0350 | #65 | .889 mm | .168 | | (3x) | 1/8 | 2 | FSD0350-C8 | 49.00 |
| .0350 | #65 | .889 mm | | 6.00 mm | (5x) | 3 mm | 50 mm | BAF0350-C8 | 53.20 |
| .0350 | #65 | .889 mm | .240 | | (5x) | 1/8 | 2 | GNB0350-C8 | 53.20 |
| .0350 | #65 | .889 mm | | 8.60 mm | (8x) | 3 mm | 50 mm | CBG0350-C8 | 58.50 |
| .0350 | #65 | .889 mm | .340 | | (8x) | 1/8 | 2 | HYX0350-C8 | 58.50 |
| .0350 | #65 | .889 mm | | 10.50 mm | (10x) | 3 mm | 50 mm | ERY0350-C8 | 62.20 |
| .0350 | #65 | .889 mm | | 12.00 mm | (12x) | 3 mm | 50 mm | DQW0350-C8 | 65.90 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)



continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.010"}_{-.000"}$ | $L_2$ $^{+.25mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .0354 | | .900 mm | | 6.00 mm | (5x) | 3 mm | 50 mm | BAF0354-C8 | 53.20 |
| .0354 | | .900 mm | | 12.50 mm | (12x) | 3 mm | 50 mm | DQW0354-C8 | 65.90 |
| .0360 | #64 | .914 mm | | 4.40 mm | (3x) | 3 mm | 50 mm | AVA0360-C8 | 49.00 |
| .0360 | #64 | .914 mm | | 6.20 mm | (5x) | 3 mm | 50 mm | BAF0360-C8 | 53.20 |
| .0360 | #64 | .914 mm | | 9.00 mm | (8x) | 3 mm | 50 mm | CBG0360-C8 | 58.50 |
| .0360 | #64 | .914 mm | | 10.50 mm | (10x) | 3 mm | 50 mm | ERY0360-C8 | 62.20 |
| .0360 | #64 | .914 mm | | 12.50 mm | (12x) | 3 mm | 50 mm | DQW0360-C8 | 65.90 |
| .0370 | #63 | .939 mm | | 4.40 mm | (3x) | 3 mm | 50 mm | AVA0370-C8 | 50.60 |
| .0370 | #63 | .939 mm | | 6.40 mm | (5x) | 3 mm | 50 mm | BAF0370-C8 | 53.20 |
| .0370 | #63 | .939 mm | | 9.20 mm | (8x) | 3 mm | 50 mm | CBG0370-C8 | 58.50 |
| .0370 | #63 | .939 mm | | 11.00 mm | (10x) | 3 mm | 50 mm | ERY0370-C8 | 62.20 |
| .0370 | #63 | .939 mm | | 13.00 mm | (12x) | 3 mm | 50 mm | DQW0370-C8 | 65.90 |
| .0380 | #62 | .965 mm | | 4.60 mm | (3x) | 3 mm | 50 mm | AVA0380-C8 | 49.00 |
| .0380 | #62 | .965 mm | | 6.60 mm | (5x) | 3 mm | 50 mm | BAF0380-C8 | 53.20 |
| .0380 | #62 | .965 mm | | 9.40 mm | (8x) | 3 mm | 50 mm | CBG0380-C8 | 58.50 |
| .0380 | #62 | .965 mm | | 11.50 mm | (10x) | 3 mm | 50 mm | ERY0380-C8 | 62.20 |
| .0380 | #62 | .965 mm | | 13.50 mm | (12x) | 3 mm | 50 mm | DQW0380-C8 | 65.90 |
| .0390 | #61 | .990 mm | | 4.80 mm | (3x) | 3 mm | 50 mm | AVA0390-C8 | 49.00 |
| .0390 | #61 | .990 mm | | 6.60 mm | (5x) | 3 mm | 50 mm | BAF0390-C8 | 53.20 |
| .0390 | #61 | .990 mm | | 9.60 mm | (8x) | 3 mm | 50 mm | CBG0390-C8 | 58.50 |
| .0390 | #61 | .990 mm | | 11.50 mm | (10x) | 3 mm | 50 mm | ERY0390-C8 | 62.20 |
| .0390 | #61 | .990 mm | | 13.50 mm | (12x) | 3 mm | 50 mm | DQW0390-C8 | 65.90 |
| .0393 | | 1.000 mm | | 4.80 mm | (3x) | 3 mm | 50 mm | AVA0393-C8 | 52.60 |
| .0393 | | 1.000 mm | | 6.80 mm | (5x) | 3 mm | 50 mm | BAF0393-C8 | 55.50 |
| .0393 | | 1.000 mm | | 9.80 mm | (8x) | 3 mm | 50 mm | CBG0393-C8 | 60.00 |
| .0393 | | 1.000 mm | | 12.00 mm | (10x) | 3 mm | 50 mm | ERY0393-C8 | 63.60 |
| .0393 | | 1.000 mm | | 14.00 mm | (12x) | 3 mm | 50 mm | DQW0393-C8 | 67.20 |
| .0400 | #60 | 1.016 mm | | 4.80 mm | (3x) | 3 mm | 50 mm | AVA0400-C8 | 51.20 |
| .0400 | #60 | 1.016 mm | .192 | | (3x) | 1/8 | 2 | FSD0400-C8 | 51.20 |
| .0400 | #60 | 1.016 mm | | 6.80 mm | (5x) | 3 mm | 50 mm | BAF0400-C8 | 55.50 |
| .0400 | #60 | 1.016 mm | .272 | | (5x) | 1/8 | 2 | GNB0400-C8 | 55.50 |
| .0400 | #60 | 1.016 mm | | 10.00 mm | (8x) | 3 mm | 50 mm | CBG0400-C8 | 60.00 |
| .0400 | #60 | 1.016 mm | .400 | | (8x) | 1/8 | 2 | HYX0400-C8 | 60.00 |
| .0400 | #60 | 1.016 mm | | 12.00 mm | (10x) | 3 mm | 50 mm | ERY0400-C8 | 63.60 |
| .0400 | #60 | 1.016 mm | | 14.00 mm | (12x) | 3 mm | 50 mm | DQW0400-C8 | 67.20 |
| .0410 | #59 | 1.041 mm | | 5.00 mm | (3x) | 3 mm | 50 mm | AVA0410-C8 | 51.20 |
| .0410 | #59 | 1.041 mm | | 7.00 mm | (5x) | 3 mm | 50 mm | BAF0410-C8 | 55.50 |
| .0410 | #59 | 1.041 mm | | 10.00 mm | (8x) | 3 mm | 50 mm | CBG0410-C8 | 60.00 |
| .0410 | #59 | 1.041 mm | | 12.00 mm | (10x) | 3 mm | 50 mm | ERY0410-C8 | 63.60 |
| .0410 | #59 | 1.041 mm | | 14.50 mm | (12x) | 3 mm | 50 mm | DQW0410-C8 | 67.20 |
| .0420 | #58 | 1.066 mm | | 5.00 mm | (3x) | 3 mm | 50 mm | AVA0420-C8 | 51.20 |
| .0420 | #58 | 1.066 mm | | 7.20 mm | (5x) | 3 mm | 50 mm | BAF0420-C8 | 55.50 |
| .0420 | #58 | 1.066 mm | | 10.50 mm | (8x) | 3 mm | 50 mm | CBG0420-C8 | 60.00 |
| .0420 | #58 | 1.066 mm | | 12.50 mm | (10x) | 3 mm | 50 mm | ERY0420-C8 | 63.60 |
| .0420 | #58 | 1.066 mm | | 14.50 mm | (12x) | 3 mm | 50 mm | DQW0420-C8 | 67.20 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)

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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .0430 | #57 | 1.092 mm | | 5.20 mm | (3x) | 3 mm | 50 mm | AVA0430-C8 | 51.20 |
| .0430 | #57 | 1.092 mm | | 7.40 mm | (5x) | 3 mm | 50 mm | BAF0430-C8 | 55.50 |
| .0430 | #57 | 1.092 mm | | 10.50 mm | (8x) | 3 mm | 50 mm | CBG0430-C8 | 60.00 |
| .0430 | #57 | 1.092 mm | | 13.00 mm | (10x) | 3 mm | 50 mm | ERY0430-C8 | 63.60 |
| .0430 | #57 | 1.092 mm | | 15.00 mm | (12x) | 3 mm | 50 mm | DQW0430-C8 | 67.20 |
| .0450 | | 1.143 mm | | 7.80 mm | (5x) | 3 mm | 50 mm | BAF0450-C8 | 55.50 |
| .0450 | | 1.143 mm | | 15.50 mm | (12x) | 3 mm | 50 mm | DQW0450-C8 | 67.20 |
| .0465 | #56 | 1.181 mm | | 5.60 mm | (3x) | 3 mm | 50 mm | AVA0465-C8 | 52.60 |
| .0465 | #56 | 1.181 mm | .224 | | (3x) | 1/8 | 2 | FSD0465-C8 | 52.60 |
| .0465 | #56 | 1.181 mm | .312 | | (5x) | 1/8 | 2 | GNB0465-C8 | 55.50 |
| .0465 | #56 | 1.181 mm | | 8.00 mm | (5x) | 3 mm | 50 mm | BAF0465-C8 | 55.50 |
| .0465 | #56 | 1.181 mm | | 11.50 mm | (8x) | 3 mm | 50 mm | CBG0465-C8 | 60.00 |
| .0465 | #56 | 1.181 mm | .460 | | (8x) | 1/8 | 2 | HYX0465-C8 | 60.00 |
| .0465 | #56 | 1.181 mm | | 14.00 mm | (10x) | 3 mm | 50 mm | ERY0465-C8 | 63.60 |
| .0465 | #56 | 1.181 mm | | 16.00 mm | (12x) | 3 mm | 63 mm | DQW0465-C8 | 67.20 |
| .0468 (3/64) | | 1.190 mm | | 5.60 mm | (3x) | 3 mm | 50 mm | AVA0468-C8 | 51.20 |
| .0468 (3/64) | | 1.190 mm | .224 | | (3x) | 1/8 | 2 | FSD0468-C8 | 51.20 |
| .0468 (3/64) | | 1.190 mm | | 8.00 mm | (5x) | 3 mm | 50 mm | BAF0468-C8 | 55.50 |
| .0468 (3/64) | | 1.190 mm | .320 | | (5x) | 1/8 | 2 | GNB0468-C8 | 55.50 |
| .0468 (3/64) | | 1.190 mm | | 11.50 mm | (8x) | 3 mm | 50 mm | CBG0468-C8 | 60.00 |
| .0468 (3/64) | | 1.190 mm | .460 | | (8x) | 1/8 | 2 | HYX0468-C8 | 60.00 |
| .0468 (3/64) | | 1.190 mm | | 14.00 mm | (10x) | 3 mm | 50 mm | ERY0468-C8 | 63.60 |
| .0468 (3/64) | | 1.190 mm | | 16.50 mm | (12x) | 3 mm | 63 mm | DQW0468-C8 | 67.20 |
| .0492 | | 1.250 mm | | 8.50 mm | (5x) | 3 mm | 50 mm | BAF0492-C8 | 55.50 |
| .0492 | | 1.250 mm | | 17.00 mm | (12x) | 3 mm | 63 mm | DQW0492-C8 | 67.20 |
| .0500 | | 1.270 mm | | 6.00 mm | (3x) | 3 mm | 50 mm | AVA0500-C8 | 51.20 |
| .0500 | | 1.270 mm | .240 | | (3x) | 1/8 | 2 | FSD0500-C8 | 51.20 |
| .0500 | | 1.270 mm | | 8.50 mm | (5x) | 3 mm | 50 mm | BAF0500-C8 | 55.50 |
| .0500 | | 1.270 mm | .340 | | (5x) | 1/8 | 2 | GNB0500-C8 | 55.50 |
| .0500 | | 1.270 mm | .480 | | (8x) | 1/8 | 2 | HYX0500-C8 | 60.00 |
| .0500 | | 1.270 mm | | 12.50 mm | (8x) | 3 mm | 50 mm | CBG0500-C8 | 60.00 |
| .0500 | | 1.270 mm | | 15.00 mm | (10x) | 3 mm | 50 mm | ERY0500-C8 | 63.60 |
| .0500 | | 1.270 mm | | 17.50 mm | (12x) | 3 mm | 63 mm | DQW0500-C8 | 67.20 |
| .0520 | #55 | 1.320 mm | | 6.20 mm | (3x) | 3 mm | 50 mm | AVA0520-C8 | 52.60 |
| .0520 | #55 | 1.320 mm | .248 | | (3x) | 1/8 | 2 | FSD0520-C8 | 52.60 |
| .0520 | #55 | 1.320 mm | | 9.00 mm | (5x) | 3 mm | 50 mm | BAF0520-C8 | 55.50 |
| .0520 | #55 | 1.320 mm | .360 | | (5x) | 1/8 | 2 | GNB0520-C8 | 55.50 |
| .0520 | #55 | 1.320 mm | .500 | | (8x) | 1/8 | 2 | HYX0520-C8 | 60.00 |
| .0520 | #55 | 1.320 mm | | 13.00 mm | (8x) | 3 mm | 50 mm | CBG0520-C8 | 60.00 |
| .0520 | #55 | 1.320 mm | | 15.50 mm | (10x) | 3 mm | 50 mm | ERY0520-C8 | 63.60 |
| .0520 | #55 | 1.320 mm | | 18.00 mm | (12x) | 3 mm | 63 mm | DQW0520-C8 | 67.20 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .0550 | #54 | 1.397 mm | | 6.60 mm | (3x) | 3 mm | 50 mm | AVA0550-C8 | 52.60 |
| .0550 | #54 | 1.397 mm | .264 | | (3x) | 1/8 | 2 | FSD0550-C8 | 52.60 |
| .0550 | #54 | 1.397 mm | | 9.50 mm | (5x) | 3 mm | 50 mm | BAF0550-C8 | 55.50 |
| .0550 | #54 | 1.397 mm | .380 | | (5x) | 1/8 | 2 | GNB0550-C8 | 55.50 |
| .0550 | #54 | 1.397 mm | | 13.50 mm | (8x) | 3 mm | 50 mm | CBG0550-C8 | 60.00 |
| .0550 | #54 | 1.397 mm | .540 | | (8x) | 1/8 | 2 | HYX0550-C8 | 60.00 |
| .0550 | #54 | 1.397 mm | | 16.50 mm | (10x) | 3 mm | 63 mm | ERY0550-C8 | 63.60 |
| .0550 | #54 | 1.397 mm | | 19.00 mm | (12x) | 3 mm | 63 mm | DOW0550-C8 | 67.20 |
| .0590 | | 1.500 mm | | 7.20 mm | (3x) | 3 mm | 50 mm | AVA0590-C8 | 51.70 |
| .0590 | | 1.500 mm | | 10.00 mm | (5x) | 3 mm | 50 mm | BAF0590-C8 | 56.10 |
| .0590 | | 1.500 mm | | 14.50 mm | (8x) | 3 mm | 50 mm | CBG0590-C8 | 60.00 |
| .0590 | | 1.500 mm | | 17.50 mm | (10x) | 3 mm | 63 mm | ERY0590-C8 | 64.30 |
| .0590 | | 1.500 mm | | 21.00 mm | (12x) | 3 mm | 63 mm | DOW0590-C8 | 68.50 |
| .0595 | #53 | 1.511 mm | | 7.20 mm | (3x) | 3 mm | 50 mm | AVA0595-C8 | 51.70 |
| .0595 | #53 | 1.511 mm | | 10.00 mm | (5x) | 3 mm | 50 mm | BAF0595-C8 | 56.10 |
| .0595 | #53 | 1.511 mm | | 14.50 mm | (8x) | 3 mm | 50 mm | CBG0595-C8 | 60.00 |
| .0595 | #53 | 1.511 mm | | 18.00 mm | (10x) | 3 mm | 63 mm | ERY0595-C8 | 64.30 |
| .0595 | #53 | 1.511 mm | | 21.00 mm | (12x) | 3 mm | 63 mm | DOW0595-C8 | 68.50 |
| .0600 | | 1.524 mm | | 10.50 mm | (5x) | 3 mm | 50 mm | BAF0600-C8 | 56.10 |
| .0600 | | 1.524 mm | | 21.00 mm | (12x) | 3 mm | 63 mm | DOW0600-C8 | 68.50 |
| .0625 (1/16) | | 1.587 mm | .296 | | (3x) | 1/8 | 2 | FSD0625-C8 | 51.70 |
| .0625 (1/16) | | 1.587 mm | | 7.60 mm | (3x) | 3 mm | 50 mm | AVA0625-C8 | 51.70 |
| .0625 (1/16) | | 1.587 mm | | 10.50 mm | (5x) | 3 mm | 50 mm | BAF0625-C8 | 56.10 |
| .0625 (1/16) | | 1.587 mm | .420 | | (5x) | 1/8 | 2 | GNB0625-C8 | 56.10 |
| .0625 (1/16) | | 1.587 mm | .600 | | (8x) | 1/8 | 2 | HYX0625-C8 | 61.20 |
| .0625 (1/16) | | 1.587 mm | | 15.50 mm | (8x) | 3 mm | 50 mm | CBG0625-C8 | 61.20 |
| .0625 (1/16) | | 1.587 mm | | 18.50 mm | (10x) | 3 mm | 63 mm | ERY0625-C8 | 64.80 |
| .0625 (1/16) | | 1.587 mm | | 22.00 mm | (12x) | 3 mm | 63 mm | DOW0625-C8 | 68.50 |
| .0625 (1/16) | | 1.587 mm | | 26.50 mm | (15x) | 3 mm | 63 mm | FAE0625-C8 | 77.90 |
| .0635 | #52 | 1.612 mm | | 7.60 mm | (3x) | 3 mm | 50 mm | AVA0635-C8 | 53.10 |
| .0635 | #52 | 1.612 mm | | 11.00 mm | (5x) | 3 mm | 50 mm | BAF0635-C8 | 56.10 |
| .0635 | #52 | 1.612 mm | | 15.50 mm | (8x) | 3 mm | 50 mm | CBG0635-C8 | 61.20 |
| .0635 | #52 | 1.612 mm | | 19.00 mm | (10x) | 3 mm | 63 mm | ERY0635-C8 | 64.80 |
| .0635 | #52 | 1.612 mm | | 22.00 mm | (12x) | 3 mm | 63 mm | DOW0635-C8 | 68.50 |
| .0670 | #51 | 1.701 mm | | 8.00 mm | (3x) | 3 mm | 50 mm | AVA0670-C8 | 51.70 |
| .0670 | #51 | 1.701 mm | | 11.50 mm | (5x) | 3 mm | 50 mm | BAF0670-C8 | 56.10 |
| .0670 | #51 | 1.701 mm | | 16.50 mm | (8x) | 3 mm | 63 mm | CBG0670-C8 | 61.20 |
| .0670 | #51 | 1.701 mm | | 20.00 mm | (10x) | 3 mm | 63 mm | ERY0670-C8 | 64.80 |
| .0670 | #51 | 1.701 mm | | 23.00 mm | (12x) | 3 mm | 63 mm | DOW0670-C8 | 68.50 |
| .0700 | #50 | 1.778 mm | | 8.50 mm | (3x) | 3 mm | 50 mm | AVA0700-C8 | 51.70 |
| .0700 | #50 | 1.778 mm | .340 | | (3x) | 1/8 | 2 | FSD0700-C8 | 51.70 |
| .0700 | #50 | 1.778 mm | | 12.00 mm | (5x) | 3 mm | 50 mm | BAF0700-C8 | 56.10 |
| .0700 | #50 | 1.778 mm | .480 | | (5x) | 1/8 | 2 | GNB0700-C8 | 56.10 |
| .0700 | #50 | 1.778 mm | .680 | | (8x) | 1/8 | 2-1/2 | HYX0700-C8 | 61.20 |
| .0700 | #50 | 1.778 mm | | 17.50 mm | (8x) | 3 mm | 63 mm | CBG0700-C8 | 61.20 |
| .0700 | #50 | 1.778 mm | | 21.00 mm | (10x) | 3 mm | 63 mm | ERY0700-C8 | 64.80 |
| .0700 | #50 | 1.778 mm | | 24.00 mm | (12x) | 3 mm | 63 mm | DOW0700-C8 | 68.50 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)

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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | TiB$_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.010"}_{-.000"}$ | $L_2$ $^{+.25mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .0730 | #49 | 1.854 mm | | 9.00 mm | (3x) | 3 mm | 50 mm | AVA0730-C8 | 51.70 |
| .0730 | #49 | 1.854 mm | | 12.50 mm | (5x) | 3 mm | 50 mm | BAF0730-C8 | 56.10 |
| .0730 | #49 | 1.854 mm | | 18.00 mm | (8x) | 3 mm | 63 mm | CBG0730-C8 | 61.20 |
| .0730 | #49 | 1.854 mm | | 22.00 mm | (10x) | 3 mm | 63 mm | ERY0730-C8 | 64.80 |
| .0730 | #49 | 1.854 mm | | 25.00 mm | (12x) | 3 mm | 63 mm | DQW0730-C8 | 68.50 |
| .0760 | #48 | 1.930 mm | | 9.00 mm | (3x) | 3 mm | 50 mm | AVA0760-C8 | 51.70 |
| .0760 | #48 | 1.930 mm | | 13.00 mm | (5x) | 3 mm | 50 mm | BAF0760-C8 | 56.10 |
| .0760 | #48 | 1.930 mm | | 19.00 mm | (8x) | 3 mm | 63 mm | CBG0760-C8 | 61.20 |
| .0760 | #48 | 1.930 mm | | 23.00 mm | (10x) | 3 mm | 63 mm | ERY0760-C8 | 64.80 |
| .0760 | #48 | 1.930 mm | | 27.00 mm | (12x) | 3 mm | 63 mm | DQW0760-C8 | 68.50 |
| .0781 (5/64) | | 1.984 mm | | 9.50 mm | (3x) | 3 mm | 50 mm | AVA0781-C8 | 51.70 |
| .0781 (5/64) | | 1.984 mm | .380 | | (3x) | 1/8 | 2 | FSD0781-C8 | 51.70 |
| .0781 (5/64) | | 1.984 mm | .520 | | (5x) | 1/8 | 2 | GNB0781-C8 | 56.10 |
| .0781 (5/64) | | 1.984 mm | | 13.50 mm | (5x) | 3 mm | 50 mm | BAF0781-C8 | 56.10 |
| .0781 (5/64) | | 1.984 mm | .760 | | (8x) | 1/8 | 2-1/2 | HYX0781-C8 | 61.20 |
| .0781 (5/64) | | 1.984 mm | | 19.50 mm | (8x) | 3 mm | 63 mm | CBG0781-C8 | 61.20 |
| .0781 (5/64) | | 1.984 mm | | 23.00 mm | (10x) | 3 mm | 63 mm | ERY0781-C8 | 64.80 |
| .0781 (5/64) | | 1.984 mm | | 27.00 mm | (12x) | 3 mm | 63 mm | DQW0781-C8 | 68.50 |
| .0785 | #47 | 1.993 mm | | 9.50 mm | (3x) | 3 mm | 50 mm | AVA0785-C8 | 51.70 |
| .0785 | #47 | 1.993 mm | | 13.50 mm | (5x) | 3 mm | 50 mm | BAF0785-C8 | 56.10 |
| .0785 | #47 | 1.993 mm | | 19.50 mm | (8x) | 3 mm | 63 mm | CBG0785-C8 | 61.20 |
| .0785 | #47 | 1.993 mm | | 27.00 mm | (12x) | 3 mm | 63 mm | DQW0785-C8 | 68.50 |
| .0787 | | 2.000 mm | | 9.50 mm | (3x) | 4 mm | 50 mm | AVA0787-C8 | 53.10 |
| .0787 | | 2.000 mm | | 13.50 mm | (5x) | 4 mm | 50 mm | BAF0787-C8 | 57.60 |
| .0787 | | 2.000 mm | | 19.50 mm | (8x) | 4 mm | 63 mm | CBG0787-C8 | 62.60 |
| .0787 | | 2.000 mm | | 24.00 mm | (10x) | 4 mm | 63 mm | ERY0787-C8 | 66.00 |
| .0787 | | 2.000 mm | | 28.00 mm | (12x) | 4 mm | 63 mm | DQW0787-C8 | 69.80 |
| .0800 | | 2.032 mm | | 9.50 mm | (3x) | 4 mm | 50 mm | AVA0800-C8 | 53.10 |
| .0800 | | 2.032 mm | .380 | | (3x) | 3/16 | 2 | FSD0800-C8 | 53.10 |
| .0800 | | 2.032 mm | | 13.50 mm | (5x) | 4 mm | 50 mm | BAF0800-C8 | 57.60 |
| .0800 | | 2.032 mm | .540 | | (5x) | 3/16 | 2 | GNB0800-C8 | 57.60 |
| .0800 | | 2.032 mm | | 20.00 mm | (8x) | 4 mm | 63 mm | CBG0800-C8 | 62.60 |
| .0800 | | 2.032 mm | .800 | | (8x) | 3/16 | 2-1/2 | HYX0800-C8 | 62.60 |
| .0800 | | 2.032 mm | | 28.00 mm | (12x) | 4 mm | 63 mm | DQW0800-C8 | 69.80 |
| .0810 | #46 | 2.057 mm | | 10.00 mm | (3x) | 4 mm | 50 mm | AVA0810-C8 | 53.10 |
| .0810 | #46 | 2.057 mm | | 14.00 mm | (5x) | 4 mm | 50 mm | BAF0810-C8 | 57.60 |
| .0810 | #46 | 2.057 mm | | 20.00 mm | (8x) | 4 mm | 63 mm | CBG0810-C8 | 62.60 |
| .0810 | #46 | 2.057 mm | | 24.00 mm | (10x) | 4 mm | 63 mm | ERY0810-C8 | 66.00 |
| .0810 | #46 | 2.057 mm | | 28.00 mm | (12x) | 4 mm | 63 mm | DQW0810-C8 | 69.80 |
| .0820 | #45 | 2.082 mm | | 10.00 mm | (3x) | 4 mm | 50 mm | AVA0820-C8 | 53.10 |
| .0820 | #45 | 2.082 mm | | 14.00 mm | (5x) | 4 mm | 50 mm | BAF0820-C8 | 57.60 |
| .0820 | #45 | 2.082 mm | | 20.00 mm | (8x) | 4 mm | 63 mm | CBG0820-C8 | 62.60 |
| .0820 | #45 | 2.082 mm | | 29.00 mm | (12x) | 4 mm | 75 mm | DQW0820-C8 | 69.80 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .0860 | #44 | 2.184 mm | .400 | | (3x) | 3/16 | 2 | FSD0860-C8 | 53.10 |
| .0860 | #44 | 2.184 mm | | 10.50 mm | (3x) | 4 mm | 50 mm | AVA0860-C8 | 53.10 |
| .0860 | #44 | 2.184 mm | | 14.50 mm | (5x) | 4 mm | 50 mm | BAF0860-C8 | 57.60 |
| .0860 | #44 | 2.184 mm | .580 | | (5x) | 3/16 | 2-1/2 | GNB0860-C8 | 57.60 |
| .0860 | #44 | 2.184 mm | | 21.00 mm | (8x) | 4 mm | 63 mm | CBG0860-C8 | 62.60 |
| .0860 | #44 | 2.184 mm | .840 | | (8x) | 3/16 | 2-1/2 | HYX0860-C8 | 62.60 |
| .0860 | #44 | 2.184 mm | | 26.00 mm | (10x) | 4 mm | 63 mm | ERY0860-C8 | 66.00 |
| .0860 | #44 | 2.184 mm | | 30.00 mm | (12x) | 4 mm | 75 mm | DQW0860-C8 | 69.80 |
| .0890 | #43 | 2.260 mm | | 10.50 mm | (3x) | 4 mm | 50 mm | AVA0890-C8 | 54.80 |
| .0890 | #43 | 2.260 mm | .420 | | (3x) | 3/16 | 2 | FSD0890-C8 | 54.80 |
| .0890 | #43 | 2.260 mm | | 15.00 mm | (5x) | 4 mm | 50 mm | BAF0890-C8 | 57.60 |
| .0890 | #43 | 2.260 mm | .600 | | (5x) | 3/16 | 2-1/2 | GNB0890-C8 | 57.60 |
| .0890 | #43 | 2.260 mm | | 22.00 mm | (8x) | 4 mm | 63 mm | CBG0890-C8 | 62.60 |
| .0890 | #43 | 2.260 mm | .880 | | (8x) | 3/16 | 2-1/2 | HYX0890-C8 | 62.60 |
| .0890 | #43 | 2.260 mm | | 27.00 mm | (10x) | 4 mm | 63 mm | ERY0890-C8 | 66.00 |
| .0890 | #43 | 2.260 mm | | 31.00 mm | (12x) | 4 mm | 75 mm | DQW0890-C8 | 69.80 |
| .0900 | | 2.286 mm | | 11.00 mm | (3x) | 4 mm | 50 mm | AVA0900-C8 | 53.10 |
| .0900 | | 2.286 mm | | 15.00 mm | (5x) | 4 mm | 50 mm | BAF0900-C8 | 57.60 |
| .0900 | | 2.286 mm | | 22.00 mm | (8x) | 4 mm | 63 mm | CBG0900-C8 | 62.60 |
| .0900 | | 2.286 mm | | 31.00 mm | (12x) | 4 mm | 75 mm | DQW0900-C8 | 69.80 |
| .0935 | #42 | 2.374 mm | | 11.50 mm | (3x) | 4 mm | 50 mm | AVA0935-C8 | 53.10 |
| .0935 | #42 | 2.374 mm | | 16.00 mm | (5x) | 4 mm | 63 mm | BAF0935-C8 | 57.60 |
| .0935 | #42 | 2.374 mm | | 23.00 mm | (8x) | 4 mm | 63 mm | CBG0935-C8 | 62.60 |
| .0935 | #42 | 2.374 mm | | 28.00 mm | (10x) | 4 mm | 63 mm | ERY0935-C8 | 66.00 |
| .0935 | #42 | 2.374 mm | | 33.00 mm | (12x) | 4 mm | 75 mm | DQW0935-C8 | 69.80 |
| .0937 (3/32) | | 2.381 mm | .440 | | (3x) | 3/16 | 2 | FSD0937-C8 | 53.10 |
| .0937 (3/32) | | 2.381 mm | | 11.50 mm | (3x) | 4 mm | 50 mm | AVA0937-C8 | 53.10 |
| .0937 (3/32) | | 2.381 mm | | 16.00 mm | (5x) | 4 mm | 63 mm | BAF0937-C8 | 57.60 |
| .0937 (3/32) | | 2.381 mm | .640 | | (5x) | 3/16 | 2-1/2 | GNB0937-C8 | 57.60 |
| .0937 (3/32) | | 2.381 mm | | 23.00 mm | (8x) | 4 mm | 63 mm | CBG0937-C8 | 62.60 |
| .0937 (3/32) | | 2.381 mm | .920 | | (8x) | 3/16 | 2-1/2 | HYX0937-C8 | 62.60 |
| .0937 (3/32) | | 2.381 mm | | 28.00 mm | (10x) | 4 mm | 63 mm | ERY0937-C8 | 66.00 |
| .0937 (3/32) | | 2.381 mm | | 33.00 mm | (12x) | 4 mm | 75 mm | DQW0937-C8 | 69.80 |
| .0960 | #41 | 2.438 mm | | 11.50 mm | (3x) | 4 mm | 50 mm | AVA0960-C8 | 53.10 |
| .0960 | #41 | 2.438 mm | .460 | | (3x) | 3/16 | 2 | FSD0960-C8 | 53.10 |
| .0960 | #41 | 2.438 mm | | 16.00 mm | (5x) | 4 mm | 63 mm | BAF0960-C8 | 57.60 |
| .0960 | #41 | 2.438 mm | .640 | | (5x) | 3/16 | 2-1/2 | GNB0960-C8 | 57.60 |
| .0960 | #41 | 2.438 mm | .920 | | (8x) | 3/16 | 2-1/2 | HYX0960-C8 | 62.60 |
| .0960 | #41 | 2.438 mm | | 24.00 mm | (8x) | 4 mm | 63 mm | CBG0960-C8 | 62.60 |
| .0960 | #41 | 2.438 mm | | 29.00 mm | (10x) | 4 mm | 75 mm | ERY0960-C8 | 66.00 |
| .0960 | #41 | 2.438 mm | | 34.00 mm | (12x) | 4 mm | 75 mm | DQW0960-C8 | 69.80 |
| .0980 | #40 | 2.489 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | AVA0980-C8 | 53.10 |
| .0980 | #40 | 2.489 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BAF0980-C8 | 57.60 |
| .0980 | #40 | 2.489 mm | | 24.00 mm | (8x) | 4 mm | 63 mm | CBG0980-C8 | 62.60 |
| .0980 | #40 | 2.489 mm | | 29.00 mm | (10x) | 4 mm | 75 mm | ERY0980-C8 | 66.00 |
| .0980 | #40 | 2.489 mm | | 34.00 mm | (12x) | 4 mm | 75 mm | DQW0980-C8 | 69.80 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)

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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.010"}_{-.000"}$ | $L_2$ $^{+.25mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .0984 | | 2.500 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | AVA0984-C8 | 53.70 |
| .0984 | | 2.500 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BAF0984-C8 | 58.00 |
| .0984 | | 2.500 mm | | 24.00 mm | (8x) | 4 mm | 63 mm | CBG0984-C8 | 63.00 |
| .0984 | | 2.500 mm | | 29.00 mm | (10x) | 4 mm | 75 mm | ERY0984-C8 | 66.60 |
| .0984 | | 2.500 mm | | 34.00 mm | (12x) | 4 mm | 75 mm | DOW0984-C8 | 70.20 |
| .0995 | #39 | 2.527 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | AVA0995-C8 | 53.70 |
| .0995 | #39 | 2.527 mm | .480 | | (3x) | 3/16 | 2 | FSD0995-C8 | 53.70 |
| .0995 | #39 | 2.527 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BAF0995-C8 | 58.00 |
| .0995 | #39 | 2.527 mm | .680 | | (5x) | 3/16 | 2-1/2 | GNB0995-C8 | 58.00 |
| .0995 | #39 | 2.527 mm | .960 | | (8x) | 3/16 | 2-1/2 | HYX0995-C8 | 63.00 |
| .0995 | #39 | 2.527 mm | | 25.00 mm | (8x) | 4 mm | 63 mm | CBG0995-C8 | 63.00 |
| .0995 | #39 | 2.527 mm | | 30.00 mm | (10x) | 4 mm | 75 mm | ERY0995-C8 | 66.60 |
| .0995 | #39 | 2.527 mm | | 35.00 mm | (12x) | 4 mm | 75 mm | DOW0995-C8 | 70.20 |
| .1000 | | 2.540 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | AVA1000-C8 | 53.70 |
| .1000 | | 2.540 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BAF1000-C8 | 58.00 |
| .1000 | | 2.540 mm | | 25.00 mm | (8x) | 4 mm | 63 mm | CBG1000-C8 | 63.00 |
| .1000 | | 2.540 mm | | 35.00 mm | (12x) | 4 mm | 75 mm | DOW1000-C8 | 70.20 |
| .1015 | #38 | 2.578 mm | | 12.00 mm | (3x) | 4 mm | 50 mm | AVA1015-C8 | 53.70 |
| .1015 | #38 | 2.578 mm | | 17.00 mm | (5x) | 4 mm | 63 mm | BAF1015-C8 | 58.00 |
| .1015 | #38 | 2.578 mm | | 25.00 mm | (8x) | 4 mm | 63 mm | CBG1015-C8 | 63.00 |
| .1015 | #38 | 2.578 mm | | 30.00 mm | (10x) | 4 mm | 75 mm | ERY1015-C8 | 66.60 |
| .1015 | #38 | 2.578 mm | | 35.00 mm | (12x) | 4 mm | 75 mm | DOW1015-C8 | 70.20 |
| .1040 | #37 | 2.641 mm | | 12.50 mm | (3x) | 4 mm | 50 mm | AVA1040-C8 | 53.70 |
| .1040 | #37 | 2.641 mm | | 18.00 mm | (5x) | 4 mm | 63 mm | BAF1040-C8 | 58.00 |
| .1040 | #37 | 2.641 mm | | 26.00 mm | (8x) | 4 mm | 63 mm | CBG1040-C8 | 63.00 |
| .1040 | #37 | 2.641 mm | | 31.00 mm | (10x) | 4 mm | 75 mm | ERY1040-C8 | 66.60 |
| .1040 | #37 | 2.641 mm | | 36.00 mm | (12x) | 4 mm | 75 mm | DOW1040-C8 | 70.20 |
| .1065 | #36 | 2.705 mm | | 13.00 mm | (3x) | 4 mm | 50 mm | AVA1065-C8 | 53.70 |
| .1065 | #36 | 2.705 mm | | 18.00 mm | (5x) | 4 mm | 63 mm | BAF1065-C8 | 58.00 |
| .1065 | #36 | 2.705 mm | | 26.00 mm | (8x) | 4 mm | 63 mm | CBG1065-C8 | 63.00 |
| .1065 | #36 | 2.705 mm | | 32.00 mm | (10x) | 4 mm | 75 mm | ERY1065-C8 | 66.60 |
| .1065 | #36 | 2.705 mm | | 37.00 mm | (12x) | 4 mm | 75 mm | DOW1065-C8 | 70.20 |
| .1093 (7/64) | | 2.778 mm | | 13.00 mm | (3x) | 4 mm | 50 mm | AVA1093-C8 | 53.70 |
| .1093 (7/64) | | 2.778 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BAF1093-C8 | 58.00 |
| .1093 (7/64) | | 2.778 mm | | 27.00 mm | (8x) | 4 mm | 63 mm | CBG1093-C8 | 63.00 |
| .1093 (7/64) | | 2.778 mm | | 33.00 mm | (10x) | 4 mm | 75 mm | ERY1093-C8 | 66.60 |
| .1093 (7/64) | | 2.778 mm | | 38.00 mm | (12x) | 4 mm | 75 mm | DOW1093-C8 | 70.20 |
| .1100 | #35 | 2.794 mm | .520 | | (3x) | 3/16 | 2 | FSD1100-C8 | 53.70 |
| .1100 | #35 | 2.794 mm | | 13.50 mm | (3x) | 4 mm | 50 mm | AVA1100-C8 | 53.70 |
| .1100 | #35 | 2.794 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BAF1100-C8 | 58.00 |
| .1100 | #35 | 2.794 mm | .760 | | (5x) | 3/16 | 2-1/2 | GNB1100-C8 | 58.00 |
| .1100 | #35 | 2.794 mm | 1.040 | | (8x) | 3/16 | 2-1/2 | HYX1100-C8 | 63.00 |
| .1100 | #35 | 2.794 mm | | 27.00 mm | (8x) | 4 mm | 63 mm | CBG1100-C8 | 63.00 |
| .1100 | #35 | 2.794 mm | | 33.00 mm | (10x) | 4 mm | 75 mm | ERY1100-C8 | 66.60 |
| .1100 | #35 | 2.794 mm | | 38.00 mm | (12x) | 4 mm | 75 mm | DOW1100-C8 | 70.20 |
| .1110 | #34 | 2.819 mm | | 13.50 mm | (3x) | 4 mm | 50 mm | AVA1110-C8 | 53.70 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .1110 | #34 | 2.819 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BAF1110-C8 | 58.00 |
| .1110 | #34 | 2.819 mm | | 27.00 mm | (8x) | 4 mm | 63 mm | CBG1110-C8 | 63.00 |
| .1110 | #34 | 2.819 mm | | 33.00 mm | (10x) | 4 mm | 75 mm | ERY1110-C8 | 66.60 |
| .1110 | #34 | 2.819 mm | | 39.00 mm | (12x) | 4 mm | 75 mm | DOW1110-C8 | 70.20 |
| .1130 | #33 | 2.870 mm | | 13.50 mm | (3x) | 4 mm | 50 mm | AVA1130-C8 | 53.70 |
| .1130 | #33 | 2.870 mm | | 19.00 mm | (5x) | 4 mm | 63 mm | BAF1130-C8 | 58.00 |
| .1130 | #33 | 2.870 mm | | 28.00 mm | (8x) | 4 mm | 63 mm | CBG1130-C8 | 63.00 |
| .1130 | #33 | 2.870 mm | | 34.00 mm | (10x) | 4 mm | 75 mm | ERY1130-C8 | 66.60 |
| .1130 | #33 | 2.870 mm | | 39.00 mm | (12x) | 4 mm | 75 mm | DOW1130-C8 | 70.20 |
| .1160 | #32 | 2.946 mm | | 14.00 mm | (3x) | 4 mm | 50 mm | AVA1160-C8 | 53.70 |
| .1160 | #32 | 2.946 mm | .560 | | (3x) | 3/16 | 2 | FSD1160-C8 | 53.70 |
| .1160 | #32 | 2.946 mm | | 20.00 mm | (5x) | 4 mm | 63 mm | BAF1160-C8 | 58.00 |
| .1160 | #32 | 2.946 mm | .800 | | (5x) | 3/16 | 2-1/2 | GNB1160-C8 | 58.00 |
| .1160 | #32 | 2.946 mm | 1.120 | | (8x) | 3/16 | 3 | HYX1160-C8 | 63.00 |
| .1160 | #32 | 2.946 mm | | 29.00 mm | (8x) | 4 mm | 63 mm | CBG1160-C8 | 63.00 |
| .1160 | #32 | 2.946 mm | | 40.00 mm | (12x) | 4 mm | 75 mm | DOW1160-C8 | 70.20 |
| .1181 | | 3.000 mm | | 14.50 mm | (3x) | 4 mm | 50 mm | AVA1181-C8 | 54.80 |
| .1181 | | 3.000 mm | | 20.00 mm | (5x) | 4 mm | 63 mm | BAF1181-C8 | 59.60 |
| .1181 | | 3.000 mm | | 29.00 mm | (8x) | 4 mm | 63 mm | CBG1181-C8 | 64.30 |
| .1181 | | 3.000 mm | | 35.00 mm | (10x) | 4 mm | 75 mm | ERY1181-C8 | 68.00 |
| .1181 | | 3.000 mm | | 42.00 mm | (12x) | 4 mm | 100 mm | DOW1181-C8 | 71.50 |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.030" −.000" | $L_2$ +.75mm −.00mm | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .1200 | #31 | 3.048 mm | | 14.50 mm | (3x) | 6 mm | 63 mm | AVA1200-C8 | 67.90 |
| .1200 | #31 | 3.048 mm | .580 | | (3x) | 3/16 | 2-1/2 | FSD1200-C8 | 67.90 |
| .1200 | #31 | 3.048 mm | .800 | | (5x) | 3/16 | 2-1/2 | GNB1200-C8 | 73.40 |
| .1200 | #31 | 3.048 mm | | 21.00 mm | (5x) | 6 mm | 63 mm | BAF1200-C8 | 73.40 |
| .1200 | #31 | 3.048 mm | | 30.00 mm | (8x) | 6 mm | 75 mm | CBG1200-C8 | 77.10 |
| .1200 | #31 | 3.048 mm | 1.200 | | (8x) | 3/16 | 3 | HYX1200-C8 | 77.10 |
| .1200 | #31 | 3.048 mm | | 42.00 mm | (12x) | 6 mm | 100 mm | DOW1200-C8 | 84.70 |
| .1250 (1/8) | | 3.175 mm | | 15.00 mm | (3x) | 6 mm | 63 mm | AVA1250-C8 | 67.90 |
| .1250 (1/8) | | 3.175 mm | .600 | | (3x) | 3/16 | 2-1/2 | FSD1250-C8 | 67.90 |
| .1250 (1/8) | | 3.175 mm | | 21.00 mm | (5x) | 6 mm | 63 mm | BAF1250-C8 | 73.40 |
| .1250 (1/8) | | 3.175 mm | .840 | | (5x) | 3/16 | 2-1/2 | GNB1250-C8 | 73.40 |
| .1250 (1/8) | | 3.175 mm | 1.200 | | (8x) | 3/16 | 3 | HYX1250-C8 | 77.10 |
| .1250 (1/8) | | 3.175 mm | | 31.00 mm | (8x) | 6 mm | 75 mm | CBG1250-C8 | 77.10 |
| .1250 (1/8) | | 3.175 mm | | 44.00 mm | (12x) | 6 mm | 100 mm | DOW1250-C8 | 84.70 |
| .1250 (1/8) | | 3.175 mm | | 53.00 mm | (15x) | 6 mm | 100 mm | FAE1250-C8 | 97.90 |
| .1260 | | 3.200 mm | | 22.00 mm | (5x) | 6 mm | 63 mm | BAF1260-C8 | 73.40 |
| .1260 | | 3.200 mm | | 31.00 mm | (8x) | 6 mm | 75 mm | CBG1260-C8 | 80.20 |
| .1285 | #30 | 3.263 mm | .610 | | (3x) | 1/4 | 2-1/2 | FSD1285-C8 | 67.90 |
| .1285 | #30 | 3.263 mm | | 16.00 mm | (3x) | 6 mm | 63 mm | AVA1285-C8 | 67.90 |
| .1285 | #30 | 3.263 mm | | 22.00 mm | (5x) | 6 mm | 63 mm | BAF1285-C8 | 73.40 |
| .1285 | #30 | 3.263 mm | .880 | | (5x) | 1/4 | 2-1/2 | GNB1285-C8 | 73.40 |
| .1285 | #30 | 3.263 mm | | 32.00 mm | (8x) | 6 mm | 75 mm | CBG1285-C8 | 77.10 |
| .1285 | #30 | 3.263 mm | 1.280 | | (8x) | 1/4 | 3 | HYX1285-C8 | 77.10 |
| .1285 | #30 | 3.263 mm | | 44.00 mm | (12x) | 6 mm | 100 mm | DOW1285-C8 | 84.70 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)

continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.030"}_{-.000"}$ | $L_2$ $^{+.75mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .1299 | | 3.300 mm | | 22.00 mm | (5x) | 6 mm | 63 mm | BAF1299-C8 | 73.40 |
| .1360 | #29 | 3.454 mm | | 16.00 mm | (3x) | 6 mm | 63 mm | AVA1360-C8 | 69.90 |
| .1360 | #29 | 3.454 mm | | 23.00 mm | (5x) | 6 mm | 63 mm | BAF1360-C8 | 73.40 |
| .1360 | #29 | 3.454 mm | | 34.00 mm | (8x) | 6 mm | 75 mm | CBG1360-C8 | 77.10 |
| .1360 | #29 | 3.454 mm | | 40.00 mm | (10x) | 6 mm | 100 mm | ERY1360-C8 | 80.80 |
| .1360 | #29 | 3.454 mm | | 48.00 mm | (12x) | 6 mm | 100 mm | DQW1360-C8 | 84.70 |
| .1405 | #28 | 3.568 mm | | 24.00 mm | (5x) | 6 mm | 75 mm | BAF1405-C8 | 73.40 |
| .1405 | #28 | 3.568 mm | | 50.00 mm | (12x) | 6 mm | 100 mm | DQW1405-C8 | 84.70 |
| .1406 (9/64) | | 3.571 mm | | 17.00 mm | (3x) | 6 mm | 63 mm | AVA1406-C8 | 67.90 |
| .1406 (9/64) | | 3.571 mm | | 24.00 mm | (5x) | 6 mm | 75 mm | BAF1406-C8 | 73.40 |
| .1406 (9/64) | | 3.571 mm | | 35.00 mm | (8x) | 6 mm | 75 mm | CBG1406-C8 | 77.10 |
| .1406 (9/64) | | 3.571 mm | | 42.00 mm | (10x) | 6 mm | 100 mm | ERY1406-C8 | 80.80 |
| .1406 (9/64) | | 3.571 mm | | 50.00 mm | (12x) | 6 mm | 100 mm | DQW1406-C8 | 84.70 |
| .1440 | #27 | 3.657 mm | | 24.00 mm | (5x) | 6 mm | 75 mm | BAF1440-C8 | 73.40 |
| .1440 | #27 | 3.657 mm | | 50.00 mm | (12x) | 6 mm | 100 mm | DQW1440-C8 | 84.70 |
| .1470 | #26 | 3.733 mm | | 18.00 mm | (3x) | 6 mm | 63 mm | AVA1470-C8 | 67.90 |
| .1470 | #26 | 3.733 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BAF1470-C8 | 73.40 |
| .1470 | #26 | 3.733 mm | | 36.00 mm | (8x) | 6 mm | 100 mm | CBG1470-C8 | 77.10 |
| .1470 | #26 | 3.733 mm | | 44.00 mm | (10x) | 6 mm | 100 mm | ERY1470-C8 | 80.80 |
| .1470 | #26 | 3.733 mm | | 52.00 mm | (12x) | 6 mm | 100 mm | DQW1470-C8 | 84.70 |
| .1495 | #25 | 3.797 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BAF1495-C8 | 73.40 |
| .1495 | #25 | 3.797 mm | | 52.00 mm | (12x) | 6 mm | 100 mm | DQW1495-C8 | 84.70 |
| .1520 | #24 | 3.860 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BAF1520-C8 | 73.40 |
| .1520 | #24 | 3.860 mm | | 54.00 mm | (12x) | 6 mm | 100 mm | DQW1520-C8 | 84.70 |
| .1540 | #23 | 3.911 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BAF1540-C8 | 73.40 |
| .1540 | #23 | 3.911 mm | | 54.00 mm | (12x) | 6 mm | 100 mm | DQW1540-C8 | 84.70 |
| .1562 (5/32) | | 3.968 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | AVA1562-C8 | 67.90 |
| .1562 (5/32) | | 3.968 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BAF1562-C8 | 73.40 |
| .1562 (5/32) | | 3.968 mm | | 39.00 mm | (8x) | 6 mm | 100 mm | CBG1562-C8 | 77.10 |
| .1562 (5/32) | | 3.968 mm | | 46.00 mm | (10x) | 6 mm | 100 mm | ERY1562-C8 | 80.80 |
| .1562 (5/32) | | 3.968 mm | | 54.00 mm | (12x) | 6 mm | 100 mm | DQW1562-C8 | 84.70 |
| .1570 | #22 | 3.987 mm | | 26.00 mm | (5x) | 6 mm | 75 mm | BAF1570-C8 | 73.40 |
| .1570 | #22 | 3.987 mm | | 39.00 mm | (8x) | 6 mm | 100 mm | CBG1570-C8 | 77.10 |
| .1570 | #22 | 3.987 mm | | 54.00 mm | (12x) | 6 mm | 100 mm | DQW1570-C8 | 84.70 |
| .1574 | | 4.000 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | AVA1574-C8 | 67.90 |
| .1574 | | 4.000 mm | | 28.00 mm | (5x) | 6 mm | 75 mm | BAF1574-C8 | 73.40 |
| .1574 | | 4.000 mm | | 39.00 mm | (8x) | 6 mm | 100 mm | CBG1574-C8 | 77.10 |
| .1574 | | 4.000 mm | | 48.00 mm | (10x) | 6 mm | 100 mm | ERY1574-C8 | 80.80 |
| .1574 | | 4.000 mm | | 56.00 mm | (12x) | 6 mm | 100 mm | DQW1574-C8 | 84.70 |
| .1590 | #21 | 4.038 mm | | 19.00 mm | (3x) | 6 mm | 63 mm | AVA1590-C8 | 67.90 |
| .1590 | #21 | 4.038 mm | | 28.00 mm | (5x) | 6 mm | 75 mm | BAF1590-C8 | 73.40 |
| .1590 | #21 | 4.038 mm | | 39.00 mm | (8x) | 6 mm | 100 mm | CBG1590-C8 | 77.10 |
| .1590 | #21 | 4.038 mm | | 48.00 mm | (10x) | 6 mm | 100 mm | ERY1590-C8 | 80.80 |
| .1590 | #21 | 4.038 mm | | 56.00 mm | (12x) | 6 mm | 100 mm | DQW1590-C8 | 84.70 |
| .1610 | #20 | 4.089 mm | | 28.00 mm | (5x) | 6 mm | 75 mm | BAF1610-C8 | 73.40 |
| .1610 | #20 | 4.089 mm | | 56.00 mm | (12x) | 6 mm | 100 mm | DQW1610-C8 | 84.70 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)



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| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.030" −.000" | $L_2$ +.75mm −.00mm | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .1660 | #19 | 4.216 mm | | 28.00 mm | (5x) | 6 mm | 75 mm | BAF1660-C8 | 73.40 |
| .1660 | #19 | 4.216 mm | | 58.00 mm | (12x) | 6 mm | 100 mm | DQW1660-C8 | 84.70 |
| .1695 | #18 | 4.305 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BAF1695-C8 | 73.40 |
| .1695 | #18 | 4.305 mm | | 60.00 mm | (12x) | 6 mm | 100 mm | DQW1695-C8 | 84.70 |
| .1718 (11/64) | | 4.365 mm | | 21.00 mm | (3x) | 6 mm | 63 mm | AVA1718-C8 | 67.90 |
| .1718 (11/64) | | 4.365 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BAF1718-C8 | 73.40 |
| .1718 (11/64) | | 4.365 mm | | 42.00 mm | (8x) | 6 mm | 100 mm | CBG1718-C8 | 77.10 |
| .1718 (11/64) | | 4.365 mm | | 52.00 mm | (10x) | 6 mm | 100 mm | ERY1718-C8 | 80.80 |
| .1718 (11/64) | | 4.365 mm | | 60.00 mm | (12x) | 6 mm | 100 mm | DQW1718-C8 | 84.70 |
| .1730 | #17 | 4.394 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BAF1730-C8 | 73.40 |
| .1730 | #17 | 4.394 mm | | 60.00 mm | (12x) | 6 mm | 100 mm | DQW1730-C8 | 84.70 |
| .1770 | #16 | 4.495 mm | | 21.00 mm | (3x) | 6 mm | 63 mm | AVA1770-C8 | 67.90 |
| .1770 | #16 | 4.495 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BAF1770-C8 | 73.40 |
| .1770 | #16 | 4.495 mm | | 44.00 mm | (8x) | 6 mm | 100 mm | CBG1770-C8 | 77.10 |
| .1770 | #16 | 4.495 mm | | 52.00 mm | (10x) | 6 mm | 100 mm | ERY1770-C8 | 80.80 |
| .1770 | #16 | 4.495 mm | | 62.00 mm | (12x) | 6 mm | 125 mm | DQW1770-C8 | 84.70 |
| .1800 | #15 | 4.572 mm | | 22.00 mm | (3x) | 6 mm | 63 mm | AVA1800-C8 | 67.90 |
| .1800 | #15 | 4.572 mm | | 30.00 mm | (5x) | 6 mm | 75 mm | BAF1800-C8 | 73.40 |
| .1800 | #15 | 4.572 mm | | 44.00 mm | (8x) | 6 mm | 100 mm | CBG1800-C8 | 77.10 |
| .1800 | #15 | 4.572 mm | | 54.00 mm | (10x) | 6 mm | 100 mm | ERY1800-C8 | 80.80 |
| .1800 | #15 | 4.572 mm | | 62.00 mm | (12x) | 6 mm | 125 mm | DQW1800-C8 | 84.70 |
| .1820 | #14 | 4.622 mm | | 32.00 mm | (5x) | 6 mm | 75 mm | BAF1820-C8 | 73.40 |
| .1820 | #14 | 4.622 mm | | 64.00 mm | (12x) | 6 mm | 125 mm | DQW1820-C8 | 84.70 |
| .1850 | #13 | 4.700 mm | | 32.00 mm | (5x) | 6 mm | 75 mm | BAF1850-C8 | 73.40 |
| .1850 | #13 | 4.700 mm | | 64.00 mm | (12x) | 6 mm | 125 mm | DQW1850-C8 | 84.70 |
| .1875 (3/16) | | 4.762 mm | .890 | | (3x) | 1/4 | 2-1/2 | FSD1875-C8 | 67.90 |
| .1875 (3/16) | | 4.762 mm | | 23.00 mm | (3x) | 6 mm | 63 mm | AVA1875-C8 | 67.90 |
| .1875 (3/16) | | 4.762 mm | | 32.00 mm | (5x) | 6 mm | 75 mm | BAF1875-C8 | 73.40 |
| .1875 (3/16) | | 4.762 mm | 1.280 | | (5x) | 1/4 | 3 | GNB1875-C8 | 73.40 |
| .1875 (3/16) | | 4.762 mm | | 46.00 mm | (8x) | 6 mm | 100 mm | CBG1875-C8 | 77.10 |
| .1875 (3/16) | | 4.762 mm | 1.840 | | (8x) | 1/4 | 3-1/2 | HYX1875-C8 | 77.10 |
| .1875 (3/16) | | 4.762 mm | | 56.00 mm | (10x) | 6 mm | 100 mm | ERY1875-C8 | 80.80 |
| .1875 (3/16) | | 4.762 mm | | 66.00 mm | (12x) | 6 mm | 125 mm | DQW1875-C8 | 84.70 |
| .1890 | #12 | 4.800 mm | | 32.00 mm | (5x) | 6 mm | 75 mm | BAF1890-C8 | 73.40 |
| .1890 | #12 | 4.800 mm | | 66.00 mm | (12x) | 6 mm | 125 mm | DQW1890-C8 | 84.70 |
| .1910 | #11 | 4.851 mm | | 32.00 mm | (5x) | 6 mm | 75 mm | BAF1910-C8 | 73.40 |
| .1910 | #11 | 4.851 mm | | 66.00 mm | (12x) | 6 mm | 125 mm | DQW1910-C8 | 84.70 |
| .1935 | #10 | 4.914 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BAF1935-C8 | 73.40 |
| .1935 | #10 | 4.914 mm | | 68.00 mm | (12x) | 6 mm | 125 mm | DQW1935-C8 | 84.70 |
| .1960 | #9 | 4.978 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BAF1960-C8 | 73.40 |
| .1960 | #9 | 4.978 mm | | 68.00 mm | (12x) | 6 mm | 125 mm | DQW1960-C8 | 84.70 |
| .1968 | | 5.000 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | AVA1968-C8 | 67.90 |
| .1968 | | 5.000 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BAF1968-C8 | 73.40 |
| .1968 | | 5.000 mm | | 48.00 mm | (8x) | 6 mm | 100 mm | CBG1968-C8 | 77.10 |
| .1968 | | 5.000 mm | | 58.00 mm | (10x) | 6 mm | 100 mm | ERY1968-C8 | 80.80 |
| .1968 | | 5.000 mm | | 68.00 mm | (12x) | 6 mm | 125 mm | DQW1968-C8 | 84.70 |

continued on next page

# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)

continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | TiB$_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.030"}_{-.000"}$ | $L_2$ $^{+.75mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .1990 | #8 | 5.054 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BAF1990-C8 | 73.40 |
| .1990 | #8 | 5.054 mm | | 70.00 mm | (12x) | 6 mm | 125 mm | DOW1990-C8 | 84.70 |
| .2009 | #7 | 5.105 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | AVA2009-C8 | 67.90 |
| .2009 | #7 | 5.105 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BAF2009-C8 | 73.40 |
| .2009 | #7 | 5.105 mm | | 50.00 mm | (8x) | 6 mm | 100 mm | CBG2009-C8 | 77.10 |
| .2009 | #7 | 5.105 mm | | 60.00 mm | (10x) | 6 mm | 100 mm | ERY2009-C8 | 80.80 |
| .2009 | #7 | 5.105 mm | | 70.00 mm | (12x) | 6 mm | 125 mm | DOW2009-C8 | 84.70 |
| .2031 (13/64) | | 5.159 mm | | 24.00 mm | (3x) | 6 mm | 63 mm | AVA2031-C8 | 69.90 |
| .2031 (13/64) | | 5.159 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BAF2031-C8 | 73.40 |
| .2031 (13/64) | | 5.159 mm | | 50.00 mm | (8x) | 6 mm | 100 mm | CBG2031-C8 | 77.10 |
| .2031 (13/64) | | 5.159 mm | | 60.00 mm | (10x) | 6 mm | 100 mm | ERY2031-C8 | 80.80 |
| .2031 (13/64) | | 5.159 mm | | 70.00 mm | (12x) | 6 mm | 125 mm | DOW2031-C8 | 84.70 |
| .2040 | #6 | 5.181 mm | | 34.00 mm | (5x) | 6 mm | 75 mm | BAF2040-C8 | 73.40 |
| .2040 | #6 | 5.181 mm | | 72.00 mm | (12x) | 6 mm | 125 mm | DOW2040-C8 | 84.70 |
| .2055 | #5 | 5.219 mm | | 36.00 mm | (5x) | 6 mm | 75 mm | BAF2055-C8 | 73.40 |
| .2055 | #5 | 5.219 mm | | 72.00 mm | (12x) | 6 mm | 125 mm | DOW2055-C8 | 84.70 |
| .2090 | #4 | 5.308 mm | | 36.00 mm | (5x) | 6 mm | 75 mm | BAF2090-C8 | 73.40 |
| .2090 | #4 | 5.308 mm | | 72.00 mm | (12x) | 6 mm | 125 mm | DOW2090-C8 | 84.70 |
| .2129 | #3 | 5.410 mm | | 26.00 mm | (3x) | 6 mm | 75 mm | AVA2129-C8 | 67.90 |
| .2129 | #3 | 5.410 mm | | 36.00 mm | (5x) | 6 mm | 75 mm | BAF2129-C8 | 73.40 |
| .2129 | #3 | 5.410 mm | | 52.00 mm | (8x) | 6 mm | 100 mm | CBG2129-C8 | 77.10 |
| .2129 | #3 | 5.410 mm | | 64.00 mm | (10x) | 6 mm | 125 mm | ERY2129-C8 | 80.80 |
| .2129 | #3 | 5.410 mm | | 74.00 mm | (12x) | 6 mm | 125 mm | DOW2129-C8 | 84.70 |
| .2187 (7/32) | | 5.556 mm | | 26.00 mm | (3x) | 6 mm | 75 mm | AVA2187-C8 | 67.90 |
| .2187 (7/32) | | 5.556 mm | | 38.00 mm | (5x) | 6 mm | 100 mm | BAF2187-C8 | 73.40 |
| .2187 (7/32) | | 5.556 mm | | 54.00 mm | (8x) | 6 mm | 100 mm | CBG2187-C8 | 77.10 |
| .2187 (7/32) | | 5.556 mm | | 66.00 mm | (10x) | 6 mm | 125 mm | ERY2187-C8 | 80.80 |
| .2187 (7/32) | | 5.556 mm | | 76.00 mm | (12x) | 6 mm | 125 mm | DOW2187-C8 | 84.70 |
| .2210 | #2 | 5.613 mm | | 38.00 mm | (5x) | 6 mm | 100 mm | BAF2210-C8 | 73.40 |
| .2210 | #2 | 5.613 mm | | 78.00 mm | (12x) | 6 mm | 125 mm | DOW2210-C8 | 84.70 |
| .2280 | #1 | 5.791 mm | | 40.00 mm | (5x) | 6 mm | 100 mm | BAF2280-C8 | 73.40 |
| .2280 | #1 | 5.791 mm | | 80.00 mm | (12x) | 6 mm | 125 mm | DOW2280-C8 | 84.70 |
| .2340 | A | 5.943 mm | | 40.00 mm | (5x) | 6 mm | 100 mm | BAF2340-C8 | 73.40 |
| .2340 | A | 5.943 mm | | 82.00 mm | (12x) | 6 mm | 125 mm | DOW2340-C8 | 84.70 |
| .2343 (15/64) | | 5.953 mm | | 28.00 mm | (3x) | 6 mm | 75 mm | AVA2343-C8 | 67.90 |
| .2343 (15/64) | | 5.953 mm | | 40.00 mm | (5x) | 6 mm | 100 mm | BAF2343-C8 | 73.40 |
| .2343 (15/64) | | 5.953 mm | | 58.00 mm | (8x) | 6 mm | 100 mm | CBG2343-C8 | 77.10 |
| .2343 (15/64) | | 5.953 mm | | 70.00 mm | (10x) | 6 mm | 125 mm | ERY2343-C8 | 80.80 |
| .2343 (15/64) | | 5.953 mm | | 82.00 mm | (12x) | 6 mm | 125 mm | DOW2343-C8 | 84.70 |
| .2362 | | 6.000 mm | | 28.00 mm | (3x) | 6 mm | 75 mm | AVA2362-C8 | 67.90 |
| .2362 | | 6.000 mm | | 40.00 mm | (5x) | 6 mm | 100 mm | BAF2362-C8 | 73.40 |
| .2362 | | 6.000 mm | | 58.00 mm | (8x) | 6 mm | 100 mm | CBG2362-C8 | 77.10 |
| .2362 | | 6.000 mm | | 70.00 mm | (10x) | 6 mm | 125 mm | ERY2362-C8 | 80.80 |
| .2362 | | 6.000 mm | | 82.00 mm | (12x) | 6 mm | 125 mm | DOW2362-C8 | 84.70 |
| .2380 | B | 6.045 mm | | 40.00 mm | (5x) | 8 mm | 100 mm | BAF2380-C8 | 75.90 |
| .2380 | B | 6.045 mm | | 84.00 mm | (12x) | 8 mm | 125 mm | DOW2380-C8 | 87.50 |

continued on next page

# MINIATURE HIGH PERFORMANCE DRILLS

## Aluminum Alloys (cont.)

continued from previous page



| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.030"}_{-.000"}$ | $L_2$ $^{+.75mm}_{-.00mm}$ | | $D_2$ (h6) | L1 | 3 FL | USD$ |
| .2420 | C | 6.146 mm | | 42.00 mm | (5x) | 8 mm | 100 mm | BAF2420-C8 | 75.90 |
| .2420 | C | 6.146 mm | | 84.00 mm | (12x) | 8 mm | 125 mm | DQW2420-C8 | 87.50 |
| .2460 | D | 6.248 mm | | 42.00 mm | (5x) | 8 mm | 100 mm | BAF2460-C8 | 75.90 |
| .2460 | D | 6.248 mm | | 86.00 mm | (12x) | 8 mm | 150 mm | DQW2460-C8 | 87.50 |
| .2500 (1/4) | E | 6.350 mm | | 30.00 mm | (3x) | 8 mm | 75 mm | AVA2500-C8 | 67.90 |
| .2500 (1/4) | E | 6.350 mm | 1.188 | | (3x) | 1/4 | 3 | FSD2500-C8 | 67.90 |
| .2500 (1/4) | E | 6.350 mm | | 42.00 mm | (5x) | 8 mm | 100 mm | BAF2500-C8 | 73.40 |
| .2500 (1/4) | E | 6.350 mm | 1.680 | | (5x) | 1/4 | 3-1/2 | GNB2500-C8 | 73.40 |
| .2500 (1/4) | E | 6.350 mm | 2.400 | | (8x) | 1/4 | 4 | HYX2500-C8 | 77.10 |
| .2500 (1/4) | E | 6.350 mm | | 62.00 mm | (8x) | 8 mm | 125 mm | CBG2500-C8 | 77.10 |
| .2500 (1/4) | E | 6.350 mm | | 74.00 mm | (10x) | 8 mm | 125 mm | ERY2500-C8 | 80.80 |
| .2500 (1/4) | E | 6.350 mm | | 88.00 mm | (12x) | 8 mm | 150 mm | DQW2500-C8 | 84.70 |
| .2510 | | 6.375 mm | | 42.00 mm | (5x) | 8 mm | 100 mm | BAF2510-C8 | 83.40 |
| .2570 | F | 6.528 mm | | 44.00 mm | (5x) | 8 mm | 100 mm | BAF2570-C8 | 83.40 |
| .2812 (9/32) | | 7.142 mm | | 48.00 mm | (5x) | 8 mm | 100 mm | BAF2812-C8 | 83.40 |
| .3125 (5/16) | | 7.937 mm | | 54.00 mm | (5x) | 8 mm | 100 mm | BAF3125-C8 | 83.40 |
| .3150 | | 8.000 mm | | 54.00 mm | (5x) | 8 mm | 100 mm | BAF3150-C8 | 83.40 |
| .3750 (3/8) | | 9.525 mm | | 46.00 mm | (3x) | 10 mm | 100 mm | AVA3750-C8 | 131.90 |
| .3750 (3/8) | | 9.525 mm | | 64.00 mm | (5x) | 10 mm | 125 mm | BAF3750-C8 | 143.10 |
| .3770 | V | 9.575 mm | | 46.00 mm | (3x) | 10 mm | 100 mm | AVA3770-C8 | 131.90 |
| .3770 | V | 9.575 mm | | 64.00 mm | (5x) | 10 mm | 125 mm | BAF3770-C8 | 143.10 |
| .3937 | | 10.000 mm | | 68.00 mm | (5x) | 10 mm | 125 mm | BAF3937-C8 | 143.10 |
| .4375 (7/16) | | 11.112 mm | | 76.00 mm | (5x) | 12 mm | 125 mm | BAF4375-C8 | 181.90 |
| .4724 | | 12.000 mm | | 82.00 mm | (5x) | 12 mm | 125 mm | BAF4724-C8 | 181.90 |
| .5000 (1/2) | | 12.700 mm | | 86.00 mm | (5x) | 16 mm | 150 mm | BAF5000-C8 | 319.70 |

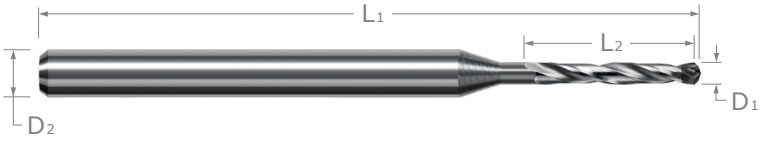
## SPEEDS & FEEDS (Miniature High Performance Drills – Aluminum Alloys)

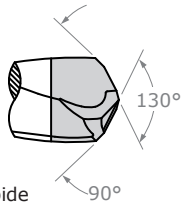
**Important Note:** Values in table are in inches and are based on 3x and 5x drill lengths. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%; for 12x, reduce to 65%). Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x diameter with each subsequent peck at 2-3x diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

| Material (Hardness: ≤ 28 Rc) | SFM | Chip Load IPR (Inches Per Revolution) By Drill Diameter | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .375 | .500 |
| **Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx) | 450 | .00079 | .00164 | .00248 | .00327 | .00412 | .00491 | .00660 | .00987 | .01320 | .01980 | .02640 |
| Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 600 | | | | | | | | | | | |
| Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 450 | .00071 | .00147 | .00223 | .00295 | .00371 | .00442 | .00594 | .00889 | .01188 | .00889 | .02376 |
| Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 420 | | | | | | | | | | | |
| Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 390 | | | | | | | | | | | |
| Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 350 | | | | | | | | | | | |
| Wrought - 5%-8% Si (4xxx) | 600 | | | | | | | | | | | |
| Wrought - 8%-12% Si (4xxx) | 480 | | | | | | | | | | | |
| **Magnesium Alloys** | 900 | .00079 | .00164 | .00248 | .00327 | .00412 | .00491 | .00660 | .00987 | .01320 | .01782 | .02640 |
| **Zinc Alloys** | 480 | | | | | | | | | | | |
| **Copper Alloys**: High Coppers - 90%+ (C1xxx) | 170 | .00063 | .00131 | .00199 | .00262 | .00329 | .00393 | .00528 | .00790 | .01056 | .01980 | .02112 |
| Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800) | 375 | | | | | | | | | | | |
| Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 170 | | | | | | | | | | | |
| Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 375 | | | | | | | | | | | |
| Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 375 | | | | | | | | | | | |
| Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 170 | | | | | | | | | | | |
| Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 400 | | | | | | | | | | | |
| **Plastics:** Unfilled Plastics | 500 | .00079 | .00164 | .00248 | .00327 | .00412 | .00491 | .00660 | .00987 | .01320 | .01584 | .02640 |
| Reinforced Plastics | 350 | .00063 | .00131 | .00199 | .00329 | .00393 | .00528 | .00790 | .01056 | .01584 | .02112 | .02640 |

# MINIATURE HIGH PERFORMANCE DRILLS

## PCD Diamond – Double Angle – Metric




- PCD diamond nib brazed on entire end of solid carbide body allows for increased tool life over carbide
- Full PCD tip allows for positive cutting geometry
- Double angle point geometry for superior performance in preventing push-out and delamination in layered composites
- Recommended work piece material: aluminum, copper, brass, bronze, plastic, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- h6 shank tolerance for high precision tool holders

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | PCD DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| | | $D_1$ +.000mm −.013mm | | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| .0937 (3/32) | | 2.381 mm | .630 | **16.00 mm** | (5x) | 4 mm | 63 mm | BCF0937 | 683.60 |
| .1181 | | 3.000 mm | .787 | **20.00 mm** | (5x) | 4 mm | 63 mm | BCF1181 | 683.60 |
| | | $D_1$ +.000mm −.013mm | | $L_2$ +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| .1250 (1/8) | | 3.175 mm | .827 | **21.00 mm** | (5x) | 6 mm | 63 mm | BCF1250 | 628.90 |
| .1299 | | 3.300 mm | .866 | **22.00 mm** | (5x) | 6 mm | 63 mm | BCF1299 | 628.90 |
| .1650 | | 4.190 mm | 1.102 | **28.00 mm** | (5x) | 6 mm | 75 mm | BCF1650 | 695.10 |
| .1875 (3/16) | | 4.762 mm | 1.260 | **32.00 mm** | (5x) | 6 mm | 75 mm | BCF1875 | 695.10 |
| .1910 | #11 | 4.851 mm | 1.260 | **32.00 mm** | (5x) | 6 mm | 75 mm | BCF1910 | 695.10 |
| .2500 (1/4) | E | 6.350 mm | 1.654 | **42.00 mm** | (5x) | 8 mm | 100 mm | BCF2500 | 800.50 |
| .2510 | | 6.375 mm | 1.654 | **42.00 mm** | (5x) | 8 mm | 100 mm | BCF2510 | 800.50 |

**For PCD End Mills, see pages 265, 266, 267, 268**

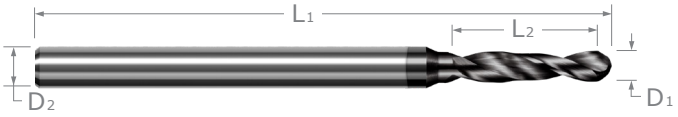
## SPEEDS & FEEDS (Miniature High Performance Drills – PCD Diamond – Metric)

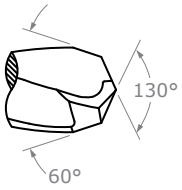
**Important Note:** Values in table are in inches and are based on 5x drill lengths. Since the melting point varies greatly from in plastics, the speed (RPM) used should be closely supervised. An additional reduction in RPM may be necessary to avoid excessive fraying, splitting and tear out of fibers. Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x Diameter with each subsequent peck at 2-3x Diameter. For Metal Matrix Composites with aluminum, pecking should begin when part thickness is more than 1x Diameter and a feed reduction of 30%. For titanium, pecking should begin when part thickness is more than .5x Diameter and a feed reduction of 50% with a subsequent peck .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

| Material | Type | Hardness | SFM | Chip Load (IPR) By Drill Diameter | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | .078 | .093 | .125 | .187 | .250 |
| **Unfilled Plastics** ETFE, FEP, HDPE, LDPE, PFA, Polyurethane, PTFE, Rulon, Teflon, UHMW | Unfilled | 50 < 100 Rr, (55 < 85 Shore D) | 800 - 1200 | .0037 | .0045 | .0060 | .0090 | .0120 |
| Acrylic, Acetal, Delrin, Lucite, Nylon 6, Nylon 6/6, PAI, PI, PEEK, Plexiglas, PS, PSU, Torlon 4203, Ultem 1000 | Unfilled | 100 > 150 Rr | 500 - 800 | .0041 | .0049 | .0066 | .0099 | .0132 |
| **Filled Plastics** Vespel SP-3 | Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE) | 50 < 100 Rr, (55 < 85 Shore D) | 800 - 1200 | .0037 | .0045 | .0060 | .0090 | .0120 |
| Nyoil, Nylatron, Plavis MS, Torlon 4301 | Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE) | 100 > 150 Rr | 500 - 800 | .0041 | .0049 | .0066 | .0099 | .0132 |
| | Carbon/Glass Filled 5% < 20% | 100 > 150 Rr | 400 - 600 | .0041 | .0049 | .0066 | .0099 | .0132 |
| | Carbon/Glass Filled 21% < 40% | 100 > 150 Rr | 350 - 500 | .0034 | .0040 | .0054 | .0081 | .0108 |
| **Fiber Reinforced Plastics** FR4, G10, G11 | Carbon/Glass Fiber 5% < 20% | 100 > 150 Rr | 350 - 500 | .0041 | .0049 | .0066 | .0099 | .0132 |
| G30 | Carbon/Glass Fiber 21% < 40% | 100 > 150 Rr | 200 - 300 | .0034 | .0040 | .0054 | .0081 | .0108 |
| **Metal Matrix Composites** | Aluminum/Composite Layered | | 320 - 500 | .0041 | .0049 | .0066 | .0099 | .0132 |
| | Titanium/Composite Layered | | 160 - 260 | .0030 | .0036 | .0048 | .0072 | .0096 |
| **Graphite** POCO 3 | | | 400 - 600 | .0043 | .0051 | .0069 | .0103 | .0138 |
| **Green Ceramic & Green Carbide** | | | 100 - 300 | .0039 | .0047 | .0063 | .0094 | .0126 |

# MINIATURE HIGH PERFORMANCE DRILLS

## Composites – Double Angle




- Optimized for drilling layered composites with excellent performance in virgin plastics and other composite materials
- Double angle geometry for superior performance in preventing push-out and delamination in layered composites
- Amorphous diamond coated for increased abrasion resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



Double Angle Point Geometry Prevents Delamination

COMPOSITES

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| .0312 (1/32) | | .793 mm | .208 | | (5x) | 1/8 | 2 | DDB0312-C4 | 67.50 |
| .0312 (1/32) | | .793 mm | | **5.40 mm** | (5x) | 3 mm | 50 mm | DDA0312-C4 | 68.50 |
| .0314 | | .800 mm | | **5.40 mm** | (5x) | 3 mm | 50 mm | DDA0315-C4 | 68.50 |
| .0320 | #67 | .812 mm | | **5.40 mm** | (5x) | 3 mm | 50 mm | DDA0320-C4 | 68.50 |
| .0320 | #67 | .812 mm | .216 | | (5x) | 1/8 | 2 | DDB0320-C4 | 67.50 |
| .0330 | #66 | .838 mm | | **5.60 mm** | (5x) | 3 mm | 50 mm | DDA0330-C4 | 68.50 |
| .0350 | #65 | .889 mm | | **6.00 mm** | (5x) | 3 mm | 50 mm | DDA0350-C4 | 68.50 |
| .0350 | #65 | .889 mm | .240 | | (5x) | 1/8 | 2 | DDB0350-C4 | 67.50 |
| .0354 | | .900 mm | | **6.00 mm** | (5x) | 3 mm | 50 mm | DDA0354-C4 | 68.50 |
| .0360 | #64 | .914 mm | | **6.20 mm** | (5x) | 3 mm | 50 mm | DDA0360-C4 | 68.50 |
| .0370 | #63 | .939 mm | | **6.40 mm** | (5x) | 3 mm | 50 mm | DDA0370-C4 | 68.50 |
| .0380 | #62 | .965 mm | | **6.60 mm** | (5x) | 3 mm | 50 mm | DDA0380-C4 | 68.50 |
| .0390 | #61 | .990 mm | | **6.60 mm** | (5x) | 3 mm | 50 mm | DDA0390-C4 | 68.50 |
| .0393 | | 1.000 mm | | **6.80 mm** | (5x) | 3 mm | 50 mm | DDA0393-C4 | 70.20 |
| .0400 | #60 | 1.016 mm | | **6.80 mm** | (5x) | 3 mm | 50 mm | DDA0400-C4 | 70.20 |
| .0400 | #60 | 1.016 mm | .272 | | (5x) | 1/8 | 2 | DDB0400-C4 | 69.10 |
| .0410 | #59 | 1.041 mm | | **7.00 mm** | (5x) | 3 mm | 50 mm | DDA0410-C4 | 70.20 |
| .0420 | #58 | 1.066 mm | | **7.20 mm** | (5x) | 3 mm | 50 mm | DDA0420-C4 | 70.20 |
| .0430 | #57 | 1.092 mm | | **7.40 mm** | (5x) | 3 mm | 50 mm | DDA0430-C4 | 70.20 |
| .0450 | | 1.143 mm | | **7.80 mm** | (5x) | 3 mm | 50 mm | DDA0450-C4 | 70.20 |
| .0465 | #56 | 1.181 mm | .312 | | (5x) | 1/8 | 2 | DDB0465-C4 | 69.10 |
| .0465 | #56 | 1.181 mm | | **8.00 mm** | (5x) | 3 mm | 50 mm | DDA0465-C4 | 70.20 |
| .0468 (3/64) | | 1.190 mm | | **8.00 mm** | (5x) | 3 mm | 50 mm | DDA0468-C4 | 70.20 |
| .0468 (3/64) | | 1.190 mm | .320 | | (5x) | 1/8 | 2 | DDB0468-C4 | 69.10 |
| .0492 | | 1.250 mm | | **8.50 mm** | (5x) | 3 mm | 50 mm | DDA0492-C4 | 70.20 |
| .0500 | | 1.270 mm | | **8.50 mm** | (5x) | 3 mm | 50 mm | DDA0500-C4 | 70.20 |
| .0500 | | 1.270 mm | .340 | | (5x) | 1/8 | 2 | DDB0500-C4 | 69.10 |
| .0520 | #55 | 1.320 mm | | **9.00 mm** | (5x) | 3 mm | 50 mm | DDA0520-C4 | 70.20 |
| .0520 | #55 | 1.320 mm | .360 | | (5x) | 1/8 | 2 | DDB0520-C4 | 69.10 |
| .0550 | #54 | 1.397 mm | | **9.50 mm** | (5x) | 3 mm | 50 mm | DDA0550-C4 | 70.20 |
| .0550 | #54 | 1.397 mm | .380 | | (5x) | 1/8 | 2 | DDB0550-C4 | 69.10 |
| .0590 | | 1.500 mm | | **10.00 mm** | (5x) | 3 mm | 50 mm | DDA0590-C4 | 71.20 |

continued on next page

# MINIATURE HIGH PERFORMANCE DRILLS

## Composites – Double Angle (cont.)

continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ $^{+.0000"}_{-.0005"}$ | | $D_1$ $^{+.000mm}_{-.013mm}$ | $L_2$ $^{+.010"}_{-.000"}$ | $L_2$ $^{+.25mm}_{-.00mm}$ | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| .0595 | #53 | 1.511 mm | | **10.00 mm** | (5x) | 3 mm | 50 mm | DDA0595-C4 | 71.20 |
| .0600 | | 1.524 mm | | **10.50 mm** | (5x) | 3 mm | 50 mm | DDA0600-C4 | 71.20 |
| .0625 (1/16) | | 1.587 mm | | **10.50 mm** | (5x) | 3 mm | 50 mm | DDA0625-C4 | 71.20 |
| .0625 (1/16) | | 1.587 mm | .420 | | (5x) | 1/8 | 2 | DDB0625-C4 | 70.20 |
| .0635 | #52 | 1.612 mm | | **11.00 mm** | (5x) | 3 mm | 50 mm | DDA0635-C4 | 71.20 |
| .0670 | #51 | 1.701 mm | | **11.50 mm** | (5x) | 3 mm | 50 mm | DDA0670-C4 | 71.20 |
| .0700 | #50 | 1.778 mm | | **12.00 mm** | (5x) | 3 mm | 50 mm | DDA0700-C4 | 71.20 |
| .0730 | #49 | 1.854 mm | | **12.50 mm** | (5x) | 3 mm | 50 mm | DDA0730-C4 | 71.20 |
| .0760 | #48 | 1.930 mm | | **13.00 mm** | (5x) | 3 mm | 50 mm | DDA0760-C4 | 71.20 |
| .0781 (5/64) | | 1.984 mm | | **13.50 mm** | (5x) | 3 mm | 50 mm | DDA0781-C4 | 71.20 |
| .0785 | #47 | 1.993 mm | | **13.50 mm** | (5x) | 3 mm | 50 mm | DDA0785-C4 | 71.20 |
| .0787 | | 2.000 mm | | **13.50 mm** | (5x) | 4 mm | 50 mm | DDA0787-C4 | 72.50 |
| .0800 | | 2.032 mm | | **13.50 mm** | (5x) | 4 mm | 50 mm | DDA0800-C4 | 72.50 |
| .0810 | #46 | 2.057 mm | | **14.00 mm** | (5x) | 4 mm | 50 mm | DDA0810-C4 | 72.50 |
| .0820 | #45 | 2.082 mm | | **14.00 mm** | (5x) | 4 mm | 50 mm | DDA0820-C4 | 72.50 |
| .0860 | #44 | 2.184 mm | | **14.50 mm** | (5x) | 4 mm | 50 mm | DDA0860-C4 | 72.50 |
| .0890 | #43 | 2.260 mm | | **15.00 mm** | (5x) | 4 mm | 50 mm | DDA0890-C4 | 72.50 |
| .0890 | #43 | 2.260 mm | .600 | | (5x) | 3/16 | 2-1/2 | DDB0890-C4 | 71.40 |
| .0900 | | 2.286 mm | | **15.00 mm** | (5x) | 4 mm | 50 mm | DDA0900-C4 | 72.50 |
| .0935 | #42 | 2.374 mm | | **16.00 mm** | (5x) | 4 mm | 63 mm | DDA0935-C4 | 72.50 |
| .0937 (3/32) | | 2.381 mm | | **16.00 mm** | (5x) | 4 mm | 63 mm | DDA0937-C4 | 72.50 |
| .0937 (3/32) | | 2.381 mm | .640 | | (5x) | 3/16 | 2-1/2 | DDB0937-C4 | 71.40 |
| .0937 (3/32) | | 2.381 mm | | **23.00 mm** | (8x) | 4 mm | 63 mm | AWS0937-C4 | 76.50 |
| .0960 | #41 | 2.438 mm | | **16.00 mm** | (5x) | 4 mm | 63 mm | DDA0960-C4 | 72.50 |
| .0960 | #41 | 2.438 mm | .640 | | (5x) | 3/16 | 2-1/2 | DDB0960-C4 | 71.40 |
| .0980 | #40 | 2.489 mm | | **17.00 mm** | (5x) | 4 mm | 63 mm | DDA0980-C4 | 72.50 |
| .0984 | | 2.500 mm | | **17.00 mm** | (5x) | 4 mm | 63 mm | DDA0984-C4 | 73.00 |
| .0995 | #39 | 2.527 mm | | **17.00 mm** | (5x) | 4 mm | 63 mm | DDA0995-C4 | 73.00 |
| .0995 | #39 | 2.527 mm | .680 | | (5x) | 3/16 | 2-1/2 | DDB0995-C4 | 72.00 |
| .1000 | | 2.540 mm | | **17.00 mm** | (5x) | 4 mm | 63 mm | DDA1000-C4 | 73.00 |
| .1000 | | 2.540 mm | | **25.00 mm** | (8x) | 4 mm | 63 mm | AWS1000-C4 | 76.50 |
| .1015 | #38 | 2.578 mm | | **17.00 mm** | (5x) | 4 mm | 63 mm | DDA1015-C4 | 73.00 |
| .1040 | #37 | 2.641 mm | | **18.00 mm** | (5x) | 4 mm | 63 mm | DDA1040-C4 | 73.00 |
| .1065 | #36 | 2.705 mm | | **18.00 mm** | (5x) | 4 mm | 63 mm | DDA1065-C4 | 73.00 |
| .1093 (7/64) | | 2.778 mm | | **19.00 mm** | (5x) | 4 mm | 63 mm | DDA1093-C4 | 73.00 |
| .1100 | #35 | 2.794 mm | | **19.00 mm** | (5x) | 4 mm | 63 mm | DDA1100-C4 | 73.00 |
| .1100 | #35 | 2.794 mm | .760 | | (5x) | 3/16 | 2-1/2 | DDB1100-C4 | 72.00 |
| .1110 | #34 | 2.819 mm | | **19.00 mm** | (5x) | 4 mm | 63 mm | DDA1110-C4 | 73.00 |
| .1130 | #33 | 2.870 mm | | **19.00 mm** | (5x) | 4 mm | 63 mm | DDA1130-C4 | 73.00 |
| .1160 | #32 | 2.946 mm | | **20.00 mm** | (5x) | 4 mm | 63 mm | DDA1160-C4 | 73.00 |
| .1160 | #32 | 2.946 mm | .800 | | (5x) | 3/16 | 2-1/2 | DDB1160-C4 | 72.00 |
| .1181 | | 3.000 mm | | **20.00 mm** | (5x) | 4 mm | 63 mm | DDA1181-C4 | 74.70 |
| .1181 | | 3.000 mm | | **29.00 mm** | (8x) | 4 mm | 63 mm | AWS1181-C4 | 78.80 |

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# MINIATURE HIGH PERFORMANCE DRILLS

## Composites – Double Angle (cont.)

continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.030" −.000" | $L_2$ +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| .1200 | #31 | 3.048 mm | .800 | | (5x) | 3/16 | 2-1/2 | DDB1200-C4 | 87.20 |
| .1200 | #31 | 3.048 mm | | **21.00 mm** | (5x) | 6 mm | 63 mm | DDA1200-C4 | 88.30 |
| .1250 (1/8) | | 3.175 mm | | **15.00 mm** | (3x) | 6 mm | 63 mm | BAA1250-C4 | 84.30 |
| .1250 (1/8) | | 3.175 mm | | **21.00 mm** | (5x) | 6 mm | 63 mm | DDA1250-C4 | 88.30 |
| .1250 (1/8) | | 3.175 mm | .840 | | (5x) | 3/16 | 2-1/2 | DDB1250-C4 | 87.20 |
| .1250 (1/8) | | 3.175 mm | | **31.00 mm** | (8x) | 6 mm | 75 mm | AWS1250-C4 | 93.40 |
| .1285 | #30 | 3.263 mm | | **22.00 mm** | (5x) | 6 mm | 63 mm | DDA1285-C4 | 88.30 |
| .1360 | #29 | 3.454 mm | | **23.00 mm** | (5x) | 6 mm | 63 mm | DDA1360-C4 | 88.30 |
| .1406 (9/64) | | 3.571 mm | | **24.00 mm** | (5x) | 6 mm | 75 mm | DDA1406-C4 | 88.30 |
| .1470 | #26 | 3.733 mm | | **26.00 mm** | (5x) | 6 mm | 75 mm | DDA1470-C4 | 88.30 |
| .1562 (5/32) | | 3.968 mm | | **26.00 mm** | (5x) | 6 mm | 75 mm | DDA1562-C4 | 88.30 |
| .1574 | | 4.000 mm | | **28.00 mm** | (5x) | 6 mm | 75 mm | DDA1574-C4 | 88.30 |
| .1590 | #21 | 4.038 mm | | **28.00 mm** | (5x) | 6 mm | 75 mm | DDA1590-C4 | 88.30 |
| .1718 (11/64) | | 4.365 mm | | **30.00 mm** | (5x) | 6 mm | 75 mm | DDA1718-C4 | 88.30 |
| .1770 | #16 | 4.495 mm | | **30.00 mm** | (5x) | 6 mm | 75 mm | DDA1770-C4 | 88.30 |
| .1800 | #15 | 4.572 mm | | **30.00 mm** | (5x) | 6 mm | 75 mm | DDA1800-C4 | 88.30 |
| .1875 (3/16) | | 4.762 mm | | **32.00 mm** | (5x) | 6 mm | 75 mm | DDA1875-C4 | 88.30 |
| .1875 (3/16) | | 4.762 mm | | **46.00 mm** | (8x) | 6 mm | 100 mm | AWS1875-C4 | 93.40 |
| .1909 | | 4.851 mm | | **23.00 mm** | (3x) | 6 mm | 63 mm | BAA1909-C4 | 84.30 |
| .1909 | | 4.851 mm | | **32.00 mm** | (5x) | 6 mm | 75 mm | DDA1909-C4 | 88.30 |
| .1968 | | 5.000 mm | | **34.00 mm** | (5x) | 6 mm | 75 mm | DDA1968-C4 | 88.30 |
| .2009 | #7 | 5.105 mm | | **34.00 mm** | (5x) | 6 mm | 75 mm | DDA2009-C4 | 88.30 |
| .2031 (13/64) | | 5.159 mm | | **34.00 mm** | (5x) | 6 mm | 75 mm | DDA2031-C4 | 88.30 |
| .2129 | #3 | 5.410 mm | | **36.00 mm** | (5x) | 6 mm | 75 mm | DDA2129-C4 | 88.30 |
| .2187 (7/32) | | 5.556 mm | | **38.00 mm** | (5x) | 6 mm | 100 mm | DDA2187-C4 | 88.30 |
| .2343 (15/64) | | 5.953 mm | | **40.00 mm** | (5x) | 6 mm | 100 mm | DDA2343-C4 | 88.30 |
| .2362 | | 6.000 mm | | **40.00 mm** | (5x) | 6 mm | 100 mm | DDA2362-C4 | 88.30 |
| .2500 (1/4) | E | 6.350 mm | | **30.00 mm** | (3x) | 8 mm | 75 mm | BAA2500-C4 | 84.30 |
| .2500 (1/4) | E | 6.350 mm | | **42.00 mm** | (5x) | 8 mm | 100 mm | DDA2500-C4 | 88.30 |
| .2500 (1/4) | E | 6.350 mm | | **62.00 mm** | (8x) | 8 mm | 125 mm | AWS2500-C4 | 93.40 |
| .2570 | | 6.528 mm | | **32.00 mm** | (3x) | 8 mm | 75 mm | BAA2570-C4 | 115.10 |
| .2812 | | 7.142 mm | | **34.00 mm** | (3x) | 8 mm | 75 mm | BAA2812-C4 | 115.10 |
| .3125 (5/16) | | 7.937 mm | | **38.00 mm** | (3x) | 8 mm | 100 mm | BAA3125-C4 | 115.10 |
| .3150 | | 8.000 mm | | **38.00 mm** | (3x) | 8 mm | 100 mm | BAA3150-C4 | 115.10 |
| .3750 (3/8) | | 9.525 mm | | **46.00 mm** | (3x) | 10 mm | 100 mm | BAA3750-C4 | 150.70 |

# MINIATURE HIGH PERFORMANCE DRILLS

## Composites – Double Angle (cont.)

### SPEEDS & FEEDS (Miniature High Performance Drills – Composites)

**Important Note:** Posted chiploads are for the double angle drills. For brad point drills, reduce chiploads by approx. 10%. Since the melting point varies greatly from plastic to plastic, the speed (RPM) used should be closely supervised. An additional reduction in RPM may be necessary to avoid excessive fraying, splitting and tear out of fibers. Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x Diameter with each subsequent peck at 2-3x Diameter. Look at our online speeds and feeds for more information. For complete speeds and feeds charts, please go to www.harveytool.com.

| Material Type | | Type | Hardness | SFM | Chip Load Per Revolution (IPR) By Cutter Diameter | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | .375 |
| Unfilled Plastics | ETFE, FEP, HDPE, LDPE, PFA, Polyurethane, PTFE, Rulon, Teflon, UHMW | Unfilled | 50 < 100 Rr, 55 < 85 Shore D | 800-1200 | .0006 | .0013 | .0020 | .0027 | .0034 | .0040 | .0054 | .0081 | .0108 | .0162 |
| | Acrylic, Acetal, Delrin, Lucite, Nylon 6, Nylon 6/6, PAI, PI, PEEK, Plexiglas, PS, PSU, Torlon 4203, Ultem 1000 | Unfilled | 100 > 150 Rr | 500-800 | .0007 | .0015 | .0022 | .0029 | .0037 | .0044 | .0059 | .0089 | .0119 | .0178 |
| Filled Plastics | Vespel SP-3 | Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE) | 50 < 100 Rr, 55 < 85 Shore D | 800-1200 | .0006 | .0013 | .0020 | .0027 | .0034 | .0040 | .0054 | .0081 | .0108 | .0162 |
| | Nyoil, Nylatron, Plavis MS, Torlon 4301 | Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE) | 100 > 150 Rr | 500-800 | .0007 | .0015 | .0022 | .0029 | .0037 | .0044 | .0059 | .0089 | .0119 | .0178 |
| | | Carbon/Glass Filled 5% < 20% | 100 > 150 Rr | 400-600 | .0007 | .0015 | .0022 | .0029 | .0037 | .0044 | .0059 | .0089 | .0119 | 0178 |
| | | Carbon/Glass Filled 21% < 40% | 100 > 150 Rr | 350-500 | .0006 | .0012 | .0018 | .0024 | .0030 | .0036 | .0049 | .0073 | .0097 | .0146 |
| Fiber Reinforced | FR4, G10, G11 | Carbon/Glass Fiber 5% < 20% | 100 > 150 Rr | 350-500 | .0007 | .0015 | .0022 | .0029 | .0037 | .0044 | .0059 | .0089 | .0119 | .0178 |
| | G30 | Carbon/Glass Fiber 21% < 40% | 100 > 150 Rr | 200-300 | .0006 | .0012 | .0018 | .0024 | .0030 | .0036 | .0049 | .0073 | .0097 | .0146 |

# MINIATURE HIGH PERFORMANCE DRILLS

## Composites – Brad Point – Metric




- Optimized for drilling glass or carbon fiber filled and reinforced composites with excellent performance in other filled, layered, and woven composite materials
- Center and OD spur point geometry for accurate scoring action, prevents fraying, uncut fibers, and tear out
- Amorphous diamond coating for increased abrasion resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA



Brad Point Prevents Fraying & Tear Out



| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| | | $D_1$ +.000mm −.013mm | | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| .0312 (1/32) | | .793 mm | .213 | **5.40 mm** | (5x) | 3 mm | 50 mm | BSW0312-C4 | 59.00 |
| .0315 | | .800 mm | .213 | **5.40 mm** | (5x) | 3 mm | 50 mm | BSW0315-C4 | 59.00 |
| .0320 | #67 | .812 mm | .213 | **5.40 mm** | (5x) | 3 mm | 50 mm | BSW0320-C4 | 59.00 |
| .0330 | #66 | .838 mm | .220 | **5.60 mm** | (5x) | 3 mm | 50 mm | BSW0330-C4 | 59.00 |
| .0350 | #65 | .889 mm | .236 | **6.00 mm** | (5x) | 3 mm | 50 mm | BSW0350-C4 | 59.00 |
| .0354 | | .900 mm | .236 | **6.00 mm** | (5x) | 3 mm | 50 mm | BSW0354-C4 | 59.00 |
| .0360 | #64 | .914 mm | .244 | **6.20 mm** | (5x) | 3 mm | 50 mm | BSW0360-C4 | 59.00 |
| .0370 | #63 | .939 mm | .252 | **6.40 mm** | (5x) | 3 mm | 50 mm | BSW0370-C4 | 59.00 |
| .0380 | #62 | .965 mm | .260 | **6.60 mm** | (5x) | 3 mm | 50 mm | BSW0380-C4 | 59.00 |
| .0390 | #61 | .990 mm | .260 | **6.60 mm** | (5x) | 3 mm | 50 mm | BSW0390-C4 | 59.00 |
| .0393 | | 1.000 mm | .268 | **6.80 mm** | (5x) | 3 mm | 50 mm | BSW0393-C4 | 61.70 |
| .0400 | #60 | 1.016 mm | .268 | **6.80 mm** | (5x) | 3 mm | 50 mm | BSW0400-C4 | 61.70 |
| .0410 | #59 | 1.041 mm | .276 | **7.00 mm** | (5x) | 3 mm | 50 mm | BSW0410-C4 | 61.70 |
| .0420 | #58 | 1.066 mm | .283 | **7.20 mm** | (5x) | 3 mm | 50 mm | BSW0420-C4 | 61.70 |
| .0430 | #57 | 1.092 mm | .291 | **7.40 mm** | (5x) | 3 mm | 50 mm | BSW0430-C4 | 61.70 |
| .0450 | | 1.143 mm | .307 | **7.80 mm** | (5x) | 3 mm | 50 mm | BSW0450-C4 | 61.70 |
| .0465 | #56 | 1.181 mm | .315 | **8.00 mm** | (5x) | 3 mm | 50 mm | BSW0465-C4 | 61.70 |
| .0468 (3/64) | | 1.190 mm | .315 | **8.00 mm** | (5x) | 3 mm | 50 mm | BSW0468-C4 | 61.70 |
| .0492 | | 1.250 mm | .335 | **8.50 mm** | (5x) | 3 mm | 50 mm | BSW0492-C4 | 61.70 |
| .0500 | | 1.270 mm | .335 | **8.50 mm** | (5x) | 3 mm | 50 mm | BSW0500-C4 | 61.70 |
| .0520 | #55 | 1.320 mm | .354 | **9.00 mm** | (5x) | 3 mm | 50 mm | BSW0520-C4 | 61.70 |
| .0550 | #54 | 1.397 mm | .374 | **9.50 mm** | (5x) | 3 mm | 50 mm | BSW0550-C4 | 61.70 |
| .0590 | | 1.500 mm | .394 | **10.00 mm** | (5x) | 3 mm | 50 mm | BSW0590-C4 | 61.70 |
| .0595 | #53 | 1.511 mm | .394 | **10.00 mm** | (5x) | 3 mm | 50 mm | BSW0595-C4 | 61.70 |
| .0600 | | 1.524 mm | .413 | **10.50 mm** | (5x) | 3 mm | 50 mm | BSW0600-C4 | 61.70 |
| .0625 (1/16) | | 1.587 mm | .413 | **10.50 mm** | (5x) | 3 mm | 50 mm | BSW0625-C4 | 61.70 |
| .0635 | #52 | 1.612 mm | .433 | **11.00 mm** | (5x) | 3 mm | 50 mm | BSW0635-C4 | 61.70 |
| .0670 | #51 | 1.701 mm | .453 | **11.50 mm** | (5x) | 3 mm | 50 mm | BSW0670-C4 | 61.70 |
| .0700 | #50 | 1.778 mm | .472 | **12.00 mm** | (5x) | 3 mm | 50 mm | BSW0700-C4 | 61.70 |
| .0730 | #49 | 1.854 mm | .492 | **12.50 mm** | (5x) | 3 mm | 50 mm | BSW0730-C4 | 61.70 |
| .0760 | #48 | 1.930 mm | .512 | **13.00 mm** | (5x) | 3 mm | 50 mm | BSW0760-C4 | 61.70 |
| .0781 (5/64) | | 1.984 mm | .531 | **13.50 mm** | (5x) | 3 mm | 50 mm | BSW0781-C4 | 61.70 |
| .0785 | #47 | 1.993 mm | .531 | **13.50 mm** | (5x) | 3 mm | 50 mm | BSW0785-C4 | 61.70 |
| .0787 | | 2.000 mm | .531 | **13.50 mm** | (5x) | 4 mm | 50 mm | BSW0787-C4 | 64.10 |
| .0800 | | 2.032 mm | .531 | **13.50 mm** | (5x) | 4 mm | 50 mm | BSW0800-C4 | 64.10 |
| .0810 | #46 | 2.057 mm | .551 | **14.00 mm** | (5x) | 4 mm | 50 mm | BSW0810-C4 | 64.10 |
| .0820 | #45 | 2.082 mm | .551 | **14.00 mm** | (5x) | 4 mm | 50 mm | BSW0820-C4 | 64.10 |

continued on next page

# MINIATURE HIGH PERFORMANCE DRILLS

## Composites – Brad Point – Metric (cont.)

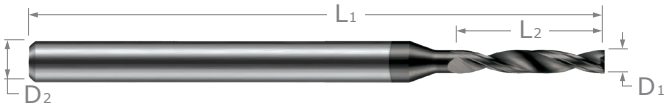
continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | |
| | | $D_1$ $^{+.000mm}_{-.013mm}$ | | $L_2$ $^{+.25mm}_{-.00mm}$ | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| .0860 | #44 | 2.184 mm | .571 | **14.50 mm** | (5x) | 4 mm | 50 mm | BSW0860-C4 | 64.10 |
| .0890 | #43 | 2.260 mm | .591 | **15.00 mm** | (5x) | 4 mm | 50 mm | BSW0890-C4 | 64.10 |
| .0900 | | 2.286 mm | .591 | **15.00 mm** | (5x) | 4 mm | 50 mm | BSW0900-C4 | 64.10 |
| .0935 | #42 | 2.374 mm | .630 | **16.00 mm** | (5x) | 4 mm | 63 mm | BSW0935-C4 | 65.00 |
| .0937 (3/32) | | 2.381 mm | .630 | **16.00 mm** | (5x) | 4 mm | 63 mm | BSW0937-C4 | 65.00 |
| .0960 | #41 | 2.438 mm | .630 | **16.00 mm** | (5x) | 4 mm | 63 mm | BSW0960-C4 | 65.00 |
| .0980 | #40 | 2.489 mm | .669 | **17.00 mm** | (5x) | 4 mm | 63 mm | BSW0980-C4 | 65.00 |
| .0984 | | 2.500 mm | .669 | **17.00 mm** | (5x) | 4 mm | 63 mm | BSW0984-C4 | 65.50 |
| .0995 | #39 | 2.527 mm | .669 | **17.00 mm** | (5x) | 4 mm | 63 mm | BSW0995-C4 | 65.50 |
| .1000 | | 2.540 mm | .669 | **17.00 mm** | (5x) | 4 mm | 63 mm | BSW1000-C4 | 65.50 |
| .1015 | #38 | 2.578 mm | .669 | **17.00 mm** | (5x) | 4 mm | 63 mm | BSW1015-C4 | 65.50 |
| .1040 | #37 | 2.641 mm | .709 | **18.00 mm** | (5x) | 4 mm | 63 mm | BSW1040-C4 | 65.50 |
| .1065 | #36 | 2.705 mm | .709 | **18.00 mm** | (5x) | 4 mm | 63 mm | BSW1065-C4 | 65.50 |
| .1093 (7/64) | | 2.778 mm | .748 | **19.00 mm** | (5x) | 4 mm | 63 mm | BSW1093-C4 | 65.50 |
| .1100 | #35 | 2.794 mm | .748 | **19.00 mm** | (5x) | 4 mm | 63 mm | BSW1100-C4 | 65.50 |
| .1110 | #34 | 2.819 mm | .748 | **19.00 mm** | (5x) | 4 mm | 63 mm | BSW1110-C4 | 65.50 |
| .1130 | #33 | 2.870 mm | .748 | **19.00 mm** | (5x) | 4 mm | 63 mm | BSW1130-C4 | 65.50 |
| .1160 | #32 | 2.946 mm | .787 | **20.00 mm** | (5x) | 4 mm | 63 mm | BSW1160-C4 | 65.50 |
| .1181 | | 3.000 mm | .787 | **20.00 mm** | (5x) | 4 mm | 63 mm | BSW1181-C4 | 65.50 |
| | | $D_1$ $^{+.000mm}_{-.013mm}$ | | $L_2$ $^{+.75mm}_{-.00mm}$ | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ |
| .1200 | #31 | 3.048 mm | .827 | **21.00 mm** | (5x) | 6 mm | 63 mm | BSW1200-C4 | 75.60 |
| .1250 (1/8) | | 3.175 mm | .827 | **21.00 mm** | (5x) | 6 mm | 63 mm | BSW1250-C4 | 75.60 |
| .1285 | #30 | 3.263 mm | .866 | **22.00 mm** | (5x) | 6 mm | 63 mm | BSW1285-C4 | 75.60 |
| .1360 | #29 | 3.454 mm | .906 | **23.00 mm** | (5x) | 6 mm | 63 mm | BSW1360-C4 | 75.60 |
| .1406 (9/64) | | 3.571 mm | .945 | **24.00 mm** | (5x) | 6 mm | 75 mm | BSW1406-C4 | 75.60 |
| .1470 | #26 | 3.733 mm | 1.024 | **26.00 mm** | (5x) | 6 mm | 75 mm | BSW1470-C4 | 75.60 |
| .1562 (5/32) | | 3.968 mm | 1.024 | **26.00 mm** | (5x) | 6 mm | 75 mm | BSW1562-C4 | 75.60 |
| .1574 | | 4.000 mm | 1.102 | **28.00 mm** | (5x) | 6 mm | 75 mm | BSW1574-C4 | 75.60 |
| .1590 | #21 | 4.038 mm | 1.102 | **28.00 mm** | (5x) | 6 mm | 75 mm | BSW1590-C4 | 75.60 |
| .1718 (11/64) | | 4.365 mm | 1.181 | **30.00 mm** | (5x) | 6 mm | 75 mm | BSW1718-C4 | 75.60 |
| .1770 | #16 | 4.495 mm | 1.181 | **30.00 mm** | (5x) | 6 mm | 75 mm | BSW1770-C4 | 75.60 |
| .1800 | #15 | 4.572 mm | 1.181 | **30.00 mm** | (5x) | 6 mm | 75 mm | BSW1800-C4 | 75.60 |
| .1875 (3/16) | | 4.762 mm | 1.260 | **32.00 mm** | (5x) | 6 mm | 75 mm | BSW1875-C4 | 75.60 |
| .1909 | | 4.851 mm | 1.259 | **32.00 mm** | (5x) | 6 mm | 75 mm | BSW1909-C4 | 75.60 |
| .1968 | | 5.000 mm | 1.339 | **34.00 mm** | (5x) | 6 mm | 75 mm | BSW1968-C4 | 75.60 |
| .2009 | #7 | 5.105 mm | 1.339 | **34.00 mm** | (5x) | 6 mm | 75 mm | BSW2009-C4 | 75.60 |
| .2031 (13/64) | | 5.159 mm | 1.339 | **34.00 mm** | (5x) | 6 mm | 75 mm | BSW2031-C4 | 75.60 |
| .2129 | #3 | 5.410 mm | 1.417 | **36.00 mm** | (5x) | 6 mm | 75 mm | BSW2129-C4 | 75.60 |
| .2187 (7/32) | | 5.556 mm | 1.496 | **38.00 mm** | (5x) | 6 mm | 100 mm | BSW2187-C4 | 75.60 |
| .2343 (15/64) | | 5.953 mm | 1.575 | **40.00 mm** | (5x) | 6 mm | 100 mm | BSW2343-C4 | 75.60 |
| .2362 | | 6.000 mm | 1.575 | **40.00 mm** | (5x) | 6 mm | 100 mm | BSW2362-C4 | 75.60 |
| .2500 (1/4) | E | 6.350 mm | 1.654 | **42.00 mm** | (5x) | 8 mm | 100 mm | BSW2500-C4 | 75.60 |
| .2570 | | 6.528 mm | 1.259 | **32.00 mm** | (3x) | 8 mm | 75 mm | BSX2570-C4 | 115.70 |
| .2812 | | 7.142 mm | 1.338 | **34.00 mm** | (3x) | 8 mm | 75 mm | BSX2812-C4 | 126.40 |
| .3125 (5/16) | | 7.937 mm | 1.496 | **38.00 mm** | (3x) | 8 mm | 100 mm | BSX3125-C4 | 126.40 |
| .3150 | | 8.000 mm | 1.496 | **38.00 mm** | (3x) | 8 mm | 100 mm | BSX3150-C4 | 150.90 |
| .3750 (3/8) | | 9.525 mm | 1.811 | **46.00 mm** | (3x) | 10 mm | 100 mm | BSX3750-C4 | 157.90 |

**PLEASE SEE SPEEDS & FEEDS ON PAGE 509**

# MINIATURE HIGH PERFORMANCE DRILLS

## Flat Bottom




**Ideal for Inclined & Rounded Surfaces**

- Flat bottom design (no point angle and no dish) allows for drilling on irregular surfaces and reduces burrs on break through
- Ideal for drilling on inclined and rounded surfaces, creating flat bottom holes, tilted drilling for angled holes, and drilling intersecting holes, half holes, shoulders, or thin plates
- AlTiN coating for improved lubricity and heat resistance
- TiB2 coating for added lubricity and improved tool life in aluminum
- h6 tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



No Point Angle & No Dish Allows for Drilling On Irregular Surfaces

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| .0312 (1/32) | | .793 mm | .208 | | (5x) | 1/8 | 2 | FBG0312-C3 | 54.30 | FBG0312-C8 | 58.00 |
| .0312 (1/32) | | .793 mm | | **3.80 mm** | (3x) | 3 mm | 50 mm | FBF0312-C3 | 53.00 | FBF0312-C8 | 54.80 |
| .0312 (1/32) | | .793 mm | | **5.40 mm** | (5x) | 3 mm | 50 mm | FBD0312-C3 | 56.40 | FBD0312-C8 | 60.20 |
| .0314 | | .800 mm | | **5.40 mm** | (5x) | 3 mm | 50 mm | FBD0315-C3 | 56.40 | FBD0315-C8 | 60.20 |
| .0320 | #67 | .812 mm | | **5.40 mm** | (5x) | 3 mm | 50 mm | FBD0320-C3 | 56.40 | FBD0320-C8 | 60.20 |
| .0320 | #67 | .812 mm | .216 | | (5x) | 1/8 | 2 | FBG0320-C3 | 54.30 | FBG0320-C8 | 58.00 |
| .0330 | #66 | .838 mm | | **5.60 mm** | (5x) | 3 mm | 50 mm | FBD0330-C3 | 56.40 | FBD0330-C8 | 60.20 |
| .0350 | #65 | .889 mm | | **6.00 mm** | (5x) | 3 mm | 50 mm | FBD0350-C3 | 56.40 | FBD0350-C8 | 60.20 |
| .0350 | #65 | .889 mm | .240 | | (5x) | 1/8 | 2 | FBG0350-C3 | 54.30 | FBG0350-C8 | 58.00 |
| .0354 | | .900 mm | | **6.00 mm** | (5x) | 3 mm | 50 mm | FBD0354-C3 | 56.40 | FBD0354-C8 | 60.20 |
| .0360 | #64 | .914 mm | | **6.20 mm** | (5x) | 3 mm | 50 mm | FBD0360-C3 | 56.40 | FBD0360-C8 | 60.20 |
| .0370 | #63 | .939 mm | | **6.40 mm** | (5x) | 3 mm | 50 mm | FBD0370-C3 | 56.40 | FBD0370-C8 | 60.20 |
| .0380 | #62 | .965 mm | | **6.60 mm** | (5x) | 3 mm | 50 mm | FBD0380-C3 | 56.40 | FBD0380-C8 | 60.20 |
| .0390 | #61 | .990 mm | | **6.60 mm** | (5x) | 3 mm | 50 mm | FBD0390-C3 | 56.40 | FBD0390-C8 | 60.20 |
| .0393 | | 1.000 mm | | **6.80 mm** | (5x) | 3 mm | 50 mm | FBD0393-C3 | 61.90 | FBD0393-C8 | 65.80 |
| .0400 | #60 | 1.016 mm | | **6.80 mm** | (5x) | 3 mm | 50 mm | FBD0400-C3 | 61.90 | FBD0400-C8 | 65.80 |
| .0400 | #60 | 1.016 mm | .272 | | (5x) | 1/8 | 2 | FBG0400-C3 | 59.60 | FBG0400-C8 | 63.30 |
| .0410 | #59 | 1.041 mm | | **7.00 mm** | (5x) | 3 mm | 50 mm | FBD0410-C3 | 61.90 | FBD0410-C8 | 65.80 |
| .0420 | #58 | 1.066 mm | | **7.20 mm** | (5x) | 3 mm | 50 mm | FBD0420-C3 | 61.90 | FBD0420-C8 | 65.80 |
| .0430 | #57 | 1.092 mm | | **7.40 mm** | (5x) | 3 mm | 50 mm | FBD0430-C3 | 61.90 | FBD0430-C8 | 65.80 |
| .0450 | | 1.143 mm | | **7.80 mm** | (5x) | 3 mm | 50 mm | FBD0450-C3 | 61.90 | FBD0450-C8 | 65.80 |
| .0465 | #56 | 1.181 mm | | **8.00 mm** | (5x) | 3 mm | 50 mm | FBD0465-C3 | 61.90 | FBD0465-C8 | 65.80 |
| .0465 | #56 | 1.181 mm | .312 | | (5x) | 1/8 | 2 | FBG0465-C3 | 59.60 | FBG0465-C8 | 63.30 |
| .0468 (3/64) | | 1.190 mm | | **5.60 mm** | (3x) | 3 mm | 50 mm | FBF0468-C3 | 58.40 | FBF0468-C8 | 60.10 |
| .0468 (3/64) | | 1.190 mm | | **8.00 mm** | (5x) | 3 mm | 50 mm | FBD0468-C3 | 61.90 | FBD0468-C8 | 65.80 |
| .0468 (3/64) | | 1.190 mm | .320 | | (5x) | 1/8 | 2 | FBG0468-C3 | 59.60 | FBG0468-C8 | 63.30 |
| .0492 | | 1.250 mm | | **8.50 mm** | (5x) | 3 mm | 50 mm | FBD0492-C3 | 61.90 | FBD0492-C8 | 65.80 |
| .0500 | | 1.270 mm | | **8.50 mm** | (5x) | 3 mm | 50 mm | FBD0500-C3 | 61.90 | FBD0500-C8 | 65.80 |
| .0500 | | 1.270 mm | .340 | | (5x) | 1/8 | 2 | FBG0500-C3 | 59.60 | FBG0500-C8 | 63.30 |
| .0520 | #55 | 1.320 mm | | **9.00 mm** | (5x) | 3 mm | 50 mm | FBD0520-C3 | 61.90 | FBD0520-C8 | 65.80 |
| .0520 | #55 | 1.320 mm | .360 | | (5x) | 1/8 | 2 | FBG0520-C3 | 59.60 | FBG0520-C8 | 63.30 |
| .0550 | #54 | 1.397 mm | | **9.50 mm** | (5x) | 3 mm | 50 mm | FBD0550-C3 | 61.90 | FBD0550-C8 | 65.80 |
| .0550 | #54 | 1.397 mm | .380 | | (5x) | 1/8 | 2 | FBG0550-C3 | 59.60 | FBG0550-C8 | 63.30 |

continued on next page

# MINIATURE HIGH PERFORMANCE DRILLS

## Flat Bottom (cont.)

continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| .0590 | | 1.500 mm | | **10.00 mm** | (5x) | 3 mm | 50 mm | FBD0590-C3 | 66.50 | FBD0590-C8 | 70.50 |
| .0595 | #53 | 1.511 mm | | **10.00 mm** | (5x) | 3 mm | 50 mm | FBD0595-C3 | 66.50 | FBD0595-C8 | 70.50 |
| .0600 | | 1.524 mm | | **10.50 mm** | (5x) | 3 mm | 50 mm | FBD0600-C3 | 66.50 | FBD0600-C8 | 70.50 |
| .0625 (1/16) | | 1.587 mm | | **7.60 mm** | (3x) | 3 mm | 50 mm | FBF0625-C3 | 63.20 | FBF0625-C8 | 66.80 |
| .0625 (1/16) | | 1.587 mm | | **10.50 mm** | (5x) | 3 mm | 50 mm | FBD0625-C3 | 66.50 | FBD0625-C8 | 70.50 |
| .0625 (1/16) | | 1.587 mm | .420 | | (5x) | 1/8 | 2 | FBG0625-C3 | 63.90 | FBG0625-C8 | 67.90 |
| .0635 | #52 | 1.612 mm | | **11.00 mm** | (5x) | 3 mm | 50 mm | FBD0635-C3 | 66.50 | FBD0635-C8 | 70.50 |
| .0670 | #51 | 1.701 mm | | **11.50 mm** | (5x) | 3 mm | 50 mm | FBD0670-C3 | 66.50 | FBD0670-C8 | 70.50 |
| .0700 | #50 | 1.778 mm | | **8.50 mm** | (3x) | 3 mm | 50 mm | FBF0700-C3 | 63.20 | FBF0700-C8 | 66.80 |
| .0700 | #50 | 1.778 mm | | **12.00 mm** | (5x) | 3 mm | 50 mm | FBD0700-C3 | 66.50 | FBD0700-C8 | 70.50 |
| .0700 | #50 | 1.778 mm | .480 | | (5x) | 1/8 | 2 | FBG0700-C3 | 63.90 | FBG0700-C8 | 67.90 |
| .0730 | #49 | 1.854 mm | | **12.50 mm** | (5x) | 3 mm | 50 mm | FBD0730-C3 | 66.50 | FBD0730-C8 | 70.50 |
| .0760 | #48 | 1.930 mm | | **13.00 mm** | (5x) | 3 mm | 50 mm | FBD0760-C3 | 66.50 | FBD0760-C8 | 70.50 |
| .0781 | | 1.984 mm | .520 | | (5x) | 1/8 | 2 | FBG0781-C3 | 63.90 | FBG0781-C8 | 67.90 |
| .0781 (5/64) | | 1.984 mm | | **13.50 mm** | (5x) | 3 mm | 50 mm | FBD0781-C3 | 66.50 | FBD0781-C8 | 70.50 |
| .0785 | #47 | 1.993 mm | | **13.50 mm** | (5x) | 3 mm | 50 mm | FBD0785-C3 | 66.50 | FBD0785-C8 | 70.50 |
| .0787 | | 2.000 mm | | **13.50 mm** | (5x) | 4 mm | 50 mm | FBD0787-C3 | 71.90 | FBD0787-C8 | 75.60 |
| .0800 | | 2.032 mm | | **9.50 mm** | (3x) | 4 mm | 50 mm | FBF0800-C3 | 68.50 | FBF0800-C8 | 69.50 |
| .0800 | | 2.032 mm | | **13.50 mm** | (5x) | 4 mm | 50 mm | FBD0800-C3 | 71.90 | FBD0800-C8 | 75.60 |
| .0810 | #46 | 2.057 mm | | **14.00 mm** | (5x) | 4 mm | 50 mm | FBD0810-C3 | 71.90 | FBD0810-C8 | 75.60 |
| .0820 | #45 | 2.082 mm | | **14.00 mm** | (5x) | 4 mm | 50 mm | FBD0820-C3 | 71.90 | FBD0820-C8 | 75.60 |
| .0860 | #44 | 2.184 mm | | **14.50 mm** | (5x) | 4 mm | 50 mm | FBD0860-C3 | 71.90 | FBD0860-C8 | 75.60 |
| .0860 | #44 | 2.184 mm | .580 | | (5x) | 3/16 | 2-1/2 | FBG0860-C3 | 69.10 | FBG0860-C8 | 72.80 |
| .0890 | #43 | 2.260 mm | | **10.50 mm** | (3x) | 4 mm | 50 mm | FBF0890-C3 | 68.50 | FBF0890-C8 | 69.50 |
| .0890 | #43 | 2.260 mm | | **15.00 mm** | (5x) | 4 mm | 50 mm | FBD0890-C3 | 71.90 | FBD0890-C8 | 75.60 |
| .0890 | #43 | 2.260 mm | .600 | | (5x) | 3/16 | 2-1/2 | FBG0890-C3 | 69.10 | FBG0890-C8 | 72.80 |
| .0900 | | 2.286 mm | | **11.00 mm** | (3x) | 4 mm | 50 mm | FBF0900-C3 | 68.50 | FBF0900-C8 | 69.50 |
| .0900 | | 2.286 mm | | **15.00 mm** | (5x) | 4 mm | 50 mm | FBD0900-C3 | 71.90 | FBD0900-C8 | 75.60 |
| .0935 | #42 | 2.374 mm | | **16.00 mm** | (5x) | 4 mm | 63 mm | FBD0935-C3 | 71.90 | FBD0935-C8 | 75.60 |
| .0937 (3/32) | | 2.381 mm | | **11.50 mm** | (3x) | 4 mm | 50 mm | FBF0937-C3 | 68.50 | FBF0937-C8 | 69.50 |
| .0937 (3/32) | | 2.381 mm | | **16.00 mm** | (5x) | 4 mm | 63 mm | FBD0937-C3 | 71.90 | FBD0937-C8 | 75.60 |
| .0937 (3/32) | | 2.381 mm | .640 | | (5x) | 3/16 | 2-1/2 | FBG0937-C3 | 69.10 | FBG0937-C8 | 72.80 |
| .0960 | #41 | 2.438 mm | | **16.00 mm** | (5x) | 4 mm | 63 mm | FBD0960-C3 | 71.90 | FBD0960-C8 | 75.60 |
| .0960 | #41 | 2.438 mm | .640 | | (5x) | 3/16 | 2-1/2 | FBG0960-C3 | 69.10 | FBG0960-C8 | 72.80 |
| .0980 | #40 | 2.489 mm | | **17.00 mm** | (5x) | 4 mm | 63 mm | FBD0980-C3 | 71.90 | FBD0980-C8 | 75.60 |
| .0984 | | 2.500 mm | | **17.00 mm** | (5x) | 4 mm | 63 mm | FBD0984-C3 | 76.10 | FBD0984-C8 | 80.00 |
| .0995 | #39 | 2.527 mm | | **17.00 mm** | (5x) | 4 mm | 63 mm | FBD0995-C3 | 76.10 | FBD0995-C8 | 80.00 |
| .0995 | #39 | 2.527 mm | .680 | | (5x) | 3/16 | 2-1/2 | FBG0995-C3 | 73.30 | FBG0995-C8 | 77.10 |
| .1000 | | 2.540 mm | | **17.00 mm** | (5x) | 4 mm | 63 mm | FBD1000-C3 | 76.10 | FBD1000-C8 | 80.00 |
| .1015 | #38 | 2.578 mm | | **17.00 mm** | (5x) | 4 mm | 63 mm | FBD1015-C3 | 76.10 | FBD1015-C8 | 80.00 |
| .1040 | #37 | 2.641 mm | | **18.00 mm** | (5x) | 4 mm | 63 mm | FBD1040-C3 | 76.10 | FBD1040-C8 | 80.00 |
| .1065 | #36 | 2.705 mm | | **18.00 mm** | (5x) | 4 mm | 63 mm | FBD1065-C3 | 76.10 | FBD1065-C8 | 80.00 |
| .1093 (7/64) | | 2.778 mm | | **19.00 mm** | (5x) | 4 mm | 63 mm | FBD1093-C3 | 76.10 | FBD1093-C8 | 80.00 |
| .1100 | #35 | 2.794 mm | | **19.00 mm** | (5x) | 4 mm | 63 mm | FBD1100-C3 | 76.10 | FBD1100-C8 | 80.00 |

continued on next page

# MINIATURE HIGH PERFORMANCE DRILLS

## Flat Bottom (cont.)

continued from previous page

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | | | |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.010" −.000" | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| .1100 | #35 | 2.794 mm | .760 | | (5x) | 3/16 | 2-1/2 | FBG1100-C3 | 73.30 | FBG1100-C8 | 77.10 |
| .1110 | #34 | 2.819 mm | | **19.00 mm** | (5x) | 4 mm | 63 mm | FBD1110-C3 | 76.10 | FBD1110-C8 | 80.00 |
| .1130 | #33 | 2.870 mm | | **19.00 mm** | (5x) | 4 mm | 63 mm | FBD1130-C3 | 76.10 | FBD1130-C8 | 80.00 |
| .1160 | #32 | 2.946 mm | | **20.00 mm** | (5x) | 4 mm | 63 mm | FBD1160-C3 | 76.10 | FBD1160-C8 | 80.00 |
| .1160 | #32 | 2.946 mm | .800 | | (5x) | 3/16 | 2-1/2 | FBG1160-C3 | 73.30 | FBG1160-C8 | 77.10 |
| .1181 | | 3.000 mm | | **14.50 mm** | (3x) | 4 mm | 50 mm | FBF1181-C3 | 72.80 | FBF1181-C8 | 73.80 |
| .1181 | | 3.000 mm | | **20.00 mm** | (5x) | 4 mm | 63 mm | FBD1181-C3 | 76.10 | FBD1181-C8 | 80.00 |
| $D_1$ +.0000" −.0005" | | $D_1$ +.000mm −.013mm | $L_2$ +.030" −.000" | $L_2$ +.75mm −.00mm | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| .1200 | #31 | 3.048 mm | | **14.50 mm** | (3x) | 6 mm | 63 mm | FBF1200-C3 | 81.40 | FBF1200-C8 | 85.10 |
| .1200 | #31 | 3.048 mm | | **21.00 mm** | (5x) | 6 mm | 63 mm | FBD1200-C3 | 85.30 | FBD1200-C8 | 89.10 |
| .1200 | #31 | 3.048 mm | .800 | | (5x) | 3/16 | 2-1/2 | FBG1200-C3 | 82.20 | FBG1200-C8 | 85.80 |
| .1250 (1/8) | | 3.175 mm | | **15.00 mm** | (3x) | 6 mm | 63 mm | FBF1250-C3 | 81.40 | FBF1250-C8 | 85.10 |
| .1250 (1/8) | | 3.175 mm | | **21.00 mm** | (5x) | 6 mm | 63 mm | FBD1250-C3 | 85.30 | FBD1250-C8 | 89.10 |
| .1250 (1/8) | | 3.175 mm | .840 | | (5x) | 3/16 | 2-1/2 | FBG1250-C3 | 82.20 | FBG1250-C8 | 85.80 |
| .1285 | #30 | 3.264 mm | .880 | | (5x) | 1/4 | 2-1/2 | FBG1285-C3 | 82.20 | FBG1285-C8 | 85.80 |
| .1360 | #29 | 3.454 mm | | **16.00 mm** | (3x) | 6 mm | 63 mm | FBF1360-C3 | 81.40 | FBF1360-C8 | 85.10 |
| .1360 | #29 | 3.454 mm | | **23.00 mm** | (5x) | 6 mm | 63 mm | FBD1360-C3 | 85.30 | FBD1360-C8 | 89.10 |
| .1360 | #29 | 3.454 mm | .920 | | (5x) | 1/4 | 3 | FBG1360-C3 | 82.20 | FBG1360-C8 | 85.80 |
| .1405 | #28 | 3.571 mm | .960 | | (5x) | 1/4 | 3 | FBG1405-C3 | 82.20 | FBG1405-C8 | 85.80 |
| .1406 (9/64) | | 3.571 mm | | **17.00 mm** | (3x) | 6 mm | 63 mm | FBF1406-C3 | 81.90 | FBF1406-C8 | 82.60 |
| .1406 (9/64) | | 3.571 mm | | **24.00 mm** | (5x) | 6 mm | 75 mm | FBD1406-C3 | 85.30 | FBD1406-C8 | 89.10 |
| .1470 | #26 | 3.733 mm | | **26.00 mm** | (5x) | 6 mm | 75 mm | FBD1470-C3 | 85.30 | FBD1470-C8 | 89.10 |
| .1562 (5/32) | | 3.968 mm | | **26.00 mm** | (5x) | 6 mm | 75 mm | FBD1562-C3 | 85.30 | FBD1562-C8 | 89.10 |
| .1574 | | 4.000 mm | | **28.00 mm** | (5x) | 6 mm | 75 mm | FBD1574-C3 | 85.30 | FBD1574-C8 | 89.10 |
| .1590 | #21 | 4.038 mm | | **19.00 mm** | (3x) | 6 mm | 75 mm | FBF1590-C3 | 81.40 | FBF1590-C8 | 85.10 |
| .1590 | #21 | 4.038 mm | | **28.00 mm** | (5x) | 6 mm | 75 mm | FBD1590-C3 | 85.30 | FBD1590-C8 | 89.10 |
| .1718 (11/64) | | 4.365 mm | | **30.00 mm** | (5x) | 6 mm | 75 mm | FBD1718-C3 | 85.30 | FBD1718-C8 | 89.10 |
| .1770 | #16 | 4.495 mm | | **30.00 mm** | (5x) | 6 mm | 75 mm | FBD1770-C3 | 85.30 | FBD1770-C8 | 89.10 |
| .1800 | #15 | 4.572 mm | | **30.00 mm** | (5x) | 6 mm | 75 mm | FBD1800-C3 | 85.30 | FBD1800-C8 | 89.10 |
| .1875 (3/16) | | 4.762 mm | | **32.00 mm** | (5x) | 6 mm | 75 mm | FBD1875-C3 | 85.30 | FBD1875-C8 | 89.10 |
| .1968 | | 5.000 mm | | **34.00 mm** | (5x) | 6 mm | 75 mm | FBD1968-C3 | 85.30 | FBD1968-C8 | 89.10 |
| .2009 | #7 | 5.105 mm | | **34.00 mm** | (5x) | 6 mm | 75 mm | FBD2009-C3 | 85.30 | FBD2009-C8 | 89.10 |
| .2031 (13/64) | | 5.159 mm | | **34.00 mm** | (5x) | 6 mm | 75 mm | FBD2031-C3 | 85.30 | FBD2031-C8 | 89.10 |
| .2129 | #3 | 5.410 mm | | **36.00 mm** | (5x) | 6 mm | 75 mm | FBD2129-C3 | 85.30 | FBD2129-C8 | 89.10 |
| .2187 (7/32) | | 5.556 mm | | **38.00 mm** | (5x) | 6 mm | 100 mm | FBD2187-C3 | 85.30 | FBD2187-C8 | 89.10 |
| .2343 (15/64) | | 5.953 mm | | **40.00 mm** | (5x) | 6 mm | 100 mm | FBD2343-C3 | 85.30 | FBD2343-C8 | 89.10 |
| .2362 | | 6.000 mm | | **40.00 mm** | (5x) | 6 mm | 100 mm | FBD2362-C3 | 85.30 | FBD2362-C8 | 89.10 |
| .2500 (1/4) | E | 6.350 mm | | **30.00 mm** | (3x) | 8 mm | 100 mm | FBF2500-C3 | 81.40 | FBF2500-C8 | 85.10 |
| .2500 (1/4) | E | 6.350 mm | | **42.00 mm** | (5x) | 8 mm | 100 mm | FBD2500-C3 | 85.30 | FBD2500-C8 | 89.10 |

# MINIATURE HIGH PERFORMANCE DRILLS

## Flat Bottom (cont.)

### SPEEDS & FEEDS (Miniature High Performance Drills – Flat Bottom)

**Important Note:** Values in table are for a fully enclosed tool that is 1x diameter into the workpiece. A starting hole is required on a flat surface. For drilling on inclined or rounded surfaces please refer to the complete speeds and feeds chart available online at www.harveytool.com. Values in table are also based on a material hardness of 29-37 Rc for Ferrous Materials and up to 28 Rc for Non-Ferrous Materials. For higher hardness materials, table values of IPR must be reduced. For Ferrous materials at 38-45 Rc reduce IPR to 80% of the chart value. Pecking cycles are recommended to avoid chip packing and breakage. Initial Peck must fully submerge the drill point into the material. Do not use a pecking cycle for half-hole drilling or any situation where the drill is not fully enclosed in the material during the drilling operation. For steels at 29-37 Rc, an initial peck should be 2-3x Diameter, and each subsequent peck should be 1-2x Diameter. For harder steels at 38-45 Rc, 1-2x Diameter is recommended for an initial peck, and each subsequent peck should be .5-1x Diameter. For Non-Ferrous Materials, an initial peck should be 3-5x Diameter, and each subsequent peck should be 2-3x Diameter.

| Coating | Material | SFM | Chip Load IPR (Inches Per Revolution) By Drill Diameter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 |
| AlTiN Hardness: 29-37 Rc (279-344 HBn) | **Carbon Steels** Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx | 240 | .00063 | .00130 | .00197 | .00260 | .00328 | .00391 | .00525 | .00785 | .01050 |
| | 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx | 150 | .00058 | .00119 | .00180 | .00238 | .00300 | .00357 | .00480 | .00718 | .00960 |
| | **Stainless Steels** 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe | 180 | .00063 | .00130 | .00197 | .00260 | .00328 | .00391 | .00525 | .00785 | .01050 |
| | 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502 | 150 | .00058 | .00119 | .00180 | .00238 | .00300 | .00357 | .00480 | .00718 | .00960 |
| | 414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7 | 125 | .00036 | .00074 | .00113 | .00149 | .00187 | .00223 | .00300 | .00449 | .00600 |
| | **Tool Steels** A, L, O, P, W series | 125 | .00058 | .00119 | .00180 | .00238 | .00300 | .00357 | .00480 | .00718 | .00960 |
| | D, H, M, T, S series | 90 | .00036 | .00074 | .00113 | .00149 | .00187 | .00223 | .00300 | .00449 | .00600 |
| | **Titanium Alloys** | 100 | .00036 | .00074 | .00113 | .00149 | .00187 | .00223 | .00300 | .00449 | .00600 |
| | **High Temp Alloys** Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy | 70 | .00036 | .00074 | .00113 | .00149 | .00187 | .00223 | .00300 | .00449 | .00600 |
| $TiB_2$ Hardness: ≤ 28 Rc (≤ 271 HBn) | **Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx) | 450 | .00072 | .00149 | .00226 | .00298 | .00374 | .00446 | .00600 | .00898 | .01200 |
| | Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 600 | | | | | | | | | |
| | Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 450 | .00065 | .00134 | .00203 | .00268 | .00337 | .00402 | .00540 | .00808 | .01080 |
| | Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 420 | | | | | | | | | |
| | Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 390 | | | | | | | | | |
| | Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 350 | | | | | | | | | |
| | Wrought - 5%-8% Si (4xxx) | 600 | | | | | | | | | |
| | Wrought - 8%-12% Si (4xxx) | 480 | | | | | | | | | |
| | **Magnesium Alloys** | 900 | .00072 | .00149 | .00226 | .00298 | .00374 | .00446 | .00600 | .00898 | .01200 |
| | **Zinc Alloys** | 480 | | | | | | | | | |
| | **Copper Alloys**: High Coppers - 90%+ (C1xxx) | 170 | .00058 | .00119 | .00180 | .00238 | .00300 | .00357 | .00480 | .00718 | .00960 |
| | Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800) | 375 | | | | | | | | | |
| | Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 170 | | | | | | | | | |
| | Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 375 | | | | | | | | | |
| | Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 375 | | | | | | | | | |
| | Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 170 | | | | | | | | | |
| | Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 400 | | | | | | | | | |
| | **Plastics:** Unfilled Plastics | 500 | .00072 | .00149 | .00226 | .00298 | .00374 | .00446 | .00600 | .00898 | .01200 |
| | Reinforced Plastics | 350 | .00058 | .00119 | .00180 | .00238 | .00300 | .00357 | .00480 | .00718 | .00960 |

# MINIATURE HIGH PERFORMANCE DRILLS

## Deep Hole – Coolant-Through – Metric




**Available in 12x & 20x Flute Lengths!**

- Drill up to 20x diameter in depth
- Coolant through design for improved chip removal and heat reduction at the drill tip
- 140° point angle
- Specialized flute shape for improved chip evacuation and maximum rigidity
- h6 shank tolerance for high precision tool holders
- AlTiN coated for improved lubricity and heat resistance
- CNC ground in Germany
- Solid carbide



Coolant Through Design for Improved Chip Removal

COOLANT-THROUGH

| DRILL DIAMETER | | | FLUTE LENGTH | | | SHANK DIAMETER | OVERALL LENGTH | AlTiN COATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | inch | metric | hole depth | | | | | | |
| | | $D_1$ +.000mm −.013mm | | $L_2$ +.25mm −.00mm | | $D_2$ (h6) | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| .0520 | #55 | 1.320 mm | .709 | **18.00 mm** | (12x) | 3 mm | 63 mm | ACD0520-C3 | 213.80 | ACD0520-C6 | 217.80 |
| .0550 | #54 | 1.397 mm | .748 | **19.00 mm** | (12x) | 3 mm | 63 mm | ACD0550-C3 | 213.80 | | |
| .0590 | | 1.500 mm | .827 | **21.00 mm** | (12x) | 3 mm | 63 mm | ACD0590-C3 | 213.80 | | |
| .0590 | | 1.500 mm | 1.280 | **32.50 mm** | (20x) | 3 mm | 75 mm | CXZ0590-C3 | 260.40 | | |
| .0595 | #53 | 1.511 mm | .827 | **21.00 mm** | (12x) | 3 mm | 63 mm | ACD0595-C3 | 213.80 | | |
| .0625 (1/16) | | 1.587 mm | .866 | **22.00 mm** | (12x) | 3 mm | 63 mm | ACD0625-C3 | 213.80 | ACD0625-C6 | 217.80 |
| .0625 (1/16) | | 1.587 mm | 1.358 | **34.50 mm** | (20x) | 3 mm | 75 mm | CXZ0625-C3 | 260.40 | CXZ0625-C6 | 264.50 |
| .0700 | #50 | 1.778 mm | .945 | **24.00 mm** | (12x) | 3 mm | 63 mm | ACD0700-C3 | 213.80 | | |
| .0781 (5/64) | | 1.984 mm | 1.063 | **27.00 mm** | (12x) | 3 mm | 63 mm | ACD0781-C3 | 213.80 | ACD0781-C6 | 217.80 |
| .0781 (5/64) | | 1.984 mm | 1.693 | **43.00 mm** | (20x) | 3 mm | 100 mm | CXZ0781-C3 | 260.40 | CXZ0781-C6 | 264.50 |
| .0787 | | 2.000 mm | 1.102 | **28.00 mm** | (12x) | 4 mm | 63 mm | ACD0787-C3 | 221.40 | | |
| .0787 | | 2.000 mm | 1.732 | **44.00 mm** | (20x) | 4 mm | 100 mm | CXZ0787-C3 | 288.90 | | |
| .0890 | #43 | 2.260 mm | 1.220 | **31.00 mm** | (12x) | 4 mm | 75 mm | ACD0890-C3 | 221.40 | | |
| .0937 (3/32) | | 2.381 mm | 1.299 | **33.00 mm** | (12x) | 4 mm | 75 mm | ACD0937-C3 | 221.40 | ACD0937-C6 | 225.70 |
| .0937 (3/32) | | 2.381 mm | 2.047 | **52.00 mm** | (20x) | 4 mm | 100 mm | CXZ0937-C3 | 288.90 | CXZ0937-C6 | 293.50 |
| .1015 | #38 | 2.578 mm | 1.378 | **35.00 mm** | (12x) | 4 mm | 75 mm | ACD1015-C3 | 221.40 | | |
| .1065 | #36 | 2.705 mm | 1.457 | **37.00 mm** | (12x) | 4 mm | 75 mm | ACD1065-C3 | 221.40 | | |
| .1093 (7/64) | | 2.778 mm | 1.496 | **38.00 mm** | (12x) | 4 mm | 75 mm | ACD1093-C3 | 221.40 | | |
| .1093 (7/64) | | 2.778 mm | 2.362 | **60.00 mm** | (20x) | 4 mm | 100 mm | CXZ1093-C3 | 288.90 | | |
| .1181 | | 3.000 mm | 1.654 | **42.00 mm** | (12x) | 4 mm | 100 mm | ACD1181-C3 | 221.40 | ACD1181-C6 | 226.10 |
| .1181 | | 3.000 mm | 2.559 | **65.00 mm** | (20x) | 4 mm | 100 mm | CXZ1181-C3 | 288.90 | | |

# MINIATURE HIGH PERFORMANCE DRILLS

## Deep Hole – Coolant-Through– Metric (cont.)

### SPEEDS & FEEDS (Miniature High Performance Drills – Deep Hole – Metric)

**Important Note:** Values in table are in inches and are based on 12x length drills and a material hardness of 29-37 Rc. For longer lengths and higher hardness materials, table values of IPR must be reduced (for 20x, reduce to 75%). For ferrous materials at 38-45 Rc, reduce IPR to 80%. For complete speeds and feeds charts, please see www.harveytool.com.

| Material (Hardness: 29-37 Rc) | SFM | Chip Load IPR (Inches Per Revolution) By Drill Diameter | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 |
| **Carbon Steels** Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx | 240 | .00110 | .00167 | .00220 | .00277 | .00330 | .00444 | .00664 | .00887 |
| 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx | 150 | .00101 | .00153 | .00201 | .00253 | .00302 | .00406 | .00607 | .00811 |
| **Stainless Steels** 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe | 180 | .00110 | .00167 | .00220 | .00277 | .00330 | .00444 | .00664 | .00887 |
| 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502 | 150 | .00101 | .00153 | .00201 | .00253 | .00302 | .00406 | .00607 | .00811 |
| 414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7 | 125 | .00063 | .00095 | .00126 | .00158 | .00189 | .00254 | .00379 | .00507 |
| **Tool Steels** A, L, O, P, W series | 125 | .00101 | .00153 | .00201 | .00253 | .00302 | .00406 | .00607 | .00811 |
| D, H, M, T, S series | 90 | .00063 | .00095 | .00126 | .00158 | .00189 | .00254 | .00379 | .00507 |
| **Titanium Alloys** | 100 | .00063 | .00095 | .00126 | .00158 | .00189 | .00254 | .00379 | .00507 |
| **High Temp Alloys** Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy | 70 | .00063 | .00095 | .00126 | .00158 | .00189 | .00254 | .00379 | .00507 |

### Deep Hole Drilling Guidelines

For best results, the following steps are recommended:

- For hole depths of 12x Diameter or greater, drill a pilot hole up to 1.5x D in depth using a drill with 3x LOF or shorter.
- Insert primary drill at low speed (~500 rpm) and start coolant flow.
- Increase speed and feed to recommended parameters.
- Under optimal conditions, it is possible to feed to full hole depth without pecking. If necessary, use 2-4 pecks to get to full hole depth.
- After reaching desired hole depth, reduce speed (~500 RPM) before retracting the drill.
- Cutting oil is recommended. As an alternative, it is possible to use emulsions with EP additives. Use a fine mesh prefilter (=5µm) on spindle through coolant to prevent a blockage of the coolant hole. A minimum coolant pressure of 600-800 PSI is recommended.

NEW SIZES!

# MINIATURE DRILLS




**Miniature Drills Down to .002″**

- For tools .020″ and smaller, there is an intermediate neck diameter as pictured above
- 130° drill point
- Carbide
- CNC ground in Germany

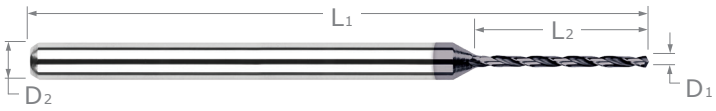
| DRILL DIAMETER | | | FLUTE LENGTH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| inch | wire | metric | | | | | | | | | |
| $D_1$ $^{+.0000″}_{-.0003″}$ * | | | $L_2$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| .0020 | | .050 mm | .014 | 1/8 | 1-1/2 | 810020** | 43.80 | | | | |
| .0020 | | .050 mm | .028 | 1/8 | 1-1/2 | 20020 | 43.80 | | | | |
| .0039 | #102 | .100 mm | .026 | 1/8 | 1-1/2 | 810039** | 31.00 | | | | |
| .0039 | #102 | .100 mm | .039 | 1/8 | 1-1/2 | 20039 | 31.00 | | | | |
| .0043 | #101 | | .056 | 1/8 | 1-1/2 | 20043 | 31.00 | | | | |
| .0047 | #100 | | .056 | 1/8 | 1-1/2 | 20047 | 31.00 | | | | |
| .0051 | #99 | .130 mm | .034 | 1/8 | 1-1/2 | 810051** | 30.00 | | | | |
| .0051 | #99 | .130 mm | .056 | 1/8 | 1-1/2 | 20051 | 30.30 | | | | |
| .0055 | #98 | | .056 | 1/8 | 1-1/2 | 20055 | 27.90 | | | | |
| .0059 | #97 | .150 mm | .040 | 1/8 | 1-1/2 | 810059** | 27.90 | | | | |
| .0059 | #97 | .150 mm | .066 | 1/8 | 1-1/2 | 20059 | 27.90 | | | | |
| .0063 | #96 | | .042 | 1/8 | 1-1/2 | 810063 | 27.90 | | | | |
| .0063 | #96 | | .066 | 1/8 | 1-1/2 | 20063 | 27.90 | | | | |
| .0067 | #95 | | .066 | 1/8 | 1-1/2 | 20067 | 27.90 | | | | |
| .0069 | | .175 mm | .066 | 1/8 | 1-1/2 | 20069 | 27.90 | | | | |
| .0071 | #94 | | .106 | 1/8 | 1-1/2 | 20071 | 25.40 | | | | |
| .0075 | #93 | | .106 | 1/8 | 1-1/2 | 20075 | 25.40 | | | | |
| .0079 | #92 | .200 mm | .054 | 1/8 | 1-1/2 | 810079** | 21.20 | 810079-C3** | 27.10 | | |
| .0079 | #92 | .200 mm | .160 | 1/8 | 1-1/2 | 20079 | 21.20 | 20079-C3 | 27.10 | 20079-C4 | 36.10 |
| .0083 | #91 | | .160 | 1/8 | 1-1/2 | 20083 | 21.20 | 20083-C3 | 27.10 | | |
| .0087 | #90 | | .126 | 1/8 | 1-1/2 | 20087 | 21.20 | 20087-C3 | 27.10 | | |
| .0089 | | .225 mm | .160 | 1/8 | 1-1/2 | 20089 | 21.20 | 20089-C3 | 27.10 | | |
| .0091 | #89 | | .160 | 1/8 | 1-1/2 | 20091 | 20.80 | 20091-C3 | 26.70 | | |
| .0095 | #88 | | .064 | 1/8 | 1-1/2 | 810095** | 20.80 | 810095-C3** | 26.70 | | |
| .0095 | #88 | | .160 | 1/8 | 1-1/2 | 20095 | 20.80 | 20095-C3 | 26.70 | | |
| .0098 | | .250 mm | .066 | 1/8 | 1-1/2 | 810098** | 20.80 | 810098-C3** | 26.70 | | |
| .0098 | | .250 mm | .160 | 1/8 | 1-1/2 | 20098 | 20.80 | 20098-C3 | 26.70 | 20098-C4 | 35.70 |
| .0100 | #87 | | .068 | 1/8 | 1-1/2 | 810100** | 20.80 | 810100-C3** | 26.70 | | |
| .0100 | #87 | | .160 | 1/8 | 1-1/2 | 20100 | 20.80 | 20100-C3 | 26.70 | 20100-C4 | 35.70 |
| .0105 | #86 | | .160 | 1/8 | 1-1/2 | 20105 | 20.80 | 20105-C3 | 26.70 | | |
| .0108 | | .275 mm | .160 | 1/8 | 1-1/2 | 20108 | 20.80 | 20108-C3 | 26.70 | | |
| .0110 | #85 | | .160 | 1/8 | 1-1/2 | 20110 | 20.80 | 20110-C3 | 26.70 | 20110-C4 | 35.70 |
| .0115 | #84 | | .180 | 1/8 | 1-1/2 | 20115 | 20.80 | 20115-C3 | 26.70 | | |
| .0118 | | .300 mm | .080 | 1/8 | 1-1/2 | 810118 | 20.80 | 810118-C3 | 26.70 | | |
| .0118 | | .300 mm | .180 | 1/8 | 1-1/2 | 20118 | 20.80 | 20118-C3 | 26.70 | 20118-C4 | 35.70 |

* Tolerance for all AlTiN coating is +.0002"/–.0003". ** Total overhang from shank transition is .250"

continued on next page

# MINIATURE DRILLS

(cont.)




continued from previous page

| DRILL DIAMETER inch | wire | metric | FLUTE LENGTH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0000″ −.0003″ * | | | $L_2$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| .0120 | #83 | | .080 | 1/8 | 1-1/2 | 810120** | 18.70 | 810120-C3** | 24.60 | | |
| .0120 | #83 | | .230 | 1/8 | 1-1/2 | 20120 | 18.70 | 20120-C3 | 24.60 | 20120-C4 | 33.60 |
| .0125 | #82 | | .230 | 1/8 | 1-1/2 | 20125 | 18.70 | 20125-C3 | 24.60 | | |
| .0130 | #81 | | .090 | 1/8 | 1-1/2 | 810130 | 18.70 | 810130-C3 | 24.60 | | |
| .0130 | #81 | | .230 | 1/8 | 1-1/2 | 20130 | 18.70 | 20130-C3 | 24.60 | 20130-C4 | 33.60 |
| .0135 | #80 | | .090 | 1/8 | 1-1/2 | 810135 | 18.70 | 810135-C3 | 24.60 | | |
| .0135 | #80 | | .270 | 1/8 | 1-1/2 | 20135 | 18.30 | 20135-C3 | 24.20 | 20135-C4 | 33.20 |
| .0138 | | .350 mm | .270 | 1/8 | 1-1/2 | 20138 | 18.30 | 20138-C3 | 24.20 | | |
| .0145 | #79 | | .100 | 1/8 | 1-1/2 | 810145** | 18.30 | 810145-C3** | 24.20 | 20157-C4 | 33.20 |
| .0160 | #78 | | .110 | 1/8 | 1-1/2 | 810160 | 18.30 | 810160-C3 | 24.20 | 810160-C4 | 33.20 |
| .0145 | #79 | | .270 | 1/8 | 1-1/2 | 20145 | 18.30 | 20145-C3 | 24.20 | 20145-C4 | 33.20 |
| .0157 | | .400 mm | .105 | 1/8 | 1-1/2 | 810157** | 18.30 | 810157-C3** | 24.20 | | |
| .0157 | | .400 mm | .270 | 1/8 | 1-1/2 | 20157 | 18.30 | 20157-C3 | 24.20 | | |
| .0160 | #78 | | .270 | 1/8 | 1-1/2 | 20160 | 18.30 | 20160-C3 | 24.20 | 20160-C4 | 33.20 |
| .0168 | | | .270 | 1/8 | 1-1/2 | 20168 | 18.30 | 20168-C3 | 24.20 | | |
| .0177 | | .450 mm | .270 | 1/8 | 1-1/2 | 20177 | 18.30 | 20177-C3 | 24.20 | | |
| .0180 | #77 | | .120 | 1/8 | 1-1/2 | 810180** | 16.90 | 810180-C3** | 22.80 | | |
| .0180 | #77 | | .270 | 1/8 | 1-1/2 | 20180 | 16.90 | 20180-C3 | 22.80 | 20180-C4 | 31.90 |
| .0197 | | .500 mm | .135 | 1/8 | 1-1/2 | 810197 | 17.50 | 810197-C3 | 23.50 | | |
| .0197 | | .500 mm | .275 | 1/8 | 1-1/2 | 20197 | 16.90 | 20197-C3 | 22.80 | 20197-C4 | 31.90 |
| .0200 | #76 | | .135 | 1/8 | 1-1/2 | 810200** | 16.90 | 810200-C3** | 22.80 | | |
| .0200 | #76 | | .275 | 1/8 | 1-1/2 | 20200 | 16.90 | 20200-C3 | 22.80 | 20200-C4 | 31.90 |
| .0210 | #75 | | .140 | 1/8 | 1-1/2 | 810205 | 16.90 | 810205-C3 | 22.80 | 810205-C4 | 31.90 |
| .0210 | #75 | | .275 | 1/8 | 1-1/2 | 20205 | 16.90 | 20205-C3 | 22.80 | 20205-C4 | 31.90 |
| .0225 | #74 | | .150 | 1/8 | 1-1/2 | 810210 | 16.90 | 810210-C3 | 22.80 | | |
| .0225 | #74 | | .275 | 1/8 | 1-1/2 | 20210 | 16.90 | 20210-C3 | 22.80 | | |
| .0236 | | .600 mm | .275 | 1/8 | 1-1/2 | 20214 | 16.90 | 20214-C3 | 22.80 | | |
| .0240 | #73 | | .275 | 1/8 | 1-1/2 | 20215 | 16.90 | 20215-C3 | 22.80 | | |
| .0250 | #72 | | .170 | 1/8 | 1-1/2 | 810220 | 16.90 | 810220-C3 | 22.80 | | |
| .0250 | #72 | | .275 | 1/8 | 1-1/2 | 20220 | 16.90 | 20220-C3 | 22.80 | 20220-C4 | 31.90 |
| .0260 | #71 | | .275 | 1/8 | 1-1/2 | 20225 | 16.90 | 20225-C3 | 22.80 | | |
| .0270 | | | .335 | 1/8 | 1-1/2 | 20227 | 16.90 | 20227-C3 | 22.80 | | |
| .0276 | | .700 mm | .335 | 1/8 | 1-1/2 | 20229 | 16.90 | 20229-C3 | 22.80 | | |
| .0280 | #70 | | .190 | 1/8 | 1-1/2 | 810230 | 16.90 | 810230-C3 | 22.80 | | |
| NEW .0280 | #70 | | .335 | 1/8 | 1-1/2 | 20230 | 16.90 | 20230-C3 | 22.80 | 20230-C4 | 31.90 |
| .0292 | #69 | | .200 | 1/8 | 1-1/2 | 810235 | 17.50 | 810235-C3 | 23.50 | | |
| .0292 | #69 | | .335 | 1/8 | 1-1/2 | 20235 | 16.90 | 20235-C3 | 22.80 | 20235-C4 | 31.90 |
| .0302 | | | .395 | 1/8 | 1-1/2 | 20240 | 16.90 | 20240-C3 | 22.80 | | |
| .0310 | #68 | | .210 | 1/8 | 1-1/2 | 810245 | 15.90 | 810245-C3 | 21.80 | | |
| .0310 | #68 | | .395 | 1/8 | 1-1/2 | 20245 | 15.90 | 20245-C3 | 21.80 | 20245-C4 | 30.80 |

* Tolerance for all AlTiN coating is +.0002"/−.0003". ** Total overhang from shank transition is .250"

continued on next page

NEW SIZES!

# MINIATURE DRILLS

(cont.)

continued from previous page

| DRILL DIAMETER inch | wire | metric | FLUTE LENGTH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0000" −.0003" * | | | $L_2$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ | |
| .0312 (1/32) | | | .210 | 1/8 | 1-1/2 | 810250 | 15.90 | 810250-C3 | 21.80 | | | |
| .0312 (1/32) | | | .395 | 1/8 | 1-1/2 | 20250 | 15.90 | 20250-C3 | 21.80 | 20250-C4 | 30.80 | |
| .0315 | | .800 mm | .395 | 1/8 | 1-1/2 | 20253 | 15.90 | 20253-C3 | 21.80 | | | |
| .0320 | #67 | | .395 | 1/8 | 1-1/2 | 20255 | 15.90 | 20255-C3 | 21.80 | 20255-C4 | 30.80 | |
| .0330 | #66 | | .395 | 1/8 | 1-1/2 | 20260 | 15.90 | 20260-C3 | 21.80 | | | |
| .0350 | #65 | | .240 | 1/8 | 1-1/2 | 810265 | 16.50 | 810265-C3 | 22.40 | | | |
| .0350 | #65 | | .395 | 1/8 | 1-1/2 | 20265 | 15.90 | 20265-C3 | 21.80 | 20265-C4 | 30.80 | |
| .0354 | | .900 mm | .395 | 1/8 | 1-1/2 | 20267 | 15.90 | 20267-C3 | 21.80 | | | |
| .0360 | #64 | | .395 | 1/8 | 1-1/2 | 20270 | 15.90 | 20270-C3 | 21.80 | | | |
| .0370 | #63 | | .395 | 1/8 | 1-1/2 | 20275 | 15.90 | 20275-C3 | 21.80 | | | |
| .0380 | #62 | | .395 | 1/8 | 1-1/2 | 20280 | 15.90 | 20280-C3 | 21.80 | | | |
| .0390 | #61 | | .395 | 1/8 | 1-1/2 | 20285 | 15.90 | 20285-C3 | 21.80 | | | |
| .0394 | | 1.000 mm | .395 | 1/8 | 1-1/2 | 20290 | 15.90 | 20290-C3 | 21.80 | 20290-C4 | 30.80 | |
| .0400 | #60 | | .270 | 1/8 | 1-1/2 | 810295 | 16.50 | 810295-C3 | 22.40 | | | |
| .0400 | #60 | | .395 | 1/8 | 1-1/2 | 20295 | 15.90 | 20295-C3 | 21.80 | 20295-C4 | 30.80 | NEW |
| .0410 | #59 | | .280 | 1/8 | 1-1/2 | 810300 | 15.90 | 810300-C3 | 21.80 | | | |
| .0410 | #59 | | .395 | 1/8 | 1-1/2 | 20300 | 15.90 | 20300-C3 | 21.80 | | | |
| .0420 | #58 | | .395 | 1/8 | 1-1/2 | 20305 | 15.90 | 20305-C3 | 21.80 | | | |
| .0430 | #57 | | .395 | 1/8 | 1-1/2 | 20310 | 15.90 | 20310-C3 | 21.80 | | | |
| .0433 | | 1.100 mm | .395 | 1/8 | 1-1/2 | 20311 | 15.90 | 20311-C3 | 21.80 | | | |
| .0440 | | | .210 | 1/8 | 1-1/2 | 703915 | 15.90 | 703915-C3 | 21.80 | | | |
| .0440 | | | .395 | 1/8 | 1-1/2 | 20315 | 15.90 | 20315-C3 | 21.80 | | | |
| .0465 | #56 | | .220 | 1/8 | 1-1/2 | 703920 | 15.90 | 703920-C3 | 21.80 | | | |
| .0465 | #56 | | .395 | 1/8 | 1-1/2 | 20320 | 15.90 | 20320-C3 | 21.80 | | | |
| .0469 (3/64) | | | .325 | 1/8 | 1-1/2 | 810325 | 16.50 | 810325-C3 | 22.40 | | | |
| .0469 (3/64) | | | .395 | 1/8 | 1-1/2 | 20325 | 15.90 | 20325-C3 | 21.80 | 20325-C4 | 30.80 | NEW |
| .0472 | | 1.200 mm | .395 | 1/8 | 1-1/2 | 20327 | 15.90 | 20327-C3 | 21.80 | | | |
| .0492 | | 1.250 mm | .395 | 1/8 | 1-1/2 | 20330 | 15.90 | 20330-C3 | 21.80 | | | |
| .0500 | | 1.270 mm | .395 | 1/8 | 1-1/2 | 20332 | 15.90 | 20332-C3 | 21.80 | | | |
| .0512 | | 1.300 mm | .413 | 1/8 | 1-1/2 | 20335 | 15.90 | 20335-C3 | 21.80 | | | |
| .0520 | #55 | | .413 | 1/8 | 1-1/2 | 20340 | 15.90 | 20340-C3 | 21.80 | 20340-C4 | 30.80 | NEW |
| .0520 | #55 | | .500 | 1/8 | 1-1/2 | 815340 | 15.90 | 815340-C3 | 21.80 | | | |
| .0531 | | 1.350 mm | .413 | 1/8 | 1-1/2 | 20345 | 15.90 | 20345-C3 | 21.80 | | | |
| .0550 | #54 | | .413 | 1/8 | 1-1/2 | 20350 | 15.90 | 20350-C3 | 21.80 | 20350-C4 | 30.80 | |
| .0550 | #54 | | .525 | 1/8 | 1-1/2 | 815350 | 15.90 | 815350-C3 | 21.80 | | | |
| .0571 | | 1.450 mm | .375 | 1/8 | 1-1/2 | 810302 | 16.50 | 810302-C3 | 22.40 | | | |
| .0571 | | 1.450 mm | .413 | 1/8 | 1-1/2 | 20355 | 15.90 | 20355-C3 | 21.80 | | | |
| .0591 | | 1.500 mm | .413 | 1/8 | 1-1/2 | 20360 | 15.90 | 20360-C3 | 21.80 | | | |
| .0595 | #53 | | .413 | 1/8 | 1-1/2 | 20365 | 15.90 | 20365-C3 | 21.80 | | | |
| .0595 | #53 | | .575 | 1/8 | 2 | 815365 | 16.70 | 815365-C3 | 22.60 | | | |
| .0610 | | 1.550 mm | .413 | 1/8 | 1-1/2 | 20370 | 15.90 | 20370-C3 | 21.80 | | | |
| .0625 (1/16) | | | .413 | 1/8 | 1-1/2 | 20375 | 15.90 | 20375-C3 | 21.80 | 20375-C4 | 30.80 | |
| .0625 (1/16) | | | .600 | 1/8 | 2 | 815375 | 16.70 | 815375-C3 | 22.60 | | | |

* Tolerance for all AlTiN coating is +.0002"/−.0003". ** Total overhang from shank transition is .250"

continued on next page

# MINIATURE DRILLS

(cont.)

continued from previous page

| | DRILL DIAMETER inch | wire | metric | FLUTE LENGTH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0000″ −.0005″ *** | | | $L_2$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| | .0630 | | 1.600 mm | .413 | 1/8 | 1-1/2 | 20376 | 15.90 | 20376-C3 | 21.80 | | |
| | .0635 | #52 | | .413 | 1/8 | 1-1/2 | 20377 | 15.90 | 20377-C3 | 21.80 | | |
| | .0635 | #52 | | .600 | 1/8 | 2 | 815377 | 16.70 | 815377-C3 | 22.60 | | |
| | .0670 | #51 | | .413 | 1/8 | 1-1/2 | 20384 | 15.90 | 20384-C3 | 21.80 | | |
| | .0670 | #51 | | .650 | 1/8 | 2 | 815384 | 16.70 | 815384-C3 | 22.60 | | |
| | .0700 | #50 | | .413 | 1/8 | 1-1/2 | 20390 | 15.90 | 20390-C3 | 21.80 | 20390-C4 | 30.80 |
| | .0700 | #50 | | .700 | 1/8 | 2 | 815390 | 16.70 | 815390-C3 | 22.60 | | |
| | .0730 | #49 | | .413 | 1/8 | 1-1/2 | 20396 | 15.90 | 20396-C3 | 21.80 | | |
| | .0760 | #48 | | .413 | 1/8 | 1-1/2 | 20402 | 15.90 | 20402-C3 | 21.80 | | |
| | .0760 | #48 | | .750 | 1/8 | 2 | 815402 | 16.70 | 815402-C3 | 22.60 | | |
| | .0781 (5/64) | | | .413 | 1/8 | 1-1/2 | 20407 | 15.90 | 20407-C3 | 21.80 | | |
| | .0781 (5/64) | | | .750 | 1/8 | 2 | 815407 | 16.70 | 815407-C3 | 22.60 | | |
| | .0785 | #47 | | .413 | 1/8 | 1-1/2 | 20408 | 15.90 | 20408-C3 | 21.80 | | |
| | .0787 | | 2.000 mm | .413 | 1/8 | 1-1/2 | 20409 | 15.90 | 20409-C3 | 21.80 | | |
| NEW | .0810 | #46 | | .413 | 1/8 | 1-1/2 | 20414 | 15.90 | 20414-C3 | 21.80 | 20414-C4 | 30.80 |
| | .0810 | #46 | | .800 | 1/8 | 2 | 815414 | 16.70 | 815414-C3 | 22.60 | | |
| | .0820 | #45 | | .413 | 1/8 | 1-1/2 | 20416 | 15.90 | 20416-C3 | 21.80 | | |
| | .0860 | #44 | | .413 | 1/8 | 1-1/2 | 20424 | 15.90 | 20424-C3 | 21.80 | | |
| | .0890 | #43 | | .413 | 1/8 | 1-1/2 | 20430 | 15.90 | 20430-C3 | 21.80 | | |
| | .0890 | #43 | | .850 | 1/8 | 2 | 815430 | 16.70 | 815430-C3 | 22.60 | | |
| | .0935 | #42 | | .413 | 1/8 | 1-1/2 | 20439 | 15.90 | 20439-C3 | 21.80 | | |
| | .0938 (3/32) | | | .413 | 1/8 | 1-1/2 | 20440 | 15.90 | 20440-C3 | 21.80 | 20440-C4 | 30.80 |
| | .0938 (3/32) | | | .900 | 1/8 | 2 | 815440 | 16.70 | 815440-C3 | 22.60 | | |
| | .0960 | #41 | | .413 | 1/8 | 1-1/2 | 20445 | 15.90 | 20445-C3 | 21.80 | | |
| | .0980 | #40 | | .413 | 1/8 | 1-1/2 | 20449 | 15.90 | 20449-C3 | 21.80 | | |
| | .0984 | | 2.500 mm | .413 | 1/8 | 1-1/2 | 20450 | 15.90 | 20450-C3 | 21.80 | | |
| | .0995 | #39 | | .413 | 1/8 | 1-1/2 | 20453 | 15.90 | 20453-C3 | 21.80 | | |
| | .1015 | #38 | | .413 | 1/8 | 1-1/2 | 20457 | 15.90 | 20457-C3 | 21.80 | | |
| | .1040 | #37 | | .413 | 1/8 | 1-1/2 | 20462 | 15.90 | 20462-C3 | 21.80 | | |
| | .1065 | #36 | | .413 | 1/8 | 1-1/2 | 20467 | 15.90 | 20467-C3 | 21.80 | | |
| | .1094 (7/64) | | | .413 | 1/8 | 1-1/2 | 20473 | 15.90 | 20473-C3 | 21.80 | | |
| | .1094 (7/64) | | | 1.100 | 1/8 | 2-1/2 | 815473 | 16.70 | 815473-C3 | 22.60 | | |
| | .1100 | #35 | | .413 | 1/8 | 1-1/2 | 20475 | 15.90 | 20475-C3 | 21.80 | | |
| | .1110 | #34 | | .413 | 1/8 | 1-1/2 | 20477 | 15.90 | 20477-C3 | 21.80 | | |
| | .1130 | #33 | | .413 | 1/8 | 1-1/2 | 20481 | 15.90 | 20481-C3 | 21.80 | | |
| | .1160 | #32 | | .413 | 1/8 | 1-1/2 | 20487 | 15.90 | 20487-C3 | 21.80 | | |
| | .1181 | | 3.000 mm | .413 | 1/8 | 1-1/2 | 20491 | 15.90 | 20491-C3 | 21.80 | | |
| | .1200 | #31 | | .413 | 1/8 | 1-1/2 | 20493 | 15.90 | 20493-C3 | 21.80 | | |
| | .1200 | #31 | | 1.200 | 1/8 | 2-1/2 | 815493 | 15.90 | 815493-C3 | 21.80 | | |
| NEW | .1250 (1/8) | | | .413 | 1/8 | 1-1/2 | 20498 | 15.90 | 20498-C3 | 21.80 | 20498-C4 | 30.80 |
| | .1250 (1/8) | | | 1.200 | 1/8 | 2-1/2 | 815498 | 16.70 | 815498-C3 | 22.60 | | |
| | .1875 (3/16) | | | .480 | 3/16 | 2 | 20623 | 30.20 | 20623-C3 | 36.40 | | |
| | .2500 (1/4) | | | .480 | 1/4 | 2 | 20748 | 40.60 | 20748-C3 | 48.10 | | |

* Tolerance for all AlTiN coating is +.0002"/−.0003". ** Total overhang from shank transition is .250". *** Tolerance for AlTiN coating is +.0002"/−.0005".

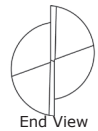
# MINIATURE DRILLS

## Spotting Drills




- Thinned web to reduce walking
- Self-centering point geometry
- 2 flutes
- Solid carbide
- CNC ground in the USA

▲ **Stocked in 10 Included Angles**




**TYPE I**

On center design reduces walking and minimizes flat at bottom of spot. Ideally suited for starting smaller diameter drills and shallow spots.




**TYPE II**

Ahead of center design improves tip strength. Ideally suited for larger diameter drills and tougher materials.

| INCLUDED ANGLE | DRILL DIAMETER | FLUTE LENGTH | WEB THICKNESS | TYPE | SHANK DIA. | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ | $L_2$ | | | $D_2$ | $L_1$ | | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| 60° | .020 | .060 (3x) | .0020 | I | 1/8 | 1-1/2 | | 932720 | 34.60 | 932720-C3 | 40.50 | | |
| | .030 | .090 (3x) | .0030 | I | 1/8 | 1-1/2 | | 932730 | 33.80 | 932730-C3 | 39.80 | | |
| | .031 (1/32) | .093 (3x) | .0030 | I | 1/8 | 1-1/2 | | 932731 | 33.80 | 932731-C3 | 39.80 | | |
| | .045 | .135 (3x) | .0030 | I | 1/8 | 1-1/2 | | 932745 | 29.30 | 932745-C3 | 35.20 | | |
| | .060 | .180 (3x) | .0050 | I | 1/8 | 1-1/2 | | 932760 | 33.80 | 932760-C3 | 39.80 | | |
| | .062 (1/16) | .186 (3x) | .0050 | I | 1/8 | 1-1/2 | | 932762 | 33.80 | 932762-C3 | 39.80 | | |
| | .090 | .270 (3x) | .0050 | I | 1/8 | 1-1/2 | | 932790 | 33.80 | 932790-C3 | 39.80 | | |
| | .093 (3/32) | .279 (3x) | .0060 | I | 1/8 | 1-1/2 | | 932793 | 33.80 | 932793-C3 | 39.80 | | |
| | .125 (1/8) | .375 (3x) | .0100 | I | 1/8 | 1-1/2 | | 932808 | 33.80 | 932808-C3 | 39.80 | | |
| | .125 (1/8) | .375 (3x) | .0100 | II | 1/8 | 1-1/2 | | 932811 | 33.80 | 932811-C3 | 39.80 | | |
| | .187 (3/16) | .312 (1.5x) | .0130 | II | 3/16 | 2 | | 715612 | 30.30 | 715612-C3 | 36.50 | | |
| | .187 (3/16) | .625 (3x) | .0130 | II | 3/16 | 2 | | 932812 | 30.30 | 932812-C3 | 36.70 | | |
| | .250 (1/4) | .375 (1.5x) | .0180 | II | 1/4 | 2-1/2 | | 715616 | 36.60 | 715616-C3 | 44.70 | | |
| | .250 (1/4) | .750 (3x) | .0180 | II | 1/4 | 2-1/2 | | 932816 | 36.60 | 932816-C3 | 45.30 | | |
| | .375 (3/8) | 1.000 (3x) | .0270 | II | 3/8 | 2-1/2 | | 932824 | 65.00 | 932824-C3 | 76.40 | | |
| 82° | .010 | .030 (3x) | .0015 | I | 1/8 | 1-1/2 | | 983110 | 41.60 | 983110-C3 | 47.50 | | |
| | .020 | .060 (3x) | .0020 | I | 1/8 | 1-1/2 | | 983120 | 35.70 | 983120-C3 | 41.60 | | |
| | .030 | .090 (3x) | .0030 | I | 1/8 | 1-1/2 | | 983130 | 32.70 | 983130-C3 | 38.60 | | |
| | .045 | .135 (3x) | .0030 | I | 1/8 | 1-1/2 | | 983145 | 29.30 | 983145-C3 | 35.20 | | |
| | .060 | .180 (3x) | .0050 | I | 1/8 | 1-1/2 | | 983160 | 29.00 | 983160-C3 | 34.90 | | |
| | .090 | .270 (3x) | .0050 | I | 1/8 | 1-1/2 | | 983190 | 27.70 | 983190-C3 | 33.60 | | |
| | .125 (1/8) | .375 (3x) | .0100 | I | 1/8 | 1-1/2 | | 983208 | 26.20 | 983208-C3 | 32.10 | | |
| | .125 (1/8) | .375 (3x) | .0100 | II | 1/8 | 1-1/2 | | 965208 | 26.20 | 965208-C3 | 32.10 | | |
| | .187 (3/16) | .625 (3x) | .0130 | II | 3/16 | 2 | | 965212 | 30.30 | 965212-C3 | 36.70 | | |
| | .250 (1/4) | .750 (3x) | .0180 | II | 1/4 | 2-1/2 | | 965216 | 38.20 | 965216-C3 | 46.90 | | |
| 90° | .008 | .024 (3x) | .0015 | I | 1/8 | 1-1/2 | | 11408 | 49.20 | 11408-C3 | 55.10 | | |
| | .010 | .030 (3x) | .0015 | I | 1/8 | 1-1/2 | | 11410 | 39.20 | 11410-C3 | 45.20 | | |
| | .010 | .030 (3x) | .0015 | I | 1/8 | 3 | LONG! | 987910 | 48.40 | 987910-C3 | 54.30 | | |
| | .012 | .036 (3x) | .0015 | I | 1/8 | 1-1/2 | | 11412 | 49.20 | 11412-C3 | 55.10 | | |
| | .015 (1/64) | .045 (3x) | .0015 | I | 1/8 | 1-1/2 | | 11415 | 39.20 | 11415-C3 | 45.20 | 11415-C8 | 46.90 |
| | .020 | .030 (1.5x) | .0020 | I | 1/8 | 1-1/2 | | 816020 | 33.80 | 816020-C3 | 39.80 | | |
| | .020 | .060 (3x) | .0020 | I | 1/8 | 1-1/2 | | 11420 | 33.80 | 11420-C3 | 39.80 | 11420-C8 | 41.50 |
| | .020 | .060 (3x) | .0020 | I | 1/8 | 3 | LONG! | 987920 | 41.60 | 987920-C3 | 47.50 | | |
| | .025 | .075 (3x) | .0020 | I | 1/8 | 1-1/2 | | 11425 | 33.80 | 11425-C3 | 39.80 | | |
| | .030 | .045 (1.5x) | .0030 | I | 1/8 | 1-1/2 | | 816030 | 31.20 | 816030-C3 | 37.90 | | |
| | .030 | .090 (3x) | .0030 | I | 1/8 | 1-1/2 | | 11430 | 31.20 | 11430-C3 | 37.20 | 11430-C8 | 38.90 |
| | .030 | .090 (3x) | .0030 | I | 1/8 | 3 | LONG! | 987930 | 40.70 | 987930-C3 | 46.60 | | |
| | .031 (1/32) | .093 (3x) | .0030 | I | 1/8 | 1-1/2 | | 11431 | 31.20 | 11431-C3 | 37.20 | | |
| | .035 | .105 (3x) | .0030 | I | 1/8 | 1-1/2 | | 11435 | 31.20 | 11435-C3 | 37.20 | | |
| | .039 (1 mm) | .117 (3x) | .0030 | I | 1/8 | 1-1/2 | | 11439 | 31.20 | 11439-C3 | 37.20 | | |
| | .040 | .120 (3x) | .0030 | I | 1/8 | 1-1/2 | | 11440 | 28.60 | 11440-C3 | 34.60 | 11440-C8 | 36.30 |
| | .045 | .068 (1.5x) | .0030 | I | 1/8 | 1-1/2 | | 816045 | 28.60 | 816045-C3 | 34.60 | | |
| | .045 | .135 (3x) | .0030 | I | 1/8 | 1-1/2 | | 11445 | 28.60 | 11445-C3 | 34.60 | 11445-C8 | 36.30 |

continued on next page

# MINIATURE DRILLS

## Spotting Drills (cont.)

continued from previous page

| INCLUDED ANGLE | DRILL DIAMETER | FLUTE LENGTH | WEB THICKNESS | TYPE | SHANK DIA. | OVERALL LENGTH | | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ | $L_2$ | | | $D_2$ | $L_1$ | | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| | .045 | .135 (3x) | .0030 | I | 1/8 | 3 | LONG! | 987945 | 36.60 | 987945-C3 | 42.60 | | |
| | .047 (3/64) | .141 (3x) | .0040 | I | 1/8 | 1-1/2 | | 11447 | 28.60 | 11447-C3 | 34.60 | | |
| | .050 | .150 (3x) | .0040 | I | 1/8 | 1-1/2 | | 11450 | 28.60 | 11450-C3 | 34.60 | | |
| | .055 | .165 (3x) | .0040 | I | 1/8 | 1-1/2 | | 11455 | 28.60 | 11455-C3 | 34.60 | | |
| | .060 | .090 (1.5x) | .0050 | I | 1/8 | 1-1/2 | | 816060 | 28.20 | 816060-C3 | 34.20 | | |
| | .060 | .180 (3x) | .0050 | I | 1/8 | 1-1/2 | | 11460 | 28.20 | 11460-C3 | 34.20 | 11460-C8 | 35.90 |
| | .060 | .180 (3x) | .0050 | I | 1/8 | 3 | LONG! | 987960 | 36.20 | 987960-C3 | 42.10 | | |
| | .062 (1/16) | .093 (1.5x) | .0050 | I | 1/8 | 1-1/2 | | 816062 | 28.20 | 816062-C3 | 34.20 | | |
| | .062 (1/16) | .186 (3x) | .0050 | I | 1/8 | 1-1/2 | | 11462 | 28.20 | 11462-C3 | 34.20 | 11462-C8 | 35.90 |
| | .070 | .210 (3x) | .0050 | I | 1/8 | 1-1/2 | | 11470 | 28.20 | 11470-C3 | 34.20 | | |
| | .075 | .225 (3x) | .0050 | I | 1/8 | 1-1/2 | | 11475 | 28.20 | 11475-C3 | 34.20 | | |
| | .078 (5/64) | .117 (1.5x) | .0050 | I | 1/8 | 1-1/2 | | 816078 | 28.20 | 816078-C3 | 34.20 | | |
| | .078 (5/64) | .234 (3x) | .0050 | I | 1/8 | 1-1/2 | | 11478 | 28.20 | 11478-C3 | 34.20 | 11478-C8 | 35.90 |
| | .080 | .240 (3x) | .0050 | I | 1/8 | 1-1/2 | | 11480 | 28.20 | 11480-C3 | 34.20 | | |
| | .090 | .135 (1.5x) | .0050 | I | 1/8 | 1-1/2 | | 816090 | 26.50 | 816090-C3 | 32.40 | | |
| | .090 | .270 (3x) | .0050 | I | 1/8 | 1-1/2 | | 11490 | 26.50 | 11490-C3 | 32.40 | 11490-C8 | 34.20 |
| | .090 | .270 (3x) | .0050 | I | 1/8 | 3 | LONG! | 987990 | 34.90 | 987990-C3 | 40.80 | | |
| | .093 (3/32) | .140 (1.5x) | .0060 | I | 1/8 | 1-1/2 | | 816093 | 26.50 | 816093-C3 | 32.40 | | |
| | .093 (3/32) | .279 (3x) | .0060 | I | 1/8 | 1-1/2 | | 11493 | 26.50 | 11493-C3 | 32.40 | 11493-C8 | 34.20 |
| | .100 | .300 (3x) | .0060 | I | 1/8 | 1-1/2 | | 11500 | 26.50 | 11500-C3 | 32.40 | | |
| | .109 (7/64) | .327 (3x) | .0080 | I | 1/8 | 1-1/2 | | 11509 | 26.50 | 11509-C3 | 32.40 | | |
| | .118 (3 mm) | .354 (3x) | .0080 | I | 1/8 | 1-1/2 | | 1153M | 26.50 | 1153M-C3 | 32.40 | | |
| 90° | .125 (1/8) | .188 (1.5x) | .0100 | I | 1/8 | 1-1/2 | | 816108 | 24.80 | 816108-C3 | 30.70 | | |
| | .125 (1/8) | .375 (3x) | .0100 | I | 1/8 | 1-1/2 | | 11525 | 24.80 | 11525-C3 | 30.70 | 11525-C8 | 32.50 |
| | .125 (1/8) | .375 (3x) | .0100 | I | 1/8 | 3 | LONG! | 988008 | 33.80 | 988008-C3 | 39.80 | | |
| | .125 (1/8) | .188 (1.5x) | .0100 | II | 1/8 | 1-1/2 | | 787708 | 24.80 | 787708-C3 | 30.70 | | |
| | .125 (1/8) | .375 (3x) | .0100 | II | 1/8 | 1-1/2 | | 37508 | 24.80 | 37508-C3 | 30.70 | | |
| | .125 (1/8) | .375 (3x) | .0100 | II | 1/8 | 4 | LONG! | 55808 | 36.00 | 55808-C3 | 42.40 | | |
| | .140 (9/64) | .375 (2.5x) | .0100 | II | 3/16 | 2 | | 37509 | 35.50 | 37509-C3 | 42.00 | | |
| | .156 (5/32) | .187 (1.5x) | .0110 | II | 3/16 | 2 | | 787710 | 29.50 | 787710-C3 | 35.70 | | |
| | .156 (5/32) | .375 (2.5x) | .0110 | II | 3/16 | 2 | | 37510 | 29.50 | 37510-C3 | 35.90 | | |
| | .187 (3/16) | .625 (3.5x) | .0130 | I | 3/16 | 2 | | 803912 | 28.60 | 803912-C3 | 35.00 | | |
| | .187 (3/16) | .312 (1.5x) | .0130 | II | 3/16 | 2 | | 787712 | 28.60 | 787712-C3 | 35.00 | | |
| | .187 (3/16) | .625 (3.5x) | .0130 | II | 3/16 | 2 | | 37512 | 28.60 | 37512-C3 | 35.00 | 37512-C8 | 37.30 |
| | .187 (3/16) | .625 (3.5x) | .0130 | II | 3/16 | 4 | LONG! | 55812 | 44.20 | 55812-C3 | 51.40 | | |
| | .218 (7/32) | .750 (3.5x) | .0150 | II | 1/4 | 2-1/2 | | 37514 | 45.50 | 37514-C3 | 54.10 | | |
| | .236 (6 mm) | .750 (3x) | .0160 | II | 1/4 | 2-1/2 | | 37515 | 45.50 | 37515-C3 | 54.10 | | |
| | .250 (1/4) | .750 (3x) | .0180 | I | 1/4 | 2-1/2 | | 803916 | 35.70 | 803916-C3 | 44.30 | | |
| | .250 (1/4) | .375 (1.5x) | .0180 | II | 1/4 | 2-1/2 | | 787716 | 35.70 | 787716-C3 | 44.30 | | |
| | .250 (1/4) | .750 (3x) | .0180 | II | 1/4 | 2-1/2 | | 37516 | 36.00 | 37516-C3 | 44.70 | 37516-C8 | 47.10 |
| | .250 (1/4) | .750 (3x) | .0180 | II | 1/4 | 6 | LONG! | 55816 | 59.90 | 55816-C3 | 71.40 | | |
| | .312 (5/16) | .750 (2.5x) | .0220 | II | 5/16 | 2-1/2 | | 37520 | 61.30 | 37520-C3 | 71.50 | | |
| | .375 (3/8) | .500 (1.5x) | .0270 | II | 3/8 | 2-1/2 | | 787724 | 65.00 | 787724-C3 | 76.40 | | |
| | .375 (3/8) | 1.000 (2.5x) | .0270 | II | 3/8 | 2-1/2 | | 37524 | 65.00 | 37524-C3 | 76.40 | | |
| | .500 (1/2) | 1.000 (2x) | .0350 | II | 1/2 | 3 | | 37532 | 112.40 | 37532-C3 | 129.40 | | |
| | .030 | .090 (3x) | .0030 | I | 1/8 | 1-1/2 | | 975830 | 33.60 | 975830-C3 | 39.50 | | |
| | .060 | .180 (3x) | .0050 | I | 1/8 | 1-1/2 | | 975860 | 29.00 | 975860-C3 | 34.90 | | |
| | .090 | .270 (3x) | .0050 | I | 1/8 | 1-1/2 | | 975890 | 29.30 | 975890-C3 | 35.20 | | |
| 100° | .125 (1/8) | .375 (3x) | .0100 | I | 1/8 | 1-1/2 | | 975908 | 26.20 | 975908-C3 | 32.10 | | |
| | .125 (1/8) | .375 (3x) | .0100 | II | 1/8 | 1-1/2 | | 955908 | 26.20 | 955908-C3 | 32.10 | | |
| | .187 (3/16) | .625 (3x) | .0130 | II | 3/16 | 2 | | 955912 | 30.30 | 955912-C3 | 36.70 | | |
| | .250 (1/4) | .375 (1.5x) | .0180 | II | 1/4 | 2-1/2 | | 703516 | 37.80 | 703516-C3 | 45.90 | | |
| | .250 (1/4) | .750 (3x) | .0180 | II | 1/4 | 2-1/2 | | 955916 | 37.80 | 955916-C3 | 46.50 | | |

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# MINIATURE DRILLS

## Spotting Drills (cont.)

continued from previous page

| INCLUDED ANGLE | DRILL DIAMETER | FLUTE LENGTH | WEB THICKNESS | TYPE | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ | $L_2$ | | | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| 120° | .010 | .030 (3x) | .0015 | I | 1/8 | 1-1/2 | 11610 | 39.20 | 11610-C3 | 45.20 | | |
| | .015 (1/64) | .045 (3x) | .0015 | I | 1/8 | 1-1/2 | 11615 | 39.20 | 11615-C3 | 45.20 | | |
| | .020 | .060 (3x) | .0020 | I | 1/8 | 1-1/2 | 11620 | 33.80 | 11620-C3 | 39.80 | | |
| | .025 | .075 (3x) | .0020 | I | 1/8 | 1-1/2 | 11625 | 33.80 | 11625-C3 | 39.80 | | |
| | .030 | .090 (3x) | .0030 | I | 1/8 | 1-1/2 | 11630 | 31.20 | 11630-C3 | 37.20 | | |
| | .031 (1/32) | .093 (3x) | .0030 | I | 1/8 | 1-1/2 | 11631 | 31.20 | 11631-C3 | 37.20 | | |
| | .040 | .120 (3x) | .0030 | I | 1/8 | 1-1/2 | 11640 | 28.60 | 11640-C3 | 34.60 | | |
| | .045 | .135 (3x) | .0030 | I | 1/8 | 1-1/2 | 11645 | 28.60 | 11645-C3 | 34.60 | | |
| | .047 (3/64) | .141 (3x) | .0040 | I | 1/8 | 1-1/2 | 11647 | 28.60 | 11647-C3 | 34.60 | | |
| | .050 | .150 (3x) | .0040 | I | 1/8 | 1-1/2 | 11650 | 28.60 | 11650-C3 | 34.60 | | |
| | .055 | .165 (3x) | .0040 | I | 1/8 | 1-1/2 | 11655 | 28.60 | 11655-C3 | 34.60 | | |
| | .060 | .180 (3x) | .0050 | I | 1/8 | 1-1/2 | 11660 | 28.20 | 11660-C3 | 34.20 | | |
| | .062 (1/16) | .186 (3x) | .0050 | I | 1/8 | 1-1/2 | 11662 | 28.20 | 11662-C3 | 34.20 | | |
| | .070 | .210 (3x) | .0050 | I | 1/8 | 1-1/2 | 11670 | 28.20 | 11670-C3 | 34.20 | | |
| | .078 (5/64) | .234 (3x) | .0050 | I | 1/8 | 1-1/2 | 11678 | 28.20 | 11678-C3 | 34.20 | | |
| | .090 | .135 (1.5x) | .0050 | I | 1/8 | 1-1/2 | 703290 | 26.50 | 703290-C3 | 32.40 | | |
| | .090 | .270 (3x) | .0050 | I | 1/8 | 1-1/2 | 11690 | 26.50 | 11690-C3 | 32.40 | | |
| | .093 (3/32) | .279 (3x) | .0060 | I | 1/8 | 1-1/2 | 11693 | 26.50 | 11693-C3 | 32.40 | | |
| | .100 | .300 (3x) | .0060 | I | 1/8 | 1-1/2 | 11700 | 26.50 | 11700-C3 | 32.40 | | |
| | .118 (3 mm) | .354 (3x) | .0080 | I | 1/8 | 1-1/2 | 1173M | 26.50 | 1173M-C3 | 32.40 | | |
| | .125 (1/8) | .188 (1.5x) | .0100 | I | 1/8 | 1-1/2 | 703308 | 24.80 | 703308-C3 | 30.70 | | |
| | .125 (1/8) | .375 (3x) | .0100 | I | 1/8 | 1-1/2 | 11725 | 24.80 | 11725-C3 | 30.70 | | |
| | .125 (1/8) | .375 (3x) | .0100 | II | 1/8 | 1-1/2 | 38208 | 24.80 | 38208-C3 | 30.70 | | |
| | .156 (5/32) | .375 (2.5x) | .0110 | II | 3/16 | 2 | 38210 | 55.50 | 38210-C3 | 61.90 | | |
| | .187 (3/16) | .625 (3.5x) | .0130 | I | 3/16 | 2 | 804012 | 28.60 | 804012-C3 | 35.00 | | |
| | .187 (3/16) | .625 (3.5x) | .0130 | II | 3/16 | 2 | 38212 | 28.60 | 38212-C3 | 35.00 | | |
| | .250 (1/4) | .375 (1.5x) | .0180 | II | 1/4 | 2-1/2 | 703116 | 35.70 | 703116-C3 | 43.80 | | |
| | .250 (1/4) | .750 (3x) | .0180 | I | 1/4 | 2-1/2 | 804016 | 35.70 | 804016-C3 | 44.30 | | |
| | .250 (1/4) | .750 (3x) | .0180 | II | 1/4 | 2-1/2 | 38216 | 36.00 | 38216-C3 | 44.70 | | |
| | .375 (3/8) | 1.000 (2.5x) | .0270 | II | 3/8 | 2-1/2 | 38224 | 65.00 | 38224-C3 | 76.40 | | |
| 130° | .030 | .090 (3x) | .0030 | I | 1/8 | 1-1/2 | 839530 | 37.00 | 839530-C3 | 41.30 | | |
| | .060 | .180 (3x) | .0050 | I | 1/8 | 1-1/2 | 839560 | 36.00 | 839560-C3 | 41.30 | | |
| | .090 | .270 (3x) | .0050 | I | 1/8 | 1-1/2 | 839590 | 36.00 | 839590-C3 | 41.30 | | |
| | .125 (1/8) | .375 (3x) | .0100 | I | 1/8 | 1-1/2 | 839608 | 37.80 | 839608-C3 | 43.10 | | |
| | .250 (1/4) | .750 (3x) | .0180 | II | 1/4 | 2-1/2 | 847016 | 39.40 | 847016-C3 | 48.00 | | |
| 140° | .010 | .030 (3x) | .0015 | I | 1/8 | 1-1/2 | 39810 | 40.50 | 39810-C3 | 46.40 | | |
| | .015 (1/64) | .045 (3x) | .0015 | I | 1/8 | 1-1/2 | 39815 | 40.50 | 39815-C3 | 46.40 | | |
| | .020 | .030 (1.5x) | .0020 | I | 1/8 | 1-1/2 | 815820 | 34.60 | 815820-C3 | 40.50 | | |
| | .020 | .060 (3x) | .0020 | I | 1/8 | 1-1/2 | 39820 | 34.60 | 39820-C3 | 40.50 | 39820-C8 | 42.20 |
| | .025 | .075 (3x) | .0020 | I | 1/8 | 1-1/2 | 39825 | 34.60 | 39825-C3 | 40.50 | | |
| | .030 | .045 (1.5x) | .0030 | I | 1/8 | 1-1/2 | 815830 | 32.70 | 815830-C3 | 38.60 | | |
| | .030 | .090 (3x) | .0030 | I | 1/8 | 1-1/2 | 39830 | 32.70 | 39830-C3 | 38.60 | | |
| | .031 (1/32) | .093 (3x) | .0030 | I | 1/8 | 1-1/2 | 39831 | 32.70 | 39831-C3 | 38.60 | | |
| | .039 | .117 (3x) | .0030 | I | 1/8 | 1-1/2 | 39839 | 29.30 | 39839-C3 | 35.20 | | |
| | .040 | .060 (1.5x) | .0030 | I | 1/8 | 1-1/2 | 815840 | 29.30 | 815840-C3 | 35.20 | | |
| | .040 | .120 (3x) | .0030 | I | 1/8 | 1-1/2 | 39840 | 29.30 | 39840-C3 | 35.20 | 39840-C8 | 37.00 |
| | .045 | .068 (1.5x) | .0030 | I | 1/8 | 1-1/2 | 815845 | 29.30 | 815845-C3 | 35.20 | | |
| | .045 | .135 (3x) | .0030 | I | 1/8 | 1-1/2 | 39845 | 29.30 | 39845-C3 | 35.20 | | |
| | .047 (3/64) | .141 (3x) | .0040 | I | 1/8 | 1-1/2 | 39847 | 29.30 | 39847-C3 | 35.20 | | |
| | .050 | .150 (3x) | .0040 | I | 1/8 | 1-1/2 | 39850 | 29.30 | 39850-C3 | 35.20 | | |
| | .055 | .165 (3x) | .0040 | I | 1/8 | 1-1/2 | 39855 | 29.30 | 39855-C3 | 35.20 | | |
| | .060 | .090 (1.5x) | .0050 | I | 1/8 | 1-1/2 | 815860 | 29.00 | 815860-C3 | 34.90 | | |

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# MINIATURE DRILLS

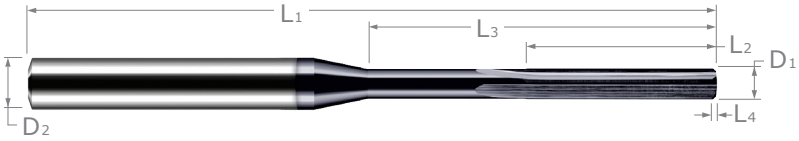
## Spotting Drills (cont.)

continued from previous page

| INCLUDED ANGLE | DRILL DIAMETER | FLUTE LENGTH | WEB THICKNESS | TYPE | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A $^{+1°}_{-1°}$ | $D_1$ | $L_2$ | | | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ | 2 FL | USD$ |
| 140° | .060 | .180 (3x) | .0050 | I | 1/8 | 1-1/2 | 39860 | 29.00 | 39860-C3 | 34.90 | | |
| | .062 (1/16) | .093 (1.5x) | .0050 | I | 1/8 | 1-1/2 | 815862 | 29.00 | 815862-C3 | 34.90 | | |
| | .062 (1/16) | .186 (3x) | .0050 | I | 1/8 | 1-1/2 | 39862 | 29.00 | 39862-C3 | 34.90 | | |
| | .070 | .210 (3x) | .0050 | I | 1/8 | 1-1/2 | 39870 | 29.00 | 39870-C3 | 34.90 | | |
| | .075 | .225 (3x) | .0050 | I | 1/8 | 1-1/2 | 39875 | 29.00 | 39875-C3 | 34.90 | | |
| | .078 (5/64) | .117 (1.5x) | .0050 | I | 1/8 | 1-1/2 | 815878 | 29.00 | 815878-C3 | 34.90 | | |
| | .078 (5/64) | .234 (3x) | .0050 | I | 1/8 | 1-1/2 | 39878 | 29.00 | 39878-C3 | 34.90 | | |
| | .090 | .135 (1.5x) | .0050 | I | 1/8 | 1-1/2 | 815890 | 27.70 | 815890-C3 | 33.60 | | |
| | .090 | .270 (3x) | .0050 | I | 1/8 | 1-1/2 | 39890 | 27.70 | 39890-C3 | 33.60 | | |
| | .093 (3/32) | .140 (1.5x) | .0060 | I | 1/8 | 1-1/2 | 815893 | 27.70 | 815893-C3 | 33.60 | | |
| | .093 (3/32) | .279 (3x) | .0060 | I | 1/8 | 1-1/2 | 39893 | 27.70 | 39893-C3 | 33.60 | | |
| | .100 | .300 (3x) | .0060 | I | 1/8 | 1-1/2 | 39900 | 27.70 | 39900-C3 | 33.60 | | |
| | .118 (3mm) | .354 (3x) | .0080 | I | 1/8 | 1-1/2 | 3993M | 27.70 | 3993M-C3 | 33.60 | | |
| | .125 (1/8) | .188 (1.5x) | .0100 | I | 1/8 | 1-1/2 | 815908 | 26.20 | 815908-C3 | 32.10 | | |
| | .125 (1/8) | .188 (1.5x) | .0100 | II | 1/8 | 1-1/2 | 715408 | 26.20 | 715408-C3 | 32.10 | | |
| | .125 (1/8) | .375 (3x) | .0100 | I | 1/8 | 1-1/2 | 39925 | 26.20 | 39925-C3 | 32.10 | 39925-C8 | 33.80 |
| | .125 (1/8) | .375 (3x) | .0100 | II | 1/8 | 1-1/2 | 41008 | 26.20 | 41008-C3 | 32.10 | | |
| | .140 (9/64) | .375 (2.5x) | .0100 | II | 3/16 | 2 | 41009 | 30.30 | 41009-C3 | 36.70 | | |
| | .156 (5/32) | .375 (2.5x) | .0110 | II | 3/16 | 2 | 41010 | 30.60 | 41010-C3 | 37.00 | | |
| | .187 (3/16) | .312 (1.5x) | .0130 | II | 3/16 | 2 | 715412 | 30.30 | 715412-C3 | 36.50 | | |
| | .187 (3/16) | .625 (3x) | .0130 | I | 3/16 | 2 | 804112 | 30.30 | 804112-C3 | 36.70 | | |
| | .187 (3/16) | .625 (3x) | .0130 | II | 3/16 | 2 | 41012 | 30.30 | 41012-C3 | 36.70 | | |
| | .250 (1/4) | .375 (1.5x) | .0180 | II | 1/4 | 2-1/2 | 715416 | 37.80 | 715416-C3 | 45.90 | | |
| | .250 (1/4) | .750 (3x) | .0180 | I | 1/4 | 2-1/2 | 804116 | 37.80 | 804116-C3 | 46.50 | | |
| | .250 (1/4) | .750 (3x) | .0180 | II | 1/4 | 2-1/2 | 41016 | 37.80 | 41016-C3 | 46.50 | 41016-C8 | 48.90 |
| | .375 (3/8) | .500 (1.5x) | .0270 | II | 3/8 | 2-1/2 | 715424 | 66.70 | 715424-C3 | 78.20 | | |
| | .375 (3/8) | 1.000 (2.5x) | .0270 | II | 3/8 | 2-1/2 | 41024 | 66.70 | 41024-C3 | 78.20 | | |
| 142° | .060 | .180 (3x) | .005 | I | 1/8 | 1-1/2 | 752560 | 34.30 | 752560-C3 | 40.20 | | |
| | .090 | .270 (3x) | .005 | I | 1/8 | 1-1/2 | 752590 | 35.00 | 752590-C3 | 40.90 | | |
| | .125 (1/8) | .375 (3x) | .010 | I | 1/8 | 1-1/2 | 752608 | 35.00 | 752608-C3 | 40.90 | | |
| | .125 (1/8) | .375 (3x) | .010 | II | 1/8 | 1-1/2 | 737808 | 34.30 | 737808-C3 | 40.20 | | |
| | .187 (3/16) | .625 (3x) | .0130 | II | 3/16 | 2 | 737812 | 37.10 | 737812-C3 | 43.30 | | |
| | .250 (1/4) | .750 (3x) | .0180 | II | 1/4 | 2-1/2 | 737816 | 43.40 | 737816-C3 | 52.40 | | |
| 150° | .020 | .060 (3x) | .0020 | I | 1/8 | 1-1/2 | 961120 | 33.60 | 961120-C3 | 39.50 | | |
| | .030 | .090 (3x) | .0030 | I | 1/8 | 1-1/2 | 961130 | 32.70 | 961130-C3 | 38.60 | | |
| | .040 | .120 (3x) | .0030 | I | 1/8 | 1-1/2 | 961140 | 29.30 | 961140-C3 | 35.20 | | |
| | .045 | .135 (3x) | .0030 | I | 1/8 | 1-1/2 | 961145 | 29.30 | 961145-C3 | 35.20 | | |
| | .047 | .141 (3x) | .0040 | I | 1/8 | 1-1/2 | 961147 | 30.20 | 961147-C3 | 36.10 | | |
| | .060 | .180 (3x) | .0050 | I | 1/8 | 1-1/2 | 961160 | 29.00 | 961160-C3 | 34.90 | | |
| | .062 (1/16) | .186 (3x) | .0050 | I | 1/8 | 1-1/2 | 961162 | 29.30 | 961162-C3 | 35.20 | | |
| | .078 (5/64) | .234 (3x) | .0050 | I | 1/8 | 1-1/2 | 961178 | 29.30 | 961178-C3 | 35.20 | | |
| | .090 | .270 (3x) | .0050 | I | 1/8 | 1-1/2 | 961190 | 29.30 | 961190-C3 | 35.20 | | |
| | .093 (3/32) | .279 (3x) | .0060 | I | 1/8 | 1-1/2 | 961193 | 29.30 | 961193-C3 | 35.20 | | |
| | .125 (1/8) | .375 (3x) | .0100 | I | 1/8 | 1-1/2 | 961208 | 26.20 | 961208-C3 | 32.10 | | |
| | .125 (1/8) | .375 (3x) | .0100 | II | 1/8 | 1-1/2 | 949508 | 26.20 | 949508-C3 | 32.10 | | |
| | .187 (3/16) | .625 (3x) | .0130 | II | 3/16 | 2 | 949512 | 30.30 | 949512-C3 | 36.70 | | |
| | .250 (1/4) | .750 (3x) | .0180 | II | 1/4 | 2-1/2 | 949516 | 37.80 | 949516-C3 | 46.50 | | |
| 170° | .060 | .180 (3x) | .0050 | I | 1/8 | 1-1/2 | 893660 | 30.20 | 893660-C3 | 36.10 | | |
| | .125 (1/8) | .375 (3x) | .0100 | I | 1/8 | 1-1/2 | 893708 | 30.20 | 893708-C3 | 36.10 | | |
| | .250 (1/4) | .750 (3x) | .0180 | II | 1/4 | 2-1/2 | 893716 | 38.20 | 893716-C3 | 46.30 | | |

continued on next page

# MINIATURE REAMERS




| | D1 Tolerances |
|---|---|
| Uncoated | +.0000″ −.0002″ |
| AlTiN Coated | +.0002″ −.0000″ |

- Available uncoated or with AlTiN coating for improved lubricity and heat resistance
- Straight flutes for through and blind hole applications
- Oversized, common shanks to maintain strength, stiffness, and accuracy • 45° chamfer angle
- h6 shank tolerance for high precision tool holders • Solid carbide • CNC ground in the USA

| REAMER DIAMETER | WIRE | MARGIN LENGTH | OVERALL REACH | CHAMFER LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$* | | $L_2$ +.020″ −.000″ | $L_3$ +.020″ −.000″ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .0080 | | .062 | .100 | .0013 | 4 | 1/8 | 1-1/2 | RSB0080 | 59.70 | RSB0080-C3 | 65.60 |
| .0083 | #91 | .062 | .100 | .0014 | 4 | 1/8 | 1-1/2 | RSB0083 | 59.70 | RSB0083-C3 | 65.60 |
| .0085 | | .062 | .109 | .0014 | 4 | 1/8 | 1-1/2 | RSB0085 | 59.70 | RSB0085-C3 | 65.60 |
| .0087 | #90 | .062 | .109 | .0015 | 4 | 1/8 | 1-1/2 | RSB0087 | 59.70 | RSB0087-C3 | 65.60 |
| .0090 | | .062 | .118 | .0015 | 4 | 1/8 | 1-1/2 | RSB0090 | 59.70 | RSB0090-C3 | 65.60 |
| .0091 | #89 | .062 | .118 | .0015 | 4 | 1/8 | 1-1/2 | RSB0091 | 59.70 | RSB0091-C3 | 65.60 |
| .0095 | #88 | .062 | .118 | .0016 | 4 | 1/8 | 1-1/2 | RSB0095 | 59.70 | RSB0095-C3 | 65.60 |
| .0100 | #87 | .078 | .125 | .0017 | 4 | 1/8 | 1-1/2 | RSB0100 | 59.70 | RSB0100-C3 | 65.60 |
| .0105 | #86 | .078 | .125 | .0018 | 4 | 1/8 | 1-1/2 | RSB0105 | 59.70 | RSB0105-C3 | 65.60 |
| .0110 | #85 | .078 | .141 | .0018 | 4 | 1/8 | 1-1/2 | RSB0110 | 59.70 | RSB0110-C3 | 65.60 |
| .0115 | #84 | .078 | .141 | .0019 | 4 | 1/8 | 1-1/2 | RSB0115 | 59.70 | RSB0115-C3 | 65.60 |
| .0120 | #83 | .093 | .156 | .0020 | 4 | 1/8 | 1-1/2 | RSB0120 | 59.70 | RSB0120-C3 | 65.60 |
| .0125 | #82 | .093 | .172 | .0021 | 4 | 1/8 | 1-1/2 | RSB0125 | 59.70 | RSB0125-C3 | 65.60 |
| .0130 | #81 | .093 | .172 | .0022 | 4 | 1/8 | 1-1/2 | RSB0130 | 59.70 | RSB0130-C3 | 65.60 |
| .0135 | #80 | .109 | .187 | .0023 | 4 | 1/8 | 1-1/2 | RSB0135 | 59.70 | RSB0135-C3 | 65.60 |
| .0140 | | .109 | .187 | .0023 | 4 | 1/8 | 1-1/2 | RSB0140 | 59.70 | RSB0140-C3 | 65.60 |
| .0145 | #79 | .109 | .187 | .0024 | 4 | 1/8 | 1-1/2 | RSB0145 | 59.70 | RSB0145-C3 | 65.60 |
| .0150 | | .109 | .187 | .0025 | 4 | 1/8 | 1-1/2 | RSB0150 | 59.70 | RSB0150-C3 | 65.60 |
| .0155 | | .109 | .187 | .0026 | 4 | 1/8 | 1-1/2 | RSB0155 | 59.70 | RSB0155-C3 | 65.60 |
| .0160 | #78 | .125 | .218 | .0027 | 4 | 1/8 | 1-1/2 | RSB0160 | 44.90 | RSB0160-C3 | 50.90 |
| .0165 | | .125 | .218 | .0019 | 4 | 1/8 | 1-1/2 | RSB0165 | 44.90 | RSB0165-C3 | 50.90 |
| .0170 | | .125 | .218 | .0020 | 4 | 1/8 | 1-1/2 | RSB0170 | 44.90 | RSB0170-C3 | 50.90 |
| .0175 | | .125 | .218 | .0020 | 4 | 1/8 | 1-1/2 | RSB0175 | 44.90 | RSB0175-C3 | 50.90 |
| .0180 | #77 | .140 | .250 | .0021 | 4 | 1/8 | 1-1/2 | RSB0180 | 44.90 | RSB0180-C3 | 50.90 |
| .0185 | | .140 | .250 | .0021 | 4 | 1/8 | 1-1/2 | RSB0185 | 44.90 | RSB0185-C3 | 50.90 |
| .0190 | | .140 | .250 | .0022 | 4 | 1/8 | 1-1/2 | RSB0190 | 44.90 | RSB0190-C3 | 50.90 |
| .0195 | | .140 | .250 | .0022 | 4 | 1/8 | 1-1/2 | RSB0195 | 44.90 | RSB0195-C3 | 50.90 |
| .0200 | #76 | .140 | .250 | .0023 | 4 | 1/8 | 1-1/2 | RSB0200 | 44.90 | RSB0200-C3 | 50.90 |
| .0205 | | .140 | .250 | .0024 | 4 | 1/8 | 1-1/2 | RSB0205 | 44.90 | RSB0205-C3 | 50.90 |
| .0210 | #75 | .172 | .281 | .0024 | 4 | 1/8 | 1-1/2 | RSB0210 | 44.90 | RSB0210-C3 | 50.90 |
| .0215 | | .172 | .281 | .0025 | 4 | 1/8 | 1-1/2 | RSB0215 | 44.90 | RSB0215-C3 | 50.90 |
| .0220 | | .172 | .281 | .0025 | 4 | 1/8 | 1-1/2 | RSB0220 | 44.90 | RSB0220-C3 | 50.90 |
| .0225 | #74 | .172 | .281 | .0026 | 4 | 1/8 | 1-1/2 | RSB0225 | 44.90 | RSB0225-C3 | 50.90 |
| .0230 | | .172 | .281 | .0026 | 4 | 1/8 | 1-1/2 | RSB0230 | 44.90 | RSB0230-C3 | 50.90 |
| .0235 | | .172 | .281 | .0027 | 4 | 1/8 | 1-1/2 | RSB0235 | 44.90 | RSB0235-C3 | 50.90 |
| .0240 | #73 | .187 | .312 | .0028 | 4 | 1/8 | 1-1/2 | RSB0240 | 44.90 | RSB0240-C3 | 50.90 |
| .0245 | | .187 | .312 | .0028 | 4 | 1/8 | 1-1/2 | RSB0245 | 44.90 | RSB0245-C3 | 50.90 |
| .0250 | #72 | .187 | .312 | .0029 | 4 | 1/8 | 1-1/2 | RSB0250 | 44.90 | RSB0250-C3 | 50.90 |

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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# MINIATURE REAMERS

(cont.)

continued from previous page

| REAMER DIAMETER | WIRE | MARGIN LENGTH | OVERALL REACH | CHAMFER LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$* | | $L_2$ +.020″ −.000″ | $L_3$ +.020″ −.000″ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .0255 | | .187 | .312 | .0029 | 4 | 1/8 | 1-1/2 | RSB0255 | 44.90 | RSB0255-C3 | 50.90 |
| .0260 | #71 | .187 | .312 | .0030 | 4 | 1/8 | 1-1/2 | RSB0260 | 44.90 | RSB0260-C3 | 50.90 |
| .0265 | | .187 | .312 | .0030 | 4 | 1/8 | 1-1/2 | RSB0265 | 44.90 | RSB0265-C3 | 50.90 |
| .0270 | | .218 | .375 | .0031 | 4 | 1/8 | 2 | RSB0270 | 44.90 | RSB0270-C3 | 50.90 |
| .0275 | | .218 | .375 | .0032 | 4 | 1/8 | 2 | RSB0275 | 44.90 | RSB0275-C3 | 50.90 |
| .0280 | #70 | .218 | .375 | .0032 | 4 | 1/8 | 2 | RSB0280 | 44.90 | RSB0280-C3 | 50.90 |
| .0285 | | .218 | .375 | .0033 | 4 | 1/8 | 2 | RSB0285 | 44.90 | RSB0285-C3 | 50.90 |
| .0290 | | .218 | .375 | .0033 | 4 | 1/8 | 2 | RSB0290 | 44.90 | RSB0290-C3 | 50.90 |
| .0292 | #69 | .218 | .375 | .0034 | 4 | 1/8 | 2 | RSB0292 | 44.90 | RSB0292-C3 | 50.90 |
| .0295 (.75 mm) | | .218 | .375 | .0034 | 4 | 1/8 | 2 | RSB0295 | 44.90 | RSB0295-C3 | 50.90 |
| .0300 | | .218 | .375 | .0035 | 4 | 1/8 | 2 | RSB0300 | 44.90 | RSB0300-C3 | 50.90 |
| .0305 | | .218 | .375 | .0035 | 4 | 1/8 | 2 | RSB0305 | 44.90 | RSB0305-C3 | 50.90 |
| .0310 | #68 | .218 | .375 | .0036 | 4 | 1/8 | 2 | RSB0310 | 44.90 | RSB0310-C3 | 50.90 |
| .0315 (.80 mm) | | .218 | .375 | .0036 | 4 | 1/8 | 2 | RSB0315 | 44.90 | RSB0315-C3 | 50.90 |
| .0320 | #67 | .250 | .437 | .0037 | 4 | 1/8 | 2 | RSB0320 | 44.90 | RSB0320-C3 | 50.90 |
| .0325 | | .250 | .437 | .0037 | 4 | 1/8 | 2 | RSB0325 | 44.90 | RSB0325-C3 | 50.90 |
| .0330 | #66 | .250 | .437 | .0038 | 4 | 1/8 | 2 | RSB0330 | 44.90 | RSB0330-C3 | 50.90 |
| .0335 (.85 mm) | | .250 | .437 | .0039 | 4 | 1/8 | 2 | RSB0335 | 44.90 | RSB0335-C3 | 50.90 |
| .0340 | | .250 | .437 | .0039 | 4 | 1/8 | 2 | RSB0340 | 44.90 | RSB0340-C3 | 50.90 |
| .0345 | | .250 | .437 | .0040 | 4 | 1/8 | 2 | RSB0345 | 44.90 | RSB0345-C3 | 50.90 |
| .0350 | #65 | .250 | .437 | .0040 | 4 | 1/8 | 2 | RSB0350 | 44.90 | RSB0350-C3 | 50.90 |
| .0355 | | .250 | .437 | .0041 | 4 | 1/8 | 2 | RSB0355 | 44.90 | RSB0355-C3 | 50.90 |
| .0360 | #64 | .281 | .500 | .0041 | 4 | 1/8 | 2 | RSB0360 | 44.90 | RSB0360-C3 | 50.90 |
| .0365 | | .281 | .500 | .0042 | 4 | 1/8 | 2 | RSB0365 | 44.90 | RSB0365-C3 | 50.90 |
| .0370 | #63 | .281 | .500 | .0043 | 4 | 1/8 | 2 | RSB0370 | 44.90 | RSB0370-C3 | 50.90 |
| .0375 | | .281 | .500 | .0043 | 4 | 1/8 | 2 | RSB0375 | 44.90 | RSB0375-C3 | 50.90 |
| .0380 | #62 | .281 | .500 | .0044 | 4 | 1/8 | 2 | RSB0380 | 44.90 | RSB0380-C3 | 50.90 |
| .0385 | | .281 | .500 | .0044 | 4 | 1/8 | 2 | RSB0385 | 44.90 | RSB0385-C3 | 50.90 |
| .0390 | #61 | .281 | .500 | .0045 | 4 | 1/8 | 2 | RSB0390 | 44.90 | RSB0390-C3 | 50.90 |
| .0395 | | .281 | .500 | .0045 | 4 | 1/8 | 2 | RSB0395 | 44.90 | RSB0395-C3 | 50.90 |
| .0400 | #60 | .281 | .500 | .0046 | 4 | 1/8 | 2 | RSB0400 | 44.90 | RSB0400-C3 | 50.90 |
| .0405 | | .281 | .500 | .0047 | 4 | 1/8 | 2 | RSB0405 | 44.90 | RSB0405-C3 | 50.90 |
| .0410 | #59 | .281 | .500 | .0047 | 4 | 1/8 | 2 | RSB0410 | 44.90 | RSB0410-C3 | 50.90 |
| .0415 | | .281 | .500 | .0048 | 4 | 1/8 | 2 | RSB0415 | 44.90 | RSB0415-C3 | 50.90 |
| .0420 | #58 | .281 | .500 | .0048 | 4 | 1/8 | 2 | RSB0420 | 44.90 | RSB0420-C3 | 50.90 |
| .0425 | | .312 | .562 | .0049 | 4 | 1/8 | 2 | RSB0425 | 44.90 | RSB0425-C3 | 50.90 |
| .0430 | #57 | .312 | .562 | .0049 | 4 | 1/8 | 2 | RSB0430 | 44.90 | RSB0430-C3 | 50.90 |
| .0435 | | .312 | .562 | .0050 | 4 | 1/8 | 2 | RSB0435 | 44.90 | RSB0435-C3 | 50.90 |
| .0440 | | .312 | .562 | .0044 | 4 | 1/8 | 2 | RSB0440 | 44.90 | RSB0440-C3 | 50.90 |
| .0445 | | .312 | .562 | .0045 | 4 | 1/8 | 2 | RSB0445 | 44.90 | RSB0445-C3 | 50.90 |
| .0450 | | .312 | .562 | .0045 | 4 | 1/8 | 2 | RSB0450 | 44.90 | RSB0450-C3 | 50.90 |
| .0455 | | .312 | .562 | .0046 | 4 | 1/8 | 2 | RSB0455 | 44.90 | RSB0455-C3 | 50.90 |
| .0460 | | .312 | .562 | .0046 | 4 | 1/8 | 2 | RSB0460 | 44.90 | RSB0460-C3 | 50.90 |
| .0465 | #56 | .312 | .562 | .0047 | 4 | 1/8 | 2 | RSB0465 | 44.90 | RSB0465-C3 | 50.90 |
| .0469 (3/64) | | .312 | .562 | .0047 | 4 | 1/8 | 2 | RSB0469 | 38.10 | RSB0469-C3 | 44.00 |
| .0470 | | .312 | .562 | .0047 | 4 | 1/8 | 2 | RSB0470 | 38.10 | RSB0470-C3 | 44.00 |
| .0475 | | .312 | .562 | .0048 | 4 | 1/8 | 2 | RSB0475 | 38.10 | RSB0475-C3 | 44.00 |

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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# MINIATURE REAMERS

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| REAMER DIAMETER | WIRE | MARGIN LENGTH | OVERALL REACH | CHAMFER LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$* | | $L_2$ +.020″ −.000″ | $L_3$ +.020″ −.000″ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .0480 | | .375 | .625 | .0048 | 4 | 1/8 | 2 | RSB0480 | 38.10 | RSB0480-C3 | 44.00 |
| .0485 | | .375 | .625 | .0049 | 4 | 1/8 | 2 | RSB0485 | 38.10 | RSB0485-C3 | 44.00 |
| .0490 | | .375 | .625 | .0049 | 4 | 1/8 | 2 | RSB0490 | 38.10 | RSB0490-C3 | 44.00 |
| .0495 | | .375 | .625 | .0050 | 4 | 1/8 | 2 | RSB0495 | 38.10 | RSB0495-C3 | 44.00 |
| .0500 | | .375 | .625 | .0050 | 4 | 1/8 | 2 | RSB0500 | 38.10 | RSB0500-C3 | 44.00 |
| .0505 | | .375 | .625 | .0051 | 4 | 1/8 | 2 | RSB0505 | 38.10 | RSB0505-C3 | 44.00 |
| .0510 | | .375 | .625 | .0051 | 4 | 1/8 | 2 | RSB0510 | 38.10 | RSB0510-C3 | 44.00 |
| .0515 | | .375 | .625 | .0052 | 4 | 1/8 | 2 | RSB0515 | 38.10 | RSB0515-C3 | 44.00 |
| .0520 | #55 | .375 | .625 | .0052 | 4 | 1/8 | 2 | RSB0520 | 38.10 | RSB0520-C3 | 44.00 |
| .0525 | | .375 | .625 | .0053 | 4 | 1/8 | 2 | RSB0525 | 38.10 | RSB0525-C3 | 44.00 |
| .0530 | | .437 | .687 | .0053 | 4 | 1/8 | 2 | RSB0530 | 38.10 | RSB0530-C3 | 44.00 |
| .0535 | | .437 | .687 | .0054 | 4 | 1/8 | 2 | RSB0535 | 38.10 | RSB0535-C3 | 44.00 |
| .0540 | | .437 | .687 | .0054 | 4 | 1/8 | 2 | RSB0540 | 38.10 | RSB0540-C3 | 44.00 |
| .0545 | | .437 | .687 | .0055 | 4 | 1/8 | 2 | RSB0545 | 38.10 | RSB0545-C3 | 44.00 |
| .0550 | #54 | .437 | .687 | .0055 | 4 | 1/8 | 2 | RSB0550 | 38.10 | RSB0550-C3 | 44.00 |
| .0555 | | .437 | .750 | .0056 | 4 | 1/8 | 2 | RSB0555 | 38.10 | RSB0555-C3 | 44.00 |
| .0560 | | .437 | .750 | .0056 | 4 | 1/8 | 2 | RSB0560 | 38.10 | RSB0560-C3 | 44.00 |
| .0565 | | .437 | .750 | .0057 | 4 | 1/8 | 2 | RSB0565 | 38.10 | RSB0565-C3 | 44.00 |
| .0570 | | .437 | .750 | .0057 | 4 | 1/8 | 2 | RSB0570 | 38.10 | RSB0570-C3 | 44.00 |
| .0575 | | .437 | .750 | .0058 | 4 | 1/8 | 2 | RSB0575 | 38.10 | RSB0575-C3 | 44.00 |
| .0580 | | .437 | .750 | .0058 | 4 | 1/8 | 2 | RSB0580 | 38.10 | RSB0580-C3 | 44.00 |
| .0585 | | .437 | .750 | .0059 | 4 | 1/8 | 2 | RSB0585 | 38.10 | RSB0585-C3 | 44.00 |
| .0590 | | .437 | .750 | .0059 | 4 | 1/8 | 2 | RSB0590 | 38.10 | RSB0590-C3 | 44.00 |
| .0595 | #53 | .437 | .750 | .0060 | 4 | 1/8 | 2 | RSB0595 | 38.10 | RSB0595-C3 | 44.00 |
| .0600 | | .437 | .812 | .0060 | 4 | 1/8 | 2 | RSB0600 | 37.70 | RSB0600-C3 | 43.60 |
| .0605 | | .437 | .812 | .0061 | 4 | 1/8 | 2 | RSB0605 | 37.70 | RSB0605-C3 | 43.60 |
| .0610 (1.55 mm) | | .437 | .812 | .0061 | 4 | 1/8 | 2 | RSB0610 | 37.70 | RSB0610-C3 | 43.60 |
| .0615 | | .437 | .812 | .0062 | 4 | 1/8 | 2 | RSB0615 | 37.70 | RSB0615-C3 | 43.60 |
| .0620 | | .437 | .812 | .0062 | 4 | 1/8 | 2 | RSB0620 | 37.70 | RSB0620-C3 | 43.60 |
| .0625 (1/16) | | .437 | .812 | .0063 | 4 | 1/8 | 2 | RSB0625 | 37.70 | RSB0625-C3 | 43.60 |
| .0630 (1.60 mm) | | .437 | .812 | .0063 | 4 | 1/8 | 2 | RSB0630 | 37.70 | RSB0630-C3 | 43.60 |
| .0635 | #52 | .437 | .812 | .0064 | 4 | 1/8 | 2 | RSB0635 | 37.70 | RSB0635-C3 | 43.60 |
| .0640 | | .437 | .812 | .0064 | 4 | 1/8 | 2 | RSB0640 | 37.70 | RSB0640-C3 | 43.60 |
| .0645 | | .437 | .812 | .0065 | 4 | 1/8 | 2 | RSB0645 | 37.70 | RSB0645-C3 | 43.60 |
| .0650 (1.65 mm) | | .437 | .812 | .0065 | 4 | 1/8 | 2 | RSB0650 | 37.70 | RSB0650-C3 | 43.60 |
| .0660 | | .500 | .875 | .0066 | 4 | 1/8 | 2 | RSB0660 | 37.70 | RSB0660-C3 | 43.60 |
| .0670 | #51 | .500 | .875 | .0067 | 4 | 1/8 | 2 | RSB0670 | 37.70 | RSB0670-C3 | 43.60 |
| .0680 | | .500 | .875 | .0068 | 4 | 1/8 | 2 | RSB0680 | 37.70 | RSB0680-C3 | 43.60 |
| .0690 | | .500 | .875 | .0062 | 4 | 1/8 | 2 | RSB0690 | 37.70 | RSB0690-C3 | 43.60 |
| .0700 | #50 | .562 | .937 | .0063 | 4 | 1/8 | 2 | RSB0700 | 37.70 | RSB0700-C3 | 43.60 |
| .0710 | | .562 | .937 | .0064 | 4 | 1/8 | 2 | RSB0710 | 37.70 | RSB0710-C3 | 43.60 |
| .0720 | | .562 | .937 | .0065 | 4 | 1/8 | 2 | RSB0720 | 37.70 | RSB0720-C3 | 43.60 |
| .0730 | #49 | .562 | .937 | .0066 | 4 | 1/8 | 2 | RSB0730 | 37.70 | RSB0730-C3 | 43.60 |
| .0740 | | .562 | .937 | .0067 | 4 | 1/8 | 2 | RSB0740 | 37.70 | RSB0740-C3 | 43.60 |
| .0750 | | .562 | 1.000 | .0068 | 4 | 1/8 | 2 | RSB0750 | 37.70 | RSB0750-C3 | 43.60 |
| .0760 | #48 | .562 | 1.000 | .0068 | 4 | 1/8 | 2 | RSB0760 | 37.70 | RSB0760-C3 | 43.60 |
| .0765 | | .562 | 1.000 | .0069 | 4 | 1/8 | 2 | RSB0765 | 37.70 | RSB0765-C3 | 43.60 |

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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# MINIATURE REAMERS

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| REAMER DIAMETER | WIRE | MARGIN LENGTH | OVERALL REACH | CHAMFER LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$* | | $L_2$ $^{+.020''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .0770 | | .562 | 1.000 | .0069 | 4 | 1/8 | 2 | RSB0770 | 37.70 | RSB0770-C3 | 43.60 |
| .0775 | | .562 | 1.000 | .0070 | 4 | 1/8 | 2 | RSB0775 | 37.70 | RSB0775-C3 | 43.60 |
| .0780 | | .562 | 1.000 | .0070 | 4 | 1/8 | 2 | RSB0780 | 37.70 | RSB0780-C3 | 43.60 |
| .0781 (5/64) | | .562 | 1.000 | .0070 | 4 | 1/8 | 2 | RSB0781 | 37.70 | RSB0781-C3 | 43.60 |
| .0785 | #47 | .562 | 1.000 | .0071 | 4 | 1/8 | 2 | RSB0785 | 37.70 | RSB0785-C3 | 43.60 |
| .0787 (2.00 mm) | | .562 | 1.000 | .0071 | 4 | 1/8 | 2 | RSB0787 | 37.70 | RSB0787-C3 | 43.60 |
| .0790 | | .562 | 1.000 | .0071 | 4 | 1/8 | 2 | RSB0790 | 37.70 | RSB0790-C3 | 43.60 |
| .0795 | | .562 | 1.000 | .0072 | 4 | 1/8 | 2 | RSB0795 | 37.70 | RSB0795-C3 | 43.60 |
| .0800 | | .562 | 1.000 | .0072 | 4 | 1/8 | 2 | RSB0800 | 37.70 | RSB0800-C3 | 43.60 |
| .0805 | | .562 | 1.000 | .0072 | 4 | 1/8 | 2 | RSB0805 | 37.70 | RSB0805-C3 | 43.60 |
| .0810 | #46 | .562 | 1.000 | .0073 | 4 | 1/8 | 2 | RSB0810 | 37.70 | RSB0810-C3 | 43.60 |
| .0815 | | .562 | 1.000 | .0073 | 4 | 1/8 | 2 | RSB0815 | 37.70 | RSB0815-C3 | 43.60 |
| .0820 | #45 | .562 | 1.000 | .0074 | 4 | 1/8 | 2 | RSB0820 | 37.70 | RSB0820-C3 | 43.60 |
| .0830 | | .562 | 1.000 | .0075 | 4 | 1/8 | 2 | RSB0830 | 37.70 | RSB0830-C3 | 43.60 |
| .0840 | | .625 | 1.125 | .0076 | 4 | 1/8 | 2-1/2 | RSB0840 | 37.70 | RSB0840-C3 | 43.60 |
| .0850 | | .625 | 1.125 | .0077 | 4 | 1/8 | 2-1/2 | RSB0850 | 37.70 | RSB0850-C3 | 43.60 |
| .0860 | #44 | .625 | 1.125 | .0077 | 4 | 1/8 | 2-1/2 | RSB0860 | 37.70 | RSB0860-C3 | 43.60 |
| .0870 | | .625 | 1.125 | .0078 | 4 | 1/8 | 2-1/2 | RSB0870 | 37.70 | RSB0870-C3 | 43.60 |
| .0880 | | .625 | 1.125 | .0079 | 4 | 1/8 | 2-1/2 | RSB0880 | 37.70 | RSB0880-C3 | 43.60 |
| .0890 | #43 | .625 | 1.125 | .0080 | 4 | 1/8 | 2-1/2 | RSB0890 | 37.70 | RSB0890-C3 | 43.60 |
| .0900 | | .625 | 1.125 | .0081 | 4 | 1/8 | 2-1/2 | RSB0900 | 37.70 | RSB0900-C3 | 43.60 |
| .0910 | | .625 | 1.125 | .0082 | 4 | 1/8 | 2-1/2 | RSB0910 | 37.70 | RSB0910-C3 | 43.60 |
| .0920 | | .625 | 1.125 | .0083 | 4 | 1/8 | 2-1/2 | RSB0920 | 37.70 | RSB0920-C3 | 43.60 |
| .0925 (2.35 mm) | | .687 | 1.250 | .0083 | 4 | 1/8 | 2-1/2 | RSB0925 | 37.70 | RSB0925-C3 | 43.60 |
| .0930 | | .687 | 1.250 | .0084 | 4 | 1/8 | 2-1/2 | RSB0930 | 37.70 | RSB0930-C3 | 43.60 |
| .0935 | #42 | .687 | 1.250 | .0084 | 4 | 1/8 | 2-1/2 | RSB0935 | 37.70 | RSB0935-C3 | 43.60 |
| .0937 (3/32) | | .687 | 1.250 | .0084 | 4 | 1/8 | 2-1/2 | RSB0937 | 37.70 | RSB0937-C3 | 43.60 |
| .0940 | | .687 | 1.250 | .0085 | 4 | 1/8 | 2-1/2 | RSB0940 | 37.70 | RSB0940-C3 | 43.60 |
| .0945 (2.40 mm) | | .687 | 1.250 | .0085 | 4 | 1/8 | 2-1/2 | RSB0945 | 37.70 | RSB0945-C3 | 43.60 |
| .0950 | | .687 | 1.250 | .0086 | 4 | 1/8 | 2-1/2 | RSB0950 | 37.70 | RSB0950-C3 | 43.60 |
| .0960 | #41 | .687 | 1.250 | .0086 | 4 | 1/8 | 2-1/2 | RSB0960 | 37.70 | RSB0960-C3 | 43.60 |
| .0970 | | .687 | 1.250 | .0087 | 4 | 1/8 | 2-1/2 | RSB0970 | 37.70 | RSB0970-C3 | 43.60 |
| .0980 | #40 | .687 | 1.250 | .0088 | 4 | 1/8 | 2-1/2 | RSB0980 | 37.70 | RSB0980-C3 | 43.60 |
| .0990 | | .687 | 1.250 | .0089 | 4 | 1/8 | 2-1/2 | RSB0990 | 37.70 | RSB0990-C3 | 43.60 |
| .0995 | #39 | .687 | 1.250 | .0090 | 4 | 1/8 | 2-1/2 | RSB0995 | 37.70 | RSB0995-C3 | 43.60 |
| .1000 | | .750 | 1.375 | .0090 | 4 | 1/8 | 2-1/2 | RSB1000 | 37.70 | RSB1000-C3 | 43.60 |
| .1010 | | .750 | 1.375 | .0091 | 4 | 1/8 | 2-1/2 | RSB1010 | 37.70 | RSB1010-C3 | 43.60 |
| .1015 | #38 | .750 | 1.375 | .0091 | 4 | 1/8 | 2-1/2 | RSB1015 | 37.70 | RSB1015-C3 | 43.60 |
| .1020 | | .750 | 1.375 | .0092 | 4 | 1/8 | 2-1/2 | RSB1020 | 37.70 | RSB1020-C3 | 43.60 |
| .1030 | | .750 | 1.375 | .0093 | 4 | 1/8 | 2-1/2 | RSB1030 | 37.70 | RSB1030-C3 | 43.60 |
| .1040 | #37 | .750 | 1.375 | .0094 | 4 | 1/8 | 2-1/2 | RSB1040 | 37.70 | RSB1040-C3 | 43.60 |
| .1050 | | .750 | 1.375 | .0095 | 4 | 1/8 | 2-1/2 | RSB1050 | 37.70 | RSB1050-C3 | 43.60 |
| .1060 | | .750 | 1.375 | .0095 | 4 | 1/8 | 2-1/2 | RSB1060 | 37.70 | RSB1060-C3 | 43.60 |
| .1065 | #36 | .750 | 1.375 | .0096 | 4 | 1/8 | 2-1/2 | RSB1065 | 37.70 | RSB1065-C3 | 43.60 |
| .1070 | | .750 | 1.375 | .0096 | 4 | 1/8 | 2-1/2 | RSB1070 | 37.70 | RSB1070-C3 | 43.60 |
| .1080 | | .750 | 1.375 | .0097 | 4 | 1/8 | 2-1/2 | RSB1080 | 37.70 | RSB1080-C3 | 43.60 |
| .1083 (2.75 mm) | | .750 | 1.375 | .0097 | 4 | 1/8 | 2-1/2 | RSB1083 | 37.70 | RSB1083-C3 | 43.60 |

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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# MINIATURE REAMERS

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| REAMER DIAMETER | WIRE | MARGIN LENGTH | OVERALL REACH | CHAMFER LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$* | | $L_2$ $^{+.020''}_{-.000''}$ | $L_3$ $^{+.020''}_{-.000''}$ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .1085 | | .750 | 1.375 | .0098 | 4 | 1/8 | 2-1/2 | RSB1085 | 37.70 | RSB1085-C3 | 43.60 |
| .1090 | | .750 | 1.375 | .0098 | 4 | 1/8 | 2-1/2 | RSB1090 | 37.70 | RSB1090-C3 | 43.60 |
| .1094 (7/64) | | .750 | 1.375 | .0098 | 4 | 1/8 | 2-1/2 | RSB1094 | 37.70 | RSB1094-C3 | 43.60 |
| .1100 | #35 | .750 | 1.375 | .0099 | 4 | 1/8 | 2-1/2 | RSB1100 | 37.70 | RSB1100-C3 | 43.60 |
| .1105 | | .750 | 1.375 | .0099 | 4 | 1/8 | 2-1/2 | RSB1105 | 37.70 | RSB1105-C3 | 43.60 |
| .1110 | #34 | .750 | 1.375 | .0100 | 4 | 1/8 | 2-1/2 | RSB1110 | 37.70 | RSB1110-C3 | 43.60 |
| .1120 | | .750 | 1.375 | .0101 | 4 | 1/8 | 2-1/2 | RSB1120 | 37.70 | RSB1120-C3 | 43.60 |
| .1130 | #33 | .750 | 1.500 | .0102 | 4 | 1/8 | 2-1/2 | RSB1130 | 37.70 | RSB1130-C3 | 43.60 |
| .1140 | | .750 | 1.500 | .0103 | 4 | 1/8 | 2-1/2 | RSB1140 | 37.70 | RSB1140-C3 | 43.60 |
| .1150 | | .750 | 1.500 | .0104 | 4 | 1/8 | 2-1/2 | RSB1150 | 37.70 | RSB1150-C3 | 43.60 |
| .1160 | #32 | .750 | 1.500 | .0104 | 4 | 1/8 | 2-1/2 | RSB1160 | 37.70 | RSB1160-C3 | 43.60 |
| .1170 | | .750 | 1.500 | .0105 | 4 | 1/8 | 2-1/2 | RSB1170 | 37.70 | RSB1170-C3 | 43.60 |
| .1180 | | .750 | 1.500 | .0106 | 4 | 1/8 | 2-1/2 | RSB1180 | 37.70 | RSB1180-C3 | 43.60 |
| .1190 | | .750 | 1.500 | .0107 | 4 | 1/8 | 2-1/2 | RSB1190 | 37.70 | RSB1190-C3 | 43.60 |
| .1200 | #31 | .750 | 1.500 | .0108 | 4 | 1/8 | 2-1/2 | RSB1200 | 37.70 | RSB1200-C3 | 43.60 |
| .1210 | | .750 | 1.500 | .0109 | 4 | 1/8 | 2-1/2 | RSB1210 | 37.70 | RSB1210-C3 | 43.60 |
| .1220 (3.10 mm) | | .750 | 1.500 | .0110 | 4 | 1/8 | 2-1/2 | RSB1220 | 37.70 | RSB1220-C3 | 43.60 |
| $D_1$* | | $L_2$ $^{+.030''}_{-.000''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .1230 | | .750 | 1.500 | .0111 | 4 | 3/16 | 3 | RSB1230 | 44.20 | RSB1230-C3 | 50.90 |
| .1235 | | .750 | 1.500 | .0111 | 4 | 3/16 | 3 | RSB1235 | 44.20 | RSB1235-C3 | 50.90 |
| .1240 | | .750 | 1.500 | .0112 | 4 | 3/16 | 3 | RSB1240 | 44.20 | RSB1240-C3 | 50.90 |
| .1245 | | .750 | 1.500 | .0112 | 4 | 3/16 | 3 | RSB1245 | 44.20 | RSB1245-C3 | 50.90 |
| .1250 (1/8) | | .750 | 1.500 | .0113 | 4 | 3/16 | 3 | RSB1250 | 44.20 | RSB1250-C3 | 50.90 |
| .1255 | | .750 | 1.500 | .0113 | 4 | 3/16 | 3 | RSB1255 | 44.20 | RSB1255-C3 | 50.90 |
| .1260 (3.20 mm) | | .750 | 1.500 | .0113 | 4 | 3/16 | 3 | RSB1260 | 44.20 | RSB1260-C3 | 50.90 |
| .1265 | | .750 | 1.500 | .0114 | 4 | 3/16 | 3 | RSB1265 | 44.20 | RSB1265-C3 | 50.90 |
| .1270 | | .750 | 1.500 | .0114 | 4 | 3/16 | 3 | RSB1270 | 44.20 | RSB1270-C3 | 50.90 |
| .1285 | #30 | .750 | 1.500 | .0116 | 4 | 3/16 | 3 | RSB1285 | 44.20 | RSB1285-C3 | 50.90 |
| .1360 | #29 | .750 | 1.625 | .0122 | 4 | 3/16 | 3 | RSB1360 | 44.20 | RSB1360-C3 | 50.90 |
| .1390 | | .750 | 1.625 | .0125 | 4 | 3/16 | 3 | RSB1390 | 44.20 | RSB1390-C3 | 50.90 |
| .1395 | | .750 | 1.625 | .0126 | 4 | 3/16 | 3 | RSB1395 | 44.20 | RSB1395-C3 | 50.90 |
| .1400 | | .750 | 1.625 | .0126 | 4 | 3/16 | 3 | RSB1400 | 44.20 | RSB1400-C3 | 50.90 |
| .1405 | #28 | .750 | 1.625 | .0126 | 4 | 3/16 | 3 | RSB1405 | 44.20 | RSB1405-C3 | 50.90 |
| .1406 (9/64) | | .750 | 1.625 | .0127 | 4 | 3/16 | 3 | RSB1406 | 44.20 | RSB1406-C3 | 50.90 |
| .1410 | | .750 | 1.625 | .0127 | 4 | 3/16 | 3 | RSB1410 | 44.20 | RSB1410-C3 | 50.90 |
| .1415 | | .750 | 1.625 | .0127 | 4 | 3/16 | 3 | RSB1415 | 44.20 | RSB1415-C3 | 50.90 |
| .1420 | | .750 | 1.625 | .0128 | 4 | 3/16 | 3 | RSB1420 | 44.20 | RSB1420-C3 | 50.90 |
| .1440 | #27 | .750 | 1.625 | .0130 | 4 | 3/16 | 3 | RSB1440 | 44.20 | RSB1440-C3 | 50.90 |
| .1470 | #26 | .875 | 1.750 | .0132 | 4 | 3/16 | 3 | RSB1470 | 44.20 | RSB1470-C3 | 50.90 |
| .1495 | #25 | .875 | 1.750 | .0135 | 4 | 3/16 | 3 | RSB1495 | 44.20 | RSB1495-C3 | 50.90 |
| .1520 | #24 | .875 | 1.750 | .0137 | 4 | 3/16 | 3 | RSB1520 | 44.20 | RSB1520-C3 | 50.90 |
| .1540 | #23 | .875 | 1.750 | .0139 | 4 | 3/16 | 3 | RSB1540 | 44.20 | RSB1540-C3 | 50.90 |
| .1545 | | .875 | 1.750 | .0139 | 4 | 3/16 | 3 | RSB1545 | 44.20 | RSB1545-C3 | 50.90 |
| .1550 | | .875 | 1.750 | .0140 | 4 | 3/16 | 3 | RSB1550 | 44.20 | RSB1550-C3 | 50.90 |
| .1555 | | .875 | 1.750 | .0140 | 4 | 3/16 | 3 | RSB1555 | 44.20 | RSB1555-C3 | 50.90 |

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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# MINIATURE REAMERS

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| REAMER DIAMETER | WIRE | MARGIN LENGTH | OVERALL REACH | CHAMFER LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$* | | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .1560 | | .875 | 1.750 | .0140 | 4 | 3/16 | 3 | RSB1560 | 44.20 | RSB1560-C3 | 50.90 |
| .1562 (5/32) | | .875 | 1.750 | .0141 | 4 | 3/16 | 3 | RSB1562 | 44.20 | RSB1562-C3 | 50.90 |
| .1565 | | .875 | 1.750 | .0141 | 4 | 3/16 | 3 | RSB1565 | 44.20 | RSB1565-C3 | 50.90 |
| .1570 | #22 | .875 | 1.750 | .0141 | 4 | 3/16 | 3 | RSB1570 | 44.20 | RSB1570-C3 | 50.90 |
| .1575 (4.00 mm) | | .875 | 1.750 | .0142 | 4 | 3/16 | 3 | RSB1575 | 44.20 | RSB1575-C3 | 50.90 |
| .1580 | | .875 | 1.875 | .0142 | 4 | 3/16 | 3 | RSB1580 | 44.20 | RSB1580-C3 | 50.90 |
| .1585 | | .875 | 1.875 | .0143 | 4 | 3/16 | 3 | RSB1585 | 44.20 | RSB1585-C3 | 50.90 |
| .1590 | #21 | .875 | 1.875 | .0143 | 4 | 3/16 | 3 | RSB1590 | 44.20 | RSB1590-C3 | 50.90 |
| .1610 | #20 | .875 | 1.875 | .0145 | 4 | 3/16 | 3 | RSB1610 | 44.20 | RSB1610-C3 | 50.90 |
| .1660 | #19 | .875 | 1.875 | .0149 | 4 | 3/16 | 3 | RSB1660 | 44.20 | RSB1660-C3 | 50.90 |
| .1695 | #18 | 1.000 | 2.000 | .0153 | 4 | 3/16 | 4 | RSB1695 | 49.60 | RSB1695-C3 | 56.80 |
| .1705 | | 1.000 | 2.000 | .0153 | 4 | 3/16 | 4 | RSB1705 | 49.60 | RSB1705-C3 | 56.80 |
| .1710 | | 1.000 | 2.000 | .0154 | 4 | 3/16 | 4 | RSB1710 | 49.60 | RSB1710-C3 | 56.80 |
| .1715 | | 1.000 | 2.000 | .0154 | 4 | 3/16 | 4 | RSB1715 | 49.60 | RSB1715-C3 | 56.80 |
| .1719 (11/64) | | 1.000 | 2.000 | .0155 | 4 | 3/16 | 4 | RSB1719 | 49.60 | RSB1719-C3 | 56.80 |
| .1725 | | 1.000 | 2.000 | .0155 | 4 | 3/16 | 4 | RSB1725 | 49.60 | RSB1725-C3 | 56.80 |
| .1730 | #17 | 1.000 | 2.000 | .0156 | 4 | 3/16 | 4 | RSB1730 | 49.60 | RSB1730-C3 | 56.80 |
| .1735 | | 1.000 | 2.000 | .0156 | 4 | 3/16 | 4 | RSB1735 | 49.60 | RSB1735-C3 | 56.80 |
| .1770 | #16 | 1.000 | 2.000 | .0159 | 4 | 3/16 | 4 | RSB1770 | 49.60 | RSB1770-C3 | 56.80 |
| .1800 | #15 | 1.000 | 2.125 | .0162 | 4 | 3/16 | 4 | RSB1800 | 49.60 | RSB1800-C3 | 56.80 |
| .1820 | #14 | 1.000 | 2.125 | .0164 | 4 | 3/16 | 4 | RSB1820 | 49.60 | RSB1820-C3 | 56.80 |
| .1850 (4.70 mm) | #13 | 1.000 | 2.125 | .0167 | 4 | 1/4 | 4 | RSB1850 | 59.90 | RSB1850-C3 | 68.50 |
| .1860 | | 1.000 | 2.125 | .0167 | 4 | 1/4 | 4 | RSB1860 | 59.90 | RSB1860-C3 | 68.50 |
| .1865 | | 1.000 | 2.125 | .0168 | 4 | 1/4 | 4 | RSB1865 | 59.90 | RSB1865-C3 | 68.50 |
| .1870 | | 1.000 | 2.125 | .0168 | 4 | 1/4 | 4 | RSB1870 | 59.90 | RSB1870-C3 | 68.50 |
| .1875 (3/16) | | 1.000 | 2.125 | .0169 | 4 | 1/4 | 4 | RSB1875 | 59.90 | RSB1875-C3 | 68.50 |
| .1880 | | 1.000 | 2.125 | .0169 | 4 | 1/4 | 4 | RSB1880 | 59.90 | RSB1880-C3 | 68.50 |
| .1885 | | 1.000 | 2.125 | .0170 | 4 | 1/4 | 4 | RSB1885 | 59.90 | RSB1885-C3 | 68.50 |
| .1890 | #12 | 1.000 | 2.125 | .0170 | 4 | 1/4 | 4 | RSB1890 | 59.90 | RSB1890-C3 | 68.50 |
| .1910 | #11 | 1.000 | 2.125 | .0172 | 4 | 1/4 | 4 | RSB1910 | 59.90 | RSB1910-C3 | 68.50 |
| .1935 | #10 | 1.000 | 2.125 | .0174 | 4 | 1/4 | 4 | RSB1935 | 59.90 | RSB1935-C3 | 68.50 |
| .1960 | #9 | 1.000 | 2.125 | .0176 | 4 | 1/4 | 4 | RSB1960 | 59.90 | RSB1960-C3 | 68.50 |
| .1969 (5.00 mm) | | 1.000 | 2.125 | .0177 | 4 | 1/4 | 4 | RSB1969 | 63.90 | RSB1969-C3 | 72.60 |
| .1990 | #8 | 1.000 | 2.125 | .0179 | 4 | 1/4 | 4 | RSB1990 | 63.90 | RSB1990-C3 | 72.60 |
| .2010 | #7 | 1.000 | 2.125 | .0181 | 4 | 1/4 | 4 | RSB2010 | 63.90 | RSB2010-C3 | 72.60 |
| .2015 | | 1.000 | 2.125 | .0181 | 4 | 1/4 | 4 | RSB2015 | 63.90 | RSB2015-C3 | 72.60 |
| .2020 | | 1.000 | 2.125 | .0182 | 4 | 1/4 | 4 | RSB2020 | 63.90 | RSB2020-C3 | 72.60 |
| .2025 | | 1.000 | 2.125 | .0182 | 4 | 1/4 | 4 | RSB2025 | 63.90 | RSB2025-C3 | 72.60 |
| .2031 (13/64) | | 1.000 | 2.250 | .0183 | 4 | 1/4 | 4 | RSB2031 | 65.10 | RSB2031-C3 | 73.70 |
| .2035 | | 1.000 | 2.250 | .0183 | 4 | 1/4 | 4 | RSB2035 | 65.10 | RSB2035-C3 | 73.70 |
| .2040 | #6 | 1.000 | 2.250 | .0184 | 4 | 1/4 | 4 | RSB2040 | 65.10 | RSB2040-C3 | 73.70 |
| .2045 | | 1.000 | 2.250 | .0184 | 4 | 1/4 | 4 | RSB2045 | 65.10 | RSB2045-C3 | 73.70 |
| .2055 | #5 | 1.000 | 2.250 | .0185 | 4 | 1/4 | 4 | RSB2055 | 65.10 | RSB2055-C3 | 73.70 |
| .2090 | #4 | 1.000 | 2.250 | .0188 | 4 | 1/4 | 4 | RSB2090 | 65.10 | RSB2090-C3 | 73.70 |
| .2130 | #3 | 1.000 | 2.250 | .0192 | 4 | 1/4 | 4 | RSB2130 | 65.10 | RSB2130-C3 | 73.70 |
| .2170 | | 1.000 | 2.375 | .0195 | 4 | 1/4 | 4 | RSB2170 | 65.10 | RSB2170-C3 | 73.70 |

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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# MINIATURE REAMERS

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| REAMER DIAMETER | WIRE | MARGIN LENGTH | OVERALL REACH | CHAMFER LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$* | | $L_2$ +.030" −.000" | $L_3$ +.030" −.000" | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .2175 | | 1.000 | 2.375 | .0196 | 4 | 1/4 | 4 | RSB2175 | 65.10 | RSB2175-C3 | 73.70 |
| .2180 | | 1.000 | 2.375 | .0196 | 4 | 1/4 | 4 | RSB2180 | 65.10 | RSB2180-C3 | 73.70 |
| .2185 | | 1.000 | 2.375 | .0197 | 4 | 1/4 | 4 | RSB2185 | 65.10 | RSB2185-C3 | 73.70 |
| .2187 (7/32) | | 1.000 | 2.375 | .0197 | 4 | 1/4 | 4 | RSB2187 | 65.10 | RSB2187-C3 | 73.70 |
| .2190 | | 1.000 | 2.375 | .0197 | 4 | 1/4 | 4 | RSB2190 | 65.10 | RSB2190-C3 | 73.70 |
| .2195 | | 1.000 | 2.375 | .0198 | 4 | 1/4 | 4 | RSB2195 | 65.10 | RSB2195-C3 | 73.70 |
| .2200 | | 1.000 | 2.375 | .0198 | 4 | 1/4 | 4 | RSB2200 | 65.10 | RSB2200-C3 | 73.70 |
| .2205 (5.60 mm) | | 1.000 | 2.375 | .0198 | 4 | 1/4 | 4 | RSB2205 | 65.10 | RSB2205-C3 | 73.70 |
| .2210 | #2 | 1.000 | 2.375 | .0199 | 4 | 1/4 | 4 | RSB2210 | 65.10 | RSB2210-C3 | 73.70 |
| .2280 | #1 | 1.125 | 2.500 | .0182 | 6 | 1/4 | 4 | RSB2280 | 70.50 | RSB2280-C3 | 79.10 |
| .2330 | | 1.125 | 2.500 | .0186 | 6 | 1/4 | 4 | RSB2330 | 70.50 | RSB2330-C3 | 79.10 |
| .2335 | | 1.125 | 2.500 | .0187 | 6 | 1/4 | 4 | RSB2335 | 70.50 | RSB2335-C3 | 79.10 |
| .2340 | A | 1.125 | 2.500 | .0187 | 6 | 1/4 | 4 | RSB2340 | 70.50 | RSB2340-C3 | 79.10 |
| .2344 (15/64) | | 1.125 | 2.500 | .0188 | 6 | 1/4 | 4 | RSB2344 | 70.50 | RSB2344-C3 | 79.10 |
| .2350 | | 1.125 | 2.500 | .0188 | 6 | 1/4 | 4 | RSB2350 | 70.50 | RSB2350-C3 | 79.10 |
| .2355 | | 1.125 | 2.500 | .0188 | 6 | 1/4 | 4 | RSB2355 | 70.50 | RSB2355-C3 | 79.10 |
| .2360 | | 1.125 | 2.500 | .0189 | 6 | 1/4 | 4 | RSB2360 | 70.50 | RSB2360-C3 | 79.10 |
| .2362 (6.00 mm) | | 1.125 | 2.500 | .0189 | 6 | 1/4 | 4 | RSB2362 | 70.50 | RSB2362-C3 | 79.10 |
| .2380 | B | 1.125 | 2.500 | .0190 | 6 | 1/4 | 4 | RSB2380 | 70.50 | RSB2380-C3 | 79.10 |
| .2420 | C | 1.125 | 2.500 | .0194 | 6 | 1/4 | 4 | RSB2420 | 70.50 | RSB2420-C3 | 79.10 |
| .2460 | D | 1.125 | 2.500 | .0197 | 6 | 1/4 | 4 | RSB2460 | 70.50 | RSB2460-C3 | 79.10 |
| .2485 | | 1.125 | 2.750 | .0199 | 6 | 5/16 | 4 | RSB2485 | 72.90 | RSB2485-C3 | 83.20 |
| .2490 | | 1.125 | 2.750 | .0199 | 6 | 5/16 | 4 | RSB2490 | 72.90 | RSB2490-C3 | 83.20 |
| .2495 | | 1.125 | 2.750 | .0200 | 6 | 5/16 | 4 | RSB2495 | 72.90 | RSB2495-C3 | 83.20 |
| .2500 (1/4) | E | 1.125 | 2.750 | .0200 | 6 | 5/16 | 4 | RSB2500 | 72.90 | RSB2500-C3 | 83.20 |
| .2505 | | 1.125 | 2.750 | .0200 | 6 | 5/16 | 4 | RSB2505 | 72.90 | RSB2505-C3 | 83.20 |
| .2510 | | 1.125 | 2.750 | .0201 | 6 | 5/16 | 4 | RSB2510 | 72.90 | RSB2510-C3 | 83.20 |
| .2515 | | 1.125 | 2.750 | .0201 | 6 | 5/16 | 4 | RSB2515 | 72.90 | RSB2515-C3 | 83.20 |
| .2570 | F | 1.125 | 2.750 | .0206 | 6 | 5/16 | 4 | RSB2570 | 72.90 | RSB2570-C3 | 83.20 |
| .2610 | G | 1.125 | 2.875 | .0209 | 6 | 5/16 | 6 | RSB2610 | 107.30 | RSB2610-C3 | 119.30 |
| .2660 | H | 1.125 | 2.875 | .0213 | 6 | 5/16 | 6 | RSB2660 | 107.30 | RSB2660-C3 | 119.30 |
| .2720 | I | 1.125 | 2.875 | .0218 | 6 | 5/16 | 6 | RSB2720 | 107.30 | RSB2720-C3 | 119.30 |
| .2770 | J | 1.125 | 2.875 | .0222 | 6 | 5/16 | 6 | RSB2770 | 107.30 | RSB2770-C3 | 119.30 |
| .2810 | K | 1.125 | 2.875 | .0225 | 6 | 5/16 | 6 | RSB2810 | 107.30 | RSB2810-C3 | 119.30 |
| .2812 | | 1.125 | 2.875 | .0225 | 6 | 5/16 | 6 | RSB2812 | 107.30 | RSB2812-C3 | 119.30 |
| .2900 | L | 1.125 | 3.000 | .0232 | 6 | 5/16 | 6 | RSB2900 | 107.30 | RSB2900-C3 | 119.30 |
| .2950 | M | 1.125 | 3.000 | .0236 | 6 | 5/16 | 6 | RSB2950 | 107.30 | RSB2950-C3 | 119.30 |
| .3020 | N | 1.125 | 3.000 | .0242 | 6 | 5/16 | 6 | RSB3020 | 107.30 | RSB3020-C3 | 119.30 |
| .3125 (5/16) | | 1.125 | 3.000 | .0250 | 6 | 3/8 | 6 | RSB3125 | 131.50 | RSB3125-C3 | 145.80 |
| .3150 | | 1.125 | 3.000 | .0252 | 6 | 3/8 | 6 | RSB3150 | 131.50 | RSB3150-C3 | 145.80 |
| .3745 | | 1.250 | 3.500 | .0300 | 6 | 1/2 | 6 | RSB3745 | 169.00 | RSB3745-C3 | 188.40 |
| .3750 (3/8) | | 1.250 | 3.500 | .0300 | 6 | 1/2 | 6 | RSB3750 | 169.00 | RSB3750-C3 | 188.40 |
| .3755 | | 1.250 | 3.500 | .0300 | 6 | 1/2 | 6 | RSB3755 | 169.00 | RSB3755-C3 | 188.40 |
| .3760 | | 1.250 | 3.500 | .0301 | 6 | 1/2 | 6 | RSB3760 | 169.00 | RSB3760-C3 | 188.40 |

Please See Speeds & Feeds On Page 539

# MINIATURE REAMERS

## Metric




- Straight flutes for through and blind hole applications
- Oversized, common shanks to maintain strength, stiffness, and accuracy
- 45° chamfer angle
- AlTiN coating for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

| REAMER DIAMETER | WIRE | MARGIN LENGTH | OVERALL REACH | CHAMFER LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$* | | $L_2$ +.5mm −.0mm | $L_3$ +.5mm −.0mm | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .4570 | #77 | 3.5 mm | 5.5 mm | .0526 | 4 | 3 mm | 50 mm | RSC0457 | 44.90 | RSC0457-C3 | 50.90 |
| .4800 | | 3.5 mm | 6 mm | .0552 | 4 | 3 mm | 50 mm | RSC0480 | 44.90 | RSC0480-C3 | 50.90 |
| .5080 | #76 | 4 mm | 6 mm | .0584 | 4 | 3 mm | 50 mm | RSC0508 | 44.90 | RSC0508-C3 | 50.90 |
| .6350 | #72 | 5 mm | 8 mm | .0730 | 4 | 3 mm | 50 mm | RSC0635 | 44.90 | RSC0635-C3 | 50.90 |
| .6600 | #71 | 5 mm | 8 mm | .0759 | 4 | 3 mm | 50 mm | RSC0660 | 44.90 | RSC0660-C3 | 50.90 |
| .7870 | #68 | 6 mm | 10 mm | .0905 | 4 | 3 mm | 50 mm | RSC0787 | 44.90 | RSC0787-C3 | 50.90 |
| .8000 | | 6 mm | 10 mm | .0920 | 4 | 3 mm | 50 mm | RSC0800 | 44.90 | RSC0800-C3 | 50.90 |
| .8120 | #67 | 6.5 mm | 10 mm | .0934 | 4 | 3 mm | 50 mm | RSC0812 | 44.90 | RSC0812-C3 | 50.90 |
| .8300 | | 6.5 mm | 10 mm | .0955 | 4 | 3 mm | 50 mm | RSC0830 | 44.90 | RSC0830-C3 | 50.90 |
| .8380 | #66 | 6.5 mm | 10 mm | .0964 | 4 | 3 mm | 50 mm | RSC0838 | 44.90 | RSC0838-C3 | 50.90 |
| .8890 | #65 | 7 mm | 11 mm | .1022 | 4 | 3 mm | 50 mm | RSC0889 | 44.90 | RSC0889-C3 | 50.90 |
| .9000 | | 7 mm | 11 mm | .1035 | 4 | 3 mm | 50 mm | RSC0900 | 44.90 | RSC0900-C3 | 50.90 |
| .9500 | | 7.5 mm | 11 mm | .1093 | 4 | 3 mm | 50 mm | RSC0950 | 44.90 | RSC0950-C3 | 50.90 |
| .9900 | #61 | 7.5 mm | 12 mm | .1139 | 4 | 3 mm | 50 mm | RSC0990 | 44.90 | RSC0990-C3 | 50.90 |
| 1.0000 | | 8 mm | 12 mm | .1150 | 4 | 3 mm | 50 mm | RSC1000 | 44.90 | RSC1000-C3 | 50.90 |
| 1.0160 | #60 | 8 mm | 12 mm | .1168 | 4 | 3 mm | 50 mm | RSC1016 | 44.90 | RSC1016-C3 | 50.90 |
| 1.0500 | | 8 mm | 13 mm | .1208 | 4 | 3 mm | 50 mm | RSC1050 | 44.90 | RSC1050-C3 | 50.90 |
| 1.0660 | #58 | 8.5 mm | 13 mm | .1226 | 4 | 3 mm | 50 mm | RSC1066 | 44.90 | RSC1066-C3 | 50.90 |
| 1.0920 | #57 | 8.5 mm | 13 mm | .1256 | 4 | 3 mm | 50 mm | RSC1092 | 44.90 | RSC1092-C3 | 50.90 |
| 1.1500 | | 9 mm | 14 mm | .1150 | 4 | 3 mm | 50 mm | RSC1150 | 44.90 | RSC1150-C3 | 50.90 |
| 1.2000 | | 9 mm | 14 mm | .1200 | 4 | 3 mm | 50 mm | RSC1200 | 38.10 | RSC1200-C3 | 44.00 |
| 1.3970 | #54 | 10 mm | 16 mm | .1397 | 4 | 3 mm | 50 mm | RSC1397 | 38.10 | RSC1397-C3 | 44.00 |
| 1.4000 | | 10 mm | 17 mm | .1400 | 4 | 3 mm | 50 mm | RSC1400 | 38.10 | RSC1400-C3 | 44.00 |
| 1.4500 | | 10 mm | 17 mm | .1450 | 4 | 3 mm | 50 mm | RSC1450 | 38.10 | RSC1450-C3 | 44.00 |
| 1.5000 | | 10 mm | 18 mm | .1500 | 4 | 3 mm | 50 mm | RSC1500 | 37.70 | RSC1500-C3 | 43.60 |
| 1.5110 | #53 | 10 mm | 18 mm | .1511 | 4 | 3 mm | 50 mm | RSC1511 | 38.10 | RSC1511-C3 | 44.00 |
| 1.5500 | | 11 mm | 18 mm | .1550 | 4 | 3 mm | 50 mm | RSC1550 | 37.70 | RSC1550-C3 | 43.60 |
| 1.6000 | | 11 mm | 20 mm | .1600 | 4 | 3 mm | 50 mm | RSC1600 | 37.70 | RSC1600-C3 | 43.60 |
| 1.6120 | #52 | 11 mm | 20 mm | .1612 | 4 | 3 mm | 50 mm | RSC1612 | 37.70 | RSC1612-C3 | 43.60 |
| 1.6500 | | 11 mm | 20 mm | .1650 | 4 | 3 mm | 50 mm | RSC1650 | 37.70 | RSC1650-C3 | 43.60 |
| 1.7010 | #51 | 12 mm | 20 mm | .1701 | 4 | 3 mm | 50 mm | RSC1701 | 37.70 | RSC1701-C3 | 43.60 |
| 1.7780 | #50 | 12 mm | 20 mm | .1600 | 4 | 3 mm | 63 mm | RSC1778 | 37.70 | RSC1778-C3 | 43.60 |
| 1.8540 | #49 | 13 mm | 22 mm | .1669 | 4 | 3 mm | 63 mm | RSC1854 | 37.70 | RSC1854-C3 | 43.60 |
| 1.9500 | | 13 mm | 22 mm | .1755 | 4 | 3 mm | 63 mm | RSC1950 | 37.70 | RSC1950-C3 | 43.60 |
| 1.9930 | #47 | 14 mm | 22 mm | .1794 | 4 | 3 mm | 63 mm | RSC1993 | 37.70 | RSC1993-C3 | 43.60 |
| 2.0000 | | 14 mm | 22 mm | .1800 | 4 | 4 mm | 63 mm | RSC2000 | 37.70 | RSC2000-C3 | 44.30 |

*Tolerance for Uncoated is +.000mm/-.005mm. Tolerance for AlTiN coating is +.005mm/-.000mm
**Tolerance for Uncoated is +.000mm/-.005mm. Tolerance for AlTiN coating is +.008mm/-.000mm

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# MINIATURE REAMERS

## Metric (cont.)

continued from previous page

| REAMER DIAMETER | WIRE | MARGIN LENGTH | OVERALL REACH | CHAMFER LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$* | | $L_2$ $^{+.5mm}_{-.0mm}$ | $L_3$ $^{+.5mm}_{-.0mm}$ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 2.0500 | | 14 mm | 24 mm | .1845 | 4 | 4 mm | 63 mm | RSC2050 | 37.70 | RSC2050-C3 | 44.30 |
| 2.0570 | #46 | 14 mm | 24 mm | .1851 | 4 | 4 mm | 63 mm | RSC2057 | 37.70 | RSC2057-C3 | 44.30 |
| 2.0820 | #45 | 14 mm | 24 mm | .1874 | 4 | 4 mm | 63 mm | RSC2082 | 37.70 | RSC2082-C3 | 44.30 |
| 2.3500 | | 16 mm | 26 mm | .2115 | 4 | 4 mm | 63 mm | RSC2350 | 37.70 | RSC2350-C3 | 44.30 |
| 2.3740 | #42 | 16 mm | 26 mm | .2137 | 4 | 4 mm | 63 mm | RSC2374 | 37.70 | RSC2374-C3 | 44.30 |
| 2.4000 | | 16 mm | 28 mm | .2160 | 4 | 4 mm | 63 mm | RSC2400 | 37.70 | RSC2400-C3 | 44.30 |
| 2.4380 | #41 | 16 mm | 28 mm | .2194 | 4 | 4 mm | 63 mm | RSC2438 | 37.70 | RSC2438-C3 | 44.30 |
| 2.4890 | #40 | 17 mm | 28 mm | .2240 | 4 | 4 mm | 63 mm | RSC2489 | 37.70 | RSC2489-C3 | 44.30 |
| 2.5000 | | 17 mm | 28 mm | .2250 | 4 | 4 mm | 63 mm | RSC2500 | 37.70 | RSC2500-C3 | 44.30 |
| 2.9500 | | 20 mm | 35 mm | .2655 | 4 | 4 mm | 75 mm | RSC2950 | 38.70 | RSC2950-C3 | 45.40 |
| 3.0000 | | 20 mm | 35 mm | .2700 | 4 | 4 mm | 75 mm | RSC3000 | 37.70 | RSC3000-C3 | 44.30 |
| 3.0480 | #31 | 20 mm | 35 mm | .2743 | 4 | 6 mm | 75 mm | RSC3048 | 37.70 | RSC3048-C3 | 45.80 |
| $D_1$* | | $L_2$ $^{+.75mm}_{-.00mm}$ | $L_3$ $^{+.75mm}_{-.00mm}$ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 3.1500 | | 20 mm | 35 mm | .2835 | 4 | 6 mm | 75 mm | RSC3150 | 44.20 | RSC3150-C3 | 52.30 |
| 3.2000 | | 20 mm | 35 mm | .2880 | 4 | 6 mm | 75 mm | RSC3200 | 44.20 | RSC3200-C3 | 52.30 |
| 3.2630 | #30 | 20 mm | 35 mm | .2937 | 4 | 6 mm | 75 mm | RSC3263 | 44.70 | RSC3263-C3 | 52.80 |
| 3.5000 | | 20 mm | 40 mm | .3150 | 4 | 6 mm | 75 mm | RSC3500 | 44.70 | RSC3500-C3 | 52.80 |
| 3.9500 | | 22 mm | 45 mm | .3555 | 4 | 6 mm | 100 mm | RSC3950 | 44.70 | RSC3950-C3 | 53.40 |
| 4.0000 | | 22 mm | 45 mm | .3600 | 4 | 6 mm | 100 mm | RSC4000 | 44.20 | RSC4000-C3 | 52.80 |
| 4.0500 | | 24 mm | 45 mm | .3645 | 4 | 6 mm | 100 mm | RSC4050 | 44.70 | RSC4050-C3 | 53.40 |
| 4.5000 | | 26 mm | 50 mm | .4050 | 4 | 6 mm | 100 mm | RSC4500 | 49.60 | RSC4500-C3 | 58.20 |
| 4.7500 | | 26 mm | 50 mm | .4275 | 4 | 6 mm | 100 mm | RSC4750 | 59.90 | RSC4750-C3 | 68.50 |
| $D_1$** | | $L_2$ $^{+.75mm}_{-.00mm}$ | $L_3$ $^{+.75mm}_{-.00mm}$ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 5.9500 | | 30 mm | 60 mm | .4760 | 6 | 6 mm | 100 mm | RSC5950 | 70.50 | RSC5950-C3 | 79.10 |
| 6.0000 | | 30 mm | 60 mm | .4800 | 6 | 6 mm | 125 mm | RSC6000 | 70.50 | RSC6000-C3 | 79.60 |
| 6.0500 | | 30 mm | 60 mm | .4840 | 6 | 8 mm | 125 mm | RSC6050 | 70.50 | RSC6050-C3 | 83.80 |
| 6.3500 | E | 35 mm | 70 mm | .5080 | 6 | 8 mm | 125 mm | RSC6350 | 71.80 | RSC6350-C3 | 85.10 |
| 8.0000 | | 40 mm | 80 mm | .6400 | 6 | 8 mm | 125 mm | RSC8000 | 131.50 | RSC8000-C3 | 144.80 |

# MINIATURE REAMERS

(cont.)

## SPEEDS & FEEDS (Miniature Reamers)

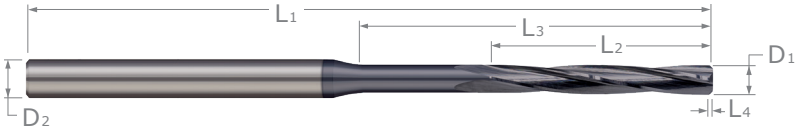
**Important Note:** Values in table are based on a material hardness of 29-37 Rc for Ferrous Materials and up to 28 Rc for Non-Ferrous Materials. For higher hardness materials, table values of IPR must be reduced. For ferrous materials at 38-45 Rc, reduce IPR to 80%. For complete speeds and feeds charts, please see www.harveytool.com.

In order to maintain appropriate stock removal amounts based on the reamer size, a hole should be pre-drilled at a diameter that is 90-94% of the finished reamed hole diameter. For example, for a finished reamed hole diameter of .0625", the pre-drilled hole diameter should be in the range of .056"-.058". The pre-drilled hole should not be smaller than 85% of the finished reamed hole diameter.

| Material | SFM | Chip Load IPR (Inches Per Revolution) By Reamer Diameter | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | .015 | .031 | .047 | .062 | .078 | .093 | .125 | .187 | .250 | . 375 |
| **Aluminum Alloys** Casting (2xx, 5xx, 7xx, 8xx) | 450 | .00041 | .00084 | .00127 | .00167 | .00211 | .00251 | .00338 | .00505 | .00675 | .01013 |
| Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 600 | | | | | | | | | | |
| Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 450 | .00036 | .00075 | .00114 | .00151 | .00190 | .00226 | .00304 | .00454 | .00608 | .00911 |
| Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 420 | | | | | | | | | | |
| Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 390 | | | | | | | | | | |
| Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 350 | | | | | | | | | | |
| Wrought - 5%-8% Si (4xxx) | 600 | | | | | | | | | | |
| Wrought - 8%-12% Si (4xxx) | 480 | | | | | | | | | | |
| **Magnesium Alloys** | 900 | .00041 | .00084 | .00127 | .00167 | .00211 | .00251 | .00338 | .00505 | .00675 | .01013 |
| **Zinc Alloys** | 480 | | | | | | | | | | |
| **Copper Alloys** High Coppers - 90%+ (C1xxxx) | 170 | .00032 | .00067 | .00102 | .00134 | .00168 | .00201 | .00270 | .00404 | .00540 | .00810 |
| Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800) | 375 | | | | | | | | | | |
| Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 170 | | | | | | | | | | |
| Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 375 | | | | | | | | | | |
| Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 375 | | | | | | | | | | |
| Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 170 | | | | | | | | | | |
| Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 400 | | | | | | | | | | |
| **Carbon Steels** Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx | 240 | .00035 | .00073 | .00111 | .00146 | .00184 | .00220 | .00295 | .00442 | .00591 | .00886 |
| 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx | 150 | .00032 | .00067 | .00102 | .00134 | .00168 | .00201 | .00270 | .00404 | .00540 | .00810 |
| **Stainless Steels** 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe | 180 | .00035 | .00073 | .00111 | .00146 | .00184 | .00220 | .00295 | .00442 | .00591 | .00886 |
| 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502 | 150 | .00032 | .00067 | .00102 | .00134 | .00168 | .00201 | .00270 | .00404 | .00540 | .00810 |
| 414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7 | 125 | .00020 | .00042 | .00063 | .00084 | .00105 | .00126 | .00169 | .00252 | .00338 | .00506 |
| **Tool Steels** A, L, O, P, W series | 125 | .00032 | .00067 | .00102 | .00134 | .00168 | .00201 | .00270 | .00404 | .00540 | .00810 |
| D, H, M, T, S series | 90 | .00020 | .00042 | .00063 | .00084 | .00105 | .00126 | .00169 | .00252 | .00338 | .00506 |
| **Titanium Alloys** | 100 | .00020 | .00042 | .00063 | .00084 | .00105 | .00126 | .00169 | .00252 | .00338 | .00506 |
| **High Temp Alloys** Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy | 70 | .00020 | .00042 | .00063 | .00084 | .00105 | .00126 | .00169 | .00252 | .00338 | .00506 |

# MINIATURE REAMERS

## Right Hand Spiral




| | D1 Tolerances |
|---|---|
| Uncoated | +.0000″ −.0002″ |
| AlTiN Coated | +.0002″ −.0000″ |

- Helical flutes increase shearing action on chamfer for superior finish
- Right hand spiral flutes for increased chip evacuation in blind hole applications
- Available uncoated or with AlTiN coating for improved lubricity and heat resistance
- Oversized, common shanks to maintain strength, stiffness, and accuracy
- 45° chamfer angle • h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

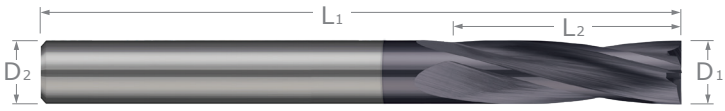
| REAMER DIAMETER | WIRE | MARGIN LENGTH | OVERALL REACH | CHAMFER LENGTH | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$* | | $L_2$ +.020″ −.000″ | $L_3$ +.020″ −.000″ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .0100 | #87 | .078 | .125 | .0017 | 4 | 1/8 | 1-1/2 | RRH0100 | 65.20 | RRH0100-C3 | 71.10 |
| .0150 | | .109 | .187 | .0025 | 4 | 1/8 | 1-1/2 | RRH0150 | 66.40 | RRH0150-C3 | 72.30 |
| .0200 | #76 | .140 | .250 | .0023 | 4 | 1/8 | 1-1/2 | RRH0200 | 48.90 | RRH0200-C3 | 54.80 |
| .0250 | #72 | .187 | .312 | .0029 | 4 | 1/8 | 1-1/2 | RRH0250 | 50.00 | RRH0250-C3 | 55.90 |
| .0300 | | .218 | .375 | .0035 | 4 | 1/8 | 2 | RRH0300 | 50.00 | RRH0300-C3 | 55.90 |
| .0305 | | .218 | .375 | .0035 | 4 | 1/8 | 2 | RRH0305 | 48.90 | RRH0305-C3 | 54.80 |
| .0310 | #68 | .218 | .375 | .0036 | 4 | 1/8 | 2 | RRH0310 | 50.00 | RRH0310-C3 | 55.90 |
| .0315 (.80 mm) | | .218 | .375 | .0036 | 4 | 1/8 | 2 | RRH0315 | 48.90 | RRH0315-C3 | 54.80 |
| .0350 | #65 | .250 | .437 | .0040 | 4 | 1/8 | 2 | RRH0350 | 50.00 | RRH0350-C3 | 55.90 |
| .0400 | #60 | .281 | .500 | .0046 | 4 | 1/8 | 2 | RRH0400 | 48.90 | RRH0400-C3 | 54.80 |
| .0500 | | .375 | .625 | .0050 | 4 | 1/8 | 2 | RRH0500 | 41.20 | RRH0500-C3 | 47.10 |
| .0600 | | .437 | .812 | .0060 | 4 | 1/8 | 2 | RRH0600 | 41.20 | RRH0600-C3 | 47.10 |
| .0620 | | .437 | .812 | .0062 | 4 | 1/8 | 2 | RRH0620 | 41.20 | RRH0620-C3 | 47.10 |
| .0625 (1/16) | | .437 | .812 | .0063 | 4 | 1/8 | 2 | RRH0625 | 41.20 | RRH0625-C3 | 47.10 |
| .0630 (1.60 mm) | | .437 | .812 | .0063 | 4 | 1/8 | 2 | RRH0630 | 41.20 | RRH0630-C3 | 47.10 |
| .0700 | #50 | .562 | .937 | .0063 | 4 | 1/8 | 2 | RRH0700 | 41.20 | RRH0700-C3 | 47.10 |
| .0781 (5/64) | | .562 | 1.000 | .0070 | 4 | 1/8 | 2 | RRH0781 | 41.20 | RRH0781-C3 | 47.10 |
| .0800 | | .562 | 1.000 | .0072 | 4 | 1/8 | 2 | RRH0800 | 41.20 | RRH0800-C3 | 47.10 |
| .0900 | | .625 | 1.125 | .0081 | 4 | 1/8 | 2-1/2 | RRH0900 | 41.20 | RRH0900-C3 | 47.10 |
| .0935 | #42 | .687 | 1.250 | .0084 | 4 | 1/8 | 2-1/2 | RRH0935 | 41.20 | RRH0935-C3 | 47.10 |
| .0937 (3/32) | | .687 | 1.250 | .0084 | 4 | 1/8 | 2-1/2 | RRH0937 | 41.20 | RRH0937-C3 | 47.10 |
| .0940 | | .687 | 1.250 | .0085 | 4 | 1/8 | 2-1/2 | RRH0940 | 41.20 | RRH0940-C3 | 47.10 |
| .0950 | | .687 | 1.250 | .0086 | 4 | 1/8 | 2-1/2 | RRH0950 | 41.20 | RRH0950-C3 | 47.10 |
| .1000 | | .750 | 1.375 | .0090 | 4 | 1/8 | 2-1/2 | RRH1000 | 41.20 | RRH1000-C3 | 47.10 |
| $D_1$* | | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | $L_4$ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| .1245 | | .750 | 1.500 | .0112 | 4 | 3/16 | 3 | RRH1245 | 48.30 | RRH1245-C3 | 54.90 |
| .1250 (1/8) | | .750 | 1.500 | .0113 | 4 | 3/16 | 3 | RRH1250 | 48.30 | RRH1250-C3 | 54.90 |
| .1255 | | .750 | 1.500 | .0113 | 4 | 3/16 | 3 | RRH1255 | 48.30 | RRH1255-C3 | 54.90 |
| .1285 | #30 | .750 | 1.500 | .0116 | 4 | 3/16 | 3 | RRH1285 | 48.30 | RRH1285-C3 | 54.90 |
| .1560 | | .875 | 1.750 | .0140 | 4 | 3/16 | 3 | RRH1560 | 48.30 | RRH1560-C3 | 54.90 |
| .1575 (4.00 mm) | | .875 | 1.750 | .0142 | 4 | 3/16 | 3 | RRH1575 | 48.30 | RRH1575-C3 | 54.90 |
| .1870 | | 1.000 | 2.125 | .0168 | 4 | 1/4 | 4 | RRH1870 | 64.90 | RRH1870-C3 | 75.00 |
| .1875 (3/16) | | 1.000 | 2.125 | .0169 | 4 | 1/4 | 4 | RRH1875 | 64.90 | RRH1875-C3 | 75.00 |
| .1880 | | 1.000 | 2.125 | .0169 | 4 | 1/4 | 4 | RRH1880 | 64.90 | RRH1880-C3 | 75.00 |

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

Please See Speeds & Feeds On Page 539

# COUNTERBORES

## Flat Bottom




**For Spot Facing or Counterboring on Irregular Surfaces**

- **Flat bottom (no dish)** design allows spot facing or counterboring on irregular surfaces
- Ideal for castings, rounded parts, concaved, or drafted surfaces • Center cutting
- Can be used for flat bottom reaming or straightening misaligned holes • 15° helix • 4 flutes • Solid carbide
- Ground with full cylindrical margin (not side cutting) • AlTiN coating for increased performance in ferrous materials
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials
- TiB2 coating prevents chip packing in non-abrasive aluminum alloys • CNC ground in the USA

| CUTTER DIAMETER | FLUTE LENGTH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | ALTiN COATED | | ALTiN NANO COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0000"/−.0005"* | $L_2$ +.030"/−.000" | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
| .0200 | .060 | 1/8 | 1-1/2 | 23320 | 36.10 | 23320-C3 | 42.00 | | | | |
| .0300 | 1/8 | 1/8 | 1-1/2 | 23330 | 35.40 | 23330-C3 | 41.30 | | | | |
| .0312 (1/32) | 1/8 | 1/8 | 1-1/2 | 23331 | 35.10 | 23331-C3 | 41.00 | | | | |
| .0394 (1 mm) | 5/32 | 1/8 | 1-1/2 | 2331M | 35.10 | 2331M-C3 | 41.00 | | | 2331M-C8 | 42.80 |
| .0400 | 5/32 | 1/8 | 1-1/2 | 23340 | 35.40 | 23340-C3 | 41.30 | | | | |
| .0469 (3/64) | 3/16 | 1/8 | 1-1/2 | 23347 | 35.10 | 23347-C3 | 41.00 | | | | |
| .0500 | 3/16 | 1/8 | 1-1/2 | 23350 | 35.40 | 23350-C3 | 41.30 | | | | |
| .0550 | 1/4 | 1/8 | 1-1/2 | 23355 | 35.10 | 23355-C3 | 41.00 | | | | |
| .0600 | 1/4 | 1/8 | 1-1/2 | 23360 | 35.10 | 23360-C3 | 41.00 | | | | |
| .0625 (1/16) | 1/4 | 1/8 | 1-1/2 | 23362 | 35.10 | 23362-C3 | 41.00 | 23362-C6 | 43.80 | 23362-C8 | 42.80 |
| .0700 | 9/32 | 1/8 | 1-1/2 | 23370 | 35.10 | 23370-C3 | 41.00 | | | | |
| .0781 (5/64) | 5/16 | 1/8 | 1-1/2 | 23378 | 35.10 | 23378-C3 | 41.00 | | | | |
| .0787 (2 mm) | 5/16 | 1/8 | 1-1/2 | 2332M | 35.10 | 2332M-C3 | 41.00 | | | | |
| .0800 | 5/16 | 1/8 | 1-1/2 | 23380 | 35.10 | 23380-C3 | 41.00 | | | | |
| .0900 | 3/8 | 1/8 | 1-1/2 | 23390 | 35.10 | 23390-C3 | 41.60 | | | | |
| .0937 (3/32) | 3/8 | 1/8 | 1-1/2 | 23393 | 35.10 | 23393-C3 | 41.00 | 23393-C6 | 43.80 | | |
| .1094 (7/64) | 3/8 | 1/8 | 1-1/2 | 23407 | 35.10 | 23407-C3 | 41.00 | | | | |
| .1181 (3 mm) | 3/8 | 1/8 | 1-1/2 | 2343M | 35.10 | 2343M-C3 | 41.00 | 2343M-C6 | 43.80 | 2343M-C8 | 42.80 |
| .1250 (1/8) | 1/2 | 1/8 | 1-1/2 | 23408 | 35.10 | 23408-C3 | 41.00 | 23408-C6 | 43.80 | 23408-C8 | 42.80 |
| .1406 (9/64) | 9/16 | 3/16 | 2 | 23409 | 33.50 | 23409-C3 | 39.90 | 23409-C6 | 41.20 | | |
| .1562 (5/32) | 5/8 | 3/16 | 2 | 23410 | 33.50 | 23410-C3 | 39.90 | | | | |
| .1575 (4 mm) | 5/8 | 3/16 | 2 | 2344M | 33.50 | 2344M-C3 | 39.90 | | | | |
| .1719 (11/64) | 5/8 | 3/16 | 2 | 23411 | 33.50 | 23411-C3 | 39.90 | 23411-C6 | 42.80 | | |
| .1750 | 5/8 | 3/16 | 2 | 23574 | 33.50 | 23574-C3 | 39.80 | | | | |
| .1875 (3/16) | 3/4 | 3/16 | 2 | 23412 | 33.50 | 23412-C3 | 39.90 | 23412-C6 | 42.80 | 23412-C8 | 42.10 |
| .1968 (5 mm) | 3/4 | 1/4 | 2-1/2 | 2345M | 45.90 | 2345M-C3 | 54.50 | 2345M-C6 | 55.60 | 2345M-C8 | 57.00 |
| .2031 (13/64) | 3/4 | 1/4 | 2-1/2 | 23413 | 45.90 | 23413-C3 | 54.50 | | | | |
| .2187 (7/32) | 3/4 | 1/4 | 2-1/2 | 23414 | 45.90 | 23414-C3 | 54.50 | | | | |
| .2344 (15/64) | 7/8 | 1/4 | 2-1/2 | 23415 | 45.90 | 23415-C3 | 54.50 | | | | |
| .2362 (6 mm) | 7/8 | 1/4 | 2-1/2 | 2346M | 45.90 | 2346M-C3 | 54.50 | 2346M-C6 | 55.60 | | |
| .2420 | 7/8 | 1/4 | 2-1/2 | 23641 | 45.90 | 23641-C3 | 54.00 | | | | |
| .2500 (1/4) | 7/8 | 1/4 | 2-1/2 | 23416 | 45.90 | 23416-C3 | 54.50 | 23416-C6 | 56.10 | 23416-C8 | 56.40 |
| .2656 (17/64) | 7/8 | 5/16 | 2-1/2 | 23417 | 56.60 | 23417-C3 | 66.80 | | | | |

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN and AlTiN Nano coating is +.0002"/−.0005".

continued on next page

# COUNTERBORES

## Flat Bottom (cont.)

continued from previous page

| CUTTER DIAMETER | FLUTE LENGTH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AlTiN NANO COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0000"}_{-.0005"}$* | $L_2$ $^{+.030"}_{-.000"}$ | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ | 4 FL | USD$ |
| .2812 (9/32) | 7/8 | 5/16 | 2-1/2 | 23418 | 56.60 | 23418-C3 | 66.80 | | | | |
| .2900 | 7/8 | 5/16 | 2-1/2 | 23689 | 56.60 | 23689-C3 | 66.20 | | | | |
| .2969 (19/64) | 7/8 | 5/16 | 2-1/2 | 23419 | 56.60 | 23419-C3 | 66.80 | | | | |
| .3125 (5/16) | 1 | 5/16 | 2-1/2 | 23420 | 56.60 | 23420-C3 | 66.80 | 23420-C6 | 70.90 | 23420-C8 | 72.90 |
| .3150 (8 mm) | 1 | 3/8 | 2-1/2 | 2348M | 67.80 | 2348M-C3 | 79.20 | | | | |
| .3281 (21/64) | 1 | 3/8 | 2-1/2 | 23421 | 67.80 | 23421-C3 | 79.20 | | | | |
| .3320 | 1 | 3/8 | 2-1/2 | 23731 | 67.80 | 23731-C3 | 79.20 | | | | |
| .3437 (11/32) | 1 | 3/8 | 2-1/2 | 23422 | 67.80 | 23422-C3 | 79.20 | | | | |
| .3594 (23/64) | 1 | 3/8 | 2-1/2 | 23423 | 67.80 | 23423-C3 | 79.20 | | | | |
| .3750 (3/8) | 1 | 3/8 | 2-1/2 | 23424 | 67.80 | 23424-C3 | 79.20 | 23424-C6 | 82.00 | 23424-C8 | 83.60 |
| .3937 (10 mm) | 1 | 7/16 | 2-3/4 | 2340M | 83.60 | 2340M-C3 | 97.70 | | | | |
| .4062 (13/32) | 1 | 7/16 | 2-3/4 | 23426 | 83.60 | 23426-C3 | 97.70 | | | | |
| .4220 | 1 | 7/16 | 2-3/4 | 23427 | 83.60 | 23427-C3 | 96.80 | | | | |
| .4375 (7/16) | 1 | 7/16 | 2-3/4 | 23428 | 83.60 | 23428-C3 | 97.70 | | | | |
| .4687 (15/32) | 1 | 1/2 | 3 | 23430 | 113.10 | 23430-C3 | 128.70 | | | | |
| .4724 (12 mm) | 1 | 1/2 | 3 | 23476 | 109.90 | 23476-C3 | 127.00 | | | | |
| .5000 (1/2) | 1 | 1/2 | 3 | 23432 | 109.90 | 23432-C3 | 127.00 | 23432-C6 | 128.80 | 23432-C8 | 128.30 |
| .5625 (9/16) | 1-1/2 | 5/8 | 3-1/2 | 23436 | 156.10 | 23436-C3 | 173.30 | | | | |
| .6250 (5/8) | 1-1/2 | 5/8 | 3-1/2 | 23440 | 175.00 | 23440-C3 | 192.00 | | | | |
| .6875 (11/16) | 1-1/2 | 3/4 | 4 | 23444 | 261.10 | 23444-C3 | 284.10 | | | | |
| .7500 (3/4) | 1-1/2 | 3/4 | 4 | 23448 | 253.70 | 23448-C3 | 272.00 | | | | |

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN and AlTiN Nano coating is +.0002"/−.0005".



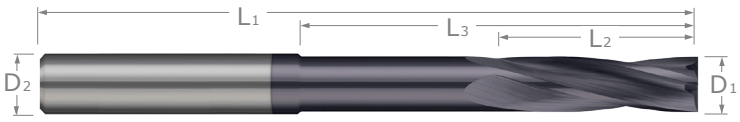


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# COUNTERBORES

## Flat Bottom – Long Reach



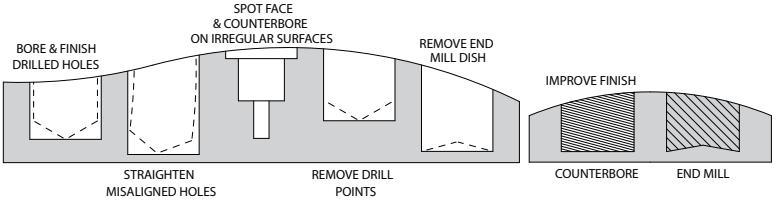

**Undersized Neck to Avoid Heeling**

- **Flat bottom (no dish)** design allows spot facing or counterboring on irregular surfaces
- Ideal for castings, rounded parts, concaved, or drafted surfaces
- Can be used for flat bottom reaming or straightening misaligned holes • Center cutting
- Ground with full cylindrical margin (not side cutting) • 15° helix • 4 flutes • Solid carbide
- CNC ground in the USA

| CUTTER DIAMETER | FLUTE LENGTH | OVERALL REACH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ +.0000″ −.0005″* | $L_2$ +.030″ −.000″ | $L_3$ +.030″ −.000″ | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .0312 (1/32) | 1/8 | 1/4 | 1/8 | 2-1/2 | 25431 | 43.40 | 25431-C3 | 49.30 |
| .0394 (1 mm) | 5/32 | 5/16 | 1/8 | 2-1/2 | 2541M | 42.50 | 2541M-C3 | 48.40 |
| .0469 (3/64) | 3/16 | 3/8 | 1/8 | 2-1/2 | 25447 | 42.50 | 25447-C3 | 48.40 |
| .0625 (1/16) | 1/4 | 1/2 | 1/8 | 2-1/2 | 25462 | 42.50 | 25462-C3 | 48.40 |
| .0781 (5/64) | 5/16 | 5/8 | 1/8 | 2-1/2 | 25478 | 42.50 | 25478-C3 | 48.40 |
| .0787 (2 mm) | 5/16 | 5/8 | 1/8 | 2-1/2 | 2542M | 42.50 | 2542M-C3 | 48.40 |
| .0937 (3/32) | 3/8 | 3/4 | 1/8 | 2-1/2 | 25493 | 42.50 | 25493-C3 | 48.40 |
| .1094 (7/64) | 3/8 | 7/8 | 1/8 | 2-1/2 | 25507 | 42.50 | 25507-C3 | 48.40 |
| .1181 (3 mm) | 3/8 | 1 | 1/8 | 2-1/2 | 2553M | 42.50 | 2553M-C3 | 48.40 |
| .1250 (1/8) | 1/2 | 1 | 1/8 | 2-1/2 | 25508 | 42.50 | 25508-C3 | 48.40 |
| .1406 (9/64) | 9/16 | 1-1/8 | 3/16 | 3 | 25509 | 51.80 | 25509-C3 | 58.30 |
| .1562 (5/32) | 5/8 | 1-1/4 | 3/16 | 3 | 25510 | 51.80 | 25510-C3 | 58.30 |
| .1575 (4 mm) | 5/8 | 1-1/4 | 3/16 | 3 | 2554M | 51.80 | 2554M-C3 | 58.30 |
| .1719 (11/64) | 5/8 | 1-3/8 | 3/16 | 3 | 25511 | 51.80 | 25511-C3 | 58.30 |
| .1875 (3/16) | 3/4 | 1-1/2 | 3/16 | 3 | 25512 | 51.80 | 25512-C3 | 58.30 |
| .1968 (5 mm) | 3/4 | 1-9/16 | 1/4 | 4 | 2555M | 71.80 | 2555M-C3 | 82.20 |
| .2031 (13/64) | 3/4 | 1-5/8 | 1/4 | 4 | 25513 | 68.80 | 25513-C3 | 79.00 |
| .2187 (7/32) | 3/4 | 1-3/4 | 1/4 | 4 | 25514 | 68.80 | 25514-C3 | 79.00 |
| .2344 (15/64) | 7/8 | 1-7/8 | 1/4 | 4 | 25515 | 68.80 | 25515-C3 | 79.00 |
| .2362 (6 mm) | 7/8 | 1-7/8 | 1/4 | 4 | 2556M | 71.80 | 2556M-C3 | 82.20 |
| .2500 (1/4) | 7/8 | 2 | 1/4 | 4 | 25516 | 68.80 | 25516-C3 | 79.00 |
| .2656 (17/64) | 7/8 | 2-1/8 | 5/16 | 4 | 25517 | 87.30 | 25517-C3 | 99.50 |
| .2812 (9/32) | 7/8 | 2-1/4 | 5/16 | 4 | 25518 | 87.30 | 25518-C3 | 99.50 |
| .2969 (19/64) | 7/8 | 2-3/8 | 5/16 | 4 | 25519 | 87.30 | 25519-C3 | 99.50 |
| .3125 (5/16) | 1 | 2-1/2 | 5/16 | 4 | 25520 | 87.30 | 25520-C3 | 99.50 |
| .3150 (8 mm) | 1 | 2-1/2 | 3/8 | 4 | 2558M | 112.60 | 2558M-C3 | 124.90 |
| .3437 (11/32) | 1 | 2-3/4 | 3/8 | 4 | 25522 | 105.40 | 25522-C3 | 117.60 |
| .3750 (3/8) | 1 | 3 | 3/8 | 4 | 25524 | 105.40 | 25524-C3 | 117.60 |
| .3937 (10 mm) | 1 | 3 | 7/16 | 4 | 2550M | 131.00 | 2550M-C3 | 148.30 |
| .4375 (7/16) | 1 | 3 | 7/16 | 4 | 25528 | 122.30 | 25528-C3 | 139.60 |
| .5000 (1/2) | 1 | 3 | 1/2 | 4 | 25532 | 149.90 | 25532-C3 | 167.20 |

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN coating is +.0002"/−.0005".

**APPLICATIONS:**



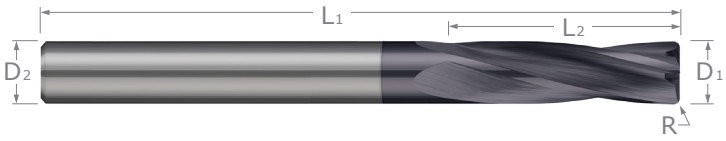

**SPOT EFFECTIVELY.** The flat bottom removes end mill dish or drill points while effectively spotting on irregular surfaces.

**HOLD POSITION.** The full cylindrical margin and back taper are not side cutting and won't grab or deflect.

**CONTROL FINISH.** The slow helix with a low rake avoids part engagement and helps to control finish.

# COUNTERBORES

## Flat Bottom – Corner Radius

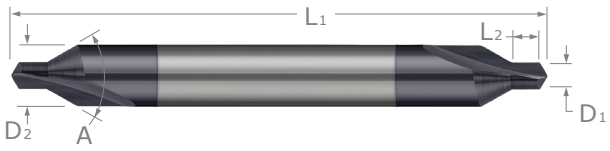



- For spot facing or counterboring on irregular surfaces
- Flat bottom (no dish) design allows spot facing or counterboring on irregular surfaces
- Corner Radius for improved strength
- Ideal for castings, rounded parts, concaved, or drafted surfaces
- Can be used for flat bottom reaming or straightening misaligned holes
- 4 flutes • 15° helix • Center cutting
- Ground with full cylindrical margin (not side cutting)
- AlTiN coating for improved lubricity and heat resistance
- Solid carbide • CNC ground in the USA

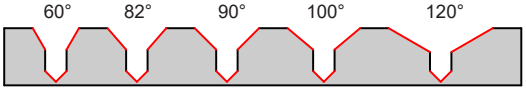
| CUTTER DIAMETER | CORNER RADIUS | FLUTE LENGTH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ $^{+.0000''}_{-.0005''}$ * | R $^{+.001''}_{-.001''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .0625 | .010 | .250 | 1/8 | 1-1/2 | 731562 | 38.50 | 731562-C3 | 44.40 |
| .0937 | .010 | .375 | 1/8 | 1-1/2 | 731593 | 38.50 | 731593-C3 | 44.40 |
| .1250 | .010 | .500 | 1/8 | 1-1/2 | 731608 | 38.50 | 731608-C3 | 44.40 |
| .1562 | .010 | .625 | 3/16 | 2 | 731610 | 36.80 | 731610-C3 | 43.10 |
| .1875 | .010 | .750 | 3/16 | 2 | 731612 | 36.80 | 731612-C3 | 43.10 |
| .2187 | .010 | .750 | 1/4 | 2-1/2 | 731614 | 49.60 | 731614-C3 | 57.70 |
| .2500 | .010 | .875 | 1/4 | 2-1/2 | 731616 | 49.60 | 731616-C3 | 57.70 |
| .2812 | .010 | .875 | 5/16 | 2-1/2 | 731618 | 60.70 | 731618-C3 | 70.40 |
| .3125 | .010 | 1.000 | 5/16 | 2-1/2 | 731620 | 60.70 | 731620-C3 | 70.40 |
| .3437 | .010 | 1.000 | 3/8 | 2-1/2 | 731622 | 72.20 | 731622-C3 | 83.70 |
| .3750 | .010 | 1.000 | 3/8 | 2-1/2 | 731624 | 72.20 | 731624-C3 | 83.70 |
| .4375 | .010 | 1.000 | 7/16 | 2-3/4 | 731628 | 88.60 | 731628-C3 | 101.90 |
| .5000 | .010 | 1.000 | 1/2 | 3 | 731632 | 115.20 | 731632-C3 | 130.80 |

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN coating is +.0002"/−.0005".

# COMBINED DRILL & COUNTERSINKS



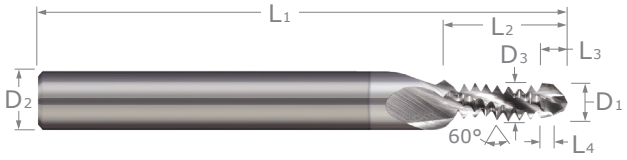

- 60°, 82°, 90°, 100°, and 120° included angles - plain type
- 2 flutes
- 118° included tip angle
- Double-ended
- Solid carbide
- CNC ground in the USA

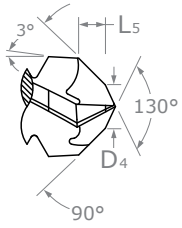



Stocked in *Five* Angles!

| INCLUDED ANGLE | SIZE | DRILL DIAMETER | DRILL LENGTH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| A +1° −1° | | D1 +.0015″ +.0005″ | L2 +.005″ −.000″ | D2 | L1 | 2 FL | USD$ | 2 FL | USD$ |
| 60° | 0000 | 1/64 | 1/64 | 1/8 | 1-1/2 | 11002 | 37.50 | 11002-C3 | 43.40 |
| | 000 | .020 | .020 | 1/8 | 1-1/2 | 11005 | 28.30 | 11005-C3 | 35.70 |
| | 00 | .025 | .025 | 1/8 | 1-1/2 | 11010 | 22.10 | 11010-C3 | 28.20 |
| | 0 | 1/32 | 1/32 | 1/8 | 1-1/2 | 11020 | 22.10 | 11020-C3 | 28.20 |
| | 1 | 3/64 | 3/64 | 1/8 | 1-1/2 | 11030 | 18.60 | 11030-C3 | 24.80 |
| | 2 | 5/64 | 5/64 | 3/16 | 2 | 11040 | 28.30 | 11040-C3 | 34.60 |
| | 3 | 7/64 | 7/64 | 1/4 | 2 | 11050 | 32.40 | 11050-C3 | 42.20 |
| | 4 | 1/8 | 1/8 | 5/16 | 2-1/2 | 11060 | 44.20 | 11060-C3 | 56.00 |
| | 5 | 3/16 | 3/16 | 7/16 | 2-3/4 | 11070 | 66.10 | 11070-C3 | 83.50 |
| | 6 | 7/32 | 7/32 | 1/2 | 3 | 11080 | 94.40 | 11080-C3 | 109.90 |
| | 7 | 1/4 | 1/4 | 1/2 | 3 | 11090 | 94.40 | 11090-C3 | 109.90 |
| 82° | 00 | .025 | .025 | 1/8 | 1-1/2 | 25610 | 23.70 | 25610-C3 | 29.60 |
| | 0 | 1/32 | 1/32 | 1/8 | 1-1/2 | 25620 | 23.50 | 25620-C3 | 29.40 |
| | 1 | 3/64 | 3/64 | 1/8 | 1-1/2 | 25630 | 19.60 | 25630-C3 | 25.50 |
| | 2 | 5/64 | 5/64 | 3/16 | 2 | 25640 | 30.30 | 25640-C3 | 37.20 |
| | 3 | 7/64 | 7/64 | 1/4 | 2 | 25650 | 34.40 | 25650-C3 | 44.20 |
| | 4 | 1/8 | 1/8 | 5/16 | 2-1/2 | 25660 | 46.70 | 25660-C3 | 58.30 |
| | 5 | 3/16 | 3/16 | 7/16 | 2-3/4 | 25670 | 70.30 | 25670-C3 | 87.60 |
| 90° | 0000 | 1/64 | 1/64 | 1/8 | 1-1/2 | 17902 | 38.60 | 17902-C3 | 44.50 |
| | 000 | .020 | .020 | 1/8 | 1-1/2 | 17905 | 29.30 | 17905-C3 | 36.60 |
| | 00 | .025 | .025 | 1/8 | 1-1/2 | 17910 | 22.90 | 17910-C3 | 30.20 |
| | 0 | 1/32 | 1/32 | 1/8 | 1-1/2 | 17920 | 22.90 | 17920-C3 | 30.20 |
| | 1 | 3/64 | 3/64 | 1/8 | 1-1/2 | 17930 | 19.20 | 17930-C3 | 25.40 |
| | 2 | 5/64 | 5/64 | 3/16 | 2 | 17940 | 29.30 | 17940-C3 | 36.30 |
| | 3 | 7/64 | 7/64 | 1/4 | 2 | 17950 | 33.30 | 17950-C3 | 43.10 |
| | 4 | 1/8 | 1/8 | 5/16 | 2-1/2 | 17960 | 45.40 | 17960-C3 | 57.00 |
| | 5 | 3/16 | 3/16 | 7/16 | 2-3/4 | 17970 | 68.20 | 17970-C3 | 85.50 |
| | 6 | 7/32 | 7/32 | 1/2 | 3 | 17980 | 96.40 | 17980-C3 | 112.00 |
| | 7 | 1/4 | 1/4 | 1/2 | 3 | 17990 | 96.40 | 17990-C3 | 112.00 |
| 100° | 0 | 1/32 | 1/32 | 1/8 | 1-1/2 | 849520 | 26.30 | 849520-C3 | 32.20 |
| | 1 | 3/64 | 3/64 | 1/8 | 1-1/2 | 849530 | 22.30 | 849530-C3 | 28.20 |
| | 2 | 5/64 | 5/64 | 3/16 | 2 | 849540 | 33.50 | 849540-C3 | 40.50 |
| | 3 | 7/64 | 7/64 | 1/4 | 2 | 849550 | 38.10 | 849550-C3 | 45.60 |
| | 4 | 1/8 | 1/8 | 5/16 | 2-1/2 | 849560 | 51.80 | 849560-C3 | 62.60 |
| 120° | 2 | 5/64 | 5/64 | 3/16 | 2 | 822540 | 33.50 | 822540-C3 | 39.40 |
| | 3 | 7/64 | 7/64 | 1/4 | 2 | 822550 | 38.10 | 822550-C3 | 45.40 |
| | 4 | 1/8 | 1/8 | 5/16 | 2-1/2 | 822560 | 51.80 | 822560-C3 | 59.30 |

# COMBINATION DRILL / THREAD MILLS

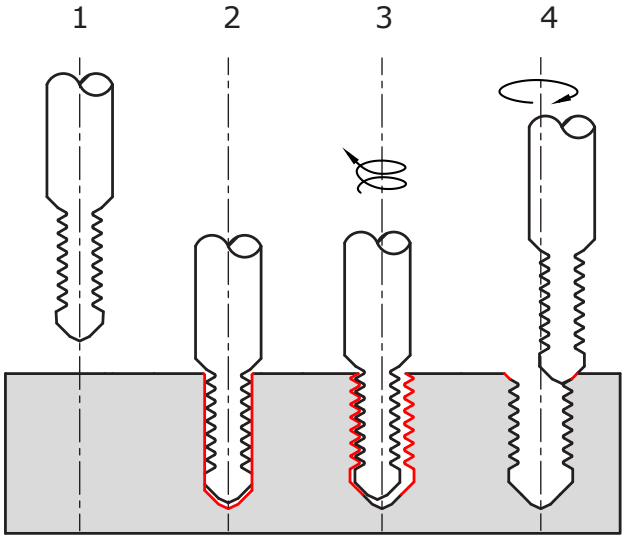



- Designed for combined drilling, threading, thread relief cutting, and chamfering
- One cutter for 4 different operations saves time on tool changes and leaves more room in the tool carousel
- Length of cut includes transition angle, allowing for optional 45° chamfer pass
- Optimized for cutting non-ferrous materials such as aluminum, unfilled plastics, copper, brass, and bronze alloys
- Recommended for cutting, threading and chamfering through holes
- 3 flutes to center • Cuts internal 60° UN threads • 90° included back chamfer
- Solid carbide • CNC ground in the USA

| THREAD SIZE | DRILL DIAMETER | LENGTH OF CUT | THREAD DIAMETER | SECONDARY POINT ANGLE DIAMETER | LENGTH OF TIP | LENGTH OF THREAD RELIEF | CHAMFER LENGTH | SHANK DIA. | OAL | UNCOATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0005″ −.0005″ | $L_2$ +.030″ −.000″ | $D_3$ +.0005″ −.0005″ | $D_4$ | $L_3$ | $L_4$ | $L_5$ | $D_2$ | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| 4-40 | .0876 | .2513 | .085 | .0356 | .0580 | .0250 | .0247 | 1/8 | 2 | 820616 | 140.10 | 820616-C8 | 147.80 |
| 6-32 | .1076 | .3323 | .100 | .0475 | .0707 | .0312 | .0284 | 3/16 | 2 | 820622 | 144.60 | 820622-C8 | 153.20 |
| 8-32 | .1336 | .3652 | .115 | .0735 | .0767 | .0312 | .0284 | 3/16 | 2 | 820628 | 154.90 | 820628-C8 | 163.50 |
| 10-24 | .1494 | .4966 | .120 | .0760 | .0939 | .0416 | .0345 | 1/4 | 2 | 820634 | 162.40 | 820634-C8 | 172.20 |
| 10-32 | .1596 | .4681 | .120 | .0995 | .0828 | .0312 | .0284 | 1/4 | 2 | 820636 | 162.40 | 820636-C8 | 172.90 |
| 1/4-20 | .2013 | .7154 | .180 | .1172 | .1168 | .0500 | .0394 | 3/8 | 2-1/2 | 820644 | 193.50 | 820644-C8 | 209.30 |
| 1/4-28 | .2152 | .7078 | .180 | .1494 | .1016 | .0357 | .0310 | 3/8 | 2-1/2 | 820646 | 193.50 | 820646-C8 | 209.30 |
| 5/16-18 | .2584 | .8750 | .240 | .1671 | .1372 | .0555 | .0427 | 3/8 | 2-1/2 | 820654 | 211.50 | 820654-C8 | 227.30 |
| 5/16-24 | .2719 | .8248 | .240 | .1985 | .1224 | .0416 | .0345 | 3/8 | 2-1/2 | 820656 | 237.90 | 820656-C8 | 253.70 |
| 3/8-16 | .3141 | 1.019 | .285 | .2140 | .1592 | .0625 | .0468 | 1/2 | 3 | 820664 | 282.60 | 820664-C8 | 301.00 |
| 7/16-20 | .3888 | 1.154 | .335 | .3047 | .1605 | .0500 | .0394 | 1/2 | 3-1/2 | 820676 | 305.70 | 820676-C8 | 325.30 |
| 1/2-13 | .4251 | 1.279 | .350 | .3064 | .2036 | .0769 | .0553 | 5/8 | 3-1/2 | 820684 | 315.30 | 820684-C8 | 342.00 |

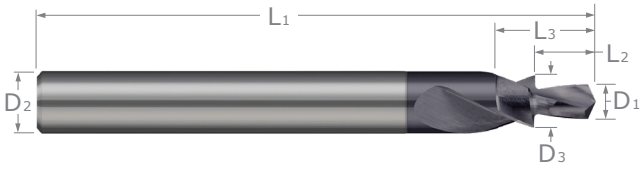
## Combination Drill/Thread Mills Order of Operations




1. Approach the workpiece by centering the tool along the axis of the anticipated hole.
2. Drill a hole to the desired depth. For simultaneous chamfering, use the full length of cut to engage on the transition of the tool.
3. To begin thread, lift drill up by ½x - 1x pitch, then helically interpolate up 1 pitch. Return tool to center axis of the hole for retraction.
4. Re-engage the tool on top of the hole to create, increase, or finish the chamfer if desired.

# COMBINATION DRILL/COUNTERBORE

## for Socket Head Cap Screws

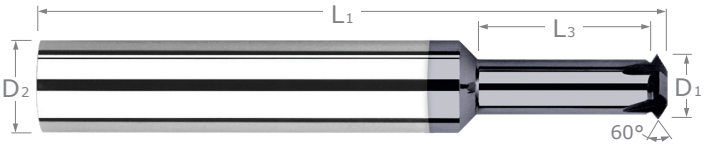



- Designed for combined drilling and counterboring
- Close fit for Socket Head Cap Screws
- Solid carbide • CNC ground in the USA

| SIZE | DRILL DIAMETER | DRILL LENGTH | COUNTERBORE DIAMETER | MARGIN LENGTH | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.000''}_{-.001''}$ | $L_2$ $^{+.010''}_{-.000''}$ | $D_3$ $^{+.000''}_{-.001''}$ | $L_3$ $^{+.010''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 0 | .067 | .101 (3x) | 1/8 | .168 | 1/8 | 2 | 700100 | 39.90 | 700100-C3 | 45.80 |
| 0 | .067 | .335 (5x) | 1/8 | .402 | 1/8 | 2 | 700000 | 40.40 | 700000-C3 | 46.30 |
| 1 | .081 | .122 (3x) | 5/32 | .203 | 3/16 | 2 | 700101 | 40.90 | 700101-C3 | 47.10 |
| 1 | .081 | .405 (5x) | 5/32 | .486 | 3/16 | 2-1/2 | 700001 | 41.40 | 700001-C3 | 48.10 |
| 2 | .094 | .141 (3x) | 3/16 | .234 | 3/16 | 2 | 700102 | 40.90 | 700102-C3 | 47.10 |
| 2 | .094 | .469 (5x) | 3/16 | .562 | 3/16 | 2-1/2 | 700002 | 41.40 | 700002-C3 | 48.10 |
| 3 | .109 | .164 (3x) | 7/32 | .273 | 1/4 | 2-1/2 | 700103 | 41.90 | 700103-C3 | 49.40 |
| 3 | .109 | .547 (5x) | 7/32 | .656 | 1/4 | 2-1/2 | 700003 | 42.50 | 700003-C3 | 50.60 |
| | $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ $^{+.030''}_{-.000''}$ | $D_3$ $^{+.000''}_{-.002''}$ | $L_3$ $^{+.030''}_{-.000''}$ | $D_2$ | $L_1$ | 2 FL | USD$ | 2 FL | USD$ |
| 4 | .125 | .188 (3x) | 7/32 | .313 | 1/4 | 2-1/2 | 700104 | 41.90 | 700104-C3 | 49.40 |
| 4 | .125 | .625 (5x) | 7/32 | .750 | 1/4 | 2-1/2 | 700004 | 42.50 | 700004-C3 | 50.60 |
| 5 | .140 | .211 (3x) | 1/4 | .352 | 1/4 | 2-1/2 | 700105 | 41.90 | 700105-C3 | 49.40 |
| 5 | .140 | .703 (5x) | 1/4 | .844 | 1/4 | 3 | 700005 | 42.50 | 700005-C3 | 50.60 |
| 6 | .156 | .234 (3x) | 9/32 | .391 | 5/16 | 2-1/2 | 700106 | 45.00 | 700106-C3 | 54.10 |
| 6 | .156 | .781 (5x) | 9/32 | .937 | 5/16 | 3 | 700006 | 47.10 | 700006-C3 | 56.80 |
| 8 | .172 | .258 (3x) | 5/16 | .430 | 5/16 | 2-1/2 | 700108 | 45.00 | 700108-C3 | 54.10 |
| 8 | .172 | .859 (5x) | 5/16 | 1.031 | 5/16 | 3 | 700008 | 47.10 | 700008-C3 | 56.80 |
| 10 | .203 | .305 (3x) | 3/8 | .508 | 3/8 | 3 | 700110 | 52.30 | 700110-C3 | 63.70 |
| 10 | .203 | 1.016 (5x) | 3/8 | 1.219 | 3/8 | 4 | 700010 | 55.40 | 700010-C3 | 67.70 |
| 1/4 | .265 | .398 (3x) | 7/16 | .664 | 1/2 | 4 | 700116 | 68.90 | 700116-C3 | 85.50 |
| 1/4 | .265 | 1.328 (5x) | 7/16 | 1.594 | 1/2 | 4 | 700016 | 68.90 | 700016-C3 | 85.50 |
| 5/16 | .343 | .516 (3x) | 17/32 | .859 | 5/8 | 4 | 700120 | 72.00 | 700120-C3 | 91.30 |
| 5/16 | .343 | 1.719 (5x) | 17/32 | 2.062 | 5/8 | 5 | 700020 | 76.20 | 700020-C3 | 98.60 |
| 3/8 | .406 | .609 (3x) | 5/8 | 1.016 | 5/8 | 5 | 700124 | 84.50 | 700124-C3 | 105.30 |
| 3/8 | .406 | 2.031 (5x) | 5/8 | 2.437 | 5/8 | 6 | 700024 | 87.60 | 700024-C3 | 110.00 |
| 7/16 | .468 | .703 (3x) | 23/32 | 1.172 | 3/4 | 5 | 700128 | 92.80 | 700128-C3 | 117.50 |
| 7/16 | .468 | 2.344 (5x) | 23/32 | 2.812 | 3/4 | 7 | 700028 | 99.00 | 700028-C3 | 128.10 |
| 1/2 | .531 | .797 (3x) | 13/16 | 1.328 | 1 | 6 | 700132 | 101.10 | 700132-C3 | 128.50 |
| 1/2 | .531 | 2.656 (5x) | 13/16 | 3.187 | 1 | 8 | 700032 | 113.60 | 700032-C3 | 145.80 |

# THREAD MILLING CUTTERS

## Single Form – UN Threads




Stocked in Multiple Reach Lengths!



- Single thread form – can mill multiple pitches
- Cuts internal and external 60° UN threads
- Mills right hand and left hand threads
- Tip of included angle ground to a point • Solid carbide • CNC ground in the USA

For thread fit chart, scan the QR code or visit harveytool.com/resources

| THREAD SIZE | CUTTER DIA. | NECK DIA. | MAX DEPTH OF THREAD | FLUTES | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.002″ | | $L_3$ +.020″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 00 | .032 | .016 | **1/16** | 2 | 1/8 | 1-1/2 | 71001 | 91.30 | 71001-C3 | 97.30 | | |
| 00 | .032 | .016 | **3/32** | 2 | 1/8 | 1-1/2 | 41401 | 96.80 | 41401-C3 | 102.80 | | |
| 00 | .032 | .016 | **1/8** | 2 | 1/8 | 1-1/2 | 54201 | 97.70 | 54201-C3 | 103.60 | | |
| 0 | .044 | .024 | **3/32** | 2 | 1/8 | 1-1/2 | 71002 | 88.20 | 71002-C3 | 94.10 | 71002-C4 | 103.20 |
| 0 | .044 | .024 | **1/8** | 2 | 1/8 | 1-1/2 | 41402 | 93.70 | 41402-C3 | 99.60 | 41402-C4 | 108.70 |
| 0 | .044 | .024 | **3/16** | 2 | 1/8 | 1-1/2 | 54202 | 100.80 | 54202-C3 | 106.70 | 54202-C4 | 115.70 |
| 0 | .044 | .024 | **1/4** | 2 | 1/8 | 1-1/2 | 993902 | 105.50 | 993902-C3 | 111.40 | | |
| 0 | .044 | .024 | **5/16** | 2 | 1/8 | 1-1/2 | 901202 | 109.80 | 901202-C3 | 115.70 | | |
| 1 | .054 | .032 | **3/32** | 2 | 1/8 | 1-1/2 | 932904 | 88.90 | 932904-C3 | 94.80 | | |
| 1 | .054 | .032 | **1/8** | 2 | 1/8 | 1-1/2 | 71004 | 88.20 | 71004-C3 | 94.10 | 71004-C4 | 103.20 |
| 1 | .054 | .032 | **3/16** | 2 | 1/8 | 1-1/2 | 41404 | 93.70 | 41404-C3 | 99.60 | 41404-C4 | 108.70 |
| 1 | .054 | .032 | **1/4** | 2 | 1/8 | 1-1/2 | 54204 | 100.80 | 54204-C3 | 106.70 | 54204-C4 | 115.70 |
| 1 | .054 | .032 | **5/16** | 2 | 1/8 | 1-1/2 | 993904 | 105.50 | 993904-C3 | 111.40 | | |
| 1 | .054 | .032 | **3/8** | 2 | 1/8 | 1-1/2 | 901204 | 109.80 | 901204-C3 | 115.70 | | |
| 2 | .064 | .038 | **1/8** | 2 | 1/8 | 1-1/2 | 772906 | 88.90 | 772906-C3 | 94.80 | | |
| 2 | .064 | .038 | **5/32** | 2 | 1/8 | 1-1/2 | 71006 | 88.20 | 71006-C3 | 94.10 | 71006-C4 | 103.20 |
| 2 | .064 | .038 | **3/16** | 2 | 1/8 | 1-1/2 | 822706 | 90.90 | 822706-C3 | 96.80 | | |
| 2 | .064 | .038 | **7/32** | 2 | 1/8 | 1-1/2 | 41406 | 93.70 | 41406-C3 | 99.60 | 41406-C4 | 108.70 |
| 2 | .064 | .038 | **1/4** | 2 | 1/8 | 1-1/2 | 821406 | 97.20 | 821406-C3 | 103.10 | | |
| 2 | .064 | .038 | **5/16** | 2 | 1/8 | 1-1/2 | 54206 | 100.80 | 54206-C3 | 106.70 | 54206-C4 | 115.70 |
| 2 | .064 | .038 | **7/16** | 2 | 1/8 | 1-1/2 | 993906 | 105.50 | 993906-C3 | 111.40 | | |
| 2 | .064 | .038 | **9/16** | 2 | 1/8 | 1-1/2 | 901206 | 109.80 | 901206-C3 | 115.70 | | |
| 3 | .072 | .040 | **5/32** | 2 | 1/8 | 1-1/2 | 71008 | 88.20 | 71008-C3 | 94.10 | 71008-C4 | 103.20 |
| 3 | .072 | .040 | **1/4** | 2 | 1/8 | 1-1/2 | 41408 | 93.70 | 41408-C3 | 99.60 | 41408-C4 | 108.70 |
| 3 | .072 | .040 | **5/16** | 2 | 1/8 | 1-1/2 | 821408 | 97.30 | 821408-C3 | 103.20 | | |
| 3 | .072 | .040 | **3/8** | 2 | 1/8 | 1-1/2 | 54208 | 100.80 | 54208-C3 | 106.70 | 54208-C4 | 115.70 |
| 3 | .072 | .040 | **1/2** | 2 | 1/8 | 1-1/2 | 993908 | 105.50 | 993908-C3 | 111.40 | | |
| 4 | .080 | .040 | **1/8** | 2 | 3/16 | 2 | 71010 | 88.40 | 71010-C3 | 95.00 | 71010-C4 | 105.10 |
| 4 | .080 | .040 | **3/16** | 2 | 3/16 | 2 | 820310 | 91.10 | 820310-C3 | 97.80 | | |
| 4 | .080 | .040 | **1/4** | 2 | 3/16 | 2 | 41410 | 93.90 | 41410-C3 | 100.50 | 41410-C4 | 115.00 |
| 4 | .080 | .040 | **5/16** | 2 | 3/16 | 2 | 821410 | 97.50 | 821410-C3 | 104.20 | | |
| 4 | .080 | .040 | **3/8** | 2 | 3/16 | 2 | 54210 | 101.20 | 54210-C3 | 107.80 | 54210-C4 | 122.10 |
| 4 | .080 | .040 | **7/16** | 2 | 3/16 | 2 | 771810 | 103.70 | 771810-C3 | 110.40 | | |
| 4 | .080 | .040 | **1/2** | 2 | 3/16 | 2 | 993910 | 106.20 | 993910-C3 | 112.90 | | |
| 4 | .080 | .040 | **5/8** | 2 | 3/16 | 2 | 901210 | 111.60 | 901210-C3 | 118.10 | | |
| 5 | .093 | .050 | **1/8** | 4 | 3/16 | 2 | 932915 | 88.90 | 932915-C3 | 95.10 | | |
| 5 | .093 | .050 | **3/16** | 4 | 3/16 | 2 | 71015 | 88.20 | 71015-C3 | 94.70 | | |
| 5 | .093 | .050 | **1/4** | 4 | 3/16 | 2 | 822715 | 90.90 | 822715-C3 | 97.60 | | |
| 5 | .093 | .050 | **3/8** | 4 | 3/16 | 2 | 41415 | 93.70 | 41415-C3 | 100.30 | 41415-C4 | 114.80 |
| 5 | .093 | .050 | **1/2** | 4 | 3/16 | 2 | 54215 | 100.80 | 54215-C3 | 107.30 | | |
| 5 | .093 | .050 | **5/8** | 4 | 3/16 | 2 | 993915 | 106.20 | 993915-C3 | 112.90 | | |

continued on next page

# THREAD MILLING CUTTERS

## Single Form – UN Threads (cont.)

continued from previous page

| THREAD SIZE | CUTTER DIA. | NECK DIA. | MAX DEPTH OF THREAD | FLUTES | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.002″ | | $L_3$ +.020″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 6 | .098 | .050 | **5/32** | 4 | 3/16 | 2 | 932920 | 88.40 | 932920-C3 | 95.00 | | |
| 6 | .098 | .050 | **1/4** | 4 | 3/16 | 2 | 71020 | 88.40 | 71020-C3 | 95.00 | 71020-C4 | 109.40 |
| 6 | .098 | .050 | **5/16** | 4 | 3/16 | 2 | 822720 | 90.90 | 822720-C3 | 97.60 | | |
| 6 | .098 | .050 | **3/8** | 4 | 3/16 | 2 | 41420 | 93.90 | 41420-C3 | 100.50 | 41420-C4 | 115.00 |
| 6 | .098 | .050 | **7/16** | 4 | 3/16 | 2 | 821420 | 97.50 | 821420-C3 | 104.20 | | |
| 6 | .098 | .050 | **1/2** | 4 | 3/16 | 2 | 54220 | 101.20 | 54220-C3 | 107.80 | 54220-C4 | 122.10 |
| 6 | .098 | .050 | **5/8** | 4 | 3/16 | 2 | 993920 | 106.20 | 993920-C3 | 112.90 | | |
| 6 | .098 | .050 | **3/4** | 4 | 3/16 | 2 | 901220 | 111.60 | 901220-C3 | 118.10 | | |
| 8 | .120 | .070 | **7/32** | 4 | 1/4 | 2-1/2 | 932930 | 89.70 | 932930-C3 | 98.60 | | |
| 8 | .120 | .070 | **5/16** | 4 | 1/4 | 2-1/2 | 71030 | 90.70 | 71030-C3 | 99.70 | 71030-C4 | 112.10 |
| 8 | .120 | .070 | **3/8** | 4 | 1/4 | 2-1/2 | 820330 | 93.70 | 820330-C3 | 102.60 | | |
| 8 | .120 | .070 | **1/2** | 4 | 1/4 | 2-1/2 | 41430 | 96.80 | 41430-C3 | 105.70 | 41430-C4 | 118.20 |
| 8 | .120 | .070 | **9/16** | 4 | 1/4 | 2-1/2 | 821430 | 100.00 | 821430-C3 | 107.30 | | |
| 8 | .120 | .070 | **5/8** | 4 | 1/4 | 2-1/2 | 54230 | 103.50 | 54230-C3 | 112.50 | 54230-C4 | 127.30 |
| 8 | .120 | .070 | **3/4** | 4 | 1/4 | 2-1/2 | 993930 | 111.60 | 993930-C3 | 120.50 | | |
| 8 | .120 | .070 | **7/8** | 4 | 1/4 | 2-1/2 | 901230 | 118.20 | 901230-C3 | 127.10 | | |
| 10 | .135 | .070 | **7/32** | 4 | 1/4 | 2-1/2 | 932940 | 89.70 | 932940-C3 | 98.60 | | |
| 10 | .135 | .070 | **5/16** | 4 | 1/4 | 2-1/2 | 71040 | 90.70 | 71040-C3 | 99.70 | 71040-C4 | 114.60 |
| 10 | .135 | .070 | **3/8** | 4 | 1/4 | 2-1/2 | 820340 | 93.70 | 820340-C3 | 102.60 | | |
| 10 | .135 | .070 | **1/2** | 4 | 1/4 | 2-1/2 | 41440 | 96.80 | 41440-C3 | 105.70 | 41440-C4 | 120.70 |
| 10 | .135 | .070 | **5/8** | 4 | 1/4 | 2-1/2 | 54240 | 103.50 | 54240-C3 | 112.50 | 54240-C4 | 127.30 |
| 10 | .135 | .070 | **3/4** | 4 | 1/4 | 2-1/2 | 771840 | 107.50 | 771840-C3 | 116.40 | | |
| 10 | .135 | .070 | **7/8** | 4 | 1/4 | 2-1/2 | 993940 | 111.60 | 993940-C3 | 120.50 | | |
| 10 | .135 | .070 | **1-1/8** | 4 | 1/4 | 2-1/2 | 901240 | 118.20 | 901240-C3 | 127.10 | | |
| 12 | .160 | .095 | **1/4** | 4 | 1/4 | 2-1/2 | 932945 | 91.60 | 932945-C3 | 100.40 | | |
| 12 | .160 | .095 | **3/8** | 4 | 1/4 | 2-1/2 | 71045 | 90.70 | 71045-C3 | 99.70 | | |
| 12 | .160 | .095 | **1/2** | 4 | 1/4 | 2-1/2 | 822745 | 93.70 | 822745-C3 | 102.60 | | |
| 12 | .160 | .095 | **5/8** | 4 | 1/4 | 2-1/2 | 41445 | 96.80 | 41445-C3 | 105.70 | | |
| 12 | .160 | .095 | **7/8** | 4 | 1/4 | 2-1/2 | 54245 | 103.50 | 54245-C3 | 112.50 | | |
| 12 | .160 | .095 | **1-1/8** | 4 | 1/4 | 2-1/2 | 993945 | 109.40 | 993945-C3 | 118.30 | | |
| 1/4 | .180 | .115 | **5/16** | 4 | 1/4 | 2-1/2 | 932950 | 89.70 | 932950-C3 | 98.60 | | |
| 1/4 | .180 | .115 | **3/8** | 4 | 1/4 | 2-1/2 | 772950 | 90.30 | 772950-C3 | 99.10 | | |
| 1/4 | .180 | .115 | **1/2** | 4 | 1/4 | 2-1/2 | 71050 | 90.70 | 71050-C3 | 99.70 | 71050-C4 | 114.60 |
| 1/4 | .180 | .115 | **5/8** | 4 | 1/4 | 2-1/2 | 822750 | 93.70 | 822750-C3 | 102.60 | | |
| 1/4 | .180 | .115 | **3/4** | 4 | 1/4 | 2-1/2 | 41450 | 96.80 | 41450-C3 | 105.70 | 41450-C4 | 120.70 |
| 1/4 | .180 | .115 | **7/8** | 4 | 1/4 | 2-1/2 | 821450 | 100.00 | 821450-C3 | 108.90 | | |
| 1/4 | .180 | .115 | **1** | 4 | 1/4 | 2-1/2 | 54250 | 103.50 | 54250-C3 | 112.50 | 54250-C4 | 127.30 |
| 1/4 | .180 | .115 | **1-1/8** | 4 | 1/4 | 2-1/2 | 771850 | 107.30 | 771850-C3 | 116.20 | | |
| 1/4 | .180 | .115 | **1-1/4** | 4 | 1/4 | 2-1/2 | 993950 | 111.60 | 993950-C3 | 120.50 | | |
| 1/4 | .180 | .115 | **1-1/2** | 4 | 1/4 | 3 | 901250 | 118.20 | 901250-C3 | 127.10 | | |
| 5/16 | .240 | .160 | **3/8** | 4 | 1/4 | 2-1/2 | 932955 | 91.60 | 932955-C3 | 100.40 | | |
| 5/16 | .240 | .160 | **1/2** | 4 | 1/4 | 2-1/2 | 71055 | 90.70 | 71055-C3 | 99.70 | 71055-C4 | 114.60 |
| 5/16 | .240 | .160 | **5/8** | 4 | 1/4 | 2-1/2 | 822755 | 93.70 | 822755-C3 | 102.60 | | |
| 5/16 | .240 | .160 | **3/4** | 4 | 1/4 | 2-1/2 | 41455 | 96.80 | 41455-C3 | 105.70 | 41455-C4 | 118.20 |
| 5/16 | .240 | .160 | **7/8** | 4 | 1/4 | 2-1/2 | 821455 | 101.80 | 821455-C3 | 110.80 | | |
| 5/16 | .240 | .160 | **1** | 4 | 1/4 | 2-1/2 | 54255 | 106.90 | 54255-C3 | 115.70 | 54255-C4 | 130.60 |
| 5/16 | .240 | .160 | **1-1/4** | 4 | 1/4 | 2-1/2 | 993955 | 111.60 | 993955-C3 | 120.50 | | |
| 5/16 | .240 | .160 | **1-1/2** | 4 | 1/4 | 3 | 901255 | 118.20 | 901255-C3 | 127.10 | | |

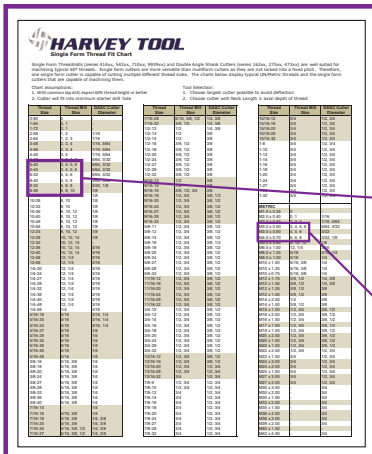
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# THREAD MILLING CUTTERS

## Single Form – UN Threads (cont.)

continued from previous page

| THREAD SIZE | CUTTER DIA. | NECK DIA. | MAX DEPTH OF THREAD | FLUTES | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | AMORPHOUS DIAMOND | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.000″ −.002″ | | $L_3$ +.020″ −.000″ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 3/8 | .300 | .218 | **3/4** | 4 | 3/8 | 2-1/2 | 71060 | 118.20 | 71060-C3 | 129.60 | 71060-C4 | 146.80 |
| 3/8 | .300 | .218 | **7/8** | 4 | 3/8 | 2-1/2 | 822760 | 121.00 | 822760-C3 | 132.40 | | |
| 3/8 | .300 | .218 | **1** | 4 | 3/8 | 2-1/2 | 41460 | 124.00 | 41460-C3 | 135.50 | 41460-C4 | 152.70 |
| 3/8 | .300 | .218 | **1-1/8** | 4 | 3/8 | 2-1/2 | 821460 | 130.00 | 821460-C3 | 141.40 | | |
| 3/8 | .300 | .218 | **1-1/4** | 4 | 3/8 | 2-1/2 | 54260 | 130.80 | 54260-C3 | 142.20 | 54260-C4 | 159.40 |
| 3/8 | .300 | .218 | **1-3/8** | 4 | 3/8 | 3 | 771860 | 133.10 | 771860-C3 | 144.50 | | |
| 3/8 | .300 | .218 | **1-1/2** | 4 | 3/8 | 3 | 993960 | 135.70 | 993960-C3 | 147.10 | | |
| 3/8 | .300 | .218 | **1-3/4** | 4 | 3/8 | 3 | 901260 | 140.60 | 901260-C3 | 152.10 | | |
| 7/16 | .340 | .230 | **3/4** | 4 | 3/8 | 2-1/2 | 71065 | 133.20 | 71065-C3 | 144.60 | | |
| 7/16 | .340 | .230 | **1** | 4 | 3/8 | 2-1/2 | 41465 | 138.80 | 41465-C3 | 150.20 | | |
| 7/16 | .340 | .230 | **1-1/4** | 4 | 3/8 | 3 | 54265 | 148.40 | 54265-C3 | 159.90 | | |
| 1/2 | .388 | .250 | **3/4** | 4 | 1/2 | 3 | 71070 | 133.20 | 71070-C3 | 150.70 | | |
| 1/2 | .388 | .250 | **1** | 4 | 1/2 | 3 | 822770 | 136.30 | 822770-C3 | 153.90 | | |
| 1/2 | .388 | .250 | **1-1/4** | 4 | 1/2 | 3 | 41470 | 139.30 | 41470-C3 | 156.90 | 41470-C4 | 175.90 |
| 1/2 | .388 | .250 | **1-1/2** | 4 | 1/2 | 3 | 821470 | 144.00 | 821470-C3 | 161.50 | | |
| 1/2 | .388 | .250 | **1-3/4** | 4 | 1/2 | 4 | 54270 | 148.60 | 54270-C3 | 166.00 | | |
| 1/2 | .388 | .250 | **2-1/4** | 4 | 1/2 | 4 | 993970 | 155.00 | 993970-C3 | 172.40 | | |
| 1/2 | .388 | .250 | **2-3/4** | 4 | 1/2 | 6 | 901270 | 161.00 | 901270-C3 | 178.50 | | |
| 9/16 | .400 | .270 | **7/8** | 6 | 1/2 | 3 | 71073 | 139.10 | 71073-C3 | 156.70 | | |
| 9/16 | .400 | .270 | **1-1/4** | 6 | 1/2 | 3 | 41473 | 139.10 | 41473-C3 | 156.70 | | |
| 5/8 | .450 | .300 | **1** | 6 | 1/2 | 3 | 71075 | 139.10 | 71075-C3 | 156.70 | | |
| 5/8 | .450 | .300 | **1-3/8** | 6 | 1/2 | 3 | 41475 | 145.60 | 41475-C3 | 163.20 | | |
| 5/8 | .450 | .300 | **1-3/4** | 6 | 1/2 | 4 | 54275 | 155.90 | 54275-C3 | 173.50 | | |
| 3/4 | .495 | .325 | **1** | 6 | 1/2 | 3 | 71080 | 139.10 | 71080-C3 | 156.70 | | |
| 3/4 | .495 | .325 | **1-1/4** | 6 | 1/2 | 3 | 822780 | 145.10 | 822780-C3 | 162.70 | | |
| 3/4 | .495 | .325 | **1-3/8** | 6 | 1/2 | 3 | 41480 | 145.60 | 41480-C3 | 163.20 | | |
| 3/4 | .495 | .325 | **1-3/4** | 6 | 1/2 | 4 | 54280 | 153.40 | 54280-C3 | 170.90 | | |
| 3/4 | .495 | .325 | **2-1/4** | 6 | 1/2 | 4 | 993980 | 160.10 | 993980-C3 | 177.50 | | |
| 3/4 | .495 | .325 | **2-3/4** | 6 | 1/2 | 6 | 901280 | 166.60 | 901280-C3 | 184.10 | | |
| 7/8 | .590 | .400 | **1-1/4** | 6 | 5/8 | 3-1/2 | 71085 | 189.20 | 71085-C3 | 206.80 | | |
| 7/8 | .590 | .400 | **1-1/2** | 6 | 5/8 | 3-1/2 | 41485 | 199.70 | 41485-C3 | 217.30 | | |
| 1 | .620 | .420 | **1-5/16** | 6 | 5/8 | 3-1/2 | 71090 | 189.20 | 71090-C3 | 206.80 | | |
| 1 | .620 | .420 | **1-3/4** | 6 | 5/8 | 3-1/2 | 41490 | 199.70 | 41490-C3 | 217.30 | | |
| 1 | .625 | .420 | **2-1/4** | 6 | 5/8 | 4 | 54290 | 214.20 | 54290-C3 | 233.60 | | |




## SINGLE FORM THREAD FIT CHARTS

| | |
|---|---|
| 5-40 | 3, 4, 5, 6 |
| 5-44 | 3, 4, 5, 6 |
| 6-32 | 4, 5, 6 |
| 6-40 | 4, 5, 6 |
| 8-32 | 5, 6, 8 |

| | |
|---|---|
| M3.0 x 0.50 | 3, 4, 5, 6 |
| M3.5 x 0.60 | 4, 5, 6 |
| M4.0 x 0.70 | 5, 6, 8 |

Our single form thread milling cutters can produce a range of thread sizes, from common UN threads to metric threads.

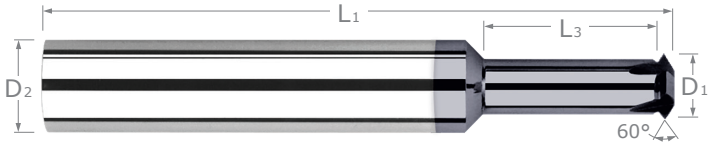
For example, our 5 thread size single form cutters (pictured left) can produce a range of thread sizes from 5-40 to 8-32 as well as M3.0 x 0.50 to M4.0 x 0.70.

For help with choosing the right thread mill, please call our Technical Support Team at **800-645-5609**.

For thread fit chart, scan the QR code or visit harveytool.com/resources

# THREAD MILLING CUTTERS

## Single Form – Metric



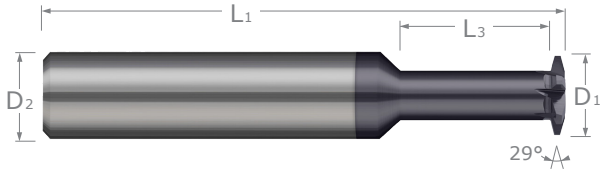

- Single thread form – can mill multiple pitches
- Cuts internal and external 60° metric threads
- Mills right hand and left hand threads
- Tip of included angle ground to a point
- Solid carbide • CNC ground in the USA

For thread fit chart, scan the QR code or visit harveytool.com/resources

| THREAD SIZE | CUTTER DIA. | NECK DIA. | MAX DEPTH OF THREAD | FLUTES | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.00 mm −.05 mm | | $L_3$ +.50 mm −.00 mm | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| M1.6 | 1.16 mm | .696 mm | **2.10 mm** | 2 | 3 mm | 38 mm | 890316 | 95.10 | 890316-C3 | 101.00 |
| M1.6 | 1.16 mm | .696 mm | **3.50 mm** | 2 | 3 mm | 38 mm | 882116 | 95.10 | 882116-C3 | 101.00 |
| M1.6 | 1.16 mm | .696 mm | **5.60 mm** | 2 | 3 mm | 38 mm | 826516 | 97.80 | 826516-C3 | 103.70 |
| M2 | 1.50 mm | .900 mm | **2.70 mm** | 2 | 3 mm | 38 mm | 890319 | 95.10 | 890319-C3 | 101.00 |
| M2 | 1.50 mm | .900 mm | **4.50 mm** | 2 | 3 mm | 38 mm | 882119 | 95.10 | 882119-C3 | 101.00 |
| M2 | 1.50 mm | .900 mm | **6.30 mm** | 2 | 3 mm | 38 mm | 737619 | 96.40 | 737619-C3 | 102.30 |
| M2 | 1.50 mm | .900 mm | **7.00 mm** | 2 | 3 mm | 38 mm | 826519 | 97.80 | 826519-C3 | 103.70 |
| M2 | 1.50 mm | .900 mm | **9.00 mm** | 2 | 3 mm | 38 mm | 761419 | 99.30 | 761419-C3 | 105.30 |
| M2.5 | 1.90 mm | 1.140 mm | **3.50 mm** | 2 | 3 mm | 38 mm | 890322 | 96.00 | 890322-C3 | 101.90 |
| M2.5 | 1.90 mm | 1.140 mm | **5.80 mm** | 2 | 3 mm | 38 mm | 882122 | 95.10 | 882122-C3 | 101.00 |
| M2.5 | 1.90 mm | 1.140 mm | **9.00 mm** | 2 | 3 mm | 38 mm | 826522 | 97.80 | 826522-C3 | 103.70 |
| M3 | 2.30 mm | 1.380 mm | **4.00 mm** | 4 | 3 mm | 38 mm | 890324 | 95.10 | 890324-C3 | 101.00 |
| M3 | 2.30 mm | 1.380 mm | **6.80 mm** | 4 | 3 mm | 38 mm | 882124 | 95.10 | 882124-C3 | 101.00 |
| M3 | 2.30 mm | 1.380 mm | **9.50 mm** | 4 | 3 mm | 38 mm | 737624 | 96.40 | 737624-C3 | 102.30 |
| M3 | 2.30 mm | 1.380 mm | **11.00 mm** | 4 | 3 mm | 38 mm | 826524 | 97.80 | 826524-C3 | 103.70 |
| M3 | 2.30 mm | 1.380 mm | **14.00 mm** | 4 | 3 mm | 38 mm | 761424 | 99.30 | 761424-C3 | 105.30 |
| M3.5 | 2.70 mm | 1.620 mm | **8.00 mm** | 4 | 3 mm | 38 mm | 882125 | 96.40 | 882125-C3 | 102.30 |
| M4 | 3.00 mm | 1.800 mm | **5.50 mm** | 4 | 3 mm | 38 mm | 890326 | 96.40 | 890326-C3 | 102.30 |
| M4 | 3.00 mm | 1.800 mm | **9.00 mm** | 4 | 3 mm | 38 mm | 882126 | 97.80 | 882126-C3 | 103.70 |
| M4 | 3.00 mm | 1.800 mm | **14.00 mm** | 4 | 3 mm | 38 mm | 826526 | 100.80 | 826526-C3 | 106.70 |
| M4 | 3.00 mm | 1.800 mm | **18.00 mm** | 4 | 3 mm | 50 mm | 761426 | 102.20 | 761426-C3 | 108.20 |
| M5 | 4.00 mm | 2.400 mm | **7.00 mm** | 4 | 4 mm | 50 mm | 890328 | 97.80 | 890328-C3 | 104.50 |
| M5 | 4.00 mm | 2.400 mm | **12.00 mm** | 4 | 4 mm | 50 mm | 882128 | 100.80 | 882128-C3 | 107.40 |
| M5 | 4.00 mm | 2.400 mm | **19.00 mm** | 4 | 4 mm | 50 mm | 826528 | 104.00 | 826528-C3 | 110.60 |
| M6 | 4.80 mm | 2.880 mm | **8.50 mm** | 4 | 6 mm | 50 mm | 890330 | 96.40 | 890330-C3 | 105.30 |
| M6 | 4.80 mm | 2.880 mm | **14.00 mm** | 4 | 6 mm | 50 mm | 882130 | 97.80 | 882130-C3 | 106.80 |
| M6 | 4.80 mm | 2.880 mm | **23.00 mm** | 4 | 6 mm | 63 mm | 826530 | 105.50 | 826530-C3 | 114.30 |
| M8 | 6.00 mm | 3.600 mm | **11.00 mm** | 4 | 6 mm | 50 mm | 890332 | 97.80 | 890332-C3 | 106.80 |
| M8 | 6.00 mm | 3.600 mm | **18.00 mm** | 4 | 6 mm | 50 mm | 882132 | 104.00 | 882132-C3 | 113.00 |
| M10 | 8.00 mm | 4.800 mm | **15.00 mm** | 4 | 8 mm | 63 mm | 890334 | 126.80 | 890334-C3 | 137.30 |
| M10 | 8.00 mm | 4.800 mm | **24.00 mm** | 4 | 8 mm | 63 mm | 882134 | 133.60 | 882134-C3 | 144.00 |
| M12 | 10.00 mm | 6.000 mm | **30.00 mm** | 4 | 10 mm | 75 mm | 882136 | 138.90 | 882136-C3 | 152.20 |
| M14 | 11.70 mm | 7.020 mm | **36.00 mm** | 4 | 12 mm | 75 mm | 882137 | 144.30 | 882137-C3 | 159.90 |
| M16 | 13.70 mm | 8.220 mm | **25.00 mm** | 6 | 14 mm | 75 mm | 890339 | 149.60 | 890339-C3 | 167.60 |
| M16 | 13.70 mm | 8.220 mm | **42.00 mm** | 6 | 14 mm | 89 mm | 882139 | 164.80 | 882139-C3 | 184.10 |

# THREAD MILLING CUTTERS

## Single Form – ACME

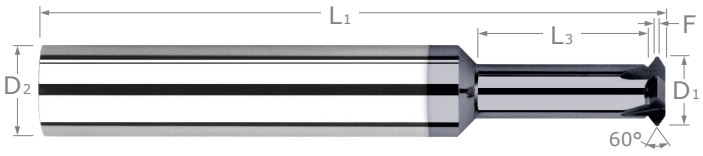



- Single thread form
- Cuts internal 29° ACME threads
- Mills right hand and left hand threads
- AlTiN coating for improved lubricity and heat resistance
- Solid carbide
- CNC ground in USA

| THREAD SIZE | CUTTER DIA. | NECK DIA. | MAX DEPTH OF THREAD | FLUTES | SHANK DIA. | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.000"}_{-.002"}$ | | $L_3$ $^{+.020"}_{-.000"}$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/4-16 | .170 | .078 | **1/4** | 4 | 3/16 | 2-1/2 | 736950 | 50.30 | 736950-C3 | 57.00 |
| 3/8 | .245 | .132 | **1/2** | 4 | 1/4 | 2-1/2 | 736960 | 59.80 | 736960-C3 | 67.90 |
| 1/2-10 | .360 | .210 | **5/8** | 4 | 3/8 | 2-1/2 | 736970 | 78.10 | 736970-C3 | 89.50 |
| 5/8-8 | .450 | .275 | **7/8** | 6 | 1/2 | 3 | 736975 | 108.50 | 736975-C3 | 124.00 |
| 3/4-6 | .495 | .278 | **7/8** | 6 | 1/2 | 3 | 736980 | 116.90 | 736980-C3 | 132.40 |
| 7/8-6 | .495 | .278 | **7/8** | 6 | 1/2 | 3 | 736985 | 116.90 | 736985-C3 | 132.40 |
| 1-5 | .620 | .370 | **1-1/8** | 6 | 5/8 | 3-1/2 | 736990 | 139.00 | 736990-C3 | 158.30 |

# THREAD MILLING CUTTERS

## Single Form – UN Threads – For Hardened Steels






Tip of Included Angle Ground to a Flat for Increased Wear Resistance

- **Designed for threading hardened steels 46-68Rc**
- Single thread form designed to mill common pitch sizes
- Cuts internal and external 60° UN threads
- Tip of included angle ground to a flat for increased wear resistance
- Large rigid core diameter and eccentric relief for improved strength
- Mills left hand and right hand threads • h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for improved edge retention • CNC ground in the USA

| THREAD SIZE | PITCH RANGE* | CUTTER DIAMETER | TIP FLAT | NECK DIAMETER | MAX DEPTH OF THREAD | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $D_1$ +.000″ −.002″ | F +.0000″ −.0005″ | | $L_3$ +.020″ −.000″ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| 0 | 80 | .044 | .0013 | .028 | **3/32** | 3 | 1/8 | 1-1/2 | 986602-C6 | 109.70 |
| 0 | 80 | .044 | .0013 | .028 | **1/8** | 3 | 1/8 | 1-1/2 | 993102-C6 | 113.10 |
| 0 | 80 | .044 | .0013 | .028 | **3/16** | 3 | 1/8 | 1-1/2 | 959502-C6 | 118.40 |
| 0 | 80 | .044 | .0013 | .028 | **1/4** | 3 | 1/8 | 1-1/2 | 930302-C6 | 123.70 |
| 0 | 80 | .044 | .0013 | .028 | **5/16** | 3 | 1/8 | 1-1/2 | 898902-C6 | 128.40 |
| 1 | 64-72 | .054 | .0014 | .034 | **1/8** | 3 | 1/8 | 1-1/2 | 986604-C6 | 108.60 |
| 1 | 64-72 | .054 | .0014 | .034 | **3/16** | 3 | 1/8 | 1-1/2 | 993104-C6 | 113.10 |
| 1 | 64-72 | .054 | .0014 | .034 | **1/4** | 3 | 1/8 | 1-1/2 | 959504-C6 | 118.40 |
| 1 | 64-72 | .054 | .0014 | .034 | **5/16** | 3 | 1/8 | 1-1/2 | 930304-C6 | 123.40 |
| 2 | 56-64 | .064 | .0016 | .041 | **5/32** | 3 | 1/8 | 1-1/2 | 986606-C6 | 108.60 |
| 2 | 56-64 | .064 | .0016 | .041 | **7/32** | 3 | 1/8 | 1-1/2 | 993106-C6 | 113.10 |
| 2 | 56-64 | .064 | .0016 | .041 | **1/4** | 3 | 1/8 | 1-1/2 | 771706-C6 | 115.80 |
| 2 | 56-64 | .064 | .0016 | .041 | **5/16** | 3 | 1/8 | 1-1/2 | 959506-C6 | 118.40 |
| 2 | 56-64 | .064 | .0016 | .041 | **7/16** | 3 | 1/8 | 1-1/2 | 930306-C6 | 123.70 |
| 3 | 48-56 | .072 | .0018 | .046 | **5/32** | 3 | 1/8 | 1-1/2 | 986608-C6 | 108.60 |
| 3 | 48-56 | .072 | .0018 | .046 | **1/4** | 3 | 1/8 | 1-1/2 | 993108-C6 | 113.10 |
| 3 | 48-56 | .072 | .0018 | .046 | **3/8** | 3 | 1/8 | 1-1/2 | 959508-C6 | 118.40 |
| 4 | 40-48 | .080 | .0021 | .050 | **5/32** | 3 | 3/16 | 2 | 986610-C6 | 109.50 |
| 4 | 40-48 | .080 | .0021 | .050 | **1/4** | 3 | 3/16 | 2 | 993110-C6 | 115.90 |
| 4 | 40-48 | .080 | .0021 | .050 | **5/16** | 3 | 3/16 | 2 | 771710-C6 | 118.30 |
| 4 | 40-48 | .080 | .0021 | .050 | **3/8** | 3 | 3/16 | 2 | 959510-C6 | 120.70 |
| 4 | 40-48 | .080 | .0021 | .050 | **1/2** | 3 | 3/16 | 2 | 930310-C6 | 125.80 |
| 4 | 40-48 | .080 | .0021 | .050 | **5/8** | 3 | 3/16 | 2 | 898910-C6 | 131.00 |
| 5 | 40-44 | .093 | .0023 | .063 | **3/16** | 4 | 3/16 | 2 | 986615-C6 | 115.90 |
| 5 | 40-44 | .093 | .0023 | .063 | **1/2** | 4 | 3/16 | 2 | 959515-C6 | 120.70 |
| 5 | 40-44 | .093 | .0023 | .063 | **5/8** | 4 | 3/16 | 2 | 930315-C6 | 127.20 |
| 6 | 32-40 | .098 | .0025 | .062 | **3/16** | 4 | 3/16 | 2 | 757320-C6 | 104.90 |
| 6 | 32-40 | .098 | .0025 | .062 | **1/4** | 4 | 3/16 | 2 | 986620-C6 | 109.50 |
| 6 | 32-40 | .098 | .0025 | .062 | **5/16** | 4 | 3/16 | 2 | 773220-C6 | 112.60 |
| 6 | 32-40 | .098 | .0025 | .062 | **3/8** | 4 | 3/16 | 2 | 993120-C6 | 115.90 |
| 6 | 32-40 | .098 | .0025 | .062 | **7/16** | 4 | 3/16 | 2 | 771720-C6 | 116.20 |
| 6 | 32-40 | .098 | .0025 | .062 | **1/2** | 4 | 3/16 | 2 | 959520-C6 | 120.70 |
| 6 | 32-40 | .098 | .0025 | .062 | **5/8** | 4 | 3/16 | 2 | 930320-C6 | 125.80 |

*Tools are designed to produce an 83% depth of thread maximum.

continued on next page

# THREAD MILLING CUTTERS

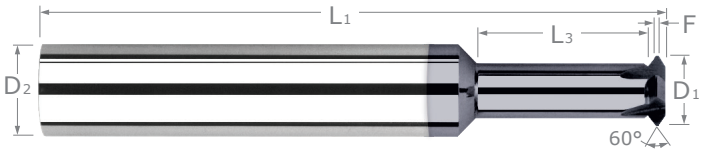
## Single Form – UN Threads – For Hardened Steels (cont.)

continued from previous page

| THREAD SIZE | PITCH RANGE* | CUTTER DIAMETER | TIP FLAT | NECK DIAMETER | MAX DEPTH OF THREAD | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $D_1$ +.000″ −.002″ | F +.0000″ −.0005″ | | $L_3$ +.020″ −.000″ | | $D_2$ (h6) | $L_1$ | TOOL # | USD$ |
| 8 | 32-36 | .120 | .0028 | .084 | **1/4** | 4 | 1/4 | 2-1/2 | 757330-C6 | 110.30 |
| 8 | 32-36 | .120 | .0028 | .084 | **5/16** | 4 | 1/4 | 2-1/2 | 986630-C6 | 114.90 |
| 8 | 32-36 | .120 | .0028 | .084 | **1/2** | 4 | 1/4 | 2-1/2 | 993130-C6 | 121.70 |
| 8 | 32-36 | .120 | .0028 | .084 | **5/8** | 4 | 1/4 | 2-1/2 | 959530-C6 | 128.00 |
| 8 | 32-36 | .120 | .0028 | .084 | **3/4** | 4 | 1/4 | 2-1/2 | 930330-C6 | 134.30 |
| 8 | 32-36 | .120 | .0028 | .084 | **7/8** | 4 | 1/4 | 2-1/2 | 898930-C6 | 140.90 |
| 10 | 24-36 | .135 | .0028 | .086 | **5/16** | 5 | 1/4 | 2-1/2 | 986640-C6 | 114.90 |
| 10 | 24-36 | .135 | .0028 | .086 | **3/8** | 5 | 1/4 | 2-1/2 | 773240-C6 | 118.30 |
| 10 | 24-36 | .135 | .0028 | .086 | **1/2** | 5 | 1/4 | 2-1/2 | 993140-C6 | 121.70 |
| 10 | 24-36 | .135 | .0028 | .086 | **5/8** | 5 | 1/4 | 2-1/2 | 959540-C6 | 128.00 |
| 10 | 24-36 | .135 | .0028 | .086 | **7/8** | 5 | 1/4 | 2-1/2 | 930340-C6 | 134.30 |
| 10 | 24-36 | .135 | .0028 | .086 | **1-1/8** | 5 | 1/4 | 2-1/2 | 898940-C6 | 140.90 |
| 12 | 24-32 | .160 | .0030 | .111 | **3/8** | 5 | 1/4 | 2-1/2 | 986645-C6 | 114.90 |
| 12 | 24-32 | .160 | .0030 | .111 | **5/8** | 5 | 1/4 | 2-1/2 | 993145-C6 | 128.00 |
| 1/4 | 20-32 | .180 | .0030 | .122 | **5/16** | 5 | 1/4 | 2-1/2 | 845750-C6 | 114.90 |
| 1/4 | 20-32 | .180 | .0030 | .122 | **3/8** | 5 | 1/4 | 2-1/2 | 757350-C6 | 118.30 |
| 1/4 | 20-32 | .180 | .0030 | .122 | **1/2** | 5 | 1/4 | 2-1/2 | 986650-C6 | 121.70 |
| 1/4 | 20-32 | .180 | .0030 | .122 | **5/8** | 5 | 1/4 | 2-1/2 | 773250-C6 | 124.90 |
| 1/4 | 20-32 | .180 | .0030 | .122 | **3/4** | 5 | 1/4 | 2-1/2 | 993150-C6 | 128.00 |
| 1/4 | 20-32 | .180 | .0030 | .122 | **1** | 5 | 1/4 | 2-1/2 | 959550-C6 | 134.30 |
| 1/4 | 20-32 | .180 | .0030 | .122 | **1-1/4** | 5 | 1/4 | 2-1/2 | 930350-C6 | 140.60 |
| 5/16 | 18-28 | .240 | .0036 | .174 | **3/8** | 5 | 1/4 | 2-1/2 | 845755-C6 | 116.00 |
| 5/16 | 18-28 | .240 | .0036 | .174 | **1/2** | 5 | 1/4 | 2-1/2 | 986655-C6 | 121.70 |
| 5/16 | 18-28 | .240 | .0036 | .174 | **5/8** | 5 | 1/4 | 2-1/2 | 773255-C6 | 126.00 |
| 5/16 | 18-28 | .240 | .0036 | .174 | **3/4** | 5 | 1/4 | 2-1/2 | 993155-C6 | 128.00 |
| 5/16 | 18-28 | .240 | .0036 | .174 | **1** | 5 | 1/4 | 2-1/2 | 959555-C6 | 134.30 |
| 5/16 | 18-28 | .240 | .0036 | .174 | **1-1/4** | 5 | 1/4 | 2-1/2 | 930355-C6 | 140.60 |
| 3/8 | 16-28 | .300 | .0036 | .227 | **1/2** | 5 | 3/8 | 2-1/2 | 845760-C6 | 148.40 |
| 3/8 | 16-28 | .300 | .0036 | .227 | **3/4** | 5 | 3/8 | 2-1/2 | 986660-C6 | 154.80 |
| 3/8 | 16-28 | .300 | .0036 | .227 | **1** | 5 | 3/8 | 2-1/2 | 993160-C6 | 161.30 |
| 3/8 | 16-28 | .300 | .0036 | .227 | **1-1/4** | 5 | 3/8 | 2-1/2 | 959560-C6 | 167.80 |
| 3/8 | 16-28 | .300 | .0036 | .227 | **1-1/2** | 5 | 3/8 | 3 | 930360-C6 | 174.10 |
| 3/8 | 16-28 | .300 | .0036 | .227 | **1-3/4** | 5 | 3/8 | 3 | 898960-C6 | 178.40 |
| 1/2 | 12-18 | .388 | .0056 | .294 | **3/4** | 5 | 1/2 | 3 | 986670-C6 | 171.00 |
| 1/2 | 12-18 | .388 | .0056 | .294 | **1** | 5 | 1/2 | 3 | 773270-C6 | 176.70 |
| 1/2 | 12-18 | .388 | .0056 | .294 | **1-1/4** | 5 | 1/2 | 3 | 993170-C6 | 182.40 |
| 1/2 | 12-18 | .388 | .0056 | .294 | **1-3/4** | 5 | 1/2 | 4 | 959570-C6 | 189.10 |
| 1/2 | 12-18 | .388 | .0056 | .294 | **2-1/4** | 5 | 1/2 | 4 | 930370-C6 | 195.40 |
| 3/4 | 10-16 | .495 | .0063 | .385 | **1** | 6 | 1/2 | 3 | 986680-C6 | 181.30 |
| 3/4 | 10-16 | .495 | .0063 | .385 | **1-3/8** | 6 | 1/2 | 3 | 993180-C6 | 196.60 |
| 3/4 | 10-16 | .495 | .0063 | .385 | **1-3/4** | 6 | 1/2 | 4 | 959580-C6 | 212.00 |
| 3/4 | 10-16 | .495 | .0063 | .385 | **2-1/4** | 6 | 1/2 | 4 | 930380-C6 | 227.20 |
| 1 | 8-14 | .620 | .0071 | .480 | **1-5/16** | 6 | 5/8 | 3-1/2 | 986690-C6 | 214.70 |
| 1 | 8-14 | .620 | .0071 | .480 | **1-3/4** | 6 | 5/8 | 3-1/2 | 993190-C6 | 230.00 |

# THREAD MILLING CUTTERS

## Single Form – Metric – For Hardened Steels






Tip of Included Angle Ground to a Flat for Increased Wear Resistance

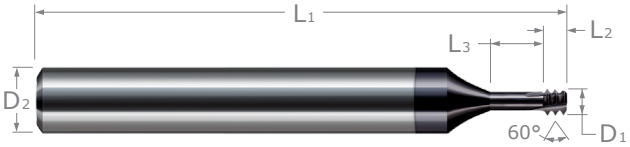
- **Designed for threading hardened steels 48-68Rc**
- Single thread form designed to mill common pitch sizes
- Cuts internal and external 60° Metric threads
- Tip of included angle ground to a flat for increased wear resistance
- Large rigid core diameter and eccentric relief for improved strength
- Mills left hand and right hand threads • h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for improved edge retention • CNC ground in the USA

| THREAD SIZE | PITCH RANGE* | CUTTER DIA. | TIP FLAT | NECK DIA. | MAX DEPTH OF THREAD | FLUTES | SHANK DIA. | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $D_1$ +.00 mm −.05 mm | F +.000 mm −.127 mm | | $L_3$ +.50 mm −.00 mm | | $D_2$ | $L_1$ | TOOL # | USD$ |
| M1.6 | 0.35 | 1.16 mm | .035 | .742 mm | **2.10 mm** | 3 | 3 mm | 38 mm | 771616-C6 | 108.80 |
| M1.6 | 0.35 | 1.16 mm | .035 | .742 mm | **3.50 mm** | 3 | 3 mm | 38 mm | 772716-C6 | 107.80 |
| M1.6 | 0.35 | 1.16 mm | .035 | .742 mm | **4.90 mm** | 3 | 3 mm | 38 mm | 724216-C6 | 110.30 |
| M2 | 0.40 | 1.50 mm | .040 | .960 mm | **2.70 mm** | 3 | 3 mm | 38 mm | 771619-C6 | 108.80 |
| M2 | 0.40 | 1.50 mm | .040 | .960 mm | **4.50 mm** | 3 | 3 mm | 38 mm | 772719-C6 | 107.80 |
| M2 | 0.40 | 1.50 mm | .040 | .960 mm | **6.30 mm** | 3 | 3 mm | 38 mm | 724219-C6 | 110.30 |
| M2.5 | 0.45 | 1.90 mm | .045 | 1.216 mm | **3.50 mm** | 3 | 3 mm | 38 mm | 771622-C6 | 108.80 |
| M2.5 | 0.45 | 1.90 mm | .045 | 1.216 mm | **5.80 mm** | 3 | 3 mm | 38 mm | 772722-C6 | 107.80 |
| M2.5 | 0.45 | 1.90 mm | .045 | 1.216 mm | **8.00 mm** | 3 | 3 mm | 38 mm | 724222-C6 | 110.30 |
| M3 | 0.50 | 2.30 mm | .050 | 1.541 mm | **4.00 mm** | 4 | 3 mm | 38 mm | 771624-C6 | 108.80 |
| M3 | 0.50 | 2.30 mm | .050 | 1.541 mm | **6.80 mm** | 4 | 3 mm | 38 mm | 772724-C6 | 107.80 |
| M3 | 0.50 | 2.30 mm | .050 | 1.541 mm | **9.50 mm** | 4 | 3 mm | 38 mm | 724224-C6 | 110.30 |
| M4 | 0.70 | 3.00 mm | .070 | 2.010 mm | **5.50 mm** | 4 | 3 mm | 38 mm | 771626-C6 | 109.40 |
| M4 | 0.70 | 3.00 mm | .070 | 2.010 mm | **9.00 mm** | 4 | 3 mm | 38 mm | 772726-C6 | 110.70 |
| M4 | 0.70 | 3.00 mm | .070 | 2.010 mm | **12.60 mm** | 4 | 3 mm | 38 mm | 724226-C6 | 113.10 |
| M5 | 0.80 | 4.00 mm | .080 | 2.800 mm | **7.00 mm** | 5 | 4 mm | 50 mm | 771628-C6 | 111.80 |
| M5 | 0.80 | 4.00 mm | .080 | 2.800 mm | **12.00 mm** | 5 | 4 mm | 50 mm | 772728-C6 | 114.50 |
| M5 | 0.80 | 4.00 mm | .080 | 2.800 mm | **17.00 mm** | 5 | 4 mm | 50 mm | 724228-C6 | 117.00 |
| M6 | 1.00 | 4.80 mm | .100 | 3.360 mm | **8.50 mm** | 5 | 6 mm | 50 mm | 771630-C6 | 112.30 |
| M6 | 1.00 | 4.80 mm | .100 | 3.360 mm | **14.00 mm** | 5 | 6 mm | 50 mm | 772730-C6 | 113.80 |
| M6 | 1.00 | 4.80 mm | .100 | 3.360 mm | **20.00 mm** | 5 | 6 mm | 63 mm | 724230-C6 | 116.30 |

*Tools are designed to produce an 83% depth of thread maximum.

# THREAD MILLING CUTTERS

## Tri-Form – UN Threads




**Left-Hand Cut, Left Hand Spiral Design**

- **Designed for threading in hardened steels and difficult-to-machine materials**
- Left-hand cut, left-hand spiral design for climb milling from top to bottom of right-hand threads
- Three forms and helical design reduces tool pressure and deflection resulting in accurate threads
- Cuts internal 60° UN threads
- Able to cut larger threads of the same pitch
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for maximum tool life
- CNC ground in the USA



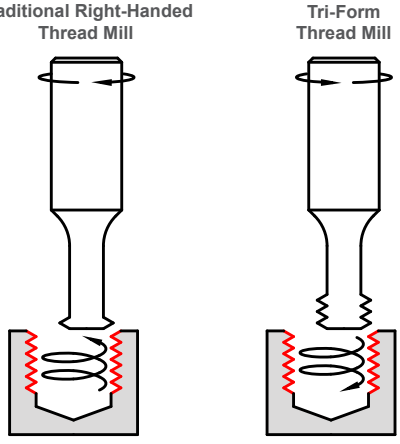
Left-Hand Cut, Left-Hand Spiral Design

| THREAD SIZE | CUTTER DIAMETER | LENGTH OF CUT | NECK DIAMETER | MAX DEPTH OF THREAD | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ | | $L_3$ $^{+.020''}_{-.000''}$ | | $D_2$ (h6) | $L_1$ | 3 FL | USD$ |
| 2-56 | .065 | .053 | .042 | **3/32** | 3 | 1/4 | 2-1/2 | 899910-C6 | 216.90 |
| 2-56 | .065 | .053 | .042 | **5/32** | 3 | 1/4 | 2-1/2 | 896410-C6 | 226.00 |
| 4-40 | .085 | .075 | .053 | **3/32** | 3 | 1/4 | 2-1/2 | 899916-C6 | 216.90 |
| 4-40 | .085 | .075 | .053 | **5/32** | 3 | 1/4 | 2-1/2 | 896416-C6 | 226.00 |
| 6-32 | .100 | .093 | .061 | **5/32** | 3 | 1/4 | 2-1/2 | 899922-C6 | 216.90 |
| 6-32 | .100 | .093 | .061 | **1/4** | 3 | 1/4 | 2-1/2 | 896422-C6 | 226.00 |
| 8-32 | .126 | .093 | .087 | **7/32** | 3 | 1/4 | 2-1/2 | 899928-C6 | 201.60 |
| 8-32 | .126 | .093 | .087 | **5/16** | 3 | 1/4 | 2-1/2 | 896428-C6 | 210.60 |
| 10-24 | .138 | .125 | .086 | **7/32** | 3 | 1/4 | 2-1/2 | 899934-C6 | 201.60 |
| 10-24 | .138 | .125 | .086 | **5/16** | 3 | 1/4 | 2-1/2 | 896434-C6 | 210.60 |
| 10-32 | .145 | .093 | .106 | **7/32** | 3 | 1/4 | 2-1/2 | 899936-C6 | 201.60 |
| 10-32 | .145 | .093 | .106 | **5/16** | 3 | 1/4 | 2-1/2 | 896436-C6 | 210.60 |
| 1/4-20 | .187 | .150 | .124 | **5/16** | 3 | 1/4 | 2-1/2 | 899944-C6 | 201.60 |
| 1/4-20 | .187 | .150 | .124 | **1/2** | 3 | 1/4 | 2-1/2 | 896444-C6 | 210.60 |
| 1/4-28 | .197 | .107 | .151 | **5/16** | 3 | 1/4 | 2-1/2 | 899946-C6 | 201.60 |
| 1/4-28 | .197 | .107 | .151 | **1/2** | 3 | 1/4 | 2-1/2 | 896446-C6 | 210.60 |
| 5/16-18 | .236 | .166 | .166 | **3/8** | 3 | 1/4 | 2-1/2 | 899954-C6 | 201.60 |
| 5/16-18 | .236 | .166 | .166 | **1/2** | 3 | 1/4 | 2-1/2 | 896454-C6 | 210.60 |
| 3/8-16 | .264 | .187 | .186 | **1/2** | 3 | 5/16 | 2-1/2 | 899964-C6 | 212.50 |
| 3/8-16 | .264 | .187 | .186 | **3/4** | 3 | 5/16 | 2-1/2 | 896464-C6 | 221.50 |

## Tri-Form Thread Mills

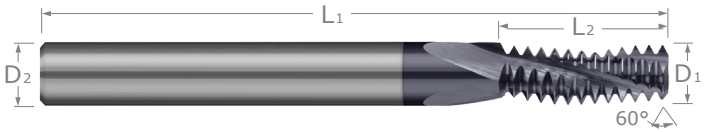
Our Tri-Form Thread Mills are unlike traditional right-handed thread mills, as they have a left-hand cut, left-hand spiral design.

- Improves thread accuracy and surface finish by climb milling from the top to the bottom of a hole.
- Tri-Form Thread Mills eliminate the need to arc-in when engaging the tool, which reduces radial pressure and deflection.



# THREAD MILLING CUTTERS

## Multi-Form – UN Threads




- Cuts internal and external 60° UN threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

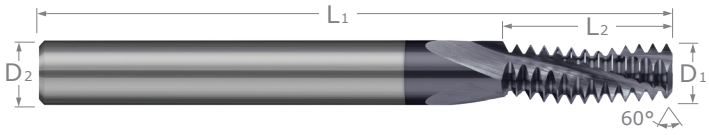
| THREAD SIZE | CUTTER DIA. | LENGTH OF CUT | FLUTES | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | | CVD DIAMOND (9 µm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0005″ −.0005″ | $L_2$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 2-56 | .065 | .125 | 3* | 1/8 | 2 | 70010 | 101.10 | 70010-C3 | 107.00 | 70010-C8 | 109.80 | | |
| 3-48 | .075 | .167 | 3* | 1/8 | 2 | 70012 | 106.90 | 70012-C3 | 112.80 | | | | |
| 4-40 | .085 | .175 | 3* | 1/8 | 2 | 70016 | 106.90 | 70016-C3 | 112.80 | 70016-C8 | 115.40 | 732816 | 166.50 |
| 5-44 | .095 | .228 | 3 | 1/8 | 2 | 70020 | 106.90 | 70020-C3 | 112.80 | | | | |
| 6-32 | .100 | .218 | 3 | 1/8 | 2 | 70022 | 110.50 | 70022-C3 | 116.50 | 70022-C8 | 119.10 | 732822 | 170.10 |
| 8-32 | .115 | .250 | 3 | 1/8 | 2 | 70028 | 118.50 | 70028-C3 | 124.50 | 70028-C8 | 127.20 | | |
| 8-36 | .115 | .250 | 3 | 1/8 | 2 | 70031 | 118.50 | 70031-C3 | 124.50 | | | | |
| 10-24 | .120 | .312 | 3 | 1/8 | 2 | 70034 | 124.80 | 70034-C3 | 130.70 | 70034-C8 | 132.40 | | |
| 10-28 | .120 | .312 | 3 | 1/8 | 2 | 70035 | 127.30 | 70035-C3 | 133.20 | | | | |
| 10-32 | .120 | .312 | 3 | 1/8 | 2 | 70036 | 124.80 | 70036-C3 | 130.70 | 70036-C8 | 133.30 | 732836 | 184.30 |
| 1/4-20 | .180 | .500 | 3 | 3/16 | 2-1/2 | 70044 | 149.20 | 70044-C3 | 155.80 | 70044-C8 | 157.80 | 732844 | 220.60 |
| 1/4-28 | .180 | .500 | 3 | 3/16 | 2-1/2 | 70046 | 149.20 | 70046-C3 | 155.80 | 70046-C8 | 157.80 | 732846 | 220.60 |
| 5/16-18 | .235 | .625 | 3 | 1/4 | 2-1/2 | 70054 | 161.60 | 70054-C3 | 170.30 | 70054-C8 | 170.90 | 732854 | 247.40 |
| 5/16-24 | .235 | .625 | 3 | 1/4 | 2-1/2 | 70056 | 182.60 | 70056-C3 | 191.30 | 70056-C8 | 191.90 | | |
| 3/8-16 | .285 | .750 | 4 | 5/16 | 3 | 70064 | 217.30 | 70064-C3 | 227.50 | 70064-C8 | 230.50 | | |
| 3/8-24 | .285 | .750 | 4 | 5/16 | 3 | 70066 | 217.30 | 70066-C3 | 227.50 | 70066-C8 | 230.50 | | |
| 7/16-14 | .305 | .750 | 4 | 5/16 | 3 | 70074 | 217.30 | 70074-C3 | 227.50 | 70074-C8 | 230.50 | | |
| 7/16-20 | .335 | .875 | 4 | 3/8 | 3-1/2 | 70076 | 234.50 | 70076-C3 | 246.70 | 70076-C8 | 251.50 | | |
| 1/2-13 | .350 | .875 | 4 | 3/8 | 3-1/2 | 70084 | 242.40 | 70084-C3 | 253.70 | | | | |
| 1/2-20 | .370 | 1.000 | 6 | 3/8 | 3-1/2 | 70086 | 254.40 | 70086-C3 | 266.70 | | | | |
| 1/2-32 | .370 | 1.000 | 6 | 3/8 | 3-1/2 | 70089 | 254.40 | 70089-C3 | 266.70 | | | | |
| 9/16-12 | .370 | .875 | 4 | 3/8 | 3-1/2 | 70092 | 242.40 | 70092-C3 | 253.70 | | | | |
| 9/16-18 | .370 | .875 | 4 | 3/8 | 3-1/2 | 70094 | 242.40 | 70094-C3 | 253.70 | | | | |
| 5/8-11 | .470 | 1.250 | 4 | 1/2 | 3-1/2 | 70104 | 299.70 | 70104-C3 | 316.70 | | | | |
| 3/4-10 | .495 | 1.250 | 4 | 1/2 | 3-1/2 | 70124 | 299.70 | 70124-C3 | 316.70 | | | | |
| 3/4-12 | .495 | 1.250 | 4 | 1/2 | 3-1/2 | 70126 | 299.70 | 70126-C3 | 316.70 | | | | |
| 3/4-16 | .490 | 1.250 | 4 | 1/2 | 3-1/2 | 70128 | 305.70 | 70128-C3 | 322.80 | | | | |
| 7/8-9 | .620 | 1.375 | 4 | 5/8 | 4 | 70132 | 459.70 | 70132-C3 | 479.00 | | | | |
| 7/8-14 | .490 | 1.250 | 4 | 1/2 | 3-1/2 | 70134 | 305.70 | 70134-C3 | 322.80 | | | | |
| 1-8 | .620 | 1.375 | 4 | 5/8 | 4 | 70154 | 459.70 | 70154-C3 | 479.00 | | | | |
| 1-12 | .745 | 1.500 | 6 | 3/4 | 4 | 70158 | 575.40 | 70158-C3 | 593.80 | | | | |

*Straight flutes

NEW SIZES!

# THREAD MILLING CUTTERS

## Multi-Form – UN Threads – For Hardened Steels

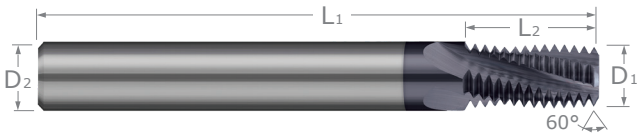



- Designed for threading hardened steels 46-68 Rc
- Cuts internal and external 60° UN threads
- Mill right hand and left hand threads
- Able to cut larger threads of the same pitch
- Variable helix design reduces chatter and harmonics and produces more accurate threads
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for maximum tool life
- CNC ground in the USA

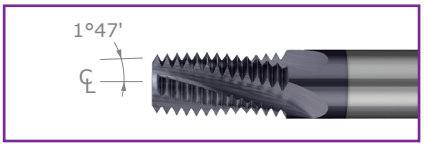
| THREAD SIZE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | AlTiN NANO COATED | | |
|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ | | $D_2$ | $L_1$ | TOOL # | USD$ | |
| 2-56 | .065 | .125 | 3 | 1/8 | 2 | 836710-C6 | 151.00 | |
| 4-40 | .085 | .180 | 3 | 1/8 | 2 | 836716-C6 | 144.30 | |
| 5-44 | .095 | .228 | 3 | 1/8 | 2 | 836720-C6 | 151.00 | |
| 6-32 | .100 | .218 | 3 | 1/8 | 2 | 836722-C6 | 148.80 | |
| 8-32 | .115 | .250 | 3 | 1/8 | 2 | 836728-C6 | 159.30 | |
| 10-24 | .120 | .312 | 3 | 3/16 | 2 | 836734-C6 | 167.20 | |
| 10-32 | .120 | .312 | 3 | 3/16 | 2 | 836736-C6 | 167.20 | |
| 1/4-20 | .180 | .500 | 3 | 3/16 | 2-1/2 | 836744-C6 | 199.20 | |
| 1/4-28 | .180 | .500 | 3 | 3/16 | 2-1/2 | 836746-C6 | 199.20 | |
| 5/16-18 | .240 | .625 | 3 | 1/4 | 2-1/2 | 836754-C6 | 217.80 | |
| 5/16-24 | .240 | .625 | 3 | 1/4 | 2-1/2 | 836756-C6 | 245.00 | |
| 3/8-16 | .285 | .750 | 4 | 5/16 | 3 | 836764-C6 | 291.10 | |
| 3/8-24 | .285 | .750 | 4 | 5/16 | 3 | 836766-C6 | 291.10 | |
| 7/16-20 | .335 | .875 | 4 | 3/8 | 3-1/2 | 836776-C6 | 314.70 | |
| 1/2-13 | .350 | .875 | 4 | 3/8 | 3-1/2 | 836784-C6 | 324.90 | |
| 1/2-20 | .350 | .875 | 4 | 3/8 | 3-1/2 | 836786-C6 | 324.90 | NEW |
| 9/16-18 | .370 | .875 | 4 | 3/8 | 3-1/2 | 836794-C6 | 324.90 | NEW |
| 3/4-16 | .495 | 1.250 | 4 | 1/2 | 3-1/2 | 836798-C6 | 412.80 | |
| 5/8-11 | .470 | 1.250 | 4 | 1/2 | 3-1/2 | 836799-C6 | 412.80 | NEW |

# THREAD MILLING CUTTERS

## Multi-Form – N.P.T. Threads



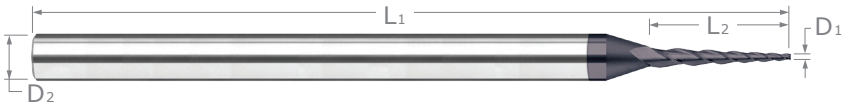

- Cuts internal and external 60° National Pipe Taper (N.P.T.) threads
- Mills right hand and left hand threads
- Helical flutes
- Solid carbide
- CNC ground in the USA




| THREAD SIZE | MAJOR CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ +.0005″ −.0005″ | $L_2$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/16, 1/8-27 | .245 | .437 | 3 | 1/4 | 2-1/2 | 70204 | 168.70 | 70204-C3 | 177.50 | 70204-C8 | 178.20 |
| 1/4, 3/8-18 | .305 | .625 | 4 | 5/16 | 3 | 70214 | 231.30 | 70214-C3 | 241.50 | 70214-C8 | 251.10 |
| 1/4, 3/8-18 | .363 | .680 | 4 | 3/8 | 3-1/2 | 790414 | 246.00 | 790414-C3 | 258.30 | | |
| 1/2, 3/4-14 | .495 | .875 | 4 | 1/2 | 3-1/2 | 70226 | 269.70 | 70226-C3 | 287.00 | | |
| 1,2-11.5 | .620 | 1.125 | 4 | 5/8 | 4 | 70232 | 381.40 | 70232-C3 | 400.70 | | |

# THREAD MILLING CUTTERS

## N.P.T. Tapered End Mills – Square




**1°47' Angle for NPT threads**

- 1°47' angle for preparation of parts prior to internal or external NPT thread milling
- Length of cut and diameters designed for range of standard NPT dimensions
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA



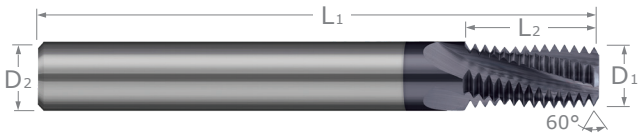

| ANGLE PER SIDE | END DIAMETER | LENGTH OF CUT | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN NANO COATED | |
|---|---|---|---|---|---|---|---|---|
| $A_1$ +0°30′ −0°30′ | $D_1$ +.0005″ −.0005″ | $L_2$ +.020″ −.000″ | $D_2$ (h6) | $L_1$ | 3 FL | USD$ | 3 FL | USD$ |
| **1°47'** | .200 | **.625** (3x) | 1/4 | 2 | 912282 | 70.30 | 912282-C6 | 83.20 |
| | .300 | **.900** (3x) | 3/8 | 2-1/2 | 912286 | 87.70 | 912286-C6 | 102.20 |
| | .400 | **1.250** (3x) | 1/2 | 3 | 912292 | 118.00 | 912292-C6 | 136.90 |

**N.P.T. Thread Fit Chart**

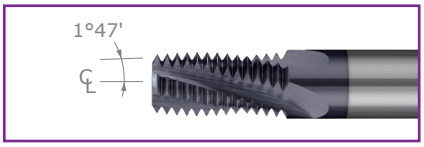
| Thread Mill Tool # | Thread Size | Tapered End Mill Tool # |
|---|---|---|
| 70204 | 1/16, 1/8-27 | 912282 |
| 70214, 790914 | 1/4, 3/8-18 | 912282, 912286 |
| 70226 | 1/2, 3/4-14 | 912286 |
| 70232 | 1, 2-11.5 | 912292 |

# THREAD MILLING CUTTERS

## Multi-Form – N.P.T.F. Threads



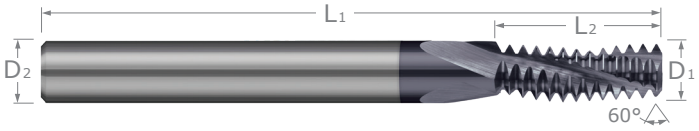

- Cuts internal and external 60° National Pipe Taper - Fuel (N.P.T.F.) threads
- Mills right hand and left hand threads
- Helical flutes
- Solid carbide
- CNC ground in the USA




| THREAD SIZE | MAJOR CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 1/16, 1/8-27 | .245 | .437 | 3 | 1/4 | 2-1/2 | 784304 | 197.10 | 784304-C3 | 205.90 |
| 1/4, 3/8-18 | .305 | .625 | 4 | 5/16 | 3 | 784314 | 235.30 | 784314-C3 | 243.40 |
| 1/2, 3/4-14 | .495 | .875 | 4 | 1/2 | 3-1/2 | 784326 | 305.40 | 784326-C3 | 322.70 |
| 1, 2-11.5 | .620 | 1.125 | 4 | 5/8 | 4 | 784332 | 454.40 | 784332-C3 | 473.70 |

# THREAD MILLING CUTTERS

## Multi-Form – Metric

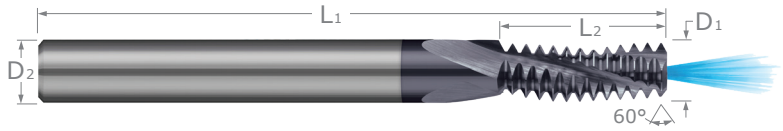



- Cuts internal and external 60° metric threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch • Helical flutes • Solid carbide
- CNC ground in the USA

| THREAD SIZE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| M2-0.40 | .059 | .126 | 3 | 1/8 | 2 | 16901 | 138.90 | 16901-C3 | 144.80 |
| M2.5-0.45 | .059 | .142 | 3 | 1/8 | 2 | 16902 | 138.90 | 16902-C3 | 144.80 |
| M3-0.50 | .085 | .178 | 3 | 1/8 | 2 | 16903 | 136.30 | 16903-C3 | 142.20 |
| M4-0.70 | .115 | .276 | 3 | 1/8 | 2 | 16907 | 136.30 | 16907-C3 | 142.20 |
| M4.5-0.75 | .120 | .250 | 3 | 1/8 | 2 | 16909 | 136.30 | 16909-C3 | 142.20 |
| M5-0.80 | .120 | .312 | 3 | 1/8 | 2 | 16911 | 136.30 | 16911-C3 | 142.20 |
| M6-0.75 | .170 | .366 | 3 | 3/16 | 2-1/2 | 16919 | 168.40 | 16919-C3 | 175.00 |
| M6-1.00 | .170 | .500 | 3 | 3/16 | 2-1/2 | 16917 | 165.20 | 16917-C3 | 171.90 |
| M8-1.00 | .235 | .625 | 3 | 1/4 | 2-1/2 | 16924 | 180.90 | 16924-C3 | 189.80 |
| M8-1.25 | .235 | .625 | 3 | 1/4 | 2-1/2 | 16923 | 177.60 | 16923-C3 | 186.40 |
| M10-1.00 | .300 | .750 | 4 | 5/16 | 3 | 16930 | 244.00 | 16930-C3 | 254.30 |
| M10-1.50 | .300 | .750 | 4 | 5/16 | 3 | 16929 | 239.60 | 16929-C3 | 249.70 |
| M12-1.75 | .360 | .875 | 4 | 3/8 | 3-1/2 | 16935 | 266.50 | 16935-C3 | 278.70 |
| M14-1.50 | .370 | .875 | 4 | 3/8 | 3-1/2 | 16941 | 266.50 | 16941-C3 | 278.70 |
| M16-2.00 | .470 | 1.250 | 4 | 1/2 | 3-1/2 | 16947 | 328.10 | 16947-C3 | 345.50 |
| M18-1.50 | .490 | 1.250 | 4 | 1/2 | 3-1/2 | 16953 | 328.10 | 16953-C3 | 345.50 |
| M20-2.50 | .495 | 1.250 | 4 | 1/2 | 3-1/2 | 16959 | 334.40 | 16959-C3 | 351.80 |

# THREAD MILLING CUTTERS

## Multi-Form – Coolant-Through – UN Threads





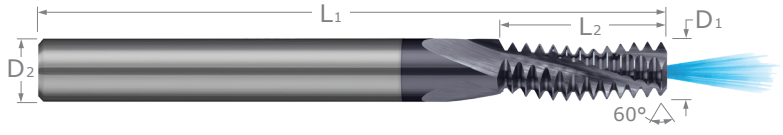

Coolant-Fed for Chip Removal

- Coolant through design for maximum chip ejection in blind holes
- Mills right hand and left hand 60° UN threads
- Able to cut larger threads of the same pitch
- Helical flutes • Solid carbide • CNC ground in the USA

| THREAD SIZE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| 2-56 | .065 | .125 | 3 | 1/8 | 1-1/2 | 17310 | 114.30 | 17310-C3 | 120.20 |
| 4-40 | .085 | .175 | 3 | 1/8 | 1-1/2 | 17316 | 114.30 | 17316-C3 | 120.20 |
| 6-32 | .100 | .218 | 3 | 1/8 | 1-1/2 | 17322 | 114.30 | 17322-C3 | 120.20 |
| 10-24 | .145 | .312 | 3 | 3/16 | 2-3/8 | 17334 | 136.30 | 17334-C3 | 142.90 |
| 10-32 | .150 | .312 | 3 | 3/16 | 2-3/8 | 17336 | 136.30 | 17336-C3 | 142.90 |
| 1/4-20 | .180 | .500 | 3 | 3/16 | 2-3/8 | 17344 | 163.80 | 17344-C3 | 170.40 |
| 1/4-28 | .180 | .500 | 3 | 3/16 | 2-3/8 | 17346 | 163.80 | 17346-C3 | 170.40 |
| 5/16-18 | .235 | .625 | 3 | 1/4 | 2-3/8 | 17354 | 176.30 | 17354-C3 | 185.20 |
| 5/16-24 | .235 | .625 | 3 | 1/4 | 2-3/8 | 17356 | 205.80 | 17356-C3 | 214.90 |
| 3/8-16 | .285 | .750 | 4 | 5/16 | 3 | 17364 | 237.70 | 17364-C3 | 248.10 |
| 3/8-24 | .285 | .750 | 4 | 5/16 | 3 | 17366 | 237.70 | 17366-C3 | 248.10 |
| 7/16-14 | .305 | .750 | 4 | 5/16 | 3 | 17374 | 237.70 | 17374-C3 | 248.10 |
| 7/16-20 | .335 | .875 | 4 | 3/8 | 3 | 17376 | 256.10 | 17376-C3 | 267.50 |
| 1/2-13 | .350 | .875 | 4 | 3/8 | 3 | 17384 | 264.20 | 17384-C3 | 275.60 |

# THREAD MILLING CUTTERS

## Multi-Form – Coolant-Through – Metric





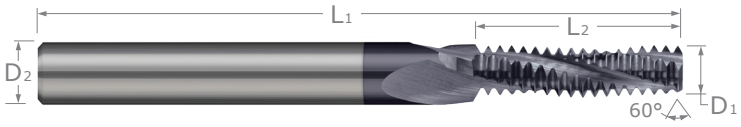

Coolant-Fed for Chip Removal

- Coolant through design for maximum chip ejection in blind holes
- Mills right hand and left hand 60° Metric threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

| THREAD SIZE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.000''}_{-.002''}$ | $L_2$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| M3-0.50 | .085 | .1780 | 3 | 1/8 | 2 | 819624 | 145.60 | 819624-C3 | 151.50 |
| M4-0.70 | .115 | .2760 | 3 | 1/8 | 2 | 819626 | 145.60 | 819626-C3 | 151.50 |
| M5-0.80 | .120 | .3125 | 3 | 1/8 | 2 | 819628 | 145.60 | 819628-C3 | 151.50 |
| M6-1.00 | .170 | .5000 | 3 | 3/16 | 2-1/2 | 819630 | 177.00 | 819630-C3 | 183.60 |
| M8-1.25 | .235 | .6250 | 3 | 1/4 | 2-1/2 | 819632 | 190.10 | 819632-C3 | 198.90 |

# THREAD MILLING CUTTERS

## Multi-Form – Long Flute – UN Threads




**Designed for Deep Threaded Applications!**

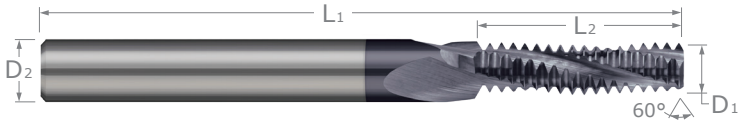
- Designed for deep threaded applications
- Larger cutter diameter for maximum strength
- Due to increased cutter diameter, tools are designed to achieve 60% threads
- Cuts internal 60° UN threads only
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

| THREAD SIZE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | | $TiB_2$ COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ | TOOL # | USD$ |
| 2-56 | .069 | .215 | 3* | 1/8 | 2 | 987110 | 132.20 | 987110-C3 | 138.20 | 987110-C8 | 141.20 |
| 3-48 | .079 | .250 | 3 | 1/8 | 2 | 987112 | 138.90 | 987112-C3 | 144.80 | | |
| 4-40 | .089 | .275 | 3 | 1/8 | 2 | 987116 | 138.90 | 987116-C3 | 144.80 | 987116-C8 | 147.90 |
| 6-32 | .110 | .375 | 3 | 1/8 | 2 | 987122 | 138.90 | 987122-C3 | 144.80 | 987122-C8 | 147.90 |
| 8-32 | .131 | .407 | 3 | 3/16 | 2-1/2 | 987128 | 147.80 | 987128-C3 | 154.50 | 987128-C8 | 157.00 |
| 8-36 | .131 | .417 | 3 | 3/16 | 2-1/2 | 987131 | 155.50 | 987131-C3 | 162.10 | | |
| 10-24 | .145 | .500 | 3 | 3/16 | 2-1/2 | 987134 | 182.40 | 987134-C3 | 189.00 | 987134-C8 | 191.60 |
| 10-32 | .150 | .500 | 3 | 3/16 | 2-1/2 | 987136 | 182.40 | 987136-C3 | 189.00 | 987136-C8 | 191.60 |
| 1/4-20 | .195 | .750 | 3 | 1/4 | 2-1/2 | 987144 | 185.50 | 987144-C3 | 194.40 | 987144-C8 | 195.00 |
| 1/4-28 | .195 | .750 | 3 | 1/4 | 2-1/2 | 987146 | 185.50 | 987146-C3 | 194.40 | 987146-C8 | 195.00 |
| 5/16-18 | .245 | .944 | 3 | 5/16 | 3 | 987154 | 240.80 | 987154-C3 | 251.10 | | |
| 5/16-24 | .245 | .958 | 3 | 5/16 | 3 | 987156 | 247.10 | 987156-C3 | 257.60 | | |
| 3/8-16 | .300 | 1.125 | 4 | 3/8 | 3-1/2 | 987164 | 287.10 | 987164-C3 | 299.40 | | |
| 3/8-24 | .300 | 1.125 | 4 | 3/8 | 3-1/2 | 987166 | 295.40 | 987166-C3 | 307.70 | | |
| 7/16-20 | .350 | 1.300 | 4 | 3/8 | 3-1/2 | 987176 | 295.40 | 987176-C3 | 307.70 | | |
| 1/2-13 | .400 | 1.308 | 4 | 1/2 | 3-1/2 | 987184 | 299.70 | 987184-C3 | 317.40 | | |
| 9/16-18 | .450 | 1.500 | 4 | 1/2 | 3-1/2 | 987194 | 318.40 | 987194-C3 | 335.80 | | |
| 5/8-11 | .490 | 1.820 | 4 | 1/2 | 4 | 987100 | 350.10 | 987100-C3 | 367.80 | | |
| 3/4-16 | .580 | 1.875 | 4 | 5/8 | 4 | 987103 | 451.80 | 987103-C3 | 471.10 | | |

*Straight flutes

# THREAD MILLING CUTTERS

## Multi-Form – Long Flute – Metric




**Designed for Deep Threaded Applications!**

- Designed for deep threaded applications
- Larger cutter diameter for maximum strength
- Due to increased cutter diameter, tools are designed to achieve 60% threads
- Cuts internal 60° metric threads only
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

| THREAD SIZE | CUTTER DIAMETER | LENGTH OF CUT | FLUTES | SHANK DIAMETER | OVERALL LENGTH | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|
| | $D_1$ $^{+.0005''}_{-.0005''}$ | $L_2$ | | $D_2$ | $L_1$ | TOOL # | USD$ | TOOL # | USD$ |
| M3-0.50 | .090 | .276 | 3 | 1/8 | 2 | 842903 | 163.70 | 842903-C3 | 169.60 |
| M4-0.70 | .124 | .441 | 3 | 3/16 | 2-1/2 | 842907 | 167.60 | 842907-C3 | 174.30 |
| M5-0.80 | .155 | .504 | 3 | 3/16 | 2-1/2 | 842911 | 164.10 | 842911-C3 | 170.80 |
| M6-1.00 | .186 | .748 | 3 | 1/4 | 2-1/2 | 842917 | 194.10 | 842917-C3 | 203.00 |
| M8-1.25 | .245 | .984 | 3 | 5/16 | 2-1/2 | 842923 | 249.50 | 842923-C3 | 260.00 |
| M10-1.50 | .311 | 1.122 | 4 | 3/8 | 3-1/2 | 842929 | 313.20 | 842929-C3 | 325.40 |
| M16-2.00 | .490 | 1.890 | 4 | 1/2 | 3-1/2 | 842947 | 408.80 | 842947-C3 | 426.40 |

In The Loupe TV

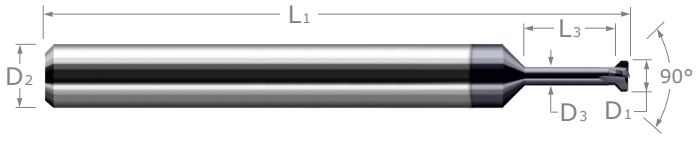
**Check Out Our New CNC Show!**

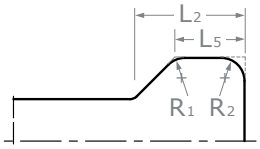
Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

youtube.com/intheloupetv

# THREAD MILLING CUTTERS

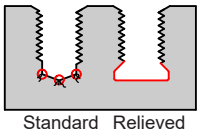
## Thread Relief Cutter




- Tool designed to relieve stress concentrations at corners of undercut and bottom of last thread to prevent fracture and failure
- Relief is typically done before threading operation to avoid damaging the thread forms
- Chamfer eliminates burrs and partial threads at last thread
- Flattens bottom of hole to achieve maximum thread depth
- Center cutting
- Solid carbide
- CNC ground in the USA

**THREADED HOLES**

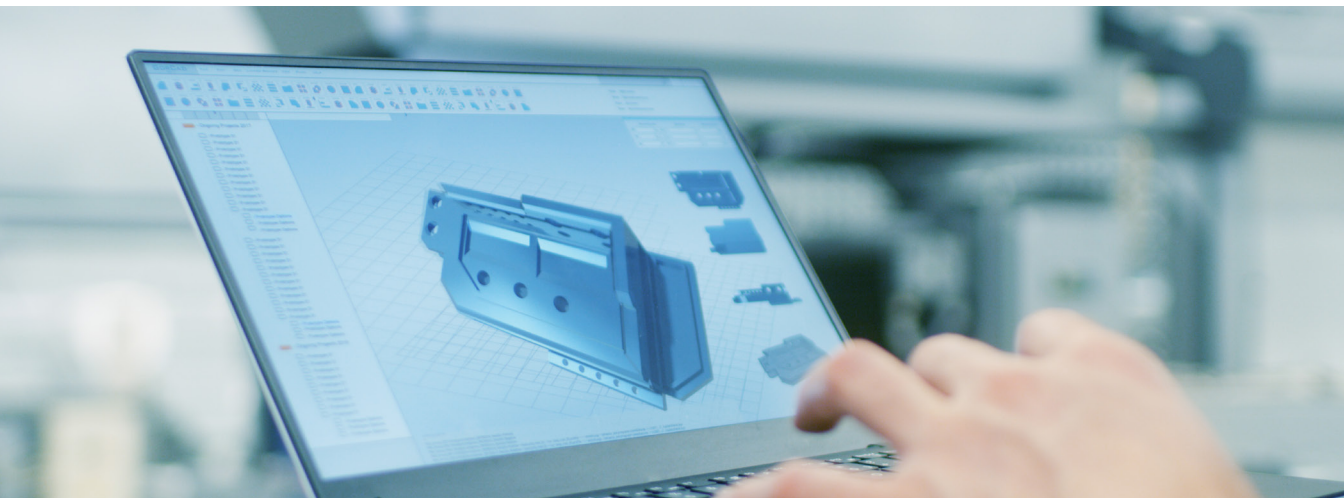


Standard Relieved

| CUTTER DIA. | LOC | WIDTH (TSC) | RADIUS 1 | RADIUS 2 | NECK DIA. | NECK LENGTH | RADIAL DOC | SHANK DIA. | OAL | UNCOATED | | AlTiN COATED | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ +.000″ −.001″ | $L_2$ +.002″ −.000″ | $L_5$ | $R_1$ +.001″ −.001″ | $R_2$ +.001″ −.001″ | $D_3$ | $L_3$ +.010″ −.000″ | | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .066 | .029 | .015 | .000 | .005 | .036 | .172 | .014 | 1/8 | 1-1/2 | 896602 | 69.90 | 896602-C3 | 75.80 |
| .075 | .030 | .015 | .000 | .005 | .042 | .187 | .015 | 1/8 | 1-1/2 | 877502 | 66.70 | 877502-C3 | 72.70 |
| .084 | .038 | .020 | .000 | .005 | .045 | .218 | .018 | 3/16 | 2 | 988804 | 64.80 | 988804-C3 | 71.50 |
| .102 | .049 | .025 | .000 | .010 | .051 | .281 | .024 | 3/16 | 2 | 985707 | 66.10 | 985707-C3 | 72.70 |
| $D_1$ +.000″ −.002″ | $L_2$ +.005″ −.000″ | $L_5$ | $R_1$ +.001″ −.001″ | $R_2$ +.001″ −.001″ | $D_3$ | $L_3$ +.030″ −.000″ | | $D_2$ | $L_1$ | 4 FL | USD$ | 4 FL | USD$ |
| .125 | .054 | .030 | .000 | .010 | .074 | .343 | .024 | 1/4 | 2-1/2 | 979609 | 80.20 | 979609-C3 | 89.20 |
| .142 | .050 | .020 | .000 | .010 | .078 | .359 | .030 | 1/4 | 2-1/2 | 975405 | 82.10 | 975405-C3 | 91.10 |
| .168 | .050 | .020 | .000 | .010 | .103 | .422 | .030 | 1/4 | 2-1/2 | 955305 | 80.20 | 955305-C3 | 89.20 |
| .193 | .055 | .020 | .000 | .010 | .118 | .547 | .035 | 1/4 | 2-1/2 | 952505 | 82.40 | 952505-C3 | 91.50 |
| .193 | .075 | .040 | .015 | .015 | .118 | .547 | .035 | 1/4 | 2-1/2 | 952516 | 82.40 | 952516-C3 | 91.50 |
| .245 | .072 | .030 | .000 | .010 | .155 | .797 | .042 | 1/4 | 2-1/2 | 946009 | 85.60 | 946009-C3 | 94.50 |
| .245 | .102 | .060 | .020 | .020 | .155 | .797 | .042 | 1/4 | 2-1/2 | 946027 | 85.60 | 946027-C3 | 94.50 |
| .355 | .086 | .030 | .000 | .010 | .236 | 1.078 | .056 | 3/8 | 2-1/2 | 942909 | 133.50 | 942909-C3 | 144.90 |
| .355 | .116 | .060 | .020 | .020 | .236 | 1.078 | .056 | 3/8 | 2-1/2 | 942927 | 133.50 | 942927-C3 | 144.90 |
| .355 | .136 | .080 | .030 | .030 | .236 | 1.078 | .056 | 3/8 | 2-1/2 | 942931 | 133.50 | 942931-C3 | 144.90 |

# CAM Tool Libraries

Harvey Performance Company works closely with industry-leading CAM software companies to optimize Harvey Tool and Helical Solutions product libraries for their platforms.



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Import tool libraries directly into CAM software and allow more time to be spent at the machine.

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# TOOL HOLDERS

Browse a fully stocked and expanded offering of Tool Holders and Collets, including Extended Reach Tool Holders, Solid ER Integrated Tool Holders, Saw Arbors, ER Collets, ER Performance Collets, and accompanying nuts and wrenches. When your machine setup includes a Harvey Tool holder and collet, you can rest assured that you'll maximize tool performance and repeatability.

**Tool Holders** . . . . . 568

Extended Reach Tool Holders & Collets . . . . . 568



Solid ER Integrated Tool Holders . . . . . 569



Solid ER Integrated Tool Holders – Coolant-Through . . . . . 569



Saw Arbors mm & in New Style! . . . . . 570



**Collets** . . . . . 571

ER Collets . . . . . 571



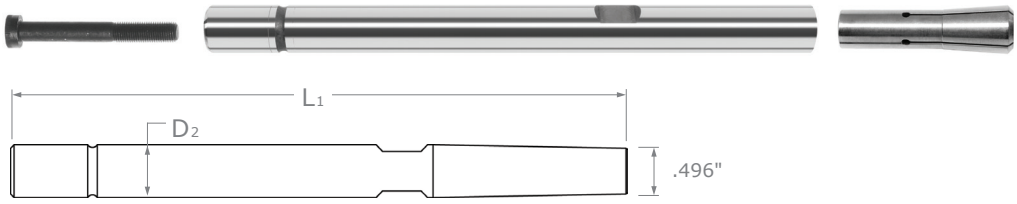
ER Performance Collets . . . . . 572



# TOOL HOLDERS

## Extended Reach Tool Holders & Collets






- Center gripping collet with threaded draw screw
- More accurate than traditional single-set screw type holders
- High precision concentricity and rigidity
- Maximum T.I.R. of .0002” from shank to collet pocket
- Quick tool changes
- Coolant through capable
- Allen wrench included
- Collet not included — choose from many sizes
- Two offsetting flats to maintain T.I.R.
- Use with mills, lathes, and grinders



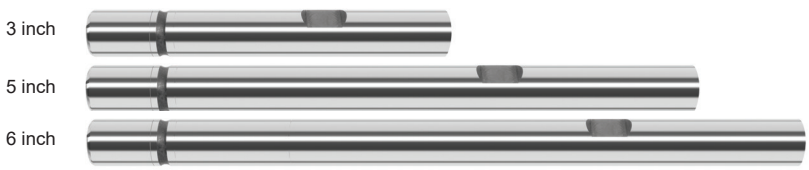
Center Gripping Collet Design.
Choose from Six Sizes!

### Tool Holders

| SHANK DIAMETER | OVERALL LENGTH | TOOL HOLDERS (Collet Not Included) | |
|---|---|---|---|
| $D_2$ | $L_1$ | TOOL # | USD$ |
| 1/2 | 3 | 36730 | 269.00 |
| 1/2 | 5 | 36750 | 288.70 |
| 1/2 | 6 | 36760 | 305.90 |

### Collets

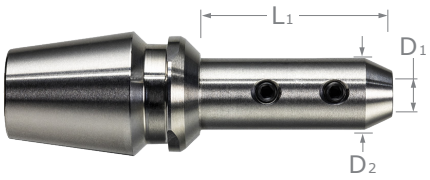
| COLLET SIZE | TOOL # | USD$ |
|---|---|---|
| 1/8 | 36810 | 91.00 |
| 3/16 | 36820 | 91.00 |
| 1/4 | 36830 | 91.00 |
| 3 mm | 36840 | 91.00 |
| 4 mm | 36850 | 91.00 |
| 6 mm | 36860 | 91.00 |

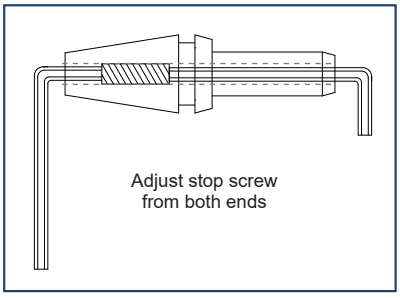


# TOOL HOLDERS

## Solid ER Integrated Tool Holders





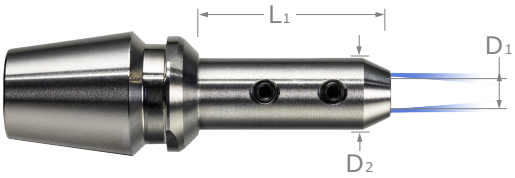



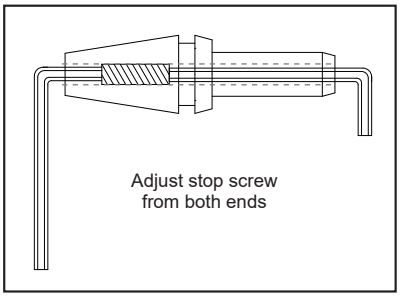

- Reached taper integrated holder that eliminates the need for multiple spindle accessories
- Designed for Turn Mill Centers and Machining Centers
- Works with any ER holder or spindle
- Multiple reaches • Maximum T.I.R. of <.0002”
- Capable of quick change with included stop screw
- Stop screw can be adjusted from both ends of holder

| BORE DIAMETER | SHAFT DIAMETER | PROJECTION LENGTH | TAPER | TOOL HOLDERS | |
|---|---|---|---|---|---|
| $D_1$ | $D_2$ | $L_1$ | | TOOL # | USD$ |
| .1250 | 9.5 mm | 16 mm | ER16 | 83001 | 315.40 |
| .1250 | 9.5 mm | 25 mm | ER16 | 83003 | 315.40 |
| .1875 | 9.5 mm | 16 mm | ER16 | 83002 | 315.40 |
| .1875 | 9.5 mm | 25 mm | ER16 | 83004 | 315.40 |
| .2500 | 12.5 mm | 14 mm | ER20 | 83005 | 376.60 |
| .2500 | 12.5 mm | 25 mm | ER20 | 83006 | 369.50 |

# TOOL HOLDERS

## Solid ER Integrated Tool Holders – Coolant-Through




- Reached taper integrated holder that eliminates the need for multiple spindle accessories
- Designed for Turn Mill Centers and Machining Centers
- Works with any ER holder or spindle
- Multiple reaches
- Maximum T.I.R. of <.0002”
- Capable of quick change with included stop screw
- Compatible with coolant through holders
- Stop screw can be adjusted from both ends of holder

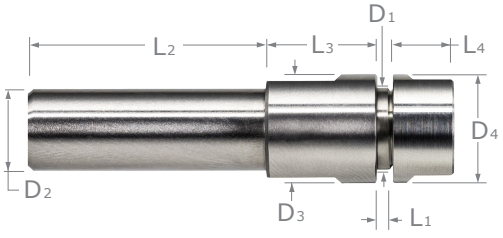
| BORE DIAMETER | SHAFT DIAMETER | PROJECTION LENGTH | TAPER | TOOL HOLDERS | |
|---|---|---|---|---|---|
| $D_1$ | $D_2$ | $L_1$ | | TOOL # | USD$ |
| .1250 | 9.5 mm | 25 mm | ER16 | 83203 | 405.70 |

NEW!

# SAW ARBORS

## Straight Shank





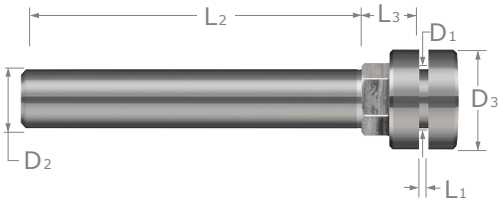

- Maximum T.I.R. of .0001”
- Straight shank allows for chucking at multiple depths
- Key not included

| ARBOR DIAMETER | ARBOR LENGTH | SHANK DIAMETER | SHANK LENGTH | FLANGE DIAMETER | FLANGE LENGTH | NUT DIAMETER | NUT LENGTH | THREAD LENGTH (IN FRONT OF ARBOR) | SAW ARBORS | |
|---|---|---|---|---|---|---|---|---|---|---|
| $D_1$ | $L_1$ | $D_2$ | $L_2$ | $D_3$ | $L_3$ | $D_4$ | $L_4$ | | TOOL # | USD$ |
| .250 | .045 | .250 | 1.40 | .394 | .500 | .394 | .250 | .300 | 84100 | 281.10 |
| .375 | .050 | .375 | 1.40 | .500 | .500 | .500 | .276 | .300 | 84101 | 281.10 |
| .500 | .050 | .500 | 1.40 | .625 | .500 | .625 | .276 | .300 | 84102 | 281.10 |
| 1.000 | .125 | .750 | 2.00 | 1.250 | 1.500 | 1.250 | .437 | .500 | 84103 | 359.30 |

For Slitting Saws, see pages 428 - 432

# SAW ARBORS

## Straight Shank Metric




- Maximum T.I.R. of .005”
- Straight shank allows for chucking at multiple depths
- Key not included

| ARBOR DIAMETER | ARBOR LENGTH | SHANK DIAMETER | SHANK LENGTH | FLANGE DIAMETER | FLANGE LENGTH | SAW ARBORS | | |
|---|---|---|---|---|---|---|---|---|
| $D_1$ | $L_1$ | $D_2$ | $L_2$ | $D_3$ | $L_3$ | TOOL # | USD$ | |
| 8 mm | 1.60 mm | 7 mm | 38 mm | 18 mm | 4.30 mm | 84104 | 281.10 | NEW |
| 13 mm | 2.50 mm | 13 mm | 45 mm | 22 mm | 7.10 mm | 84105 | 296.70 | NEW |
| 22 mm | 3.00 mm | 22 mm | 38 mm | 32 mm | 6.40 mm | 84107 | 374.50 | NEW |

For Slitting Saws, see page 430

# ER COLLETS

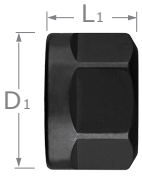



- Maximum T.I.R. of .0004”
- High polished finish helps resists oxidation
- Related nut and wrench sold separately

| SIZE | BORE DIAMETER | CLAMP RANGE | ER COLLETS | |
|---|---|---|---|---|
| | $D_1$ | | TOOL # | USD$ |
| ER11 | 1/8 | .086 - .125 | 82401 | 18.20 |
| ER16 | 1/8 | .086 - .125 | 82402 | 19.60 |
| ER16 | 3/16 | .148 - .187 | 82403 | 19.60 |
| ER16 | 1/4 | .211 - .250 | 82404 | 19.60 |
| ER16 | 3/8 | .336 - .375 | 82405 | 28.30 |
| ER20 | 1/4 | .211 - .250 | 82406 | 30.20 |
| ER32 | 1/4 | .211 - .250 | 82407 | 31.90 |
| ER32 | 3/8 | .336 - .375 | 82408 | 31.90 |
| ER32 | 1/2 | .461 - .500 | 82409 | 31.90 |



# ER COLLETS
## Nuts




- Special anti-friction coating increases clamping pressure of tool shank

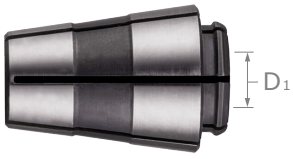
| SIZE | HEAD DIAMETER | NUT LENGTH | THREAD SIZE | MAX TORQUE | ER NUTS | |
|---|---|---|---|---|---|---|
| | $D_1$ | $L_1$ | | | TOOL # | USD$ |
| ER11 | 19 mm | 12 mm | M14 x 0.75 | 17 ft. lbs | 82461 | 33.80 |
| ER16 | 27.5 mm | 18 mm | M22 x 1.5 | 42 ft. lbs | 82462 | 33.80 |
| ER20 | 34 mm | 19 mm | M25 x 1.5 | 59 ft. lbs | 82463 | 48.10 |
| ER32 | 50 mm | 23 mm | M40 x 1.5 | 100 ft. lbs | 82464 | 53.20 |

# ER COLLETS
## Wrenches



| SIZE | LENGTH | WIDTH | THICKNESS | ER WRENCHES | |
|---|---|---|---|---|---|
| | | | | TOOL # | USD$ |
| ER11 | 4.80 | 1.50 | 0.20 | 82481 | 16.10 |
| ER16 | 5.60 | 2.00 | 0.20 | 82482 | 16.10 |
| ER20 | 6.30 | 2.40 | 0.20 | 82483 | 33.70 |
| ER32 | 10.00 | 3.00 | 0.20 | 82484 | 40.10 |

# ER PERFORMANCE COLLETS

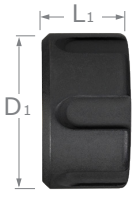



- Specialized, low profile design reduces radial distortion and improves repeatability during tool changeover
- Maximum T.I.R. of .0002”
- Works with any ER holder or spindle
- High polished finish helps resist oxidation
- Related nut and wrench sold separately

| SIZE | BORE DIAMETER | CLAMP RANGE | ER PERFORMANCE COLLETS | |
|---|---|---|---|---|
| | $D_1$ | | TOOL # | USD$ |
| ER11 | 1/8 | .1050 - .1250 | 85501 | 42.40 |
| ER16 | 1/8 | .1050 - .1250 | 85502 | 42.40 |
| ER16 | 3/16 | .1470 - .1875 | 85503 | 42.40 |
| ER16 | 1/4 | .2100 - .2500 | 85504 | 42.40 |

# ER PERFORMANCE COLLETS

## Nuts




- Provides increased clamping pressure on tool shank which reduces vibration and increases tool life
- Allows collet to sit further into the collet pocket, creating a more concentric tool
- Special anti-friction coating increases clamping pressure of tool shank

| SIZE | HEAD DIAMETER | NUT LENGTH | THREAD SIZE | MAX TORQUE | ER PERFORMANCE NUTS | |
|---|---|---|---|---|---|---|
| | $D_1$ | $L_1$ | | | TOOL # | USD$ |
| ER11 | 18 mm | 12 mm | M14 x 0.75 | 25 ft. lbs | 85561 | 41.40 |
| ER16 | 26 mm | 14 mm | M22 x 1.5 | 42 ft. lbs | 85562 | 41.40 |

# ER PERFORMANCE COLLETS

## Wrenches



| SIZE | LENGTH | WIDTH | THICKNESS | ER PERFORMANCE WRENCHES | |
|---|---|---|---|---|---|
| | | | | TOOL # | USD$ |
| ER11 | Please see page 571 for ER11 Wrench size | | | | |
| ER16 | 6.50 | 2.20 | 0.20 | 85582 | 40.40 |



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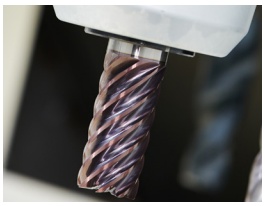
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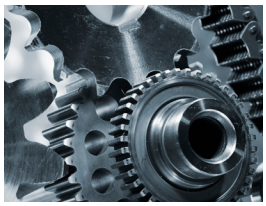
**How to Avoid Common Part Finish Problems**



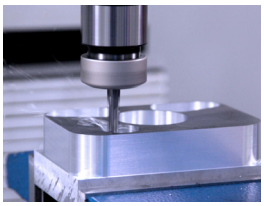
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**Why Flute Count Matters**



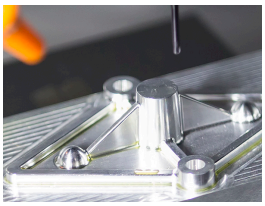
**Titanium Machining Guide**



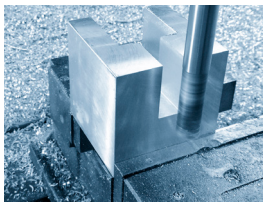
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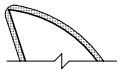
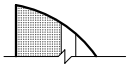
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# COATINGS & SUBSTRATES CHART

| Coating/ Substrate: | TiN<br>Titanium Nitride -C1 | AlTiN<br>Aluminum Titanium Nitride -C3 | AlTiN Nano<br>Aluminum Titanium Nitride Nano -C6 | Ti Nano<br>Titanium Based -C10 | Ti Hard Nano<br>Titanium Based -C12 |
|---|---|---|---|---|---|
| **Application/ Benefits:** | • General purpose coating for machining ferrous materials. | • High performance coating in ferrous materials.<br>• Excellent high temperature resistance and hardness.<br>• Maintains high surface hardness at elevated temperatures improving tool life and allowing faster feed rates.<br>• Produces aluminum oxide layer at high temperature which reduces thermal conductivity, transferring heat into the chip.<br>• Excellent in dry machining, machining titanium alloys, inconel, stainless alloys and cast iron.<br>• Not recommended for use in aluminum and aluminum alloys. | • Premium coating in ferrous materials.<br>• Latest generation AlTiN coating mixed with silicon to produce a unique nanocomposite coating. This structure improves hardness, heat resistance, and toughness over traditional AlTiN coatings.<br>• Superior results, extended tool life and reduced cycle times over traditional AlTiN coatings in demanding applications where setup minimizes runout and vibration.<br>• Not recommended for use in aluminum and aluminum alloys. | • Highest performing coating in ferrous materials.<br>• Exceptionally hard nanocomposite coating, particularly suitable for hard machining, high temperature, and premium finish applications.<br>• Enhanced wear resistance and longer tool life in rigid, vibration-free machine setups.<br>• Optimized for a wide variety of ferrous and difficult-to-machine materials including inconel, stainless steel, and high hardness materials up to 65 Rc. | • High performing coating in hardened steels.<br>• Improved coating adhesion produces a smooth and dense layer structure.<br>• HiPiMS coating technology provide enhanced hardness, wear resistance, thermal stability, and low friction, resulting in longer tool life, improved machining efficiency, and superior performance on tough materials.<br>• High hardness, temperature, and oxidation resistance.<br>• homogenous wear behavior leads to process stability. |
| **Materials:** | **Ferrous Materials & Exotic Metals** | | | | |
| | General Purpose Ferrous Materials | Alloy steels, stainless steels, tool steels, titanium, inconel, nickel and other aerospace materials | Hardened steels, hardened stainless, nickel based alloys, tool steels, titanium alloys, inconel and other aerospace materials | Inconel, superalloys, hardened steels, stainless steel, titanium, and other aerospace materials. | Hardened steel, stainless steel, titanium, cast iron |
| **Color:** | Gold | Dark Gray / Black | Blue / Black | Copper | Red Gold |
| **Structure:** | Mono-layer | Multi-layer | Nano Composite Multi-layer | Nano Composite | Nano Composite |
| **Hardness (HV 0.05):** | 2447 (24 GPa) | 3569 (35 GPa) | 4181 (41 GPa) | 4487 (44 GPa) | 3477 (34.1 Gpa) |
| **Coefficient of Friction:** | .40 | .70 | .40 | .35 | .35 |
| **Coating Thickness (microns):** | 2 - 5 | 2 - 5 | 1 - 4 | 1-4 | 1.5 - 3 |
| **Max. Working Temp:** | 1000° F | 1400° F | 2100° F | 2,192°F | 2,012°F |

PLEASE NOTE: Information and test results were compiled from multiple sources and testing methods. Data presented is intended to be a general application guideline for comparing various coatings / substrates.

# COATINGS & SUBSTRATES CHART

| **ZrN**<br>Zirconium Nitride -C7 | **$TiB_2$**<br>Titanium Diboride -C8 | **Amorphous Diamond**<br>Diamond-Like Coating -C4 | **CVD Diamond**<br>Crystalline CVD Diamond | **PCD Diamond**<br>Polycrystalline Diamond |
|---|---|---|---|---|
| • High hardness, lubricity and abrasion resistance.<br>• Improves performance over uncoated carbide in a wide variety of non-ferrous materials.<br>• Less expensive alternative to diamond. | • Primary benefit over other non-ferrous coatings is extremely low affinity to aluminum.<br>• Prevents build-up on cutting edge, chip packing and extends tool life.<br>• Recommended in Aluminum Alloys and Magnesium Alloys.<br>• Not ideally suited for abrasive varieties of these alloys. | • A PVD amorphous diamond coating which improves lubricity and wear resistance in non-ferrous materials.<br>• Coating is thin relative to CVD diamond, preventing edge rounding.<br>• Sharp edges improve results (performance and finish) over CVD in certain abrasive, non-ferrous materials (copper, brass, high silicon aluminum).<br>• Low temperature threshold makes diamond unsuitable for ferrous applications.<br>Thin coating maintains sharper edge.<br>  | • True Crystalline CVD diamond is grown directly into a carbide end mill.<br>• Dramatically improves hardness.<br>• Hardness improves abrasion resistance and allows higher feed rates than uncoated carbide.<br>• Ideal for machining Graphite, Composites, Green Carbide, and Green Ceramics.<br>• Thinner CVD layer yields a sharper cutting edge compared to the standard CVD coating and leaves a smoother finish on non-ferrous materials<br>• Low temperature threshold makes diamond unsuitable for ferrous applications.<br>  Thinner CVD diamond layer for a balance between wear resistance and edge sharpness.<br>  Thicker diamond layer for increased wear resistance.<br>Diamond layer approx 5 times thicker than Amorphous Diamond, improving wear resistance. | • PCD diamond is manufactured as a carbide backed flat wafer. The wafer is brazed to a carbide body to form an end mill.<br>• PCD has excellent hardness and abrasion resistance, and is the thickest diamond layer we offer.<br>• Sharply ground cutting edges and thick diamond layer combine the sharp edge benefits of Amorphous Diamond with the abrasion resistance of CVD Diamond.<br>• Low temperature threshold makes diamond unsuitable for ferrous applications.<br>  <br>Thickest diamond layer ground to sharp edge. |
| **Non-Ferrous & Non-Metallic Materials** | | | | |
| Abrasive non-ferrous alloys such as Brass, Bronze, Copper and Abrasive Aluminum Alloys | Aluminum Alloys, Magnesium Alloys | Abrasive Plastics, Graphite, Carbon Fiber Materials, Composites, Aluminum, Copper, Brass, Bronze, Carbon, Gold, Silver, Magnesium, Zinc | Graphite, Composites, Green Carbide, Green Ceramics | Abrasive Plastics, Graphite, Carbon Fiber Materials, Composites, Aluminum, Copper, Brass, Bronze, Carbon, Gold, Silver, Magnesium, Zinc, Green Carbide, Green Ceramics |
| Light Gold / Champagne | Light Gray / Silver | Charcoal / Gray <1µm Rainbow | Gray | Gray / Black |
| Mono-layer | Mono-layer | Mono-layer | True Crystalline CVD Multi-Layer | Polycrystalline Diamond (Carbide Backed) |
| 2243 (22 GPa) | 2804 (27.5 GPa) | 7954 - 8973 (78 - 88 GPa) | 8973 - 9993 (88 - 98 GPa) | 8973 - 9993 (88 - 98 GPa) |
| .40 | .35 | .10 | .05 - .30 | .05 - .20 |
| 2 - 5 | 1 - 3 | .5 - 2.5 | 3 - 13<br>Thickness Identified on Product Tables | .010" - .030"<br>Solid PCD Layer |
| 1100° F | 900° F | 750° F | 1100° F | 1100° F |

PLEASE NOTE: Information and test results were compiled from multiple sources and testing methods. Data presented is intended to be a general application guideline for comparing various coatings / substrates.

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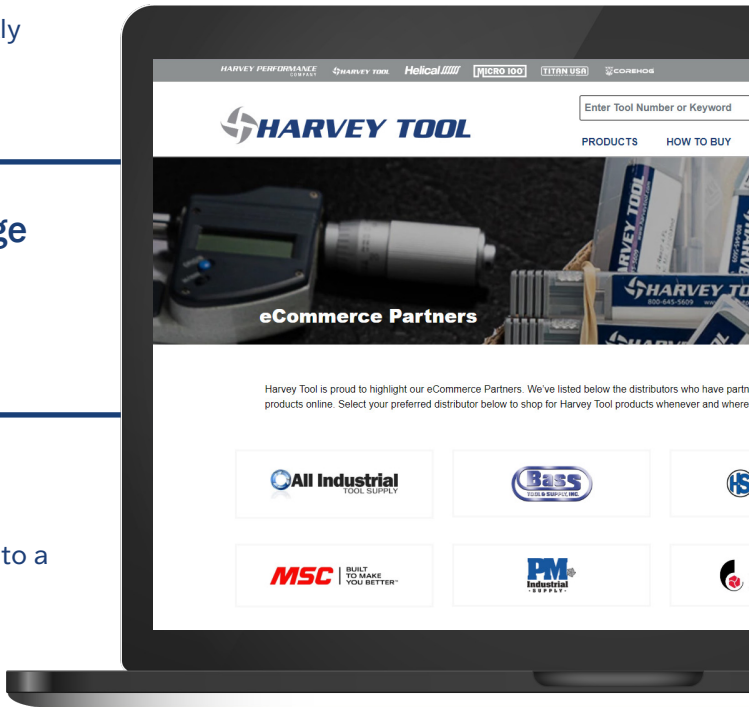
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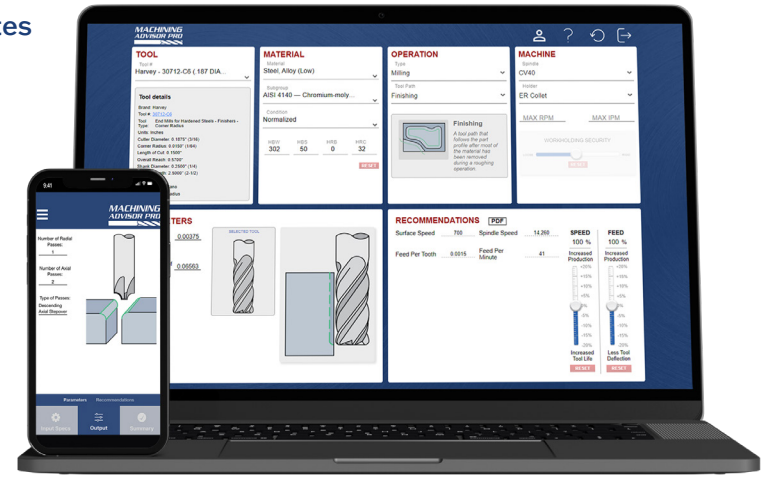
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## Miniature End Mills



Square - Long Flute - Metric - pg. 27



Corner Radius - Stub, Standard - Metric - pg. 88

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# TOOLS FOR FALL 2025

## Material Specific End Mills

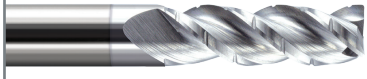
### End Mills for Titanium Alloys

Ball - Variable Helix pg. 142



### End Mills for Aluminum

Corner Radius - Chipbreaker Rougher pg. 220

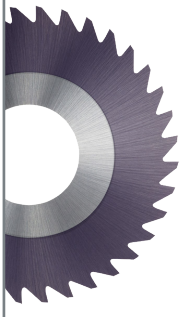


### Diamond End Mills for Non Ferrous Material

Square - PCD Diamond - Full Nib pg. 265



## Specialty Profiles



Slitting Saws - Metric pg. 430

## Told Holders



Saw Arbors - Straight Shank - Metric - pg. 570




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