

Preview Edition: **BEYOND™** **SOLID END MILLS**  
**INNOVATIONS 2012**

**beyond™**

 **KENNAMETAL®**

Kennametal Inc. delivers productivity to customers seeking peak performance in demanding environments by providing innovative custom and standard wear-resistant solutions. This proven productivity is enabled through our advanced materials sciences and application knowledge. Our commitment to a sustainable environment provides additional value to our customers.

Companies operating in everything from airframes to coal mining, from engines to oil wells, and from turbochargers to construction recognize Kennametal for extraordinary contributions to their value chains. **Preview Edition: BEYOND™ SOLID END MILLS** showcases the introduction of a new Beyond grade for solid carbide end mills — KCPM15™ — engineered to deliver up to 30% longer tool life in addition to productivity improvements of 30% or more. KCPM15™ end mills feature precise, high-quality edge preparation for improved coating adhesion and edge stability. The resulting improved chip control also contributes to extended tool life and performance.

Visit us at [www.kennametal.com](http://www.kennametal.com).



**K**ennametal is pleased to announce KCPM15™ — the first Beyond™ grade for solid carbide end mills. KCPM15 features an improved high-performance carbide substrate with proprietary aluminum titanium nitride (AlTiN) PVD coating.



*Pictured above is the HARVI II™ KCPM15™ end mill. The KCPM15 grade is engineered to deliver up to 30% longer tool life when milling steels and stainless steels due to improved resistance to cratering, flank wear, and depth-of-cut notching. See pages 10–13 for more information.*

Engineered to Increase Tool Life and Productivity by up to 30%!

# END MILLING



# Solid End Mills

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NEW Inch KCPM15 Offering

<b>beyond</b>		Series	Diameter inch	Length of Cut	Flute Z	Helix	Internal Coolant
HARVI II		HARVI II UCDE	0.250-1	1.75-2.5 x D			
HARVI II		HARVI II UCDE	0.188-1	1.75-3 x D			
HARVI		HARVI HPHV	0.125-1.250	1.25-6 x D			
HARVI I		HARVI I UADE	0.250-1	1-1.5 x D			
HARVI		HARVI HPRSH	0.500-1	1-1.25 x D			
HARVI		HARVI HPHVBN	0.125-1	1 x D			
Finisher		HPFSS 5-Flute	0.188-1	1.5-4 x D			
Rougher		HPRSS	0.250-1	2-3 x D			
Rougher		MDRHEC	0.250-0.750	1-3 x D			

				Series	Center Cutting	Neck	P	M	K	N	S	H						Product Page	Cutting Data Page
		X				X	●	●	●	○	○		X	X	X			10	11
X		X					●	●	●	○	○		X	X	X			12	13
X	X	X			X		●	●	●	○	○		X	X	X			14-18	19
		X			X	X	●	●	●	○	○		X	X	X			20	21
X	X				X		●	●	●	○			X	X	X			22	23
			X		X		●	●	●	○	○		X			X	X	24	25
X					X		●	○	●	○			X		X			26	27
		X			X		●	●	○	○			X	X	X			28	29
	X				X		●	●	●	○			X	X	X			30	31

# KCPM15 Solid Carbide End Mill Products

In addition to a high-performance carbide substrate and advanced AlTiN coating, KCPM15™ end mills feature precise, high-quality edge preparation for improved coating adhesion and edge stability. The resulting improved chip control contributes to extended tool life and enhanced performance.

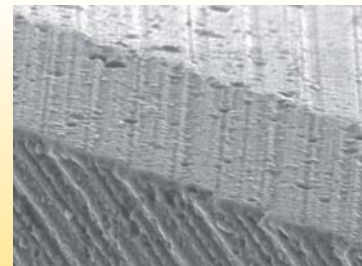
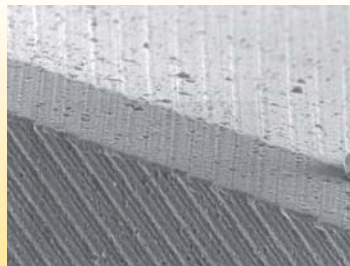
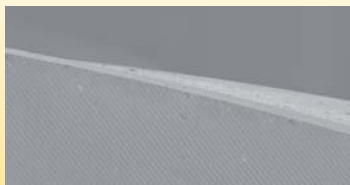


<b>P</b>	Steel
<b>M</b>	Stainless Steel
<b>K</b>	Cast Iron
<b>N</b>	Non-Ferrous Materials
<b>S</b>	High-Temp Alloys
<b>H</b>	Hardened Materials

Coating		Grade Description	
KCPM15		Coated carbide grade with thick PVD coating and optimized chemistry and process for increased wear resistance. Outstanding protection in milling stainless steel to mitigate crater, DOCN (depth-of-cut notching), and flank wear.	<b>P</b>
	AlTiN		<b>M</b> <b>K</b> <b>S</b>

## Conventional End Mill Surface

### Conventional

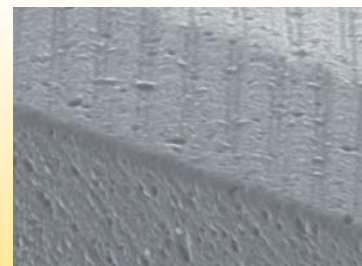
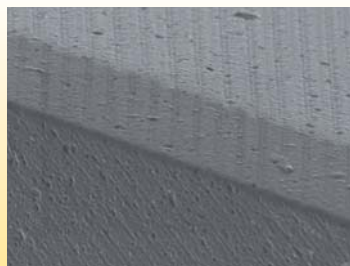


## KCPM15 End Mill Surface

### New KCPM15 grade



View: 1<sup>st</sup> and 2<sup>nd</sup> Relief



### Features

High-quality edge preparation.

### Functions

Perfect coating adhesion.

### Benefits

Less performance scattering.

Improved surface roughness.

Longer average tool life.

Higher edge stability.

Better chip evacuation.

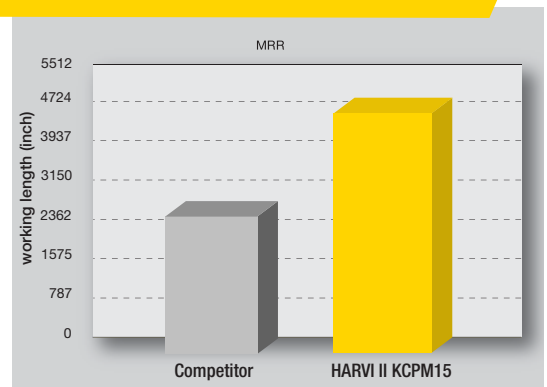


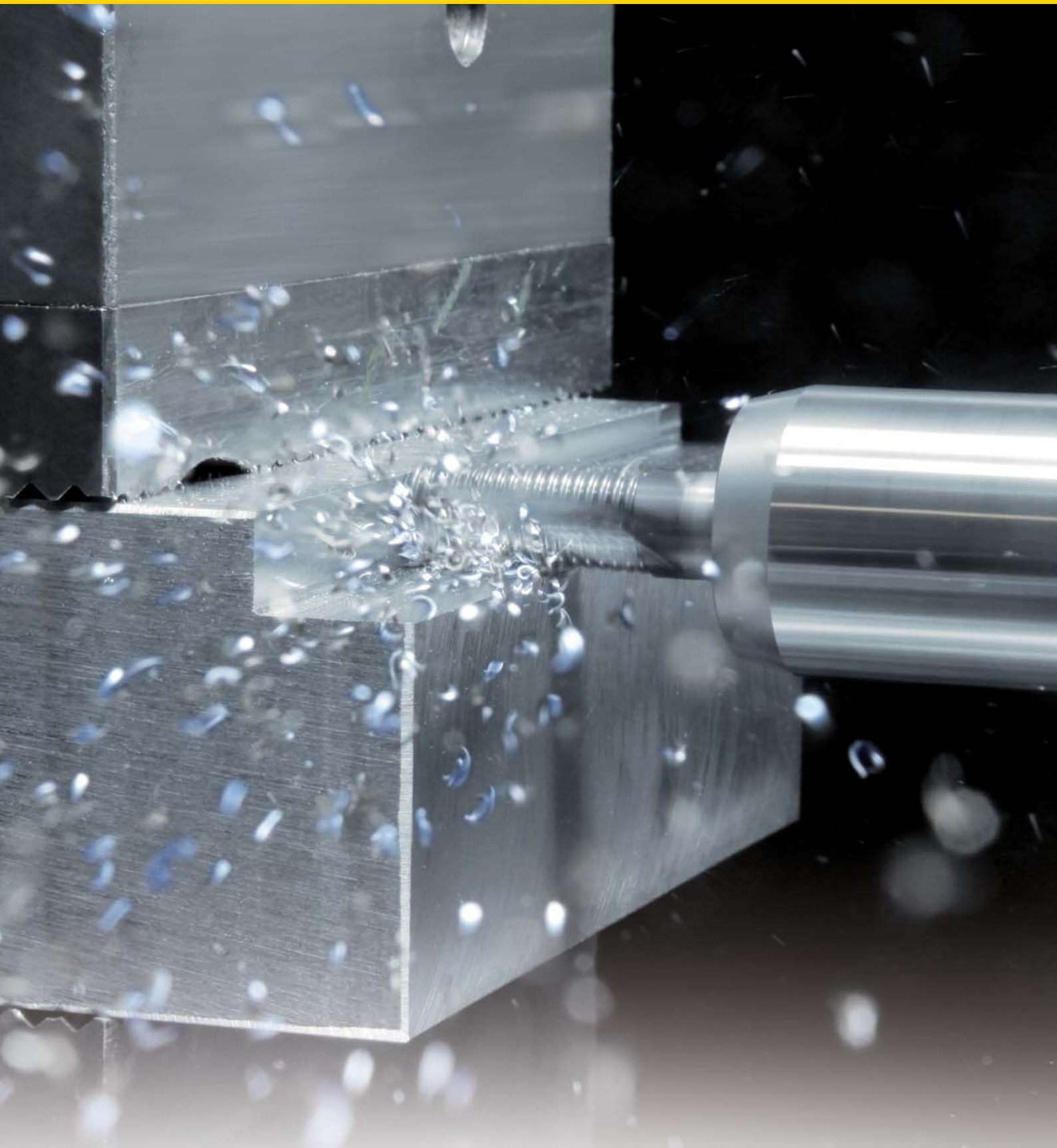


## Tool Life Comparison

	COMPETITOR	HARVI II™
coating:	AlTiN	AlTiN
end mill:	ø 5/8"	ø 5/8"
material:	Stainless steel 316L	Stainless steel 316L
depth of cut (ap):	5/8"	5/8"
width of cut (ae):	5/8"	5/8"
speed (vc):	260 SFM	260 SFM
RPM (N):	1592	1592
feed rate (vf):	19 IPM	19 IPM
chip load per tooth (fz):	0.0023 IPT	0.0023 IPT
tool life:	2480"	4685"

Up to 100% more tool life!





**Beyond™ Solid End Mills —**  
High-Performance milling in a new dimension.

# Go Beyond™ Traditional CFRP Milling Grades

Maximize Productivity  
with KCN05™ Solid Carbide Routers



## Composite Milling Solutions

Designed for machining difficult CFRP (Carbon-Fiber reinforced plastic) and non-ferrous components, Kennametal has the right milling solutions. Our diamond-coated (Grade KCN05) routers provide excellent tool life while producing smooth finishes with improved edge quality. Our unique geometries are free cutting, reducing heat generation, and providing high-quality machined surfaces.



### Compression-Style Router

Cutters are designed to provide high feed rates and produce excellent quality edges on both sides of the material. This up-cut/down-cut geometry generates the forces into the workpiece establishing stable cutting conditions.



### Down-Cut-Style Router

Cutters are designed for surface work with great ramping capabilities for producing pockets. Geometry designed to produce down forces eliminates surface delamination.



### Burr-Style Router

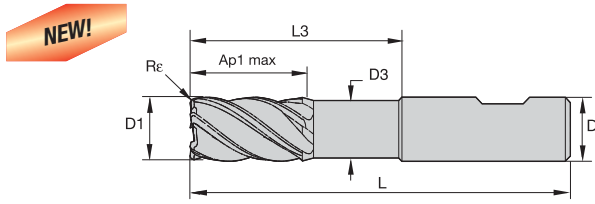
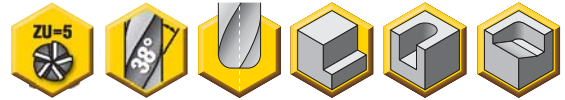
Cutters originally designed for the trimming of fiberglass are also found to work in CFRP with excellent temperature control while producing good surface quality.



### Ball-End-Style Router

Cutters are designed for slotting and profiling while providing excellent tool life.

- Non-center cutting.
- Unequal flute spacing minimizes chatter for smoother machining.



**beyond**



**beyond**







- first choice
- alternate choice

KCPM15		KCPM15		D1	D	Ap1 max	L3	L	Re	D3
UCDE250J5ARA	—	—	—	1/4	1/4	1/2	1 1/4	4	.015	.235
UCDE375J5ARA	—	—	—	3/8	3/8	7/8	1 7/8	4	.015	.353
—	—	UCDE500K5ARB	—	1/2	1/2	1 1/4	2 1/4	4	.030	.470
—	—	UCDE625K5ARB	—	5/8	5/8	1 1/4	2 1/4	4	.030	.588
—	—	UCDE750K5ARB	—	3/4	3/4	1 1/2	3 1/4	5 1/2	.030	.705
—	—	UCDE1000K5ARB	—	1	1	1 3/4	3 1/4	4 1/2	.030	.940

For application data, see page 11.

**End Mill Tolerances**

D1	Tolerance	D	Tolerance h6 + / -
All	+.000 / - .002	≤ 1/8"	0 / .00024
		> 1/8" to 1/4"	0 / .00031
		> 1/4" to 3/8"	0 / .00035
		> 3/8" to 23/32"	0 / .00043
		> 23/32" to 1 3/16"	0 / .00051

UCDE												
Group	 A		 B									
					Recommended Feed per Tooth (fz=inch/th) for Side Milling (A). For Slotting (B), reduce fz by 10%. D1 – Diameter							
				Cutting Speed vc SFM		fraction	1/4	3/8	1/2	5/8	3/4	1
	ap	ae	ap	Min	Max	decimal	0.250	0.375	0.500	0.625	0.750	1.000
P1	0.75 x D	0.5 x D	0.75 x D	490	- 660	fz	0.0018	0.0027	0.0035	0.0039	0.0043	0.0050
P2	0.75 x D	0.5 x D	0.75 x D	460	- 620	fz	0.0018	0.0027	0.0035	0.0039	0.0043	0.0050
P3	0.75 x D	0.5 x D	0.75 x D	390	- 520	fz	0.0015	0.0023	0.0029	0.0034	0.0038	0.0046
P4	0.75 x D	0.5 x D	0.5 x D	300	- 490	fz	0.0014	0.0020	0.0026	0.0030	0.0033	0.0039
P5	0.75 x D	0.5 x D	0.75 x D	200	- 330	fz	0.0012	0.0018	0.0023	0.0027	0.0030	0.0036
P6	0.75 x D	0.5 x D	0.5 x D	160	- 250	fz	0.0010	0.0015	0.0019	0.0022	0.0024	0.0028
M1	0.75 x D	0.5 x D	0.75 x D	260	- 330	fz	0.0015	0.0023	0.0029	0.0034	0.0038	0.0046
M2	0.75 x D	0.5 x D	0.75 x D	200	- 260	fz	0.0012	0.0018	0.0023	0.0027	0.0030	0.0036
M3	0.75 x D	0.5 x D	0.75 x D	200	- 260	fz	0.0010	0.0015	0.0019	0.0022	0.0024	0.0028
K1	0.75 x D	0.5 x D	0.75 x D	390	- 520	fz	0.0018	0.0027	0.0035	0.0039	0.0043	0.0050
K2	0.75 x D	0.5 x D	0.75 x D	360	- 460	fz	0.0015	0.0023	0.0029	0.0034	0.0038	0.0046
K3	0.75 x D	0.5 x D	0.75 x D	330	- 430	fz	0.0012	0.0018	0.0023	0.0027	0.0030	0.0036
S1	0.75 x D	0.3 x D	0.3 x D	160	- 300	fz	0.0015	0.0023	0.0029	0.0034	0.0038	0.0046
S2	0.75 x D	0.5 x D	0.75 x D	160	- 260	fz	0.0012	0.0018	0.0023	0.0027	0.0030	0.0036
S3	0.75 x D	0.3 x D	0.3 x D	70	- 130	fz	0.0008	0.0012	0.0016	0.0018	0.0020	0.0025
S4	0.75 x D	0.5 x D	0.75 x D	150	- 210	fz	0.0011	0.0017	0.0022	0.0025	0.0028	0.0033
H1	0.75 x D	0.5 x D	0.5 x D	260	- 460	fz	0.0014	0.0020	0.0026	0.0030	0.0033	0.0039

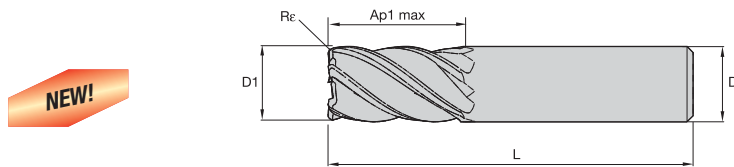
These guidelines may require variations to achieve optimum results.

Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.

Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on >1/2" diameter.

- Kennametal standard.
- Non-center cutting.
- Five-flute geometry enables slotting up to 1 x D.
- Unequal flute spacing minimizes chatter for smoother machining.
- Single tool for both roughing and finishing operations for fewer setups.



**NEW!**





● first choice  
○ alternate choice

KCPM15		KCPM15	D1	D	Ap1 max	L	Re
UCDE188J5BRA	—	—	3/16	3/16	5/8	2 1/4	.015
UCDE188J5BRB	—	—	3/16	3/16	5/8	2 1/4	.030
UCDE188J5BS	—	—	3/16	3/16	5/8	2 1/4	—
UCDE250J5BRA	—	—	1/4	1/4	3/4	2 1/2	.015
UCDE250J5BRB	—	—	1/4	1/4	3/4	2 1/2	.030
UCDE250J5BS	—	—	1/4	1/4	3/4	2 1/2	—
UCDE312J5BRA	—	—	5/16	5/16	3/4	2 1/2	.015
UCDE312J5BRB	—	—	5/16	5/16	3/4	2 1/2	.030
UCDE312J5BS	—	—	5/16	5/16	3/4	2 1/2	—
UCDE375J5BRA	—	—	3/8	3/8	7/8	2 1/2	.015
UCDE375J5BRB	—	—	3/8	3/8	7/8	2 1/2	.030
UCDE375J5BS	—	—	3/8	3/8	7/8	2 1/2	—
UCDE500J5BRA	—	UCDE500K5BRA	1/2	1/2	1 1/4	3	.015
UCDE500J5BRB	—	UCDE500K5BRB	1/2	1/2	1 1/4	3	.030
UCDE500J5BRF	—	UCDE500K5BRF	1/2	1/2	1 1/4	3	.120
UCDE500J5BS	—	UCDE500K5BS	1/2	1/2	1 1/4	3	—
UCDE625J5BRB	—	UCDE625K5BRB	5/8	5/8	1 1/4	3 1/2	.030
UCDE625J5BS	—	UCDE625K5BS	5/8	5/8	1 1/4	3 1/2	—
UCDE750J5BRB	—	UCDE750K5BRB	3/4	3/4	1 1/2	4	.030
UCDE750J5BRD	—	—	3/4	3/4	1 1/2	4	.060
UCDE750J5BRE	—	—	3/4	3/4	1 1/2	4	.090
UCDE750J5BRF	—	UCDE750K5BRF	3/4	3/4	1 1/2	4	.120
UCDE750J5BS	—	UCDE750K5BS	3/4	3/4	1 1/2	4	—
UCDE1000J5BRB	—	UCDE1000K5BRB	1	1	1 3/4	4 1/2	.030
UCDE1000J5BRD	—	—	1	1	1 3/4	4 1/2	.060
UCDE1000J5BRE	—	—	1	1	1 3/4	4 1/2	.090
UCDE1000J5BRF	—	UCDE1000K5BRF	1	1	1 3/4	4 1/2	.120
UCDE1000J5BS	—	UCDE1000K5BS	1	1	1 3/4	4 1/2	—

For application data, see page 13.

D1	Tolerance	D	Tolerance h6 + / -
All	+ .000 / - .002	≤ 1/8"	0 / .00024
		> 1/8" to 1/4"	0 / .00031
		> 1/4" to 3/8"	0 / .00035
		> 3/8" to 23/32"	0 / .00043
		> 23/32" to 1 3/16"	0 / .00051

UCDE															
A		B													
				 Recommended Feed per Tooth (fz=inch/th) for Side Milling (A). For Slotting (B), reduce fz by 10%. D1 – Diameter											
Group	Cutting Speed vc SFM		fraction												
	ap	ae	ap	Min	Max	decimal	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	1
P1	1.25 x D	0.5 x D	1 x D	490	- 660	fz	0.0014	0.0018	0.0023	0.0027	0.0031	0.0035	0.0039	0.0043	0.0050
P2	1.25 x D	0.5 x D	1 x D	460	- 620	fz	0.0014	0.0018	0.0023	0.0027	0.0031	0.0035	0.0039	0.0043	0.0050
P3	1.25 x D	0.5 x D	1 x D	390	- 520	fz	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046
P4	1.25 x D	0.5 x D	0.75 x D	300	- 490	fz	0.0010	0.0014	0.0018	0.0020	0.0023	0.0026	0.0030	0.0033	0.0039
P5	1.25 x D	0.5 x D	1 x D	200	- 330	fz	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036
P6	1.25 x D	0.5 x D	0.75 x D	160	- 250	fz	0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022	0.0024	0.0028
M1	1.25 x D	0.5 x D	1 x D	260	- 330	fz	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046
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S3	1.0 x D	0.3 x D	0.3 x D	70	- 130	fz	0.0006	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020	0.0025
S4	1.25 x D	0.5 x D	1 x D	150	- 210	fz	0.0008	0.0011	0.0014	0.0017	0.0019	0.0022	0.0025	0.0028	0.0033
H1	1.25 x D	0.5 x D	0.75 x D	260	- 460	fz	0.0010	0.0014	0.0018	0.0020	0.0023	0.0026	0.0030	0.0033	0.0039

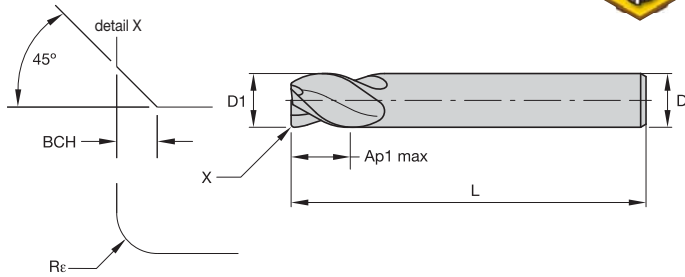
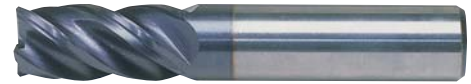
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Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on >1/2" diameter.

• Center cutting.



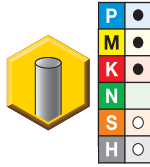
● first choice  
○ alternate choice

KCPM15	KCPM15	D1	D	Ap1 max	L	Re	BCH
HPHV125S4025CH	—	1/8	1/8	1/4	1 1/2	—	.015
HPHV125S4025	—	1/8	1/8	1/4	1 1/2	—	—
HPHV125S4025LR015	—	1/8	1/8	1/4	2 1/2	.015	—
HPHV125S4025L	—	1/8	1/8	1/4	2 1/2	—	—
HPHV125S4050R015	—	1/8	1/8	1/2	2	.015	—
HPHV125S4050CH	—	1/8	1/8	1/2	2	—	.015
HPHV125S4050	—	1/8	1/8	1/2	2	—	—
HPHV125S4050LR015	—	1/8	1/8	1/2	2 1/2	.015	—
HPHV125S4050L	—	1/8	1/8	1/2	2 1/2	—	—
HPHV188S4031CH	—	3/16	3/16	5/16	1 1/2	—	.015
HPHV188S4031	—	3/16	3/16	5/16	1 1/2	—	—
HPHV188S4031LR015	—	3/16	3/16	5/16	2 1/2	.015	—
HPHV188S4031L	—	3/16	3/16	5/16	2 1/2	—	—
HPHV188S4063R015	—	3/16	3/16	5/8	2 1/4	.015	—
HPHV188S4063R030	—	3/16	3/16	5/8	2 1/4	.030	—
HPHV188S4063CH	—	3/16	3/16	5/8	2 1/4	—	.015
HPHV188S4063	—	3/16	3/16	5/8	2 1/4	—	—
HPHV188S4063LR015	—	3/16	3/16	5/8	2 1/2	.015	—
HPHV188S4063LR030	—	3/16	1/4	5/8	2 1/2	.030	—
HPHV188S4063L	—	3/16	3/16	5/8	2 1/2	—	—
HPHV250S4038R030	—	1/4	1/4	3/8	2	.030	—
HPHV250S4038CH	—	1/4	1/4	3/8	2	—	.015
HPHV250S4038	—	1/4	1/4	3/8	2	—	—
HPHV250S4038LR015	—	1/4	1/4	3/8	2 1/2	.015	—
HPHV250S4038LR030	—	1/4	1/4	3/8	2 1/2	.030	—
HPHV250S4038L	—	1/4	1/4	3/8	2 1/2	—	—
HPHV250S4050R015	—	1/4	1/4	1/2	2 1/2	.015	—
HPHV250S4050R030	—	1/4	1/4	1/2	2 1/2	.030	—
HPHV250S4050R060	—	1/4	1/4	1/2	2 1/2	.060	—
HPHV250S4050	—	1/4	1/4	1/2	2 1/2	—	—
HPHV250S4075R015	—	1/4	1/4	3/4	2 1/2	.015	—
HPHV250S4075R030	—	1/4	1/4	3/4	2 1/2	.030	—
HPHV250S4075R060	—	1/4	1/4	3/4	2 1/2	.060	—
HPHV250S4075CH	—	1/4	1/4	3/4	2 1/2	—	.015
HPHV250S4075	—	1/4	1/4	3/4	2 1/2	—	—
HPHV250S4100R015	—	1/4	1/4	1	3	.015	—
HPHV250S4100R030	—	1/4	1/4	1	3	.030	—
HPHV250S4100	—	1/4	1/4	1	3	—	—
HPHV250S4125R015	—	1/4	1/4	1 1/2	3 1/4	.015	—
HPHV250S4125R030	—	1/4	1/4	1 1/2	3 1/4	.030	—

(continued)



(continued)



- first choice
- alternate choice

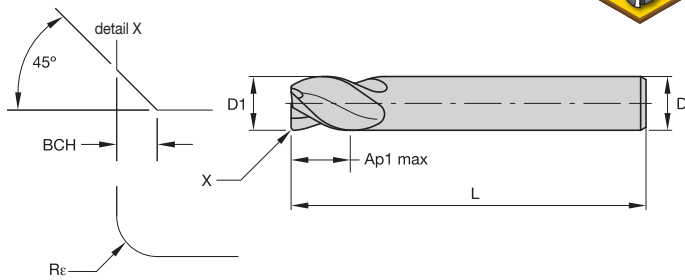
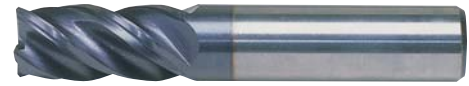
	KCPM15	D1	D	Ap1 max	L	Rε	BCH
HPHV250S4125CH	—	1/4	1/4	1 1/4	3 1/4	—	.015
HPHV250S4125	—	1/4	1/4	1 1/4	3 1/4	—	—
HPHV250S4175R015	—	1/4	1/4	1 3/4	4	.015	—
HPHV250S4175R030	—	1/4	1/4	1 3/4	4	.030	—
HPHV312S4050R030	—	5/16	5/16	1/2	2	.030	—
HPHV312S4050CH	—	5/16	5/16	1/2	2	—	.015
HPHV312S4050	—	5/16	5/16	1/2	2	—	—
HPHV312S4050LR015	—	5/16	5/16	1/2	2 1/2	.015	—
HPHV312S4050LR030	—	5/16	5/16	1/2	2 1/2	.030	—
HPHV312S4050L	—	5/16	5/16	1/2	2 1/2	—	—
HPHV312S4075R015	—	5/16	5/16	3/4	2 1/2	.015	—
HPHV312S4075R030	—	5/16	5/16	3/4	2 1/2	.030	—
HPHV312S4075R060	—	5/16	5/16	3/4	2 1/2	.060	—
HPHV312S4075CH	—	5/16	5/16	3/4	2 1/2	—	.015
HPHV312S4075	—	5/16	5/16	3/4	2 1/2	—	.015
HPHV312S4125R030	—	5/16	5/16	1 1/2	3 1/4	.030	—
HPHV375S4050R030	—	3/8	3/8	1/2	2	.030	—
HPHV375S4050CH	—	3/8	3/8	1/2	2	—	.020
HPHV375S4050	—	3/8	3/8	1/2	2	—	—
HPHV375S4050LR015	—	3/8	3/8	1/2	2 1/2	.015	—
HPHV375S4050LR030	—	3/8	3/8	1/2	2 1/2	.030	—
HPHV375S4050L	—	3/8	3/8	1/2	2 1/2	—	—
HPHV375S4088R015	—	3/8	3/8	7/8	2 1/2	.015	—
HPHV375S4088R030	—	3/8	3/8	7/8	2 1/2	.030	—
HPHV375S4088R060	—	3/8	3/8	7/8	2 1/2	.060	—
HPHV375S4088R090	—	3/8	3/8	7/8	2 1/2	.090	—
HPHV375S4088CH	—	3/8	3/8	7/8	2 1/2	—	.020
HPHV375S4088	—	3/8	3/8	7/8	2 1/2	—	—
HPHV375S4088LR015	—	3/8	3/8	7/8	3	.015	—
HPHV375S4088LR030	—	3/8	3/8	7/8	3	.030	—
HPHV375S4088LR060	—	3/8	3/8	7/8	3	.060	—
HPHV375S4088LR090	—	3/8	3/8	7/8	3	.090	—
HPHV375S4088L	—	3/8	3/8	7/8	3	—	—
HPHV375S4100R015	—	3/8	3/8	1	3	.015	—
HPHV375S4100R030	—	3/8	3/8	1	3	.030	—
HPHV375S4100R060	—	3/8	3/8	1	3	.060	—
HPHV375S4100	—	3/8	3/8	1	3	—	—
HPHV375S4125R015	—	3/8	3/8	1 1/4	3	.015	—
HPHV375S4125R030	—	3/8	3/8	1 1/4	3	.030	—
HPHV375S4125R060	—	3/8	3/8	1 1/4	3	.060	—
HPHV375S4125	—	3/8	3/8	1 1/4	3	—	—
HPHV375S4150R030	—	3/8	3/8	1 1/2	4	.030	—
HPHV375S4150R060	—	3/8	3/8	1 1/2	4	.060	—
HPHV375S4150	—	3/8	3/8	1 1/2	4	—	—
HPHV375S4250R030	—	3/8	3/8	2 1/2	4	.030	—
HPHV375S4250R060	—	3/8	3/8	2 1/2	4	.060	—
HPHV438S4063CH	—	7/16	7/16	5/8	2 1/2	—	.020
HPHV438S4088CH	—	7/16	7/16	7/8	2 1/2	—	.020
HPHV438S4113R015	—	7/16	7/16	1 1/8	3 1/2	.015	—

(continued)

**End Mill Tolerances**

D1	D1 Tolerance	D	D Tolerance
<1/4"	+0.000 / -.002	<1/4"	+0.0000 / -.0005
≥1/4"	+0.000 / -.003	≥1/4"	+0.0000 / -.0005

(continued)



beyond



beyond

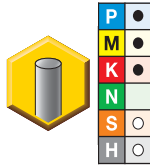


● first choice  
○ alternate choice

KCPM15	KCPM15	D1	D	Ap1 max	L	Re	BCH
—	HPHV500S4063R030	1/2	1/2	5/8	2 1/2	.030	—
—	HPHV500S4063R060	1/2	1/2	5/8	2 1/2	.060	—
—	HPHV500S4063	1/2	1/2	5/8	2 1/2	—	.020
—	HPHV500S4063CH	1/2	1/2	5/8	2 1/2	—	.020
—	HPHV500S4063LR015	1/2	1/2	5/8	3	.015	—
—	HPHV500S4063LR030	1/2	1/2	5/8	3	.030	—
—	HPHV500S4063LR060	1/2	1/2	5/8	3	.060	—
—	HPHV500S4063L	1/2	1/2	5/8	3	—	—
—	HPHV500S4100R030	1/2	1/2	1	3	.030	—
—	HPHV500S4100R060	1/2	1/2	1	3	.060	—
—	HPHV500S4100CH	1/2	1/2	1	3	—	.020
—	HPHV500S4100	1/2	1/2	1	3	—	—
—	HPHV500S4125R015	1/2	1/2	1 1/4	3	.015	—
—	HPHV500S4125R030	1/2	1/2	1 1/4	3	.030	—
—	HPHV500S4125R060	1/2	1/2	1 1/4	3	.060	—
—	HPHV500S4125R090	1/2	1/2	1 1/4	3	.090	—
—	HPHV500S4125R120	1/2	1/2	1 1/4	3	.120	—
—	HPHV500S4125CH	1/2	1/2	1 1/4	3	—	.020
—	HPHV500S4125	1/2	1/2	1 1/4	3	—	—
—	HPHV500S4150R030	1/2	1/2	1 1/2	4	.030	—
—	HPHV500S4150R060	1/2	1/2	1 1/2	4	.060	—
—	HPHV500S4150CH	1/2	1/2	1 1/2	4	—	.020
—	HPHV500S4150	1/2	1/2	1 1/2	4	—	—
—	HPHV500S4163R030	1/2	1/2	1 5/8	4	.030	—
—	HPHV500S4163R060	1/2	1/2	1 5/8	4	.060	—
—	HPHV500S4163R120	1/2	1/2	1 5/8	4	.120	—
—	HPHV500S4163	1/2	1/2	1 5/8	4	—	—
—	HPHV500S4200R030	1/2	1/2	2	4	.030	—
—	HPHV500S4200CH	1/2	1/2	2	4	—	.020
—	HPHV500S4200	1/2	1/2	2	4	—	—
—	HPHV500S4250R030	1/2	1/2	2 1/2	4 1/2	.030	—
—	HPHV500S4250R060	1/2	1/2	2 1/2	4 1/2	.060	—
—	HPHV500S4300R030	1/2	1/2	3	5	.030	—
—	HPHV500S4300R060	1/2	1/2	3	5	.060	—
—	HPHV625S4075R060	5/8	5/8	3/4	3	.060	—
—	HPHV625S4075R120	5/8	5/8	3/4	3	.120	—

(continued)

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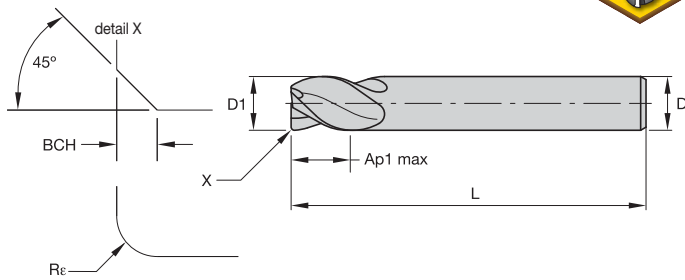
KCPM15	KCPM15	D1	D	Ap1 max	L	Re	BCH
—	HPHV625S4075	5/8	5/8	3/4	3	—	.020
—	HPHV625S4075CH	5/8	5/8	3/4	3	—	.020
—	HPHV625S4075LR015	5/8	5/8	3/4	3 1/2	.015	—
—	HPHV625S4075LR030	5/8	5/8	3/4	3 1/2	.030	—
—	HPHV625S4075LR060	5/8	5/8	3/4	3 1/2	.060	—
—	HPHV625S4075LR120	5/8	5/8	3/4	3 1/2	.120	—
—	HPHV625S4075L	5/8	5/8	3/4	3 1/2	—	—
—	HPHV625S4125R030	5/8	5/8	1 1/4	3 1/2	.030	—
—	HPHV625S4125R060	5/8	5/8	1 1/4	3 1/2	.060	—
—	HPHV625S4125R090	5/8	5/8	1 1/4	3 1/2	.090	—
—	HPHV625S4125R120	5/8	5/8	1 1/4	3 1/2	.120	—
—	HPHV625S4125CH	5/8	5/8	1 1/4	3 1/2	—	.020
—	HPHV625S4125	5/8	5/8	1 1/4	3 1/2	—	—
—	HPHV625S4163R030	5/8	5/8	1 5/8	3 1/2	.030	—
—	HPHV625S4163R060	5/8	5/8	1 5/8	3 1/2	.060	—
—	HPHV625S4163R120	5/8	5/8	1 5/8	3 1/2	.120	—
—	HPHV625S4163	5/8	5/8	1 5/8	3 1/2	—	—
—	HPHV625S4213R030	5/8	5/8	2 1/8	4	.030	—
—	HPHV625S4213R120	5/8	5/8	2 1/8	4	.120	—
—	HPHV625S4213	5/8	5/8	2 1/8	4	—	—
—	HPHV625S4225R060	5/8	5/8	2 1/4	5	.060	—
—	HPHV750S4088CH	3/4	3/4	7/8	3 1/2	—	.020
—	HPHV750S4088	3/4	3/4	7/8	3 1/2	—	.020
—	HPHV750S4088LR030	3/4	3/4	7/8	4	.030	—
—	HPHV750S4088L	3/4	3/4	7/8	4	—	—
—	HPHV750S4150R015	3/4	3/4	1 1/2	4	.015	—
—	HPHV750S4150R030	3/4	3/4	1 1/2	4	.030	—
—	HPHV750S4150R060	3/4	3/4	1 1/2	4	.060	—
—	HPHV750S4150R090	3/4	3/4	1 1/2	4	.090	—
—	HPHV750S4150R120	3/4	3/4	1 1/2	4	.120	—
—	HPHV750S4150CH	3/4	3/4	1 1/2	4	—	.020
—	HPHV750S4150	3/4	3/4	1 1/2	4	—	—
—	HPHV750S4163R030	3/4	3/4	1 5/8	4	.030	—
—	HPHV750S4163R060	3/4	3/4	1 5/8	4	.060	—
—	HPHV750S4163R120	3/4	3/4	1 5/8	4	.120	—
—	HPHV750S4163CH	3/4	3/4	1 5/8	4	—	.020
—	HPHV750S4225R030	3/4	3/4	2 1/4	5	.030	—
—	HPHV750S4225R060	3/4	3/4	2 1/4	5	.060	—
—	HPHV750S4225CH	3/4	3/4	2 1/4	5	—	.020
—	HPHV750S4300CH	3/4	3/4	3	6	—	.020
—	HPHV750S4300	3/4	3/4	3	6	—	—
—	HPHV750S4400R030	3/4	3/4	4	6 1/4	.030	—
—	HPHV750S4400R060	3/4	3/4	4	6 1/4	.060	—
—	HPHV1000S4150R030	1	1	1 1/2	4	.030	—

(continued)

**End Mill Tolerances**

D1	D1 Tolerance	D	D Tolerance
<1/4"	+0.000 / -.002	<1/4"	+.0000 / -.0005
≥1/4"	+0.000 / -.003	≥1/4"	+.0000 / -.0005

(continued)



beyond



beyond



● first choice  
○ alternate choice

KCPM15	KCPM15	D1	D	Ap1 max	L	Re	BCH
—	HPHV1000S4150R060	1	1	1 1/2	4	.060	—
—	HPHV1000S4150R090	1	1	1 1/2	4	.090	—
—	HPHV1000S4150R120	1	1	1 1/2	4	.120	—
—	HPHV1000S4150R250	1	1	1 1/2	4	.250	—
—	HPHV1000S4150CH	1	1	1 1/2	4	—	.020
—	HPHV1000S4150	1	1	1 1/2	4	—	—
—	HPHV1000S4200R030	1	1	2	4	.030	—
—	HPHV1000S4200R060	1	1	2	4	.060	—
—	HPHV1000S4200R120	1	1	2	4	.120	—
—	HPHV1000S4200R250	1	1	2	4	.250	—
—	HPHV1000S4200	1	1	2	4	—	—
—	HPHV1000S4225R030	1	1	2 1/4	5	.030	—
—	HPHV1000S4225R060	1	1	2 1/4	5	.060	—
—	HPHV1000S4225CH	1	1	2 1/4	5	—	.020
—	HPHV1000S4225	1	1	2 1/4	5	—	—
—	HPHV1000S4263R030	1	1	2 5/8	5	.030	—
—	HPHV1000S4263CH	1	1	2 5/8	5	—	.020
—	HPHV1000S4263	1	1	2 5/8	5	—	—
—	HPHV1000S4300R030	1	1	3	6	.030	—
—	HPHV1000S4300R060	1	1	3	6	.060	—
—	HPHV1000S4300CH	1	1	3	6	—	—
—	HPHV1000S4400R030	1	1	4	7	.030	—
—	HPHV1000S4400R060	1	1	4	7	.060	—
—	HPHV1000S4400CH	1	1	4	7	—	.020
—	HPHV1250S4225R030	1 1/4	1 1/4	2 1/4	5	.030	—
—	HPHV1250S4225R120	1 1/4	1 1/4	2 1/4	5	.120	—
—	HPHV1250S4225CH	1 1/4	1 1/4	2 1/4	5	—	.020

End Mill Tolerances

D1	D1 Tolerance	D	D Tolerance
<1/4"	+0.000 / -0.002	<1/4"	+0.0000 / -0.0005
≥1/4"	+0.000 / -0.003	≥1/4"	+0.0000 / -0.0005

HPHV																	
Group																	
	A		B		<b>beyond</b> <b>KCPM15</b> Recommended Feed per Tooth (fz=inch/th) for Side Milling (A). For Slotting (B), reduce fz by 10%. D1 – Diameter												
	ap	ae	ap		Cutting Speed vc SFM		fraction	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	1
				Min	Max	decimal	0.125	0.188	0.250	0.313	0.375	0.438	0.500	0.625	0.750	1.000	1.250
P1	1.25 x D	0.5 x D	1 x D	490	- 660	fz	0.0009	0.0014	0.0018	0.0023	0.0027	0.0031	0.0035	0.0039	0.0043	0.0050	0.0062
P2	1.25 x D	0.5 x D	1 x D	460	- 620	fz	0.0009	0.0014	0.0018	0.0023	0.0027	0.0031	0.0035	0.0039	0.0043	0.0050	0.0062
P3	1.25 x D	0.5 x D	1 x D	390	- 520	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
P4	1.25 x D	0.5 x D	0.75 x D	300	- 490	fz	0.0007	0.0010	0.0014	0.0018	0.0020	0.0023	0.0026	0.0030	0.0033	0.0039	0.0049
P5	1.25 x D	0.5 x D	1 x D	200	- 330	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
P6	1.25 x D	0.5 x D	0.75 x D	160	- 250	fz	0.0005	0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022	0.0024	0.0028	0.0036
M1	1.25 x D	0.5 x D	1 x D	260	- 330	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
M2	1.25 x D	0.5 x D	1 x D	200	- 260	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
M3	1.25 x D	0.5 x D	1 x D	200	- 260	fz	0.0005	0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022	0.0024	0.0028	0.0036
K1	1.25 x D	0.5 x D	1 x D	390	- 520	fz	0.0009	0.0014	0.0018	0.0023	0.0027	0.0031	0.0035	0.0039	0.0043	0.0050	0.0062
K2	1.25 x D	0.5 x D	1 x D	360	- 460	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
K3	1.25 x D	0.5 x D	1 x D	330	- 430	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
S1	1.0 x D	0.3 x D	0.3 x D	160	- 300	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
S2	1.25 x D	0.5 x D	1 x D	160	- 260	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
S3	1.0 x D	0.3 x D	0.3 x D	70	- 130	fz	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020	0.0025	0.0031
S4	1.25 x D	0.5 x D	1 x D	150	- 210	fz	0.0005	0.0008	0.0011	0.0014	0.0017	0.0019	0.0022	0.0025	0.0028	0.0033	0.0042
H1	1.25 x D	0.5 x D	0.75 x D	260	- 460	fz	0.0007	0.0010	0.0014	0.0018	0.0020	0.0023	0.0026	0.0030	0.0033	0.0039	0.0049

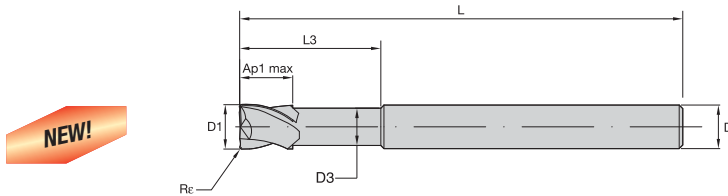
These guidelines may require variations to achieve optimum results.

Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.

Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on >1/2" diameter.

- Center cutting.
- Unequal flute spacing minimizes chatter for smoother machining.



**beyond**






- first choice
- alternate choice

KCPM15	D1	D	Ap1 max	L3	L	Re	D3
UADE0250J4AQA	1/4	1/4	3/8	1 1/4	4	.015	.24
UADE0250J4AQB	1/4	1/4	3/8	1 1/4	4	.030	.24
UADE0375J4AQA	3/8	3/8	1/2	2	4	.015	.34
UADE0375J4AQB	3/8	3/8	1/2	2	4	.030	.34
UADE0500J4AQB	1/2	1/2	5/8	2 1/4	4	.030	.47
UADE0625J4AQB	5/8	5/8	3/4	2 1/4	4	.030	.59
UADE0750J4AQB	3/4	3/4	1	2 1/4	4 1/2	.030	.70
UADE0750J4BQB	3/4	3/4	1	3 1/4	5 1/2	.030	.70
UADE1000J4BQB	1	1	1 1/8	3 1/4	5 1/2	.030	.94

For application data, see page 21.

**End Mill Tolerances**

D1	D1 Tolerance	D Tolerance	Re Tolerance
All	+.000 / - .002	+.0000 / - .0005	+.000 / - .002

UADE												
Group	 A		 B									
					Recommended Feed per Tooth (fz=inch/th) for Side Milling (A). For Slotting (B), reduce fz by 10%. D1 – Diameter							
	ap		ae	ap	Cutting Speed vc SFM		fraction	1/4	3/8	1/2	5/8	3/4
				Min	Max	decimal	0.250	0.375	0.500	0.625	0.750	1.000
P1	0.75 x D	0.5 x D	0.75 x D	500	- 650	fz	0.0018	0.0027	0.0035	0.0039	0.0043	0.0050
P2	0.75 x D	0.5 x D	0.75 x D	450	- 625	fz	0.0018	0.0027	0.0035	0.0039	0.0043	0.0050
P3	0.75 x D	0.5 x D	0.75 x D	400	- 525	fz	0.0015	0.0023	0.0029	0.0034	0.0038	0.0046
P4	0.75 x D	0.5 x D	0.5 x D	300	- 475	fz	0.0014	0.0020	0.0026	0.0030	0.0033	0.0039
P5	0.75 x D	0.5 x D	0.75 x D	200	- 325	fz	0.0012	0.0018	0.0023	0.0027	0.0030	0.0036
P6	0.75 x D	0.5 x D	0.5 x D	150	- 225	fz	0.0010	0.0015	0.0019	0.0022	0.0024	0.0028
M1	0.75 x D	0.5 x D	0.75 x D	260	- 330	fz	0.0015	0.0023	0.0029	0.0034	0.0038	0.0046
M2	0.75 x D	0.5 x D	0.75 x D	200	- 260	fz	0.0012	0.0018	0.0023	0.0027	0.0030	0.0036
M3	0.75 x D	0.5 x D	0.75 x D	200	- 260	fz	0.0010	0.0015	0.0019	0.0022	0.0024	0.0028
K1	0.75 x D	0.5 x D	0.75 x D	390	- 520	fz	0.0018	0.0027	0.0035	0.0039	0.0043	0.0050
K2	0.75 x D	0.5 x D	0.75 x D	360	- 460	fz	0.0015	0.0023	0.0029	0.0034	0.0038	0.0046
K3	0.75 x D	0.5 x D	0.75 x D	330	- 430	fz	0.0012	0.0018	0.0023	0.0027	0.0030	0.0036
S1	0.75 x D	0.3 x D	0.3 x D	150	- 275	fz	0.0015	0.0023	0.0029	0.0034	0.0038	0.0046
S2	0.75 x D	0.5 x D	0.75 x D	160	- 260	fz	0.0012	0.0018	0.0023	0.0027	0.0030	0.0036
S3	0.75 x D	0.3 x D	0.3 x D	70	- 130	fz	0.0008	0.0012	0.0016	0.0018	0.0020	0.0025
S4	0.75 x D	0.5 x D	0.75 x D	150	- 210	fz	0.0011	0.0017	0.0022	0.0025	0.0028	0.0033
H1	0.75 x D	0.5 x D	0.5 x D	260	- 450	fz	0.0014	0.0020	0.0026	0.0030	0.0033	0.0039

Side milling applications — For longest reach (L3) tools, reduce ae by 30%.

Slot milling applications — For longest reach (L3) tools, reduce ap by 30%.

Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.

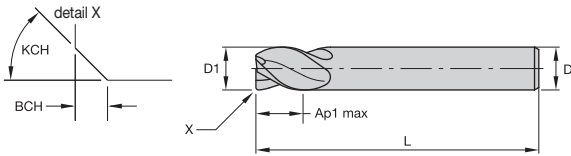
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on >1/2" diameter.

- Kennametal standard.
- Center cutting.



**NEW!**



**beyond**



- first choice
- alternate choice


KCPM15	D1	D	Ap1 max	L	BCH
HPRSHV500S4600CH	1/2	1/2	5/8	6	.020
HPRSHV500S4600	1/2	1/2	5/8	6	—
HPRSHV625S4600CH	5/8	5/8	3/4	6	.020
HPRSHV625S4600	5/8	5/8	3/4	6	—
HPRSHV750S4600	3/4	3/4	1	6	—
HPRSHV750S4600CH	3/4	3/4	1	6	.020
HPRSHV750S4500CH	3/4	3/4	1	5	.020
HPRSHV1000S4600CH	1	1	1 1/8	6	.020
HPRSHV1000S4600	1	1	1 1/8	6	—
HPRSHV1000S4700CH	1	1	1 1/8	7	.020

For application data, see page 23.

**End Mill Tolerances**

D1	D1 Tolerance	D	D Tolerance
All	+ .000" to - .002"	All	+ .0000" to - .0005"



HPRSHV											
Group	 A		 B								
						Recommended Feed per Tooth (fz=inch/th) for Side Milling (A). For Slotting (B), reduce fz by 10%. D1 – Diameter					
	ap	ae	ap	Cutting Speed vc SFM		fraction	1/2	5/8	3/4	1	
			Min	Max	decimal	0.500	0.625	0.750	1.000		
<b>P5</b>	0.75 x D	0.5 x D	0.75 x D	200	- 325	fz	0.0023	0.0027	0.0030	0.0036	
<b>P6</b>	0.75 x D	0.5 x D	0.5 x D	150	- 225	fz	0.0019	0.0022	0.0024	0.0028	
<b>S2</b>	0.75 x D	0.5 x D	0.75 x D	160	- 260	fz	0.0023	0.0027	0.0030	0.0036	
<b>S3</b>	0.75 x D	0.3 x D	0.3 x D	70	- 130	fz	0.0016	0.0018	0.0020	0.0025	
<b>S4</b>	0.75 x D	0.5 x D	0.75 x D	150	- 210	fz	0.0022	0.0025	0.0028	0.0033	

These guidelines may require variations to achieve optimum results.

Side milling applications — For longest length tools, reduce ae by 30%.

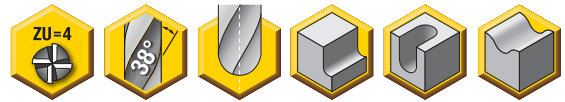
Slot milling applications — For longest length tools, reduce ap by 30%.

Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.

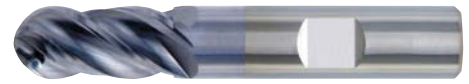
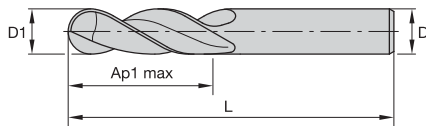
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on >1/2" diameter.

- Center cutting.



**NEW!**



**beyond**



**beyond**



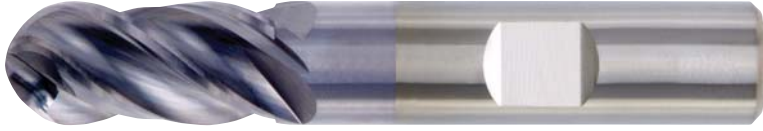

- first choice
- alternate choice

KCPM15		KCPM15	D1	D	Ap1 max	L
HPHVBN125S4050	HPHVBN188S4063	—	1/8	1/8	1/2	2
HPHVBN250S4075	HPHVBN312S4075	—	1/4	1/4	3/4	2 1/2
HPHVBN375S4088	HPHVBN438S4088	—	3/8	3/8	7/8	2 1/2
—	HPHVBN500S4100	—	7/16	7/16	7/8	2 1/2
—	HPHVBN500S4125	—	1/2	1/2	1	3
—	HPHVBN625S4125	—	1/2	1/2	1 1/4	3
—	HPHVBN750S4150	—	5/8	5/8	1 1/4	3 1/2
—	HPHVBN1000S4150	—	3/4	3/4	1 1/2	4
—	—	—	1	1	1 1/2	4

For application data, see page 25.

**End Mill Tolerances**

D1	Tolerance	D	Tolerance h6 + / -
All	+ .000 / - .002	≤ 1/8"	0 / .00024
		> 1/8" to 1/4"	0 / .00031
		> 1/4" to 3/8"	0 / .00035
		> 3/8" to 23/32"	0 / .00043
		> 23/32" to 1 3/16"	0 / .00051

HPHVBN																	
Group	A		B														
	ap	ae	ap	 Recommended Feed per Tooth (fz=inch/th) for Side Milling (A). For Slotting (B), reduce fz by 10%. D1 – Diameter													
				Cutting Speed vc SFM		fraction	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	1	1 1/4
	Min	Max	decimal	0.125	0.188	0.250	0.313	0.375	0.438	0.500	0.625	0.750	1.000	1.250			
P1	1.25 x D	0.5 x D	1 x D	490	- 660	fz	0.0009	0.0014	0.0018	0.0023	0.0027	0.0031	0.0035	0.0039	0.0043	0.0050	0.0062
P2	1.25 x D	0.5 x D	1 x D	460	- 620	fz	0.0009	0.0014	0.0018	0.0023	0.0027	0.0031	0.0035	0.0039	0.0043	0.0050	0.0062
P3	1.25 x D	0.5 x D	1 x D	390	- 520	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
P4	1.25 x D	0.5 x D	0.75 x D	300	- 490	fz	0.0007	0.0010	0.0014	0.0018	0.0020	0.0023	0.0026	0.0030	0.0033	0.0039	0.0049
P5	1.25 x D	0.5 x D	1 x D	200	- 330	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
P6	1.25 x D	0.5 x D	0.75 x D	160	- 250	fz	0.0005	0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022	0.0024	0.0028	0.0036
M1	1.25 x D	0.5 x D	1 x D	260	- 330	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
M2	1.25 x D	0.5 x D	1 x D	200	- 260	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
M3	1.25 x D	0.5 x D	1 x D	200	- 260	fz	0.0005	0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022	0.0024	0.0028	0.0036
K1	1.25 x D	0.5 x D	1 x D	390	- 520	fz	0.0009	0.0014	0.0018	0.0023	0.0027	0.0031	0.0035	0.0039	0.0043	0.0050	0.0062
K2	1.25 x D	0.5 x D	1 x D	360	- 460	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
K3	1.25 x D	0.5 x D	1 x D	330	- 430	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
S1	1.0 x D	0.3 x D	0.3 x D	160	- 300	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
S2	1.25 x D	0.5 x D	1 x D	160	- 260	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
S3	1.0 x D	0.3 x D	0.3 x D	70	- 130	fz	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020	0.0025	0.0031
S4	1.25 x D	0.5 x D	1 x D	150	- 210	fz	0.0005	0.0008	0.0011	0.0014	0.0017	0.0019	0.0022	0.0025	0.0028	0.0033	0.0042
H1	1.25 x D	0.5 x D	0.75 x D	260	- 460	fz	0.0007	0.0010	0.0014	0.0018	0.0020	0.0023	0.0026	0.0030	0.0033	0.0039	0.0049

These guidelines may require variations to achieve optimum results.

Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.

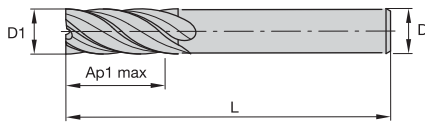
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on >1/2" diameter.

- Kennametal standard.
- Center cutting.



**NEW!**



**beyond**



**beyond**




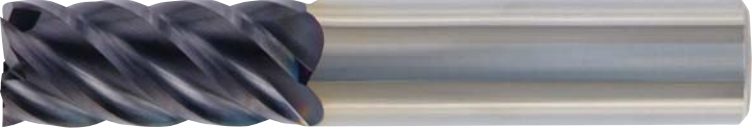

- first choice
- alternate choice

KCPM15		KCPM15	D1	D	Ap1 max	L
HPFSS188S5056	—	—	3/16	3/16	9/16	2
HPFSS250S5038	—	—	1/4	1/4	3/8	2
HPFSS250S5075	—	—	1/4	1/4	3/4	2 1/2
HPFSS250S5125	—	—	1/4	1/4	1 1/4	4
HPFSS375S5050	—	—	3/8	3/8	1/2	2
HPFSS375S5088	—	—	3/8	3/8	7/8	2 1/2
HPFSS375S5150	—	—	3/8	3/8	1 1/2	4
—	HPFSS500S5063	—	1/2	1/2	5/8	2 1/2
—	HPFSS500S5125	—	1/2	1/2	1 1/4	3
—	HPFSS500S5200	—	1/2	1/2	2	4
—	HPFSS625S5075	—	5/8	5/8	3/4	3
—	HPFSS625S5163	—	5/8	5/8	1 5/8	4
—	HPFSS750S5088	—	3/4	3/4	7/8	3
—	HPFSS750S5163	—	3/4	3/4	1 5/8	4
—	HPFSS750S5325	—	3/4	3/4	3 1/4	5
—	HPFSS1000S5150	—	1	1	1 1/2	4
—	HPFSS1000S5200	—	1	1	2	4
8—	HPFSS1000S5325	—	1	1	3 1/4	6

For application data, see page 27.

### End Mill Tolerances

D1	Tolerance	D	Tolerance
≤ 1/4"	+ .000" to - .002"	≤ 1/4"	+ .0000" to - .0005"
> 1/4"	+ .000" to - .003"	> 1/4"	+ .0000" to - .0005"

HPFSS 5-Flute																
Group	 A															
					Recommended Feed per Tooth (fz=inch/th) for Side Milling (A).											
			Cutting Speed vc SFM		D1 — Diameter											
	ap	ae	Min	Max	fraction	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	1	1 1/4
P1	2.5 x D	0.1 x D	490	- 660	fz	0.0009	0.0014	0.0018	0.0023	0.0027	0.0031	0.0035	0.0039	0.0043	0.0050	0.0062
P2	2.5 x D	0.1 x D	460	- 620	fz	0.0009	0.0014	0.0018	0.0023	0.0027	0.0031	0.0035	0.0039	0.0043	0.0050	0.0062
P3	2.5 x D	0.1 x D	390	- 520	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
P4	2.5 x D	0.1 x D	300	- 490	fz	0.0007	0.0010	0.0014	0.0018	0.0020	0.0023	0.0026	0.0030	0.0033	0.0039	0.0049
P5	2.5 x D	0.1 x D	200	- 330	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
P6	2.5 x D	0.1 x D	160	- 250	fz	0.0005	0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022	0.0024	0.0028	0.0036
M1	2.5 x D	0.1 x D	260	- 330	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
M2	2.5 x D	0.1 x D	200	- 260	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
M3	2.5 x D	0.1 x D	200	- 260	fz	0.0005	0.0008	0.0010	0.0013	0.0015	0.0017	0.0019	0.0022	0.0024	0.0028	0.0036
K1	2.5 x D	0.1 x D	390	- 520	fz	0.0009	0.0014	0.0018	0.0023	0.0027	0.0031	0.0035	0.0039	0.0043	0.0050	0.0062
K2	2.5 x D	0.1 x D	360	- 460	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
K3	2.5 x D	0.1 x D	330	- 430	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
S1	2.5 x D	0.06 x D	160	- 300	fz	0.0007	0.0011	0.0015	0.0020	0.0023	0.0026	0.0029	0.0034	0.0038	0.0046	0.0057
S2	2.5 x D	0.1 x D	160	- 260	fz	0.0006	0.0009	0.0012	0.0016	0.0018	0.0021	0.0023	0.0027	0.0030	0.0036	0.0046
S3	2.5 x D	0.06 x D	70	- 130	fz	0.0004	0.0006	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020	0.0025	0.0031
S4	2.5 x D	0.1 x D	150	- 210	fz	0.0005	0.0008	0.0011	0.0014	0.0017	0.0019	0.0022	0.0025	0.0028	0.0033	0.0042
H1	2.5 x D	0.1 x D	260	- 460	fz	0.0007	0.0010	0.0014	0.0018	0.0020	0.0023	0.0026	0.0030	0.0033	0.0039	0.0049

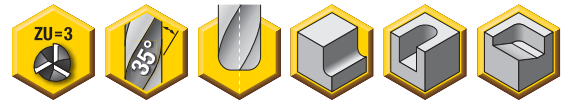
These guidelines may require variations to achieve optimum results.

Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.

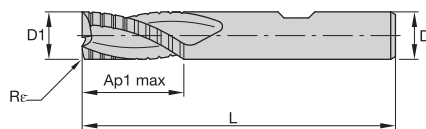
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on >1/2" diameter.

- Kennametal standard.
- Center cutting.
- Chipbreaker profile.



**NEW!**



**beyond**





- first choice
- alternate choice

KCPM15	D1	D	Ap1 max	L	Re
HPRSS250S3075	1/4	1/4	3/4	2 1/2	.020
HPRSS375S3100	3/8	3/8	1	2 1/2	.020
HPRSS500S3125	1/2	1/2	1 1/4	3	.030
HPRSS625S3163	5/8	5/8	1 5/8	3 1/2	.030
HPRSS750S3163	3/4	3/4	1 5/8	4	.030
HPRSS1000S3200	1	1	2	4	.030

For application data, see page 29.

### End Mill Tolerances

D1	d11	D	Tolerance h6 +/-
< 1/8"	-.0008 / -.0031	< 1/8"	0 / .00024
1/8" to 7/32"	-.0012 / -.0041	1/8" to 7/32"	0 / .00031
1/4" to 3/8"	-.0016 / -.0051	1/4" to 3/8"	0 / .00035
13/32" to 11/16"	-.002 / -.0063	13/32" to 11/16"	0 / .00043
23/32" to 1 3/16"	-.0026 / -.0077	23/32" to 1 3/16"	0 / .00051

HPRSS Inch • Rougher													
Group													
	A		B	KCPM15		Recommended Feed per Tooth (fz=inch/th) for Side Milling (A). For Slotting (B), reduce fz by 10%. D1 – Diameter							
	ap	ae	ap	Cutting Speed vc SFM		fraction	1/4	5/16	3/8	1/2	5/8	3/4	1
				Min	Max	decimal	0.250	0.313	0.375	0.500	0.625	0.750	1.000
P1	1 x D	0.5 x D	0.75 x D	500	- 650	fz	0.0018	0.0023	0.0027	0.0035	0.0039	0.0043	0.0050
P2	1 x D	0.5 x D	0.75 x D	450	- 625	fz	0.0018	0.0023	0.0027	0.0035	0.0039	0.0043	0.0050
P3	1 x D	0.5 x D	0.75 x D	400	- 525	fz	0.0015	0.0020	0.0023	0.0029	0.0034	0.0038	0.0046
P4	1 x D	0.4 x D	0.3 x D	350	- 475	fz	0.0014	0.0018	0.0020	0.0026	0.0030	0.0033	0.0039
P5	1 x D	0.5 x D	0.75 x D	200	- 325	fz	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030	0.0036
P6	1 x D	0.4 x D	0.3 x D	150	- 225	fz	0.0010	0.0013	0.0015	0.0019	0.0022	0.0024	0.0028
M1	1 x D	0.5 x D	0.75 x D	250	- 325	fz	0.0015	0.0020	0.0023	0.0029	0.0034	0.0038	0.0046
M2	1 x D	0.5 x D	0.75 x D	190	- 260	fz	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030	0.0036
M3	1 x D	0.5 x D	0.75 x D	200	- 260	fz	0.0010	0.0013	0.0015	0.0019	0.0022	0.0024	0.0028
K1	1 x D	0.5 x D	0.75 x D	400	- 525	fz	0.0018	0.0023	0.0027	0.0035	0.0039	0.0043	0.0050
K2	1 x D	0.5 x D	0.75 x D	360	- 460	fz	0.0015	0.0020	0.0023	0.0029	0.0034	0.0038	0.0046
K3	1 x D	0.5 x D	0.75 x D	330	- 430	fz	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030	0.0036
S1	1 x D	0.4 x D	0.3 x D	150	- 275	fz	0.0015	0.0020	0.0023	0.0029	0.0034	0.0038	0.0046
S2	1 x D	0.5 x D	0.75 x D	160	- 275	fz	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030	0.0036
S3	1 x D	0.4 x D	0.3 x D	65	- 125	fz	0.0008	0.0010	0.0012	0.0016	0.0018	0.0020	0.0025
S4	1 x D	0.5 x D	0.75 x D	150	- 220	fz	0.0011	0.0014	0.0017	0.0022	0.0025	0.0028	0.0033
H1	1 x D	0.4 x D	0.3 x D	300	- 450	fz	0.0014	0.0018	0.0020	0.0026	0.0030	0.0033	0.0039

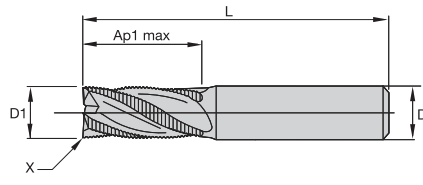
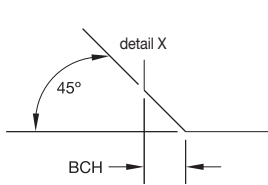
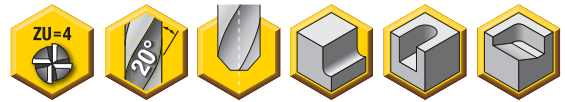
These guidelines may require variations to achieve optimum results.

Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.

Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on >1/2" diameter.

- Center cutting.
- Fine-pitch profile.



beyond



- first choice
- alternate choice




KCPM15	D1	D	Ap1 max	L	BCH	Z U
MDRHEC250S3025	1/4	1/4	1/4	2	.012	4
MDRHEC250S3075	1/4	1/4	3/4	2 1/2	.012	4
MDRHEC312S4081	5/16	5/16	13/16	2 1/2	.012	4
MDRHEC375S4038	3/8	3/8	3/8	2	.020	4
MDRHEC375S4088	3/8	3/8	7/8	2 1/2	.020	4
MDRHEC500S4050	1/2	1/2	1/2	2 1/2	.020	4
MDRHEC500S4100	1/2	1/2	1	3	.020	4
MDRHEC625S4063	5/8	5/8	5/8	3	.020	4
MDRHEC625S4125	5/8	5/8	1 1/4	3 1/2	.020	4
MDRHEC750S4075	3/4	3/4	3/4	3 1/2	.020	4
MDRHEC750S4150	3/4	3/4	1 1/2	4	.020	4

For application data, see page 31.

End Mill Tolerances

D1	d11	D	Tolerance h6 + / -
< 1/8"	-.0008 / -.0031	< 1/8"	0 / .00024
1/8" to 7/32"	-.0012 / -.0041	1/8" to 7/32"	0 / .00031
1/4" to 3/8"	-.0016 / -.0051	1/4" to 3/8"	0 / .00035
13/32" to 11/16"	-.002 / -.0063	13/32" to 11/16"	0 / .00043
23/32" to 1 3/16"	-.0026 / -.0077	23/32" to 1 3/16"	0 / .00051



MDRHEC													
Group													
	A		B	KCPM15		Recommended Feed per Tooth (fz=inch/th) for Side Milling (A). For Slotting (B), reduce fz by 10%. D1 — Diameter							
	ap	ae	ap	Cutting Speed vc SFM		fraction	1/4	5/16	3/8	1/2	5/8	3/4	
				Min	Max	decimal	0.250	0.313	0.375	0.500	0.625	0.750	
P1	1 x D	0.5 x D	0.5 x D	500	-	650	fz	0.0015	0.0019	0.0022	0.0028	0.0032	0.0034
P2	1 x D	0.5 x D	0.5 x D	450	-	625	fz	0.0015	0.0019	0.0022	0.0028	0.0032	0.0034
P3	1 x D	0.4 x D	0.5 x D	400	-	525	fz	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030
P4	1 x D	0.3 x D	0.4 x D	350	-	475	fz	0.0011	0.0014	0.0016	0.0021	0.0024	0.0026
P5	1 x D	0.4 x D	0.5 x D	200	-	325	fz	0.0010	0.0013	0.0015	0.0019	0.0022	0.0024
M1	1 x D	0.4 x D	0.5 x D	250	-	325	fz	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030
M2	1 x D	0.4 x D	0.5 x D	190	-	260	fz	0.0010	0.0013	0.0015	0.0019	0.0022	0.0024
M3	1 x D	0.4 x D	0.5 x D	200	-	260	fz	0.0008	0.0011	0.0012	0.0016	0.0018	0.0019
K1	1 x D	0.5 x D	0.5 x D	400	-	525	fz	0.0015	0.0019	0.0022	0.0028	0.0032	0.0034
K2	1 x D	0.4 x D	0.5 x D	360	-	460	fz	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030
K3	1 x D	0.4 x D	0.5 x D	330	-	430	fz	0.0010	0.0013	0.0015	0.0019	0.0022	0.0024
S1	1 x D	0.4 x D	0.5 x D	150	-	275	fz	0.0012	0.0016	0.0018	0.0023	0.0027	0.0030
S2	1 x D	0.4 x D	0.5 x D	160	-	275	fz	0.0010	0.0013	0.0015	0.0019	0.0022	0.0024
H1	1 x D	0.3 x D	0.4 x D	260	-	460	fz	0.0011	0.0014	0.0016	0.0021	0.0024	0.0026

These guidelines may require variations to achieve optimum results.

Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.

Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Above parameters are based on ideal conditions. For smaller taper machining centers, please adjust parameters accordingly on >1/2" diameter.

Application Icons

Ramping	Slotting: Square End	Side Milling/ Shoulder Milling: Ball Nose	Side Milling/ Shoulder Milling: with AE/AP	3D Profiling: with AE/AP
Slotting: Ball Nose	Slotting: with AE/AP	Side Milling/ Shoulder Milling: Square End	3D Profiling	

Geometry Icons

Corner Style: Ball Nose	Corner Style: Square End	Helix Angle: 45°	Helix Angle: 30°	
Corner Style: Corner Chamfer	Shank: Plain	Helix Angle: 47°	Helix Angle: 35°	
Corner Style: Corner Radius	Shank: Weldon	Helix Angle: 20°	Helix Angle: 38°	

Feature Icons

DIN Number: 6527	Tool Dimensions: Flute Configuration: multiple	Tool Dimensions: Flute Configuration: 4		
Through Coolant	Tool Dimensions: Flute Configuration: 3	Tool Dimensions: Flute Configuration: 5		

DIN — German Institute for Standardization

# ***Metalcutting Safety***

## **IMPORTANT SAFETY INSTRUCTIONS**

**Read before using the tools in this catalog!**

### **Projectile and Fragmentation Hazards:**

Modern metalcutting operations involve high spindle and cutter speeds and high temperatures and cutting forces. Hot metal chips may fly off the workpiece during metalcutting. Although cutting tools are designed and manufactured to withstand high-cutting forces and temperatures, they can sometimes fragment, particularly if they are subjected to over-stress, severe impact, or other abuse.

#### **To avoid injury:**

- Always wear appropriate personal protective equipment, including safety goggles, when operating metalcutting machines or working nearby.
- Always make sure all machine guards are in place.

### **Breathing and Skin Contact Hazards:**

Grinding carbide or other advanced cutting tool materials produce dust or mist containing metallic particles. Breathing this dust or mist — especially over an extended period — can cause temporary or permanent lung disease or make existing medical conditions worse. Contact with this dust or mist can irritate eyes, skin, and mucous membranes and may make existing skin conditions worse.

#### **To avoid injury:**

- Always wear breathing protection and safety goggles when grinding.
- Provide ventilation control and collect and properly dispose of dust, mist, or sludge from grinding.
- Avoid skin contact with dust or mist.

For more information, read the applicable Material Safety Data Sheet provided by Kennametal and consult General Industry Safety and Health Regulations, Part 1910, Title 29 of the Code of Federal Regulations.

These safety instructions are general guidelines. Many variables affect machining operations. It is impossible to cover every specific situation. The technical information included in this catalog and recommendations on machining practices may not apply to your particular operation. For more information, consult Kennametal's Metalcutting Safety booklet, available free from Kennametal at 724.539.5747 or fax 724.539.5439. For specific product safety and environmental questions, contact our Corporate Environmental Health and Safety Office at 724.539.5066 or fax 724.539.5372.

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# BEYOND SOLID END MILLS

## **World and Corporate Headquarters**

Kennametal Inc.  
1600 Technology Way  
Latrobe, PA 15650 USA  
Phone: 800.446.7738 (United States and Canada)  
E-mail: [info@kennametal.com](mailto:info@kennametal.com)

## **European Headquarters**

Kennametal Europe GmbH  
Rheingoldstrasse 50  
CH 8212 Neuhausen am Rheinfall  
Switzerland  
Phone: (41) 52.6750.100  
E-mail: [neuhausen.info@kennametal.com](mailto:neuhausen.info@kennametal.com)

## **Asia-Pacific Headquarters**

Kennametal Pte. Ltd.  
No.11 Gul Link Jurong  
Singapore 629381  
Phone: (65) 6.2659222  
E-mail: [sales@kennametal.com.sg](mailto:sales@kennametal.com.sg)

## **India Headquarters**

Kennametal India Limited  
8/9th Mile, Tumkur Road  
Bangalore - 560 073  
Phone: +91 (80) 2839 4321  
E-mail: [bangalore.information@kennametal.com](mailto:bangalore.information@kennametal.com)