

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

INDEX

Type of Tool	Tool Style	Range of Diameter (inch)	No. of Flutes	Helix Angle	Special Features	Type of Application		Workpiece Materials						See Page
								P	M	K	N	S	H	
		Min - Max			R-Radius CH-Chamfer N-Neck C-Coolant KW-Keyway Mic-Micro TR-Toroidal SQ-Square End									
	HEC	.016-1.250	2/3/4	30	SQ	Side milling	Slotting	●	●	●	○			18-19
	CRHEC	.125-1.000	4	30	R	Side milling	Slotting	●	●	●	○			25
	DHEC	.031-0.500	2/4	30	SQ	Side milling	Slotting	●	●	●				26
	HHEC	.125-1.000	3	60	SQ	Side milling			●			●		24
	HPHV	.125-1.000	4	38	CH, SQ	Side milling	Slotting	●	●	●		●		28
	HPRSHV	.500-1.000	4	38	CH, SQ	Side milling		●	●	●		●		29
	HPHVT	.500-1.000	4	38	CH, SQ	Side milling	Slotting					●		30
	HPFSS	.125-1.000	3	30	R		Slotting	○	●	○		○		31
	HPFSS	.125-1.000	5	47	SQ	Side milling		○	●	○		●		32
	HPFT	.250-1.000	6	45	SQ	Side milling		●	●			●	○	33
	HPRSA	.250-1.000	2	37	N, SQ	Side milling					●			36
	HPF45A	.125-1.000	2	45	SQ	Side milling	Slotting				●			34
	HPF37A	.250-1.000	3	45	SQ	Side milling	Slotting				●			35
	HEC - KDF300	.031-1.000	2/4	30	Diamond coated, SQ	Side milling	Slotting				●			38
	CRHEC-KDF300	.062-.500	4	30	Diamond coated, R	Side milling					●			37
	HPFDM	.250-1.000	4/5/6	50	SQ	Side milling	Slotting	○	○				●	40

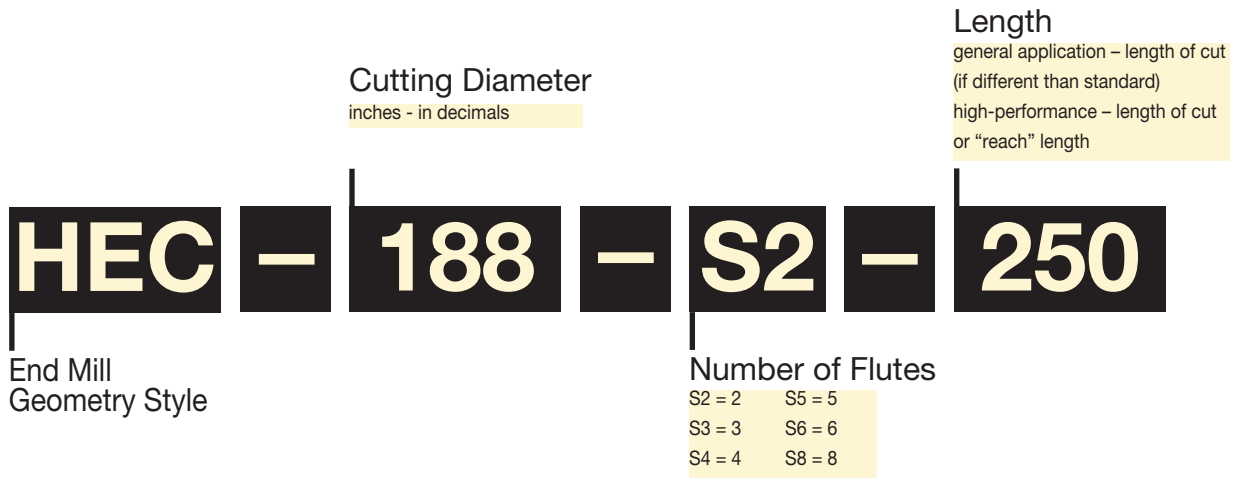
Type of Tool	Tool Style	Range of Diameter (inch) Min - Max	No. of Flutes	Helix Angle	Special Features	Type of Application	Workpiece Materials						See Page
							P	M	K	N	S	H	
					R-Radius CH-Chamfer N-Neck C-Coolant KW-Keyway Mic-Micro TR-Toroidal SQ-Square End								
	SFRHEC	.250-1.000	3	42	CH	Side milling Slotting				●			50
	HPRSS	.250-1.000	3	35	R	Side milling Slotting	○	●			○		51
	MDRHEC	.250-1.000	4/5	30	CH	Side milling Slotting	●	●	●		○		52
	HPRDM	.188-1.000	3/4/6	45	R	Side milling Slotting	○					●	54
	HPRST	.250-1.000	4/6	40	R	Side milling Slotting	●				●	●	53

Ball Nose Finisher

Type of Tool	Tool Style	Range of Diameter (inch) Min - Max	No. of Flutes	Helix Angle	Special Features	Type of Application	Workpiece Materials						See Page
							P	M	K	N	S	H	
					R-Radius CH-Chamfer N-Neck C-Coolant KW-Keyway Mic-Micro TR-Toroidal SQ-Square End								
	BNEC...S2	.031-1.000	2	30		3D Milling	●	●	●		○		58-59
	BNEC...S3	.031-.500	3	30		3D Milling	●	●	●				60
	BNEC...S4	.031-1.000	4	30		3D Milling	●	●	●		○		61-62
	DBNEC	.031-.500	4	30		3D Milling	●	●					63
	BNEC - KDF300	.031-1.000	2/4	30	Diamond coating	3D Milling				●			66
	HPBNDM	.125-.750	4	20		3D Milling	●	○				●	65
	HPHVBN	.125-1.000	4	38		3D Milling	●	●	●		●	○	64

	grades	coating composition	recommended use
SOLID CARBIDE	K600	uncoated carbide	Carbide grade made from high quality, micro-grain materials for cutting all types of workpiece materials. Very high toughness ensures a controlled wear rate. The micro-grain structure enables extremely sharp cutting edges.
INSERTS	KC610M	TiN TiCN TiN	Carbide grade made from high quality, micro-grain materials for cutting all types of workpiece materials. Very high toughness ensures a controlled wear rate. The micro-grain structure enables extremely sharp cutting edges.
FACE MILLS	KC625M	TiC(N) TiCN TiN	Coated carbide grade with PVD multi-layer (TiN/TiCN/TiC). For universal use due to its high wear resistance and hardness. Only use wet or with minimal amounts of lubrication.
90° MILLS	KC633M	TiAlN TiN TiAlN	Coated carbide grade with PVD coating (TiAlN/TiN/TiAlN). KC633M is a high-performance grade for dry milling all types of material. This grade is characterized by good hardness and wear resistance. It provides outstanding protection for solid carbide tools against cratering and abrasion.
SLOTTING	KC635M	TiAlN	Coated carbide grade with 3µm thick PVD coating (TiAlN). KC635M is a high-performance grade for hard machining. This grade is characterized by high hardness and wear resistance and is suitable for cutting hard materials (up to 65 HRC).
DIE AND MOLD	KC643M	AlTiN	Coated carbide grade with PVD (AlTiN) coating. KC643M is a very thin and hard PVD coating particularly suitable for cutting most materials. This grade can be used for materials with hardness up to 52 HRC.
CERAMIC MILLS	KC651M	TiB ₂	The PVD coating is extremely hard and provides very good wear characteristics at high cutting speeds. Resists built-up edge, can help reduce deburring, and generates excellent surface finish. Ideally suited for aluminum
CLASSIC MILLS	KDF300	diamond coated	A pure, diamond-coated carbide for milling aluminum, graphite, and other non-ferrous materials. It is a very tough and wear-resistant grade.
THREAD MILLS			
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Inch



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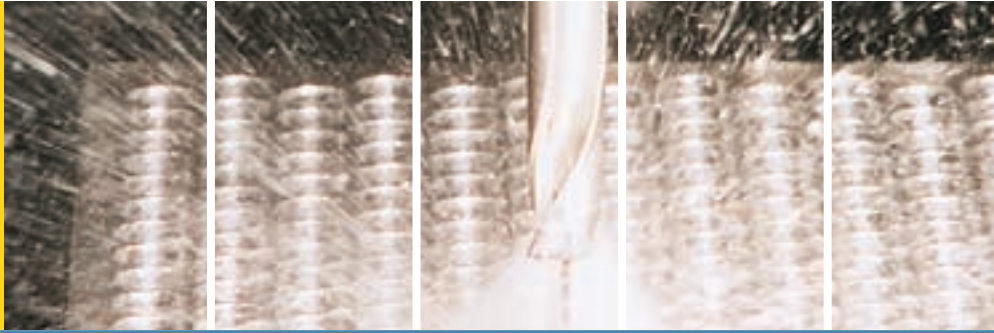
CERAMIC MILLS

CLASSIC MILLS

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HARVI™ Solid Carbide End Mills



- Unequal flute spacing delivers smooth, chatter-free machining!
- Yields superior surface finishes, even at high speeds!
- Rougher and finisher in one tool!
- Easy to regrind!
- Maximize performance in steel, stainless steel, cast iron, and high-temp alloys!

PROVEN SUCCESS

CHALLENGE:

Material: 15-5 PH (38-40 HRC)

Operation: Slotting

Diameter: .375" (10 mm)

Chip Load: .0013"/tooth (0,03 mm/tooth)

Axial Depth of Cut: .500" (12,7 mm)

RESULT:

Old tool life: 8 parts per end mill;

New tool life: 30 parts per end mill!

Old tool cost-per-part: \$7.25;

New tool cost-per-part: \$0.92!

Kennametal will significantly improve your milling productivity!

Let us prove it.

www.kennametal.com

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THINK **KENNAMETAL.**

Experttoolings.com

Square End Mills — Finishing

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IGMILLING
LINGMILL
MILLINGMI

General-Application Finishing End Mills



HEC 2-Flute – Conventional Lengths

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

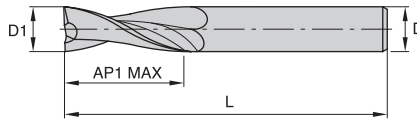
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Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Slotting.



■ 2-Flute, 30° Helix

- first choice
- alternate choice

H				
S				●
N	○	○		
K		○		●
M				●
P	○	○	○	●

	D1	D	Ap1 max	L	catalog number	K600	KC610M	KC635M
	1/64	1/8	1/32	1 1/2	HEC016S2	●	●	
	1/32	1/8	5/64	1 1/2	HEC031S2	●	●	●
	3/64	1/8	7/64	1 1/2	HEC047S2	●	●	
	1/16	1/8	1/8	1 1/2	HEC062S2013		●	●
	1/16	1/8	3/16	1 1/2	HEC062S2	●	●	●
	5/64	1/8	3/16	1 1/2	HEC078S2	●	●	
	3/32	1/8	3/16	1 1/2	HEC094S2018		●	●
	3/32	1/8	3/8	1 1/2	HEC094S2	●	●	●
	3/32	1/8	5/8	2	HEC094S2063	●	●	●
	7/64	1/8	3/8	1 1/2	HEC109S2	●	●	
	1/8	1/8	1/4	1 1/2	HEC125S2025	●	●	●
	1/8	1/8	1/2	1 1/2	HEC125S2	●	●	●
	1/8	1/8	3/4	2 1/4	HEC125S2075	●	●	●
	1/8	1/8	1	3	HEC125S2100	●	●	●
	9/64	3/16	9/16	2	HEC141S2	●	●	
	5/32	3/16	5/16	2	HEC156S2031		●	●
	5/32	3/16	9/16	2	HEC156S2	●	●	●
	11/64	3/16	5/8	2	HEC172S2	●	●	
	3/16	3/16	5/16	1 1/2	HEC188S2031	●	●	●
	3/16	3/16	5/8	2	HEC188S2	●	●	●
	3/16	3/16	3/4	2 1/2	HEC188S2075	●	●	●
	3/16	3/16	1 1/8	3	HEC188S2113	●	●	●
	13/64	1/4	5/8	2 1/2	HEC203S2	●	●	
	7/32	1/4	7/16	2	HEC219S2044	●	●	●
	7/32	1/4	5/8	2 1/2	HEC219S2	●	●	●
	15/64	1/4	3/4	2 1/2	HEC234S2	●	●	
	1/4	1/4	1/2	2	HEC250S2050	●	●	●
	1/4	1/4	3/4	2 1/2	HEC250S2	●	●	●
	1/4	1/4	1 1/8	3	HEC250S2113	●	●	●
	1/4	1/4	1 1/2	4	HEC250S2150	●	●	●
	17/64	5/16	3/4	2 1/2	HEC266S2	●	●	
	9/32	5/16	3/4	2 1/2	HEC281S2	●	●	●
	19/64	5/16	13/16	2 1/2	HEC297S2	●	●	●
	5/16	5/16	1/2	2	HEC312S2050	●	●	●
	5/16	5/16	13/16	2 1/2	HEC312S2	●	●	●

Continued on next page

■ 2-Flute, 30° Helix (continued from previous page)

● first choice
○ alternate choice

H	■	■	■	■
S	■	■	○	■
N	■	○	■	■
K	■	○	■	■
M	■	○	■	■
P	■	○	■	■

D1	D	Ap1 max	L	catalog number	K600	KC610M	KC635M
5/16	5/16	1 1/8	3	HEC312S2113	●	●	●
5/16	5/16	1 5/8	4	HEC312S2163	●	●	●
21/64	3/8	1	2 1/2	HEC328S2	●	●	●
11/32	3/8	1	2 1/2	HEC344S2	●	●	●
3/8	3/8	5/8	2	HEC375S2063	●	●	●
3/8	3/8	7/8	2 1/2	HEC375S2088	●	●	●
3/8	3/8	1 1/8	3	HEC375S2113	●	●	●
3/8	3/8	1 3/4	4	HEC375S2175	●	●	●
25/64	7/16	1	2 3/4	HEC391S2100	●	●	●
13/32	7/16	1	2 3/4	HEC406S2100	●	●	●
27/64	7/16	1	2 3/4	HEC422S2100	●	●	●
7/16	7/16	5/8	2 1/2	HEC438S2063	●	●	●
7/16	7/16	1	2 1/2	HEC438S2	●	●	●
7/16	7/16	2	4	HEC438S2200	●	●	●
15/32	1/2	1	3	HEC469S2	●	●	●
31/64	1/2	1	3	HEC484S2	●	●	●
1/2	1/2	5/8	2 1/2	HEC500S2063	●	●	●
1/2	1/2	1	3	HEC500S2	●	●	●
1/2	1/2	2	4	HEC500S2200	●	●	●
1/2	1/2	3	6	HEC500S2300	●	●	●
9/16	9/16	3/4	3	HEC562S2075	●	●	●
9/16	9/16	1 1/4	3 1/2	HEC562S2125	●	●	●
9/16	9/16	2 1/4	5	HEC562S2225	●	●	●
5/8	5/8	3/4	3	HEC625S2075	●	●	●
5/8	5/8	1 1/4	3 1/2	HEC625S2	●	●	●
5/8	5/8	2 1/4	5	HEC625S2225	●	●	●
5/8	5/8	4	7	HEC625S2400	●	●	●
11/16	3/4	1 3/8	4	HEC688S2	●	●	●
3/4	3/4	1	3	HEC750S2100	●	●	●
3/4	3/4	1 1/2	4	HEC750S2	●	●	●
3/4	3/4	2 1/4	5	HEC750S2225	●	●	●
3/4	3/4	3	6	HEC750S2300	●	●	●
3/4	3/4	4	7	HEC750S2400	●	●	●
7/8	7/8	1 1/2	4	HEC875S2	●	●	●
7/8	7/8	2 1/4	5	HEC875S2225	●	●	●
1	1	1 1/2	4	HEC100S2	●	●	●
1	1	2 1/4	5	HEC100S2225	●	●	●
1	1	3	6	HEC100S2300	●	●	●
1	1	4	7	HEC100S2400	●	●	●
1 1/4	1 1/4	2	4 1/2	HEC1250S2200	●	●	●

For application data, see page 43.

Ordering Example:
HEC375S2088 KC610M

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"

SOLID CARBIDE
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90° MILLS
SLOTTING
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HEC 3-Flute – Conventional Lengths

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

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DIE AND MOLD

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CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

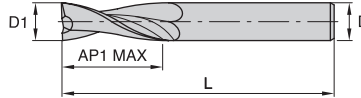
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Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Side cutting and slotting.



■ 3-Flute, 30° Helix

- first choice
- alternate choice

H	■	○	○
S	■	○	○
N	■	○	○
K	■	○	○
M	■	○	●
P	■	○	●

D1	D	Ap1 max	L	catalog number	KG600	KC610M
1/16	1/8	3/16	1 1/2	HEC062S3	●	●
3/32	1/8	3/8	1 1/2	HEC094S3	●	●
1/8	1/8	1/2	1 1/2	HEC125S3	●	●
5/32	3/16	9/16	2	HEC156S3	●	●
3/16	3/16	5/8	2	HEC188S3	●	●
7/32	1/4	5/8	2 1/2	HEC219S3	●	●
1/4	1/4	3/4	2 1/2	HEC250S3	●	●
5/16	5/16	13/16	2 1/2	HEC312S3	●	●
11/32	3/8	1	2 1/2	HEC344S3	●	●
3/8	3/8	7/8	2 1/2	HEC375S3088	●	●
3/8	3/8	1 1/8	3	HEC375S3113	●	●
7/16	7/16	1	2 1/2	HEC438S3	●	●
1/2	1/2	1	3	HEC500S3	●	●
1/2	1/2	2	4	HEC500S3200	●	●
5/8	5/8	1 1/4	3 1/2	HEC625S3	●	●
3/4	3/4	1 1/2	4	HEC750S3	●	●
3/4	3/4	2 1/4	5	HEC750S3225	●	●
1	1	1 1/2	4	HEC100S3	●	●
1	1	2 1/4	5	HEC100S3225	●	●

For application data, see page 43.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"

Ordering Example:
HEC375S3088 KC610M

CARBIDE RECYCLING RECYCLING



Carbide Recycling Program

*Get cash for your used carbide —
and help preserve the environment, too!*

Here's all you have to do:

- 1) Go to www.kennametal.com/carbiderecycling.
- 2) Locate latest scrap rates.
- 3) Complete (name, address, phone, email, scrap type, and amount) and submit online form.
- 4) Print a shipping label.
- 5) Ship your materials to Kennametal.

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*Get more shop space.
Get leaner.
Get more competitive.*

And, get cash, too!



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General-Application Finishing End Mills



HEC 4-Flute – Conventional Lengths

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

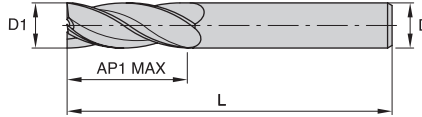
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Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Side cutting.



4-Flute, 30° Helix

- first choice
- alternate choice

H				
S				●
N	○			
K	○			●
M				●
P	○			●

D1	D	Ap1 max	L	catalog number	K600	KC610M	KC635M
1/64	1/8	1/32	1 1/2	HEC016S4	●	●	
1/32	1/8	5/64	1 1/2	HEC031S4	●	●	●
3/64	1/8	7/64	1 1/2	HEC047S4	●	●	
1/16	1/8	1/8	1 1/2	HEC062S4013		●	●
1/16	1/8	3/16	1 1/2	HEC062S4	●	●	●
5/64	1/8	3/16	1 1/2	HEC078S4	●	●	
3/32	1/8	3/16	1 1/2	HEC094S4018		●	●
3/32	1/8	3/8	1 1/2	HEC094S4	●	●	●
3/32	1/8	5/8	2	HEC094S4063	●	●	●
7/64	1/8	3/8	1 1/2	HEC109S4	●	●	
1/8	1/8	1/4	1 1/2	HEC125S4025	●	●	●
1/8	1/8	1/2	1 1/2	HEC125S4	●	●	●
1/8	1/8	3/4	2 1/4	HEC125S4075	●	●	●
1/8	1/8	1	3	HEC125S4100	●	●	●
9/64	3/16	9/16	2	HEC141S4	●	●	
5/32	3/16	5/16	2	HEC156S4031		●	●
5/32	3/16	9/16	2	HEC156S4	●	●	●
11/64	3/16	5/8	2	HEC172S4	●	●	
3/16	3/16	5/16	1 1/2	HEC188S4031	●	●	●
3/16	3/16	5/8	2	HEC188S4	●	●	●
3/16	3/16	3/4	2 1/2	HEC188S4075	●	●	●
3/16	3/16	1 1/8	3	HEC188S4113	●	●	●
13/64	1/4	5/8	2 1/2	HEC203S4	●	●	
7/32	1/4	7/16	2	HEC219S4044	●	●	●
7/32	1/4	5/8	2 1/2	HEC219S4	●	●	●
15/64	1/4	3/4	2 1/2	HEC234S4	●	●	
1/4	1/4	1/2	2	HEC250S4050	●	●	●
1/4	1/4	3/4	2 1/2	HEC250S4	●	●	●
1/4	1/4	1 1/2	4	HEC250S4150	●	●	●
1/4	1/4	1 1/8	3	HEC250S4113	●	●	●
1/4	1/4	1 1/2	6	HEC250S4150L	●		●
17/64	5/16	3/4	2 1/2	HEC266S4	●	●	
9/32	5/16	3/4	2 1/2	HEC281S4	●	●	●
19/64	5/16	13/16	2 1/2	HEC297S4	●	●	
5/16	5/16	1/2	2	HEC312S4050	●	●	●

Continued on next page

H	■	■	■	■
S	■	■	■	●
N	■	○	■	■
K	■	○	■	■
M	■	■	■	■
P	■	○	■	■

● first choice
○ alternate choice

■ 4-Flute, 30° Helix (continued from previous page)

D1	D	Ap1 max	L	catalog number	K600	KC610M	KC635M
5/16	5/16	13/16	2 1/2	HEC312S4	●	●	●
5/16	5/16	1 1/8	3	HEC312S4113	●	●	●
5/16	5/16	1 5/8	4	HEC312S4163	●	●	●
21/64	3/8	1	2 1/2	HEC328S4	●	●	●
11/32	3/8	1	2 1/2	HEC344S4	●	●	●
23/64	3/8	1	2 1/2	HEC360S4	●	●	●
3/8	3/8	5/8	2	HEC375S4063	●	●	●
3/8	3/8	7/8	2 1/2	HEC375S4088	●	●	●
3/8	3/8	1 1/8	3	HEC375S4113	●	●	●
3/8	3/8	1 1/2	6	HEC375S4150L	●	●	●
3/8	3/8	1 3/4	4	HEC375S4175	●	●	●
25/64	7/16	1	2 3/4	HEC391S4100	●	●	●
13/32	7/16	1	2 3/4	HEC406S4100	●	●	●
27/64	7/16	1	2 3/4	HEC422S4100	●	●	●
7/16	7/16	5/8	2 1/2	HEC438S4063	●	●	●
7/16	7/16	1	2 3/4	HEC438S4100	●	●	●
7/16	7/16	2	4	HEC438S4200	●	●	●
15/32	1/2	1	3	HEC469S4	●	●	●
31/64	1/2	1	3	HEC484S4	●	●	●
1/2	1/2	5/8	2 1/2	HEC500S4063	●	●	●
1/2	1/2	1	3	HEC500S4	●	●	●
1/2	1/2	2	4	HEC500S4200	●	●	●
1/2	1/2	3	6	HEC500S4300	●	●	●
9/16	9/16	3/4	3	HEC562S4075	●	●	●
9/16	9/16	1 1/4	3 1/2	HEC562S4125	●	●	●
9/16	9/16	2 1/4	5	HEC562S4225	●	●	●
5/8	5/8	3/4	3	HEC625S4075	●	●	●
5/8	5/8	1 1/4	3 1/2	HEC625S4	●	●	●
5/8	5/8	2 1/4	5	HEC625S4225	●	●	●
5/8	5/8	4	7	HEC625S4400	●	●	●
11/16	3/4	1 3/8	4	HEC688S4	●	●	●
3/4	3/4	1	3	HEC750S4100	●	●	●
3/4	3/4	1 1/2	4	HEC750S4	●	●	●
3/4	3/4	2 1/4	5	HEC750S4225	●	●	●
3/4	3/4	3	6	HEC750S4300	●	●	●
3/4	3/4	4	7	HEC750S4400	●	●	●
7/8	7/8	1 1/2	4	HEC875S4	●	●	●
7/8	7/8	2 1/4	5	HEC875S4225	●	●	●
1	1	1 1/2	4	HEC100S4	●	●	●
1	1	2 1/4	5	HEC100S4225	●	●	●
1	1	3	6	HEC100S4300	●	●	●
1	1	4	7	HEC100S4400	●	●	●
1 1/4	1 1/4	2	4 1/2	HEC1250S4200	●	●	●

For application data, see page 43.

■ End Mill Tolerances

Ordering Example:
HEC375S4088 KC610M

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"

General-Application Finishing End Mills



HHEC — for High-Temp Alloys and Medium Steels

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

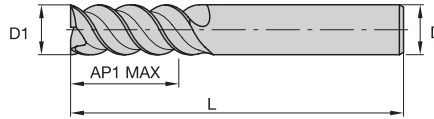
INDEX

Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Side cutting.



3-Flute, 60° Helix

- first choice
- alternate choice

H	Grey	
S	Orange	●
N	Green	
K	Red	
M	Yellow	●
P	Blue	

D1	D1	D	Ap1 max	L	catalog number	KC635M
1/8	.125	1/4	1/2	2 1/2	HHEC125S3	●
3/16	.188	1/4	5/8	2 1/2	HHEC188S3	●
1/4	.250	1/4	3/4	2 1/2	HHEC250S3	●
5/16	.313	5/16	13/16	2 1/2	HHEC312S3	●
3/8	.375	3/8	7/8	2 1/2	HHEC375S3	●
1/2	.500	1/2	1	3	HHEC500S3	●
9/16	.563	9/16	1 1/4	3 1/2	HHEC562S3	●
5/8	.625	5/8	1 1/4	3 1/2	HHEC625S3	●
3/4	.750	3/4	1 1/2	4	HHEC750S3	●
1	1.000	1	1 1/2	4	HHEC100S3	●

For application data, see page 43.

End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+.000" to -.002"	+.0000" to -.0005"
over 1/4"	+.000" to -.003"	+.0000" to -.0005"

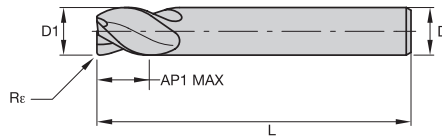
Ordering Example:
HHEC375S3 KC635M

Features

- Kennametal standard.
- Plain and Weldon shanks.
- Corner radius - center cutting.

Application

- Side cutting and slotting.



H	●
S	●
N	●
K	●
M	●
P	●

- first choice
- alternate choice

■ 4-Flute, 30° Helix

D1	D1	D	Ap1 max	L	Rε	mounting style	catalog number	KC635M
1/8	.1250	1/8	1/2	1 1/2	.0150	PLAIN	CRHEC125S4R15	●
1/8	.1250	1/8	1/2	1 1/2	.0200	PLAIN	CRHEC125S4R20	●
3/16	.1875	3/16	5/8	2	.0150	PLAIN	CRHEC188S4R15	●
3/16	.1875	3/16	5/8	2	.0200	PLAIN	CRHEC188S4R20	●
3/16	.1875	3/16	5/8	2	.0300	PLAIN	CRHEC188S4R30	●
1/4	.2500	1/4	3/4	2 1/2	.0150	PLAIN	CRHEC250S4R15	●
1/4	.2500	1/4	3/4	2 1/2	.0200	PLAIN	CRHEC250S4R20	●
1/4	.2500	1/4	3/4	2 1/2	.0300	PLAIN	CRHEC250S4R30	●
1/4	.2500	1/4	3/4	2 1/2	.0450	PLAIN	CRHEC250S4R45	●
5/16	.3125	5/16	13/16	2 1/2	.0150	PLAIN	CRHEC312S4R15	●
5/16	.3125	5/16	13/16	2 1/2	.0200	PLAIN	CRHEC312S4R20	●
5/16	.3125	5/16	13/16	2 1/2	.0300	PLAIN	CRHEC312S4R30	●
5/16	.3125	5/16	13/16	2 1/2	.0450	PLAIN	CRHEC312S4R45	●
3/8	.3750	3/8	1	2 1/2	.0150	WELDON	CRHEC375S4R15	●
3/8	.3750	3/8	1	2 1/2	.0200	WELDON	CRHEC375S4R20	●
3/8	.3750	3/8	1	2 1/2	.0300	WELDON	CRHEC375S4R30	●
3/8	.3750	3/8	1	2 1/2	.0450	WELDON	CRHEC375S4R45	●
1/2	.5000	1/2	1	3	.0150	WELDON	CRHEC500S4R15	●
1/2	.5000	1/2	1	3	.0200	WELDON	CRHEC500S4R20	●
1/2	.5000	1/2	1	3	.0300	WELDON	CRHEC500S4R30	●
1/2	.5000	1/2	1	3	.0450	WELDON	CRHEC500S4R45	●
1/2	.5000	1/2	1	3	.0600	WELDON	CRHEC500S4R60	●
5/8	.6250	5/8	1 1/4	3 1/2	.0150	WELDON	CRHEC625S4R15	●
5/8	.6250	5/8	1 1/4	3 1/2	.0300	WELDON	CRHEC625S4R30	●
5/8	.6250	5/8	1 1/4	3 1/2	.0600	WELDON	CRHEC625S4R60	●
5/8	.6250	5/8	1 1/4	3 1/2	.0900	WELDON	CRHEC625S4R90	●
3/4	.7500	3/4	1 1/2	4	.0150	WELDON	CRHEC750S4R15	●
3/4	.7500	3/4	1 1/2	4	.0200	WELDON	CRHEC750S4R20	●
3/4	.7500	3/4	1 1/2	4	.0300	WELDON	CRHEC750S4R30	●
3/4	.7500	3/4	1 1/2	4	.0450	WELDON	CRHEC750S4R45	●
3/4	.7500	3/4	1 1/2	4	.0600	WELDON	CRHEC750S4R60	●
3/4	.7500	3/4	1 1/2	4	.0900	WELDON	CRHEC750S4R90	●
3/4	.7500	3/4	1 1/2	4	.1250	WELDON	CRHEC750S4R125	●
1	1.0000	1	1 1/2	4	.0150	WELDON	CRHEC100S4R15	●
1	1.0000	1	1 1/2	4	.0200	WELDON	CRHEC100S4R20	●
1	1.0000	1	1 1/2	4	.0300	WELDON	CRHEC100S4R30	●
1	1.0000	1	1 1/2	4	.0450	WELDON	CRHEC100S4R45	●
1	1.0000	1	1 1/2	4	.0600	WELDON	CRHEC100S4R60	●
1	1.0000	1	1 1/2	4	.0900	WELDON	CRHEC100S4R90	●
1	1.0000	1	1 1/2	4	.1250	WELDON	CRHEC100S4R125	●

For application data, see page 42.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance	Rε Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"	+ .000" to - .002"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"	+ .000" to - .002"

Ordering Example:
CRHEC375S4R30 KC635M

DHEC 2-Flute – Double End

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

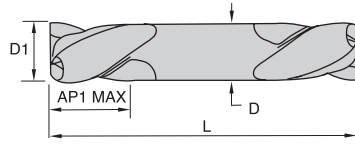
INDEX

Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Slotting.



■ 2-Flute, 30° Helix

- first choice
- alternate choice

H			
S			●
N	○	○	
K	○	○	●
M			●
P	○	○	●

D1	D	Ap1 max	L	catalog number	K600	KC610M	KC635M
1/32	1/8	1/16	1 1/2	DHEC031S2	●	●	
3/64	1/8	3/32	1 1/2	DHEC047S2		●	
1/16	1/8	1/8	1 1/2	DHEC062S2	●	●	
5/64	1/8	1/8	1 1/2	DHEC078S2		●	
3/32	1/8	3/16	1 1/2	DHEC094S2	●	●	
7/64	1/8	3/16	1 1/2	DHEC109S2		●	
1/8	1/8	1/4	1 1/2	DHEC125S2025	●	●	●
1/8	1/8	3/8	2	DHEC125S2038	●	●	●
5/32	3/16	5/16	2	DHEC156S2	●	●	●
11/64	3/16	5/16	2	DHEC172S2		●	
3/16	3/16	3/8	2	DHEC188S2	●	●	●
1/4	1/4	1/2	2 1/2	DHEC250S2	●	●	●
5/16	5/16	1/2	2 1/2	DHEC312S2	●	●	●
3/8	3/8	9/16	2 1/2	DHEC375S2056	●	●	●
1/2	1/2	5/8	3	DHEC500S2	●	●	●

For application data, see page 42.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"

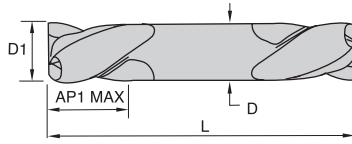
Ordering Example:
DHEC375S2056 KC610M

Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Side cutting.



H				
S				●
N	○			
K	○			●
M				●
P	○			●

● first choice
○ alternate choice

■ 4-Flute, 30° Helix

D1	D	Ap1 max	L	catalog number	K600	KC610M	KC635M
1/32	1/8	1/16	1 1/2	DHEC031S4	●	●	
3/64	1/8	3/32	1 1/2	DHEC047S4	●	●	
1/16	1/8	1/8	1 1/2	DHEC062S4	●	●	●
5/64	1/8	1/8	1 1/2	DHEC078S4	●	●	
3/32	1/8	3/16	1 1/2	DHEC094S4	●	●	●
7/64	1/8	3/16	1 1/2	DHEC109S4	●	●	
1/8	1/8	1/4	1 1/2	DHEC125S4025	●	●	●
1/8	1/8	3/8	2	DHEC125S4038	●	●	●
9/64	3/16	5/16	2	DHEC141S4	●	●	
5/32	3/16	5/16	2	DHEC156S4	●	●	●
11/64	3/16	5/16	2	DHEC172S4	●	●	
3/16	3/16	3/8	2	DHEC188S4	●	●	●
13/64	1/4	1/2	2 1/2	DHEC203S4	●	●	
7/32	1/4	1/2	2 1/2	DHEC219S4	●	●	
15/64	1/4	1/2	2 1/2	DHEC234S4	●	●	
1/4	1/4	1/2	2 1/2	DHEC250S4	●	●	●
9/32	5/16	1/2	2 1/2	DHEC281S4	●	●	
5/16	5/16	1/2	2 1/2	DHEC312S4	●	●	●
3/8	3/8	9/16	2 1/2	DHEC375S4056	●	●	●
7/16	1/2	9/16	3	DHEC438S4	●	●	●
1/2	1/2	5/8	3	DHEC500S4	●	●	●

For application data, see page 42.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"

Ordering Example:
DHEC375S4056 KC610M

High-Performance Finishing End Mills



HPHV – HARVI 4-Flute with Unequal Spacing

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

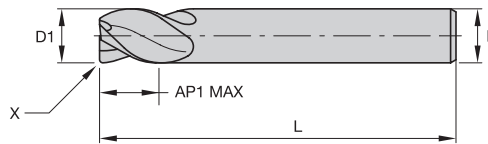
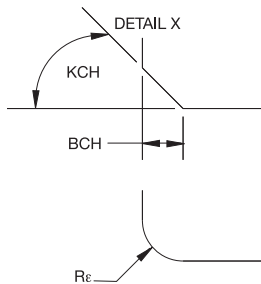
INDEX

Features

- Kennametal standard.
- Plain and Weldon shanks.
- Sharp and chamfered corner - center cutting.

Application

- Side cutting and slotting.
- For aerospace, general engineering, die and mold, medical, and automotive applications.



■ 4-Flute, 38° Helix

- first choice
- alternate choice

H	●
S	●
N	●
K	●
M	●
P	●

D1	D	Ap1 max	L	Rε	mounting style	catalog number	KC633M
1/8	1/8	1/2	2	—	PLAIN	HPHV125S4050CH	●
1/8	1/8	1/2	2	.0	PLAIN	HPHV125S4050	●
3/16	3/16	5/8	2 1/4	—	PLAIN	HPHV188S4063CH	●
3/16	3/16	5/8	2 1/4	.0	PLAIN	HPHV188S4063	●
1/4	1/4	3/8	2	—	PLAIN	HPHV250S4038CH	●
1/4	1/4	3/4	2 1/2	—	PLAIN	HPHV250S4075CH	●
1/4	1/4	3/4	2 1/2	.0	PLAIN	HPHV250S4075	●
5/16	5/16	3/4	2 1/2	—	PLAIN	HPHV312S4075CH	●
3/8	3/8	7/8	2 1/2	.0	PLAIN	HPHV375S4088	●
3/8	3/8	7/8	2 1/2	—	PLAIN	HPHV375S4088CH	●
1/2	1/2	5/8	2 1/2	—	WELDON	HPHV500S4063CH	●
1/2	1/2	1	3	—	WELDON	HPHV500S4100CH	●
1/2	1/2	1 1/4	3	—	WELDON	HPHV500S4125CH	●
1/2	1/2	1 1/4	3	.0	WELDON	HPHV500S4125	●
5/8	5/8	3/4	3	—	WELDON	HPHV625S4075CH	●
5/8	5/8	1 1/4	3 1/2	—	WELDON	HPHV625S4125CH	●
5/8	5/8	1 1/4	3 1/2	.0	WELDON	HPHV625S4125	●
3/4	3/4	7/8	3 1/2	—	WELDON	HPHV750S4088CH	●
3/4	3/4	1 1/2	4	.0	WELDON	HPHV750S4150	●
3/4	3/4	1 1/2	4	—	WELDON	HPHV750S4150CH	●
1	1	1 1/2	4	.0	WELDON	HPHV1000S4150	●
1	1	1 1/2	4	—	WELDON	HPHV1000S4150CH	●

For application data, see page 44.

■ Chamfer Table

D1	BCH	KCH
≤ 5/16"	.015"	45°
≥ 3/8"	.020"	45°

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
< 1/4"	+ .000" to - .002"	+ .0000" to - .0005"
1/4" and larger	+ .000" to - .003"	+ .0000" to - .0005"

Order Example:

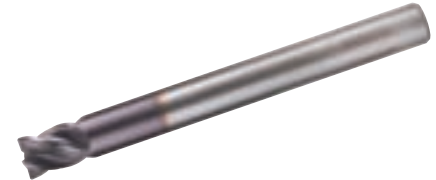
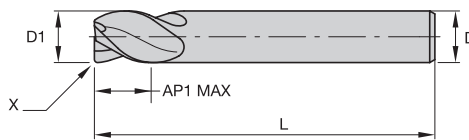
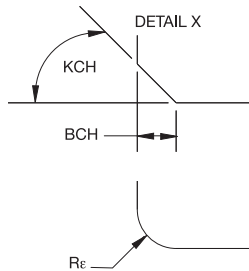
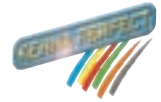
- End mill with chamfer HPHV375S4088CH KC633M
- End mill with square corner HPHV375S4088 KC633M

Features

- Kennametal standard.
- Plain shank.
- Sharp and chamfered corner - center cutting.

Application

- Side cutting.
- For use in aerospace, general engineering, die and mold, medical, and automotive applications.



■ 4-Flute, 38° Helix

- first choice
- alternate choice

H	●
S	●
N	●
K	●
M	●
P	●

D1	D1	D	Ap1 max	L	Re	catalog number	KC633M
1/2	.500	1/2	5/8	6	—	HPRSHV500S4600CH	●
1/2	.500	1/2	5/8	6	.0	HPRSHV500S4600	●
5/8	.625	5/8	3/4	6	—	HPRSHV625S4600CH	●
5/8	.625	5/8	3/4	6	.0	HPRSHV625S4600	●
3/4	.750	3/4	1	5	—	HPRSHV750S4500CH	●
3/4	.750	3/4	1	6	.0	HPRSHV750S4600	●
3/4	.750	3/4	1	6	—	HPRSHV750S4600CH	●
1	1.000	1	1 1/8	6	—	HPRSHV1000S4600CH	●
1	1.000	1	1 1/8	6	.0	HPRSHV1000S4600	●
1	1.000	1	1 1/8	7	—	HPRSHV1000S4700CH	●

For application data, see page 44.

■ Chamfer Table

D1	BCH	KCH
All	.020"	45°

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance	Re Tolerance
< 1/4"	+ .000" to - .002"	+ .0000" to - .0005"	+ .000" to - .002"

Ordering Example:

- End mill with chamfer HPRSHV500S4600CH KC633M
- End mill with square corner HPRSHV500S4600 KC633M

High-Performance Finishing End Mills



HPHVT – HARVI 4-Flute with Unequal Spacing for High-Temp Alloys

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

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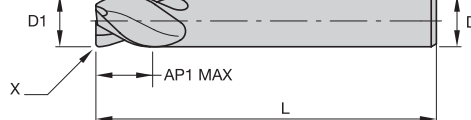
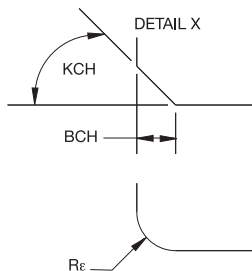


Features

- Kennametal standard.
- Weldon shank.
- Sharp and chamfered corner - center cutting.

Application

- Side cutting and slotting.
- For aerospace and medical applications.



4-Flute, 38° Helix

- first choice
- alternate choice

H	Grey
S	Orange
N	Green
K	Red
M	Yellow
P	Blue

D1	D1	D	AP1max	L	Re	catalog number	KC643M
1/2	.500	1/2	5/8	2 1/2	0	HPHVT500S4063	●
1/2	.500	1/2	5/8	2 1/2	-	HPHVT500S4063CH	●
1/2	.500	1/2	1 1/4	3	0	HPHVT500S4125	●
1/2	.500	1/2	1 1/4	3	-	HPHVT500S4125CH	●
5/8	.625	5/8	3/4	3	0	HPHVT625S4075	●
5/8	.625	5/8	3/4	3	-	HPHVT625S4075CH	●
5/8	.625	5/8	1 1/4	3 1/2	0	HPHVT625S4125	●
5/8	.625	5/8	1 1/4	3 1/2	-	HPHVT625S4125CH	●
3/4	.750	3/4	7/8	3 1/2	0	HPHVT750S4088	●
3/4	.750	3/4	7/8	3 1/2	-	HPHVT750S4088CH	●
3/4	.750	3/4	1 1/2	4	0	HPHVT750S4150	●
3/4	.750	3/4	1 1/2	4	-	HPHVT750S4150CH	●
1	1.000	1	1 1/2	4	0	HPHVT1000S4150	●
1	1.000	1	1 1/2	4	-	HPHVT1000S4150CH	●
1 1/4	1.250	1 1/4	2 1/4	5	0	HPHVT1250S4225	●
1 1/4	1.250	1 1/4	2 1/4	5	-	HPHVT1250S4225CH	●

For application data, see page 44.

Chamfer Table

D1	BCH	KCH
All	.020"	45°

End Mill Tolerances

D1	D1 Tolerance	D Tolerance
All	+.000" to -.002"	h6

Ordering Example:

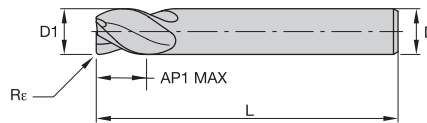
- End mill with chamfer HPHVT500S4063CH KC643M
- End mill with square corner HPHVT500S4063 KC643M

Features

- Kennametal standard.
- Plain and Weldon shanks.
- Corner radius - center cutting.

Application

- Slotting.
- For aerospace, general engineering, medical, and automotive applications.



■ 3-Flute, 30° Helix

- first choice
- alternate choice

H	○
S	○
N	○
K	○
M	●
P	○

D1	D1	D	Ap1 max	L	Rε	mounting style	catalog number	KC635M
1/8	.125	1/8	1/4	1 1/2	.010	PLAIN	HPFSS125S3025	●
1/8	.125	1/8	1/2	1 1/2	.010	PLAIN	HPFSS125S3050	●
3/16	.188	3/16	5/16	2	.020	PLAIN	HPFSS188S3031	●
3/16	.188	3/16	9/16	2	.020	PLAIN	HPFSS188S3056	●
1/4	.250	1/4	3/8	2	.020	PLAIN	HPFSS250S3038	●
1/4	.250	1/4	1/2	2	.020	PLAIN	HPFSS250S3050	●
1/4	.250	1/4	3/4	2 1/2	.020	PLAIN	HPFSS250S3075	●
5/16	.313	5/16	7/16	2	.020	PLAIN	HPFSS312S3044	●
5/16	.313	5/16	13/16	2 1/2	.020	PLAIN	HPFSS312S3081	●
3/8	.375	3/8	1/2	2	.020	PLAIN	HPFSS375S3050	●
3/8	.375	3/8	7/8	2 1/2	.020	PLAIN	HPFSS375S3088	●
1/2	.500	1/2	5/8	2 1/2	.035	WELDON	HPFSS500S3063	●
1/2	.500	1/2	1 1/4	3	.035	WELDON	HPFSS500S3125	●
5/8	.625	5/8	3/4	3	.035	WELDON	HPFSS625S3075	●
5/8	.625	5/8	1 5/8	4	.035	WELDON	HPFSS625S3163	●
3/4	.750	3/4	7/8	3	.035	WELDON	HPFSS750S3088	●
3/4	.750	3/4	1 5/8	4	.035	WELDON	HPFSS750S3163	●
1	1.000	1	2	4	.035	WELDON	HPFSS1000S3200	●

For application data, see page 45.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance	Rε Range
1/8"	+ .000" to - .002"	+ .0000" to - .0005"	.008"-.010"
3/16" and 1/4"	+ .000" to - .002"	+ .0000" to - .0005"	.015"-.020"
5/16" and 3/8"	+ .000" to - .003"	+ .0000" to - .0005"	.015"-.020"
over 3/8"	+ .000" to - .003"	+ .0000" to - .0005"	.030"-.035"

Ordering Example:
HPFSS375S3088 KC635M

High-Performance Finishing End Mills



HPFSS 5-Flute – for Soft Steels and Stainless Steels

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

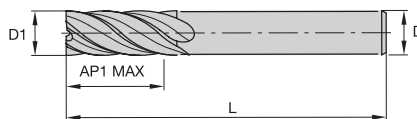
INDEX

Features

- Kennametal standard.
- Plain and Weldon shanks.
- Sharp corner - center cutting.

Application

- Side cutting.
- For aerospace, general engineering, medical, and automotive applications.



■ 5-Flute, 47° Helix

- first choice
- alternate choice

H	Grey	●
S	Orange	●
N	Green	●
K	Red	○
M	Yellow	●
P	Blue	●

D1	D1	D	Ap1 max	L	mounting style	catalog number	KC635M
1/8	.125	1/8	1/4	1 1/2	PLAIN	HPFSS125S5025	●
1/8	.125	1/8	1/2	1 1/2	PLAIN	HPFSS125S5050	●
3/16	.188	3/16	9/16	2	PLAIN	HPFSS188S5056	●
7/32	.219	1/4	3/4	2 1/2	PLAIN	HPFSS219S5075	●
1/4	.250	1/4	3/8	2	PLAIN	HPFSS250S5038	●
1/4	.250	1/4	1/2	2	PLAIN	HPFSS250S5050	●
1/4	.250	1/4	3/4	2 1/2	PLAIN	HPFSS250S5075	●
1/4	.250	1/4	1 1/4	4	PLAIN	HPFSS250S5125	●
5/16	.313	5/16	7/16	2	PLAIN	HPFSS312S5044	●
5/16	.313	5/16	13/16	2 1/2	PLAIN	HPFSS312S5081	●
5/16	.313	5/16	1 1/4	4	PLAIN	HPFSS312S5125	●
3/8	.375	3/8	1/2	2	PLAIN	HPFSS375S5050	●
3/8	.375	3/8	7/8	2 1/2	PLAIN	HPFSS375S5088	●
3/8	.375	3/8	1 1/2	4	PLAIN	HPFSS375S5150	●
1/2	.500	1/2	5/8	2 1/2	WELDON	HPFSS500S5063	●
1/2	.500	1/2	1 1/4	3	WELDON	HPFSS500S5125	●
1/2	.500	1/2	2	4	WELDON	HPFSS500S5200	●
5/8	.625	5/8	3/4	3	WELDON	HPFSS625S5075	●
5/8	.625	5/8	1 5/8	4	WELDON	HPFSS625S5163	●
5/8	.625	5/8	2 1/2	5	WELDON	HPFSS625S5250	●
3/4	.750	3/4	7/8	3	WELDON	HPFSS750S5088	●
3/4	.750	3/4	1 5/8	4	WELDON	HPFSS750S5163	●
3/4	.750	3/4	3 1/4	5	WELDON	HPFSS750S5325	●
1	1.000	1	1 1/2	4	WELDON	HPFSS1000S5150	●
1	1.000	1	2	4	WELDON	HPFSS1000S5200	●
1	1.000	1	3 1/4	6	WELDON	HPFSS1000S5325	●

For application data, see page 45.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"

Ordering Example:

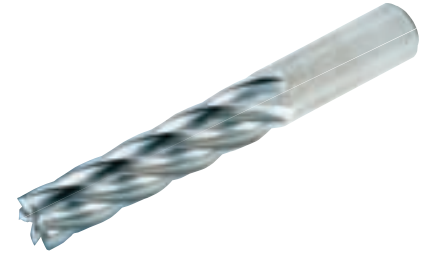
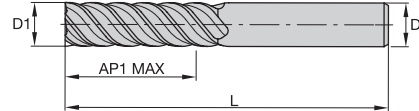
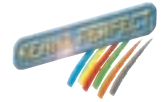
HPFSS375S5088 KC635M

Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Side cutting
- For aerospace, general engineering, medical, and automotive applications.



■ 6-Flute, 45° Helix

- first choice
- alternate choice

H	○
S	●
N	●
K	●
M	●
P	●

D1	D1	D	Ap1 max	L	catalog number	KC635M
1/4	.250	1/4	3/4	2 1/2	HPFT250S6075	●
1/4	.250	1/4	1 1/8	3	HPFT250S6113	●
5/16	.313	5/16	13/16	2 1/2	HPFT312S6081	●
3/8	.375	3/8	7/8	2 1/2	HPFT375S6088	●
3/8	.375	3/8	1 1/8	3	HPFT375S6113	●
1/2	.500	1/2	1	3	HPFT500S6100	●
1/2	.500	1/2	2	4 1/2	HPFT500S6200	●
5/8	.625	5/8	1 1/4	3 1/2	HPFT625S6125	●
5/8	.625	5/8	2 1/4	5	HPFT625S6225	●
3/4	.750	3/4	1 1/2	4	HPFT750S6150	●
3/4	.750	3/4	2 1/4	5	HPFT750S6225	●
1	1.000	1	1 1/2	4	HPFT1000S6150	●
1	1.000	1	2 1/4	5	HPFT1000S6225	●

For application data, see page 46.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
3/8" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 3/8"	+ .000" to - .003"	+ .0000" to - .0005"

Ordering Example:
HPFT375S6088 KC635M

High-Performance Finishing End Mills



HPF45A 2-Flute — for Chatter-Free Machining in Aluminum

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

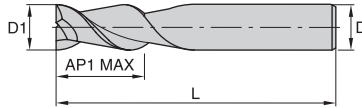
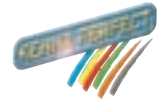
INDEX

Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Slotting.
- For aerospace and general engineering applications.



■ 2-Flute, 45° Helix

- first choice
- alternate choice

H			
S			
N	●	●	
K			
M			
P			

D1	D	Ap1 max	L	catalog number	K600	KC651M
1/8	1/8	1/2	2	HPF45A125S2050	●	●
3/16	3/16	5/8	2	HPF45A188S2063	●	●
1/4	1/4	3/4	2 1/2	HPF45A250S2075	●	●
5/16	5/16	13/16	2 1/2	HPF45A312S2081	●	●
3/8	3/8	7/8	2 1/2	HPF45A375S2088	●	●
1/2	1/2	1 1/4	3	HPF45A500S2125	●	●
5/8	5/8	1 1/4	3 1/2	HPF45A625S2125	●	●
3/4	3/4	1 1/2	4	HPF45A750S2150	●	●
1	1	2	4 1/2	HPF45A1000S2200	●	●

For application data, see page 47.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	h6
over 1/4"	+ .000" to - .002"	h6

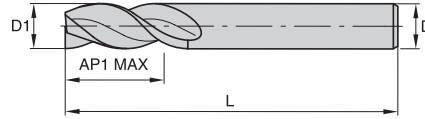
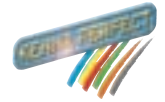
Ordering Example:
HPF45A375S2088 KC651M

Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Slotting and side cutting.
- For aerospace and general engineering applications.



■ 3-Flute, 45° Helix

- first choice
- alternate choice

H			
S			
N	●	●	
K			
M			
P			

D1	D	Ap1 max	L	catalog number	K600	KC651M
1/4	1/4	3/4	2 1/2	HPF37A250S3075	●	●
5/16	5/16	13/16	2 1/2	HPF37A312S3081	●	●
3/8	3/8	7/8	2 1/2	HPF37A375S3088	●	●
1/2	1/2	1 1/4	3	HPF37A500S3125	●	●
5/8	5/8	1 1/4	3 1/2	HPF37A625S3125	●	●
3/4	3/4	1 1/2	4	HPF37A750S3150	●	●
1	1	2	4 1/2	HPF37A1000S3200	●	●

For application data, see page 47.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	h6
over 1/4"	+ .000" to - .002"	h6

Ordering Example:
HPF37A375S3088 KC651M

High-Performance Finishing End Mills



HPRSA 2-Flute – With Extended Neck for Aluminum

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

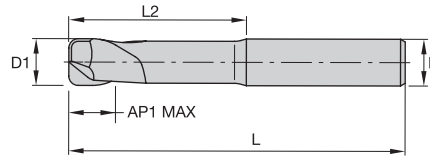
INDEX

Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Side cutting and slotting.
- For aerospace and general engineering applications.



2-Flute, 37° Helix

- first choice
- alternate choice

H	Grey
S	Orange
N	Green
K	Red
M	Yellow
P	Blue

D1	D1	D	Ap1 max	L2	L	catalog number	KC625M
1/4	.2500	1/4	3/8	2 1/4	4	HPRSA250S2225	●
3/8	.3750	3/8	1/2	2 1/4	4	HPRSA375S2225	●
1/2	.5000	1/2	5/8	2 1/4	5	HPRSA500S2225	●
1/2	.5000	1/2	5/8	3 1/4	6	HPRSA500S2325	●
5/8	.6250	5/8	3/4	3 1/4	6	HPRSA625S2325	●
3/4	.7500	3/4	1	2 1/4	5	HPRSA750S2225	●
3/4	.7500	3/4	1	3 1/4	6	HPRSA750S2325	●
1	1.0000	1	1 1/8	2 1/4	5	HPRSA1000S2225	●
1	1.0000	1	1 1/8	4 1/4	7	HPRSA1000S2425	●

For application data, see page 47.

End Mill Tolerances

D1	D1 Tolerance	D Tolerance
All	+ .000" to - .003"	+ .0000" to - .0005"

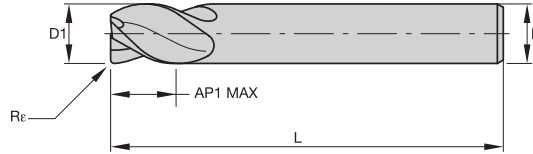
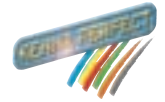
Ordering Example:
HPRSA375S2225 KC625M

Features

- Kennametal standard.
- Plain shank.
- Corner radius - center cutting.

Application

- Slotting and side cutting.
- For aerospace and general engineering applications.



■ 4-Flute, 30° Helix

- first choice
- alternate choice

H	Grey
S	Orange
N	Green
K	Red
M	Yellow
P	Blue

D1	D1	D	Ap1 max	L	Re	catalog number	KDF300
1/16	.0625	1/8	1/4	1 1/2	.0150	CRHEC062S4025R15	●
1/8	.1250	1/8	1/2	1 1/2	.0150	CRHEC125S4050R15	●
1/8	.1250	1/8	1	3	.0150	CRHEC125S4100R15	●
1/8	.1250	1/8	1	3	.0300	CRHEC125S4100R30	●
1/4	.2500	1/4	3/4	2 1/2	.0150	CRHEC250S4075R15	●
1/4	.2500	1/4	1 1/2	4	.0150	CRHEC250S4150R15	●
1/4	.2500	1/4	3/4	2 1/2	.0300	CRHEC250S4075R30	●
1/4	.2500	1/4	1 1/2	4	.0300	CRHEC250S4150R30	●
1/2	.5000	1/2	1	3	.0150	CRHEC500S4100R15	●
1/2	.5000	1/2	3	6	.0150	CRHEC500S4300R15	●
1/2	.5000	1/2	3	6	.0300	CRHEC500S4300R30	●

For application data, see page 48.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance	Runout
1/4" and under	+ .000" to - .002"	+ .000" to - .0004"	.001"
over 1/4"	+ .000" to - .002"	+ .000" to - .0004"	.001"

Ordering Example:
CRHEC250S4150R30 KDF300

HEC 2-Flute with Diamond Coating

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

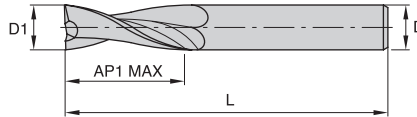
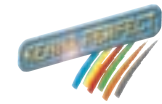
INDEX

Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Slotting.
- For aerospace and general engineering applications.



2-Flute, 30° Helix

D1	D	Ap1 max	L	catalog number	KDF300
1/16	1/8	1/4	1 1/2	HEC062S2025	●
1/8	1/8	1/2	1 1/2	HEC125S2050	●
3/16	3/16	5/8	2	HEC188S2063	●
1/4	1/4	3/4	2 1/2	HEC250S2075	●
5/16	5/16	13/16	2 1/2	HEC312S2081	●
3/8	3/8	1	2 1/2	HEC375S2100	●
1/2	1/2	1	3	HEC500S2100	●

● first choice
○ alternate choice

H	Grey	White
S	Orange	White
N	Green	Black
K	Red	White
M	Yellow	White
P	Blue	White

For application data, see page 48.

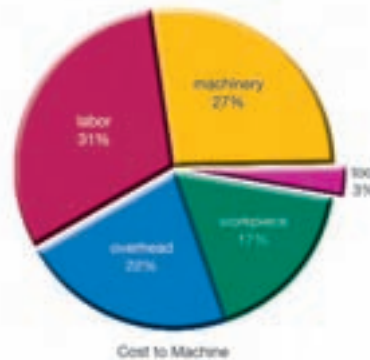
End Mill Tolerances

D1	D1 Tolerance	D Tolerance	Runout
1/4" and under	+ .000" to - .002"	+ .000" to - .0004"	.001"
over 1/4"	+ .000" to - .002"	+ .000" to - .0004"	.001"

Machining highly abrasive non-ferrous materials has improved as a result of the evolution of the KDF300 diamond coating.

This coating is a pure diamond with no metallic binders. It is highly recommended for use in die and mold operations where graphite is a key component.

The associated gains in productivity far outweigh the differences in tool costs. The graph illustrates that any cost savings in labor and overhead affects 53% of the cost to machine a part. A lower tool cost will impact only 3% of the machining costs.



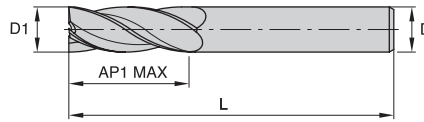
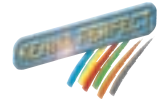
Ordering Example:
HEC375S2100 KDF300

Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Side cutting.
- For use in die and mold, aerospace, and general engineering applications.



■ 4-Flute, 30° Helix

- first choice
- alternate choice

H	■
S	■
N	●
K	■
M	■
P	■

D1	D	Ap1 max	L	catalog number	KDF300
1/32	1/8	3/32	1 1/2	HEC031S4009	●
1/16	1/8	1/4	1 1/2	HEC062S4025	●
5/64	1/8	1/4	1 1/2	HEC078S4025	●
3/32	1/8	3/8	1 1/2	HEC094S4038	●
1/8	1/8	1/2	1 1/2	HEC125S4050	●
1/8	1/8	1	3	HEC125S4100	●
3/16	3/16	5/8	2	HEC188S4063	●
3/16	3/16	1	4	HEC188S4100	●
1/4	1/4	3/4	3	HEC250S4075	●
1/4	1/4	1 1/2	4	HEC250S4150	●
5/16	5/16	13/16	2 1/2	HEC312S4081	●
5/16	5/16	1 1/2	4	HEC312S4150	●
3/8	3/8	1	2 1/2	HEC375S4100	●
3/8	3/8	1 1/2	4	HEC375S4150	●
1/2	1/2	1	3	HEC500S4100	●
1/2	1/2	1 1/2	4	HEC500S4150	●
1/2	1/2	3	6	HEC500S4300	●
3/4	3/4	1 1/2	4	HEC750S4150	●
1	1	1 1/2	4	HEC1000S4150	●

For application data, see page 48.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance	Runout
1/4" and under	+0.000" to -.002"	+0.000" to -.0004"	.001"
over 1/4"	+0.000" to -.002"	+0.000" to -.0004"	.001"

Ordering Example:
HEC375S4100 KDF300

High-Performance Finishing End Mills



HPFDM Multi-Flute for Medium and Hardened Steels

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

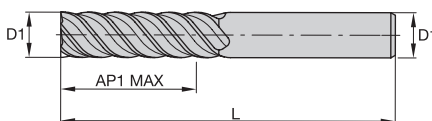
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Features

- Kennametal standard.
- Plain shank.
- Sharp corner - center cutting.

Application

- Slotting and side cutting.
- For die and mold and general engineering applications.



Multi-Flute, 50° Helix

- first choice
- alternate choice

H	●
S	○
N	○
K	○
M	○
P	○

D1	D1	D	Ap1 max	L	Z U	catalog number	KC633M
1/4	.250	1/4	3/8	3	4	HPFDM250S4038	●
1/4	.250	1/4	5/8	3	4	HPFDM250S4063	●
1/4	.250	1/4	7/8	3	4	HPFDM250S4088	●
5/16	.313	5/16	1/2	4	4	HPFDM312S4050	●
5/16	.313	5/16	3/4	4	4	HPFDM312S4075	●
5/16	.313	5/16	1 1/8	4	4	HPFDM312S4113	●
3/8	.375	3/8	9/16	4	4	HPFDM375S4056	●
3/8	.375	3/8	15/16	4	5	HPFDM375S5094	●
3/8	.375	3/8	1 5/16	4	5	HPFDM375S5131	●
1/2	.500	1/2	3/4	5	4	HPFDM500S4075	●
1/2	.500	1/2	1 1/4	5	6	HPFDM500S6125	●
1/2	.500	1/2	1 3/4	5	6	HPFDM500S6175	●
5/8	.625	5/8	15/16	5	4	HPFDM625S4094	●
5/8	.625	5/8	1 9/16	5	6	HPFDM625S6156	●
3/4	.750	3/4	1 1/8	6	4	HPFDM750S4113	●
3/4	.750	3/4	1 7/8	6	6	HPFDM750S6188	●
3/4	.750	3/4	2 5/8	6	6	HPFDM750S6263	●
1	1.000	1	2 1/2	6	6	HPFDM1000S6250	●
1	1.000	1	3 1/2	6	6	HPFDM1000S6350	●

For application data, see page 48.

End Mill Tolerances

D1	D1 Tolerance	D Tolerance
All	+.000" to -.002"	h6

Ordering Example:
HPFDM375S4056 KC633M

Group	Material	Description	
P2	Medium and high carbon steels > 0.3% C	AISI:	1008, 1010, 1020, 1026, 1035, 1040, 1045, 1080, 1525, 1541, 1551, 1561, 1572
P3	Alloy steels and tool steels <330HB, <35HRC	AISI:	1300, 2000, 3000, 4000, 5000, 6000, 7000, and 8000 series steels.
		Tool Steels:	SAE classes M and T hot and cold work SAE classes: A, D, H, O, and S; Wrought high carbon/low alloy W1, W2, L2, P1, P6, and P20
P4	Alloy steels and tool steels 340-450HB, 36-48HRC	AISI:	1300, 2000, 3000, 4000, 5000, 6000, 7000, and 8000 series steels.
		Tool Steels:	SAE classes M and T hot and cold work SAE classes: A, D, H, O, and S; Wrought high carbon/low alloy W1, W2, L2, P1, P6, and P20
P5	Ferritic, martensitic and PH stainless steels <330HB, <35HRC	AISI:	410, 416, 416F, 416 Se, 420F, 15-5 PH, 17-4 PH, 13-8 PH
P6	Ferritic, martensitic and PH stainless steels >330HB, >35HRC	AISI:	410, 416, 416F, 416 Se, 420F, 15-5 PH, 17-4 PH, 13-8 PH
M1	Austenitic stainless steel	AISI:	200, 201, 202, 209, 219, 301, 302, 303, 304, 304L, 305
M2	Austenitic stainless steel	AISI:	310, 314, 316, 316L, 317, 321, 347, 384, ASTM: XM-1, XM-5 XM-7, XM-21, CF-8M
M3	Austenitic stainless steel: Duplex (ferritic and austenitic mixture)	AISI:	323, 329, F55, 2205, S329000
K1	Grey cast iron (GG)	ASTM A48:	Class 20, 25, 30, 35, 40, 45, 50, 55, 60, SAE J431: grade G1800, G3000, G3500
		SAE J431:	grade G1800, G3000, G3500
K2	Ductile, CGI, and malleable cast iron <80KSI	SAE J431:	60-40-18, 65-45-12
		SAE J434:	D4018, D4512, D5506
		ASTM A47:	grade 32510, 35018
		SAE J58:	grade M3210, M4504, M5503
		ASTM A842:	grade 250, 300, 350, 400, 450
N1	Aluminum alloys <12.2% Si	Low silicon aluminum, 6061-T6, 7075-T6	
N2	Aluminum alloys >12.2% Si	High silicon aluminum, 6061-T6, 7075-T6	
S1	Iron-based heat-resistant alloys	Wrought:	A-286, Discaloy, Incoloy 801, N-155, 16-25-6, 19-9 DL
		Cast:	ASTM A297, A351, A608, A567
S2	Cobalt-based heat-resistant alloys	Wrought:	AiResist 213, Haynes 25 (L605), Haynes 188, J-1570, Stellite
		Cast:	AiResist 13, Haynes 21, MAR-M302, MAR-M509, NASA Co-W-Re, WI-52
S3	Nickel-based heat-resistant alloys	Astroloy, Hastelloy C/C-276/X, Inconel 6061/617-625/700/706/718	
		IN102, Incoloy 901, Mar-M200, Nimonic, Rene 41, Udimet, Waspaloy, Monel	
S4	Alpha-Beta titanium alloys	Pure: Ti98.9, Ti99.9 Alloyed Ti-5Al-2.5Sn, Ti-6Al-4V, Ti-6Al-2Sn-4Zr-2Mo, Ti-3Al-8V-6Cr-4Mo-4Zr, Ti-10V-2Fe-3Al, Ti-13V-11Cr-3Al	
H1	Hardened steels <48HRC	Tool steels: H10, H11, H13, D2, D3, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	
H2	Hardened steels 48-55HRC	Tool steels: H10, H11, H13, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	
H3	Hardened steels 56-60HRC	Tool steels: H10, H11, H13, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	
H4	Hardened steels >60HRC	Tool steels: H10, H11, H13, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	

See page 516 for complete material listing.

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

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CRHEC

				Reduce speed by 20% for slotting applications									
	Application			Vc KC635M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.								
	Side Milling		Slotting		D1- Diameter (Inch)								
Group	ap	ae	ap	SFM	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
P2	1XD	0.1XD	0.5XD	350~450	.0006	.001	.0015	.0020	.0025	.0030	.0035	.0040	.0045
P3	1XD	0.1XD	0.5XD	250~350	.0005	.0007	.0010	.0015	.0020	.0024	.0028	.0030	.0035
P4	1XD	0.1XD	0.5XD	175~325	.0004	.0005	.0010	.0011	.0015	.0020	.0025	.0027	.0030
P5	1XD	0.1XD	0.5XD	250~450	.0004	.0006	.0010	.0015	.0020	.0024	.0026	.0030	.0035
M1	1XD	0.1XD	0.5XD	275~500	.0006	.0008	.0012	.0015	.0020	.0025	.0030	.0035	.0040
M2	1XD	0.1XD	0.5XD	200~450	.0003	.0004	.0007	.0010	.0015	.0017	.0025	.0030	.0035
M3	1XD	0.1XD	0.5XD	175~400	.0003	.0004	.0007	.0010	.0015	.0017	.0025	.0030	.0035
K1	1XD	0.1XD	0.5XD	425~725	.0007	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0070
K2	1XD	0.1XD	0.5XD	400~600	.0007	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0070
S1	1XD	0.1XD	0.5XD	65~125	.0004	.0006	.0009	.0012	.0015	.0018	.002	.0024	.0027
S2	1XD	0.1XD	0.5XD	65~125	.0004	.0006	.0009	.0012	.0015	.0018	.002	.0024	.0027
S3	1XD	0.1XD	0.5XD	65~125	.0004	.0006	.0009	.0012	.0015	.0018	.002	.0024	.0027
S4	1XD	0.1XD	0.5XD	100~200	.0008	.0012	.0015	.0018	.0022	.0025	.0028	.0030	.0035

These guidelines may require variations to achieve optimum results.

DHEC

				Reduce speed by 20% for slotting applications												
	Application			Vc K600	Vc KC610M	Vc KC635M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.									
	Side Milling		Slotting	D1- Diameter (Inch)												
Group	ap	ae	ap	SFM	SFM	SFM	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
P2	1XD	0.1XD	0.5XD	200~300	300~400	350~450	.0004	.0006	.001	.0015	.0020	.0025	.0030	.0035	.0040	.0045
P3	1XD	0.1XD	0.5XD	175~300	175~300	250~350	.0003	.0005	.0007	.0010	.0015	.0020	.0024	.0028	.0030	.0035
P4	1XD	0.1XD	0.5XD	N/A	N/A	175~325	.0002	.0004	.0005	.0010	.0011	.0015	.0020	.0025	.0027	.0030
P5	1XD	0.1XD	0.5XD	N/A	200~350	250~450	.0002	.0004	.0006	.0010	.0015	.0020	.0024	.0026	.0030	.0035
M1	1XD	0.1XD	0.5XD	N/A	225~400	275~500	.0004	.0006	.0008	.0012	.0015	.0020	.0025	.0030	.0035	.0040
M2	1XD	0.1XD	0.5XD	N/A	N/A	200~450	.0002	.0003	.0004	.0007	.0010	.0015	.0017	.0025	.0030	.0035
M3	1XD	0.1XD	0.5XD	N/A	N/A	175~400	.0002	.0003	.0004	.0007	.0010	.0015	.0017	.0025	.0030	.0035
K1	1XD	0.1XD	0.5XD	300~450	N/A	425~725	.0005	.0007	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0070
K2	1XD	0.1XD	0.5XD	200~300	N/A	400~600	.0005	.0007	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0070

These guidelines may require variations to achieve optimum results.

HEC

				Reduce speed by 20% for slotting applications												
		Application		Vc K600	Vc KC610M	Vc KC635M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)									
		Side Milling														
		Slotting														
Group	ap	ae	ap	SFM	SFM	SFM	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
P2	1XD	0.1XD	0.5XD	200~300	300~400	350~450	.0004	.0006	.001	.0015	.0020	.0025	.0030	.0035	.0040	.0045
P3	1XD	0.1XD	0.5XD	175~300	175~300	250~350	.0003	.0005	.0007	.0010	.0015	.0020	.0024	.0028	.0030	.0035
P4	1XD	0.1XD	0.5XD	N/A	N/A	175~325	.0002	.0004	.0005	.0010	.0011	.0015	.0020	.0025	.0027	.0030
P5	1XD	0.1XD	0.5XD	N/A	200~350	250~450	.0002	.0004	.0006	.0010	.0015	.0020	.0024	.0026	.0030	.0035
M1	1XD	0.1XD	0.5XD	N/A	225~400	275~500	.0004	.0006	.0008	.0012	.0015	.0020	.0025	.0030	.0035	.0040
M2	1XD	0.1XD	0.5XD	N/A	N/A	200~450	.0002	.0003	.0004	.0007	.0010	.0015	.0017	.0025	.0030	.0035
M3	1XD	0.1XD	0.5XD	N/A	N/A	175~400	.0002	.0003	.0004	.0007	.0010	.0015	.0017	.0025	.0030	.0035
K1	1XD	0.1XD	0.5XD	300~450	N/A	425~725	.0005	.0007	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0070
K2	1XD	0.1XD	0.5XD	200~300	N/A	400~600	.0005	.0007	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0070
S1	1XD	0.1XD	0.5XD	N/A	N/A	65~125	.0002	.0004	.0006	.0009	.0012	.0015	.0018	.002	.0024	.0027
S2	1XD	0.1XD	0.5XD	N/A	N/A	65~125	.0002	.0004	.0006	.0009	.0012	.0015	.0018	.002	.0024	.0027
S3	1XD	0.1XD	0.5XD	N/A	N/A	65~125	.0002	.0004	.0006	.0009	.0012	.0015	.0018	.002	.0024	.0027
S4	1XD	0.1XD	0.5XD	N/A	N/A	100~200	.0004	.0008	.0012	.0015	.0018	.0022	.0025	.0028	.0030	.0035

These guidelines may require variations to achieve optimum results.

HHEC

				Reduce speed by 20% for slotting applications												
		Application		Vc KC635M			Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)									
		Side Milling														
Group	ap	ae	SFM	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"				
M1	1XD	0.1XD	275~500	.0005	.0007	.0010	.0015	.0020	.0025	.0030	.0035	.0040				
M2	1XD	0.1XD	200~450	.0005	.0007	.0010	.0015	.0020	.0025	.0030	.0035	.0040				
S1	1XD	0.1XD	100~175	.0003	.0004	.0005	.0006	.0007	.0010	.0015	.0022	.0025				
S2	1XD	0.1XD	100~175	.0003	.0004	.0005	.0006	.0007	.0010	.0015	.0022	.0025				
S3	1XD	0.1XD	65~95	.0003	.0004	.0005	.0006	.0007	.0010	.0015	.0022	.0025				
S4	1XD	0.1XD	150~200	.0003	.0004	.0006	.0009	.0010	.0015	.0018	.0022	.0025				

These guidelines may require variations to achieve optimum results.

SOLID CARBIDE

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FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

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HPHV

				Reduce speed by 20% for slotting applications									
	Application			Vc K633	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.								
	Side Milling		Slotting		D1- Diameter (Inch)								
Group	ap	ae	ap	SFM	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
P2	1XD	0.5XD	1XD	500-600	.0012	.0014	.0016	.0021	.0026	.0031	.0034	.0036	.0040
P3	1XD	0.5XD	1XD	400-500	.0012	.0014	.0016	.0021	.0026	.0031	.0034	.0036	.0040
P4	1XD	0.5XD	1XD	300-400	.0008	.0010	.0012	.0016	.0021	.0026	.0031	.0034	.0036
P5	1XD	0.5XD	1XD	225-275	.0012	.0014	.0016	.0021	.0026	.0031	.0034	.0036	.0040
M1	1XD	0.5XD	1XD	275-375	.0008	.0010	.0012	.0016	.0021	.0026	.0031	.0034	.0036
M2	1XD	0.5XD	1XD	200-275	.0004	.0008	.0012	.0014	.0016	.0020	.0022	.0026	.0031
M3	1XD	0.5XD	1XD	125-200	.0004	.0008	.0012	.0014	.0016	.0020	.0022	.0026	.0031
K1	1XD	0.5XD	1XD	425-525	.0014	.0015	.0017	.0022	.0028	.0034	.0036	.0039	.0050
S1	1XD	0.2XD	0.3XD	65-90	.0004	.0008	.0010	.0012	.0014	.0016	.0018	.0020	.0022
S2	1XD	0.2XD	0.3XD	65-90	.0004	.0008	.0010	.0012	.0014	.0016	.0018	.0020	.0022
S3	1XD	0.2XD	0.3XD	65-90	.0004	.0008	.0010	.0012	.0014	.0016	.0018	.0020	.0022
S4	1XD	0.3XD	0.5XD	135-175	.0008	.0010	.0014	.0016	.0020	.0022	.0026	.0029	.0034

These guidelines may require variations to achieve optimum results.

HPRSHV

				Reduce speed by 20% for slotting applications				
	Application			Vc K633	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.			
	Side Milling		Slotting		D1- Diameter (Inch)			
Group	ap	ae	ap	SFM	1/2"	5/8"	3/4"	1"
P2	1XD	0.3XD	0.35XD	400-500	.0025	.0028	.0030	.0033
P3	1XD	0.3XD	0.35XD	400-500	.0025	.0028	.0030	.0033
P4	1XD	0.3XD	0.35XD	300-400	.0022	.0026	.0028	.0030
P5	1XD	0.3XD	0.35XD	225-275	.0025	.0028	.0030	.0033
M1	1XD	0.3XD	0.35XD	240-300	.0022	.0027	.0030	.0033
M2	1XD	0.3XD	0.35XD	200-250	.0017	.0024	.0027	.0029
M3	1XD	0.3XD	0.35XD	185-225	.0017	.0024	.0027	.0029
K1	1XD	0.3XD	0.35XD	425-525	.0028	.0030	.0035	.0040
S1	1XD	0.2XD	0.25XD	75-125	.0014	.0016	.0018	.0020
S2	1XD	0.2XD	0.25XD	75-125	.0014	.0016	.0018	.0020
S3	1XD	0.2XD	0.25XD	65-90	.0014	.0016	.0018	.0020
S4	1XD	0.3XD	0.35XD	125-175	.0018	.0022	.0024	.0026

These guidelines may require variations to achieve optimum results.

HPHVT

				Reduce speed by 20% for slotting applications				
	Application			Vc KC643M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.			
	Side Milling		Slotting		D1- Diameter (Inch)			
Group	ap	ae	ap	SFM	1/2"	5/8"	3/4"	1"
S1	1XD	0.2XD	0.5XD	85-125	.0016	.0020	.0023	.0024
S2	1XD	0.2XD	0.5XD	85-125	.0016	.0020	.0023	.0024
S3	1XD	0.2XD	0.3XD	85-125	.0016	.0020	.0023	.0024
S4	1XD	0.3XD	1XD	150-190	.0024	.0028	.0030	.0036

These guidelines may require variations to achieve optimum results.

HPFSS—3-flute

		<p>Reduce speed by 20% for slotting applications</p>											
<p>Application</p> <p>Side Milling Slotting</p>			<p>Vc KC635M</p>	<p>Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.</p> <p>D1- Diameter (Inch)</p>									
Group	ap	ae		ap	SFM	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
P2	1XD	0.4XD	0.5XD	400~500	.0008	.0014	.0016	.0021	.0026	.0030	.0035	.0040	.0045
P3	1XD	0.4XD	0.5XD	350~475	.0008	.0014	.0016	.0021	.0026	.0030	.0035	.0040	.0045
P4	1XD	0.4XD	0.5XD	200~300	.0006	.0011	.0012	.0016	.0021	.0024	.0026	.0028	.0030
P5	1XD	0.1XD	0.5XD	300~400	.0008	.0012	.0016	.0021	.0026	.0028	.0030	.0032	.0034
M1	1XD	0.4XD	0.5XD	300~475	.0007	.0008	.0012	.0016	.0020	.0025	.0030	.0035	.0040
M2	1XD	0.4XD	0.5XD	225~275	.0006	.0010	.0012	.0016	.0020	.0022	.0024	.0026	.0028
M3	1XD	0.4XD	0.5XD	200~250	.0005	.0010	.0012	.0016	.0020	.0022	.0024	.0026	.0028
K1	1XD	0.4XD	0.5XD	425~525	.0007	.0008	.0010	.0015	.0020	.0025	.0030	.0040	.0048
S1	1XD	0.2XD	0.3XD	50~85	.0004	.0006	.0010	.0012	.0014	.0016	.0018	.0020	.0025
S2	1XD	0.2XD	0.3XD	50~85	.0004	.0006	.0010	.0012	.0014	.0016	.0018	.0020	.0025
S3	1XD	0.2XD	0.3XD	50~85	.0004	.0006	.0010	.0012	.0014	.0016	.0018	.0020	.0025
S4	1XD	0.3XD	0.3XD	100~150	.0006	.0008	.0012	.0014	.0016	.0018	.0020	.0022	.0025

These guidelines may require variations to achieve optimum results.

HPFSS—5-Flute

		<p>Reduce speed by 20% for slotting applications</p>											
<p>Application</p> <p>Side Milling</p>			<p>Vc KC635M</p>	<p>Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.</p> <p>D1- Diameter (Inch)</p>									
Group	ap	ae		SFM	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
P2	1XD	0.4XD	400~500	.0008	.0014	.0016	.0021	.0026	.0030	.0035	.0040	.0045	
P3	1XD	0.4XD	350~475	.0008	.0014	.0016	.0021	.0026	.0030	.0035	.0040	.0045	
P4	1XD	0.4XD	200~300	.0006	.0011	.0012	.0016	.0021	.0024	.0026	.0028	.0030	
P5	1XD	0.1XD	300~400	.0008	.0012	.0016	.0021	.0026	.0028	.0030	.0032	.0034	
M1	1XD	0.4XD	300~475	.0007	.0008	.0012	.0016	.0020	.0025	.0030	.0035	.0040	
M2	1XD	0.4XD	225~275	.0006	.0010	.0012	.0016	.0020	.0022	.0024	.0026	.0028	
M3	1XD	0.4XD	200~250	.0005	.0010	.0012	.0016	.0020	.0022	.0024	.0026	.0028	
K1	1XD	0.4XD	425~525	.0007	.0008	.0010	.0015	.0020	.0025	.0030	.0040	.0048	
S1	1XD	0.2XD	50~85	.0004	.0006	.0010	.0012	.0014	.0016	.0018	.0020	.0025	
S2	1XD	0.2XD	50~85	.0004	.0006	.0010	.0012	.0014	.0016	.0018	.0020	.0025	
S3	1XD	0.2XD	50~85	.0004	.0006	.0010	.0012	.0014	.0016	.0018	.0020	.0025	
S4	1XD	0.3XD	100~150	.0006	.0008	.0012	.0014	.0016	.0018	.0020	.0022	.0025	

These guidelines may require variations to achieve optimum results.

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

INDEX

HPFT—6-flute

		<p>Reduce speed by 20% for slotting applications</p>								
<p>Application</p>		<p>Vc KC635M</p>	<p>Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.</p>							
<p>Side Milling</p>			<p>D1- Diameter (Inch)</p>							
Group	ap	ae	SFM	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
P2	1XD	0.1XD	400-500	.0016	.0021	.0026	.0031	.0034	.0040	.0045
P3	1XD	0.1XD	350-450	.0016	.0021	.0026	.0031	.0034	.0040	.0045
P4	1XD	0.1XD	200-300	.0011	.0014	.0018	.0022	.0024	.0027	.0030
P5	1XD	0.1XD	300-400	.0016	.0021	.0026	.0031	.0034	.0040	.0045
M1	1XD	0.1XD	300-400	.0014	.0018	.0021	.0026	.0031	.0034	.0040
M2	1XD	0.1XD	225-275	.0011	.0014	.0018	.0022	.0024	.0027	.0030
M3	1XD	0.1XD	200-250	.0011	.0014	.0018	.0022	.0024	.0027	.0030
S1	1XD	0.1XD	50-85	.0010	.0012	.0015	.0018	.0022	.0024	.0027
S2	1XD	0.1XD	50-85	.0010	.0012	.0015	.0018	.0022	.0024	.0027
S3	1XD	0.1XD	50-85	.0010	.0012	.0015	.0018	.0022	.0024	.0027
S4	1XD	0.1XD	100-150	.0014	.0018	.0020	.0025	.0028	.0030	.0035
H1	1XD	0.1XD	150-275	.0012	.0014	.0018	.0020	.0022	.0025	.0028

These guidelines may require variations to achieve optimum results.

HPRSA

			Reduce speed by 20% for slotting applications							
Application			Vc KC625M		Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)					
Side Milling		Slotting								
Group	ap	ae	ap	SFM	1/4"	3/8"	1/2"	5/8"	3/4"	1"
N1	1XD	0.5XD	1XD	600~4000	.0020	.0040	.0060	.0070	.0080	.0090
N2	1XD	0.5XD	1XD	300~2000	.0020	.0030	.0040	.0050	.0060	.0070

These guidelines may require variations to achieve optimum results.

HPF45A

			Reduce speed by 20% for slotting applications											
Application			Vc K600	Vc KC651M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)									
Side Milling		Slotting												
Group	ap	ae	ap	SFM	SFM	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
N1	1XD	0.5XD	1XD	600~4000	750~6000	.0014	.0016	.0020	.0025	.0040	.0050	.0060	.0070	.0080
N2	1XD	0.5XD	1XD	300~2000	N/A	.0014	.0016	.0020	.0025	.0040	.0050	.0060	.0070	.0080

These guidelines may require variations to achieve optimum results.

HPF37A

			Reduce speed by 20% for slotting applications									
Application			Vc K600	Vc KC651M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)							
Side Milling		Slotting										
Group	ap	ae	ap	SFM	SFM	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
N1	1XD	0.5XD	1XD	600~4000	750~7000	.0020	.0025	.0035	.0055	.0065	.0070	.0080
N2	1XD	0.5XD	1XD	300~2000	N/A	.0020	.0025	.0035	.0055	.0065	.0070	.0080

These guidelines may require variations to achieve optimum results.

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

INDEX

HEC and CRHEC with Diamond Coating

			Reduce speed by 20% for slotting applications									
	Application Side Milling		Vc KDF300	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)								
Group	ap	ae	SFM	1/64"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"
N1 - Aluminum alloys	1XD	0.1XD	300~900	.0004	.0006	.0007	.0008	.0009	.0014	.0016	.0018	.0025
N1 - Graphite	1XD	0.1XD	100~3000	.0003	.0005	.0010	.0012	.0015	.0017	.0019	.0022	.0025
N1 - Thermoset plastics	1XD	0.1XD	50~1300	.0003	.0005	.0010	.0012	.0015	.0017	.0021	.0023	.0030
N1 - Fiber-filled plastics	1XD	0.1XD	150~750			.0010	.0012	.0015	.0017	.0021	.0023	.0030

These guidelines may require variations to achieve optimum results.

HPFDM

			Reduce speed by 20% for slotting applications							
	Application Side Milling		Vc KC633M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)						
Group	ap	ae	SFM	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
P4	1XD	0.4XD	475~550	.0014	.0020	.0024	.0030	.0040	.0046	.0060
P6	1XD	0.4XD	475~550	.0014	.0020	.0024	.0030	.0040	.0046	.0060
H1	1XD	0.4XD	475~550	.0014	.0020	.0024	.0030	.0040	.0046	.0060
H2	1XD	0.3XD	250~400	.0008	.0012	.0016	.0018	.0024	.0030	.0035
H3	1XD	0.2XD	150~175	.0006	.0008	.0010	.0015	.0018	.0022	.0025
H4	1XD	0.1XD	95~125	.0006	.0008	.0010	.0015	.0018	.0022	.0025

These guidelines may require variations to achieve optimum results.

Square End Mills — Roughing & Semi-Finishing

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IGMILLING
LINGMILL
MILLINGMI

General-Application Roughing End Mills



SFRHEC – for Aluminum

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

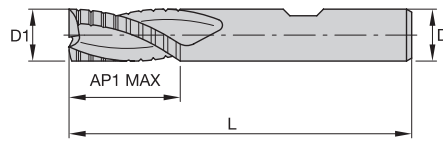
INDEX

Features

- Kennametal standard.
- Weldon shank.
- Chamfered corner - center cutting.
- Coarse pitch profile.

Application

- Side cutting and slotting.



3-Flute, 37° Helix

- first choice
- alternate choice

H			
S			
N	●	●	
K			
M			
P			

D1	D1	D	Ap1 max	L	catalog number	K600	KC625M
1/4	.250	1/4	3/4	2 1/2	SFRHEC250S3075	●	●
5/16	.313	5/16	3/4	2 1/2	SFRHEC312S3075	●	●
3/8	.375	3/8	7/8	2 1/2	SFRHEC375S3088	●	●
1/2	.500	1/2	1	3	SFRHEC500S3100	●	●
1/2	.500	1/2	2	4 1/2	SFRHEC500S3200	●	●
5/8	.625	5/8	1 1/4	3 1/2	SFRHEC625S3125	●	●
5/8	.625	5/8	2 1/4	5	SFRHEC625S3225	●	●
3/4	.750	3/4	1 1/2	4	SFRHEC750S3150	●	●
3/4	.750	3/4	2 1/4	5	SFRHEC750S3225	●	●
1	1.000	1	1 1/2	4	SFRHEC100S3150	●	●
1	1.000	1	2 1/4	5	SFRHEC100S3225	●	●

For application data, see page 55.

End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"

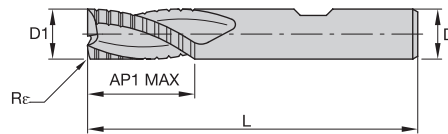
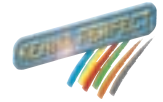
Order Example:
SFRHEC375S3088 KC625M

Features

- Kennametal standard.
- Weldon shank.
- Radius corner - center cutting.
- Chipbreaker profile.

Application

- Slotting and side cutting.
- For aerospace, general engineering, and automotive applications.



■ 3-Flute, 35° Helix

- first choice
- alternate choice

H	■	○
S	■	○
N	■	○
K	■	○
M	■	○
P	■	○

D1	D1	D	Ap1 max	L	Rε	catalog number	KC633M
1/4	.250	1/4	3/4	2 1/2	.020	HPRSS250S3075	●
3/8	.375	3/8	1	2 1/2	.020	HPRSS375S3100	●
1/2	.500	1/2	1 1/4	3	.030	HPRSS500S3125	●
5/8	.625	5/8	1 5/8	3 1/2	.030	HPRSS625S3163	●
3/4	.750	3/4	1 5/8	4	.030	HPRSS750S3163	●
1	1.000	1	2	4	.030	HPRSS1000S3200	●

For application data, see page 55.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
All	din h11	din h6

Order Example:
HPRSS375S3100 KC633M

High-Performance Roughing End Mills



MDRHEC – for Medium Steels and Stainless Steels

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

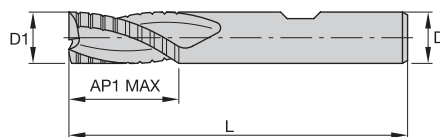
INDEX

Features

- Kennametal standard.
- Weldon shank.
- Chamfered corner - center cutting.
- Fine-pitch profile.

Application

- Slotting and side cutting.
- For general engineering and die and mold applications.



Multi-Flute, 25° Helix

- first choice
- alternate choice

H	■	○
S	■	○
N	■	○
K	■	○
M	■	○
P	■	○

D1	D1	D	Ap1 max	L	Z U	catalog number	KC633M
1/4	.250	1/4	1/4	2	4	MDRHEC250S4025	●
1/4	.250	1/4	3/4	2 1/2	4	MDRHEC250S4075	●
5/16	.312	5/16	13/16	2 1/2	4	MDRHEC312S4081	●
3/8	.375	3/8	3/8	2	4	MDRHEC375S4038	●
3/8	.375	3/8	7/8	2 1/2	4	MDRHEC375S4088	●
1/2	.500	1/2	1/2	2 1/2	4	MDRHEC500S4050	●
1/2	.500	1/2	1	3	4	MDRHEC500S4100	●
5/8	.625	5/8	5/8	3	4	MDRHEC625S4063	●
5/8	.625	5/8	1 1/4	3 1/2	4	MDRHEC625S4125	●
3/4	.750	3/4	3/4	3 1/2	4	MDRHEC750S4075	●
3/4	.750	3/4	1 1/2	4	4	MDRHEC750S4150	●
1	1.000	1	1 1/8	3 1/2	5	MDRHEC100S5113	●
1	1.000	1	1 1/2	4	5	MDRHEC100S5150	●

For application data, see page 56.

End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"

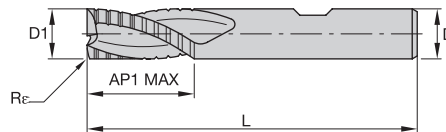
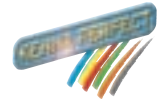
Order Example:
MDRHEC375S4088 KC633M

Features

- Kennametal standard.
- Plain and Weldon shank.
- Radius corner - center cutting.
- Shallow-pitch profile.

Application

- Slotting and side cutting.
- For aerospace, general engineering, die and mold, and medical applications.



SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

INDEX

Multi-Flute, 45° Helix

- first choice
- alternate choice

H	●
S	●
N	○
K	○
M	○
P	○

D1	D1	D	AP1max	L	Re	Z	mounting style	catalog number	KC643M
1/4	.250	1/4	3/8	2	0.03	4	Plain	HPRST250S4038	●
1/4	.250	1/4	3/4	2 1/2	0.03	4	Plain	HPRST250S4075	●
3/8	.375	3/8	1/2	2	0.03	4	Plain	HPRST375S4050	●
3/8	.375	3/8	7/8	2 1/2	0.03	4	Plain	HPRST375S4088	●
1/2	.500	1/2	5/8	2 1/2	0.04	4	Weldon	HPRST500S4063	●
1/2	.500	1/2	1 1/4	3	0.04	4	Weldon	HPRST500S4125	●
5/8	.625	5/8	3/4	3	0.04	4	Weldon	HPRST625S4075	●
5/8	.625	5/8	1 1/4	3 1/2	0.04	4	Weldon	HPRST625S4125	●
5/8	.625	5/8	1 1/4	3 1/2	0.04	6	Weldon	HPRST625S6125	●
3/4	.750	3/4	7/8	3 1/2	0.05	4	Weldon	HPRST750S4088	●
3/4	.750	3/4	1 1/2	4	0.05	4	Weldon	HPRST750S4150	●
3/4	.750	3/4	1 1/2	4	0.05	6	Weldon	HPRST750S6150	●
1	1.000	1	1 1/2	4	0.05	4	Weldon	HPRST1000S4150	●
1	1.000	1	1 1/2	4	0.05	6	Weldon	HPRST1000S6150	●

For application data, see page 56.

End Mill Tolerances

D1	D1 Tolerance	D Tolerance
All	din d11	din h6

Order Example:
HPRST375S4050 KC643M

High-Performance Roughing End Mills



HPRDM – for Medium and Hardened Steels

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

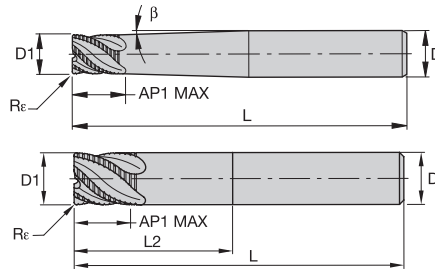
INDEX

Features

- Kennametal standard.
- Plain shank.
- Radius corner - center cutting.
- Shallow-pitch profile.

Application

- Slotting and side cutting.
- For die and mold, general engineering, and medical applications.



Multi-Flute, 45° Helix

- first choice
- alternate choice

H	●
S	○
N	○
K	○
M	○
P	○

D1	D1	D	Ap1 max	L2	L	Rr	BETA	Z U	catalog number	KC633M
3/16	.188	1/4	3/16	—	3	.030	2.500	3	HPRDM188S3019	●
1/4	.250	3/8	1/4	—	4	.030	2.500	4	HPRDM250S4025	●
5/16	.313	3/8	5/16	—	4	.030	2.500	4	HPRDM312S4031	●
3/8	.375	1/2	3/8	—	5	.030	2.500	4	HPRDM375S4038	●
1/2	.500	5/8	1/2	—	5	.040	2.500	4	HPRDM500S4050	●
5/8	.625	5/8	5/8	1 7/8	5	.040	—	6	HPRDM625S6063	●
3/4	.750	3/4	3/4	2 1/4	6	.050	—	6	HPRDM750S6075	●
1	1.000	1	1	3	6	.050	—	6	HPRDM1000S6100	●


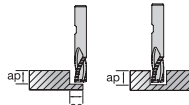

For application data, see page 56.

End Mill Tolerances

D1	D1 Tolerance	D Tolerance
All	din h11	din h6


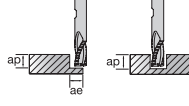

Order Example:
HPRDM375S4038 KC633M

SFRHEC

 <p>Coarse Pitch</p>			<p>Reduce speed by 20% for slotting applications</p>							
	<p>Application</p>				<p>Vc K600</p>	<p>Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.</p>				
	Side Milling	Slotting					D1- Diameter (Inch)			
Material	ap	ae	ap	SFM	1/4"	3/8"	1/2"	5/8"	3/4"	1"
N1	1.5XD	0.5XD	1XD	600~1800	.0015	.0025	.0030	.0040	.0045	.0060

These guidelines may require variations to achieve optimum results.

HPRSS

 <p>Chipbreaker Pitch</p>			<p>Reduce speed by 20% for slotting applications</p>							
	<p>Application</p>				<p>Vc K600</p>	<p>Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.</p>				
	Side Milling	Slotting					D1- Diameter (Inch)			
Group	ap	ae	ap	SFM	1/4"	3/8"	1/2"	5/8"	3/4"	1"
P2	1XD	0.5XD	1XD	400~500	.0013	.0020	.0030	.0035	.0040	.0045
M1	1XD	0.5XD	1XD	350~450	.0012	.0016	.0024	.0030	.0035	.0040
M2	1XD	0.5XD	1XD	250~325	.0008	.0016	.0024	.0030	.0035	.0040
S3	1XD	0.5XD	1XD	65~95	.0006	.0008	.0012	.0015	.0020	.0024

These guidelines may require variations to achieve optimum results.

Group	Material	Description	
P2	Medium and high carbon steels > 0.3% C	AISI:	1008, 1010, 1020, 1026, 1035, 1040, 1045, 1080, 1525, 1541, 1551, 1561, 1572
P3	Alloy steels and tool steels <330HB, <35HRC	AISI:	1300, 2000, 3000, 4000, 5000, 6000, 7000, and 8000 series steels.
		Tool Steels:	SAE classes M and T hot and cold work SAE classes: A, D, H, O, and S; Wrought high carbon/low alloy W1, W2, L2, P1, P6, and P20
P4	Alloy steels and tool steels 340-450HB, 36-48HRC	AISI:	1300, 2000, 3000, 4000, 5000, 6000, 7000, and 8000 series steels.
		Tool Steels:	SAE classes M and T hot and cold work SAE classes: A, D, H, O, and S; Wrought high carbon/low alloy W1, W2, L2, P1, P6, and P20
P5	Ferritic, martensitic and PH stainless steels <330HB, <35HRC	AISI:	410, 416, 416F, 416 Se, 420F, 15-5 PH, 17-4 PH, 13-8 PH
P6	Ferritic, martensitic and PH stainless steels >330HB, >35HRC	AISI:	410, 416, 416F, 416 Se, 420F, 15-5 PH, 17-4 PH, 13-8 PH
M1	Austenitic stainless steel	AISI:	200, 201, 202, 209, 219, 301, 302, 303, 304, 304L, 305
M2	Austenitic stainless steel	AISI:	310, 314, 316, 316L, 317, 321, 347, 384, ASTM: XM-1, XM-5 XM-7, XM-21, CF-8M
M3	Austenitic stainless steel: Duplex (ferritic and austenitic mixture)	AISI:	323, 329, F55, 2205, S329000
K1	Grey cast iron (GG)	ASTM A48:	Class 20, 25, 30, 35, 40, 45, 50, 55, 60, SAE J431: grade G1800, G3000, G3500
		SAE J431:	grade G1800, G3000, G3500
K2	Ductile, CGI, and malleable cast iron <80KSI	SAE J431:	60-40-18, 65-45-12
		SAE J434:	D4018, D4512, D5506
		ASTM A47:	grade 32510, 35018
		SAE J58:	grade M3210, M4504, M5503
		ASTM A842:	grade 250, 300, 350, 400, 450
N1	Aluminum alloys <12.2% Si	Low silicon aluminum, 6061-T6, 7075-T6	
N2	Aluminum alloys >12.2% Si	High silicon aluminum, 6061-T6, 7075-T6	
S1	Iron-based heat-resistant alloys	Wrought:	A-286, Incoloy 801, N-155, 16-25-6, 19-9 DL
		Cast:	ASTM A297, A351, A608, A567
S2	Cobalt-based heat-resistant alloys	Wrought:	AiResist 213, Haynes 25 (L605), Haynes 188, J-1570, Stellite
		Cast:	AiResist 13, Haynes 21, MAR-M302, MAR-M509, NASA Co-W-Re, WI-52
S3	Nickel-based heat-resistant alloys	Astroloy, Hastelloy C/C-276/X, Inconel 6061/617-625/700/706/718	
		IN102, Incoloy 901, Mar-M200, Nimonic, Rene 41, Udimet, Waspaloy, Monel	
S4	Alpha-Beta titanium alloys	Pure: Ti98.9, Ti99.9 Alloyed Ti-5Al-2.5Sn, Ti-6Al-4V, Ti-6Al-2SN-4Zr-2Mo, Ti-3Al-8V-6Cr-4Mo-4Zr, Ti-10V-2Fe-3Al, Ti-13V-11Cr-3Al	
H1	Hardened steels <48HRC	Tool steels: H10, H11, H13, D2, D3, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	
H2	Hardened steels 48~55HRC	Tool steels: H10, H11, H13, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	
H3	Hardened steels 56~60HRC	Tool steels: H10, H11, H13, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	
H4	Hardened steels >60HRC	Tool steels: H10, H11, H13, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	

See page 516 for complete material listing.

SOLID CARBIDE
 INSERTS
 FACE MILLS
 90° MILLS
 SLOTTING
 DIE AND MOLD
 CERAMIC MILLS
 CLASSIC MILLS
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MDRHEC

<p>Fine Pitch</p>				Reduce speed by 20% for slotting applications													
	Application										Vc KC633M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)					
	Side Milling	ap	ae														
Group	ap	ap	ae	SFM	1/4"	3/8"	1/2"	5/8"	3/4"	1"							
P3	1XD	1XD	0.5XD	400~500	.0013	.0020	.0030	.0035	.0040	.0045							
P5	1XD	1XD	0.4XD	350~450	.0013	.0020	.0030	.0035	.0040	.0045							
M1	1XD	1XD	0.4XD	350~450	.0012	.0016	.0024	.0030	.0035	.0040							
K1	1XD	1XD	0.5XD	500~600	.0012	.0019	.0021	.0035	.0035	.0040							
S4	1XD	1XD	0.3XD	75~100	.0006	.0008	.0012	.0015	.0023	.0030							

These guidelines may require variations to achieve optimum results.

HPRDM

<p>Flat Shallow Pitch</p>				Reduce speed by 20% for slotting applications													
	Application										Vc KC633M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)					
	Side Milling	ap	ae														
Group	ap	ae	ap	SFM	1/4"	3/8"	1/2"	5/8"	3/4"	1"							
P4	.8XD	0.4XD	0.5XD	400~500	.0008	.0012	.0016	.0020	.0024	.0028							
P6	.8XD	0.35XD	0.5XD	325~400	.0008	.0012	.0016	.0020	.0024	.0028							
H1	.8XD	0.4XD	0.5XD	265~400	.0008	.0012	.0016	.0020	.0024	.0028							
H2	.8XD	0.3XD	0.3XD	200~260	.0006	.0010	.0013	.0015	.0018	.0022							
H3	1XD	0.25XD	0.3XD	175~210	.0004	.0008	.0010	.0012	.0016	.0018							
H4	1XD	0.1XD	0.2XD	100~130	.0004	.0006	.0008	.0010	.0012	.0014							

These guidelines may require variations to achieve optimum results.

HPRST

<p>Flat Shallow Pitch</p>				Reduce speed by 20% for slotting applications													
	Application										Vc KC643M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)					
	Side Milling	ap	ae														
Group	ap	ap	ae	SFM	1/4"	3/8"	1/2"	5/8"	3/4"	1"							
P4	1XD	1XD	0.4XD	350~450	.0010	.0016	.0021	.0026	.0034	.0036							
P6	1XD	1XD	0.25XD	200~300	.0008	.0013	.0016	.0021	.0026	.0029							
S1	1XD	1XD	0.2XD	90~120	.0006	.0010	.0012	.0015	.0020	.0022							
S2	1XD	1XD	0.2XD	90~120	.0006	.0010	.0012	.0015	.0020	.0022							
S3	1XD	1XD	0.2XD	65~95	.0006	.0010	.0012	.0015	.0020	.0022							
S4	1XD	1XD	0.3XD	150~250	.0012	.0020	.0024	.0034	.0039	.0042							
H1	1XD	1XD	0.4XD	350~450	.0010	.0016	.0021	.0026	.0034	.0036							
H2	1XD	1XD	0.35XD	300~375	.0008	.0013	.0016	.0021	.0026	.0029							

These guidelines may require variations to achieve optimum results.

Ball Nose End Mills — Finishing

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GMILLING
LINGMILL
MILLINGMI

General-Application Ball Nose End Mills



BNEC 2-Flute Ball Nose – Conventional Lengths

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

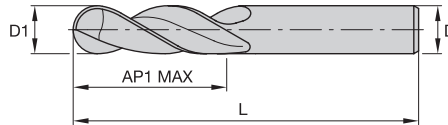
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Features

- Kennametal standard.
- Plain shank.
- Ball nose - center cutting.

Application

- Slotting and 3-dimensional milling.



■ 2-Flute, 30° Helix

- first choice
- alternate choice

H			
S			●
N	○	○	○
K	○	○	●
M	○	○	●
P	○	○	●

D1	D	Ap1 max	L	catalog number	K600	KC610M	KC635M
1/32	1/8	5/64	1 1/2	BNEC031S2	●	●	●
3/64	1/8	1/8	1 1/2	BNEC047S2	●	●	○
1/16	1/8	3/16	1 1/2	BNEC062S2	●	●	●
5/64	1/8	3/16	1 1/2	BNEC078S2	●	●	○
3/32	1/8	3/16	1 1/2	BNEC094S2018	●	●	●
3/32	1/8	3/8	1 1/2	BNEC094S2	●	●	●
7/64	1/8	3/8	1 1/2	BNEC109S2	●	●	○
1/8	1/8	1/4	1 1/2	BNEC125S2025	●	●	●
1/8	1/8	1/2	1 1/2	BNEC125S2	●	●	●
1/8	1/8	3/4	2 1/4	BNEC125S2075	●	●	●
1/8	1/8	3/4	3	BNEC125S2075L	●	●	●
9/64	3/16	9/16	2	BNEC141S2	●	●	○
5/32	3/16	5/16	2	BNEC156S2031	●	●	●
5/32	3/16	9/16	2	BNEC156S2	●	●	●
11/64	3/16	5/8	2	BNEC172S2	●	●	○
3/16	3/16	5/16	1 1/2	BNEC188S2031	●	●	●
3/16	3/16	5/8	2	BNEC188S2	●	●	●
3/16	3/16	3/4	2 1/2	BNEC188S2075	●	●	●
3/16	3/16	1	4	BNEC188S2100	●	●	●
13/64	1/4	5/8	2 1/2	BNEC203S2	●	○	○
7/32	1/4	5/8	2 1/2	BNEC219S2	●	●	○
15/64	1/4	3/4	2 1/2	BNEC234S2	●	○	○
1/4	1/4	1/2	2	BNEC250S2050	●	●	●
1/4	1/4	3/4	2 1/2	BNEC250S2	●	●	●
1/4	1/4	1 1/8	3	BNEC250S2113	●	●	●
1/4	1/4	1 1/2	4	BNEC250S2150	●	●	●
1/4	1/4	1 1/2	6	BNEC250S2150L	●	●	●
9/32	5/16	3/4	2 1/2	BNEC281S2	●	●	○

Continued on next page

H			
S			●
N	○		
K	○		●
M		●	●
P	○	●	●

● first choice
○ alternate choice

■ **2-Flute, 30° Helix** (Continued from previous page)

D1	D	Ap1 max	L	catalog number	K600	KC610M	KC635M
5/16	5/16	1/2	2	BNEC312S2050	●	●	●
5/16	5/16	13/16	2 1/2	BNEC312S2	●	●	●
5/16	5/16	1 1/8	3	BNEC312S2113		●	●
5/16	5/16	1 1/2	6	BNEC312S2150	●	●	●
11/32	3/8	1	2 1/2	BNEC344S2		●	
3/8	3/8	5/8	2	BNEC375S2063	●	●	●
3/8	3/8	7/8	2 1/2	BNEC375S2088	●	●	●
3/8	3/8	1 1/8	3	BNEC375S2113	●	●	●
3/8	3/8	1 3/4	4	BNEC375S2175	●	●	●
3/8	3/8	3	6	BNEC375S2300L	●	●	●
13/32	7/16	1	2 1/2	BNEC406S2100	●	●	
7/16	7/16	1	2 1/2	BNEC438S2100	●	●	●
15/32	1/2	1	3	BNEC469S2		●	
1/2	1/2	5/8	2 1/2	BNEC500S2063	●	●	●
1/2	1/2	1	3	BNEC500S2	●	●	●
1/2	1/2	1 1/2	6	BNEC500S2150	●	●	●
1/2	1/2	2	4	BNEC500S2200	●	●	●
1/2	1/2	3	6	BNEC500S2300	●	●	●
9/16	9/16	1 1/4	3 1/2	BNEC562S2	●	●	●
5/8	5/8	1 1/4	3 1/2	BNEC625S2	●	●	●
5/8	5/8	3	6	BNEC625S2300		●	●
3/4	3/4	1	3	BNEC750S2100	●	●	●
3/4	3/4	1 1/2	4	BNEC750S2	●	●	●
3/4	3/4	2	6	BNEC750S2200	●	●	●
7/8	7/8	1 1/2	4	BNEC875S2		●	●
1	1	1 1/2	4	BNEC100S2	●	●	●
1	1	3	6	BNEC100S2300	●	●	●

For application data, see page 69.

■ **End Mill Tolerances**

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"

Ordering Example:
BNEC375S2088 KC610M

BNEC 3-Flute Ball Nose – Conventional Lengths

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

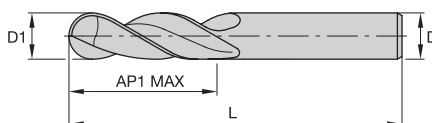
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Features

- Kennametal standard.
- Plain shank.
- Ball nose - center cutting.

Application

- Slotting, side cutting, and 3-dimensional milling.



■ 3-Flute, 30° Helix

- first choice
- alternate choice

H	Grey	
S	Orange	
N	Green	
K	Red	
M	Yellow	●
P	Blue	●

D1	D	Ap1 max	L	catalog number	KC610M
1/32	1/8	5/64	1 1/2	BNEC031S3	●
1/16	1/8	3/16	1 1/2	BNEC062S3	●
3/32	1/8	3/8	1 1/2	BNEC094S3	●
1/8	1/8	1/2	1 1/2	BNEC125S3	●
3/16	3/16	5/8	2	BNEC188S3	●
1/4	1/4	3/4	2 1/2	BNEC250S3	●
5/16	5/16	13/16	2 1/2	BNEC312S3	●
3/8	3/8	7/8	2 1/2	BNEC375S3088	●
1/2	1/2	1	3	BNEC500S3	●

For application data, see page 69.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"

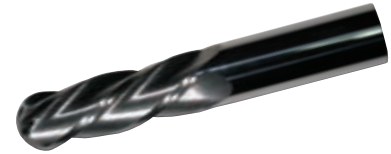
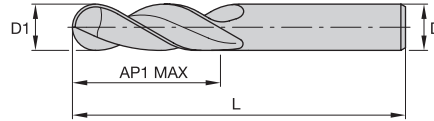
Ordering Example:
BNEC375S3088 KC610M

Features

- Kennametal standard.
- Plain shank.
- Ball nose - center cutting.

Application

- Side cutting and 3-dimensional milling.



■ 4-Flute, 30° Helix

- first choice
- alternate choice

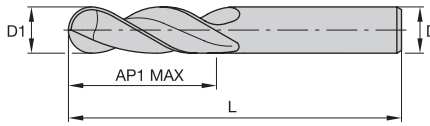
H	■	■	■	■
S	■	■	○	■
N	■	○	■	■
K	■	○	■	■
M	■	■	■	■
P	○	■	■	■

D1	D	Ap1 max	L	catalog number	K600	KC610M	KC635M
1/32	1/8	5/64	1 1/2	BNEC031S4	●	●	●
3/64	1/8	1/8	1 1/2	BNEC047S4	●	●	●
1/16	1/8	3/16	1 1/2	BNEC062S4	●	●	●
5/64	1/8	3/16	1 1/2	BNEC078S4	●	●	●
3/32	1/8	3/16	1 1/2	BNEC094S4018	●	●	●
3/32	1/8	3/8	1 1/2	BNEC094S4	●	●	●
7/64	1/8	3/8	1 1/2	BNEC109S4	●	●	●
1/8	1/8	1/4	1 1/2	BNEC125S4025	●	●	●
1/8	1/8	1/2	1 1/2	BNEC125S4	●	●	●
1/8	1/8	3/4	2 1/4	BNEC125S4075	●	●	●
1/8	1/8	3/4	3	BNEC125S4075L	●	●	●
9/64	3/16	9/16	2	BNEC141S4	●	●	●
5/32	3/16	5/16	2	BNEC156S4031	●	●	●
5/32	3/16	9/16	2	BNEC156S4	●	●	●
11/64	3/16	5/8	2	BNEC172S4	●	●	●
3/16	3/16	5/16	1 1/2	BNEC188S4031	●	●	●
3/16	3/16	5/8	2	BNEC188S4	●	●	●
3/16	3/16	3/4	2 1/2	BNEC188S4075	●	●	●
3/16	3/16	1	4	BNEC188S4100	●	●	●
13/64	1/4	5/8	2 1/2	BNEC203S4	●	●	●
7/32	1/4	5/8	2 1/2	BNEC219S4	●	●	●
15/64	1/4	3/4	2 1/2	BNEC234S4	●	●	●
1/4	1/4	1/2	2	BNEC250S4050	●	●	●
1/4	1/4	3/4	2 1/2	BNEC250S4	●	●	●
1/4	1/4	1 1/8	3	BNEC250S4113	●	●	●
1/4	1/4	1 1/2	4	BNEC250S4150	●	●	●
1/4	1/4	1 1/2	6	BNEC250S4150L	●	●	●
9/32	5/16	3/4	2 1/2	BNEC281S4	●	●	●
5/16	5/16	1/2	2	BNEC312S4050	●	●	●
5/16	5/16	13/16	2 1/2	BNEC312S4	●	●	●
5/16	5/16	1 1/8	3	BNEC312S4113	●	●	●
5/16	5/16	1 1/2	6	BNEC312S4150	●	●	●

Continued on next page

SOLID CARBIDE
INSERTS
FACE MILLS
90° MILLS
SLOTTING
DIE AND MOLD
CERAMIC MILLS
CLASSIC MILLS
THREAD MILLS
TECHNICAL DATA
INDEX

BNEC 4-Flute Ball Nose – Conventional Lengths (Continued)



● first choice
○ alternate choice

H			
S			●
N	○		
K			●
M		●	●
P	○	●	●

■ 4-Flute, 30° Helix (Continued from previous page)

	D1	D	Ap1 max	L	catalog number	K600	KC610M	KC635M
	11/32	3/8	1	2 1/2	BNEC344S4		●	
	3/8	3/8	5/8	2	BNEC375S4063	●	●	●
	3/8	3/8	7/8	2 1/2	BNEC375S4088	●	●	●
	3/8	3/8	1 1/8	3	BNEC375S4113	●	●	●
	3/8	3/8	1 3/4	4	BNEC375S4175	●	●	●
	3/8	3/8	3	6	BNEC375S4300L	●	●	●
	13/32	7/16	1	2 1/2	BNEC406S4100	●	●	
	7/16	7/16	1	2 1/2	BNEC438S4100	●	●	●
	15/32	1/2	1	3	BNEC469S4		●	
	1/2	1/2	5/8	2 1/2	BNEC500S4063	●	●	●
	1/2	1/2	1	3	BNEC500S4	●	●	●
	1/2	1/2	1 1/2	6	BNEC500S4150	●	●	●
	1/2	1/2	2	4	BNEC500S4200	●	●	●
	1/2	1/2	3	6	BNEC500S4300	●	●	●
	9/16	9/16	1 1/4	3 1/2	BNEC562S4	●	●	●
	5/8	5/8	1 1/4	3 1/2	BNEC625S4	●	●	●
	5/8	5/8	3	6	BNEC625S4300		●	●
	3/4	3/4	1	3	BNEC750S4100	●	●	●
	3/4	3/4	1 1/2	4	BNEC750S4	●	●	●
	3/4	3/4	2	6	BNEC750S4200	●	●	●
	7/8	7/8	1 1/2	4	BNEC875S4	●	●	●
	1	1	1 1/2	4	BNEC100S4	●	●	●
	1	1	3	6	BNEC100S4300	●	●	●

For application data, see page 69.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+ .000" to - .002"	+ .0000" to - .0005"
over 1/4"	+ .000" to - .003"	+ .0000" to - .0005"

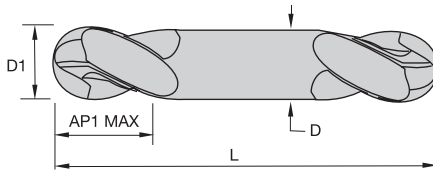
Ordering Example:
BNEC375S4088 KC610M

Features

- Kennametal standard.
- Plain shank.
- Ball nose - center cutting.

Application

- Side cutting and 3-dimensional milling.



H	●
S	●
N	●
K	●
M	●
P	●

- first choice
- alternate choice

■ 4-Flute, 30° Helix

D1	D1	D	Ap1 max	L	catalog number	KC610M
1/32	.031	1/8	1/16	1 1/2	DBNEC031S4	●
1/16	.063	1/8	1/8	1 1/2	DBNEC062S4	●
3/32	.094	1/8	3/16	1 1/2	DBNEC094S4	●
7/64	.109	1/8	3/16	1 1/2	DBNEC109S4	●
1/8	.125	1/8	1/4	1 1/2	DBNEC125S4025	●
5/32	.156	3/16	5/16	2	DBNEC156S4	●
3/16	.188	3/16	3/8	2	DBNEC188S4	●
1/4	.250	1/4	1/2	2 1/2	DBNEC250S4	●
5/16	.313	5/16	1/2	2 1/2	DBNEC312S4	●
3/8	.375	3/8	9/16	3	DBNEC375S4	●
1/2	.500	1/2	5/8	3	DBNEC500S4	●

For application data, see page 69.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
1/4" and under	+.000" to -.002"	+.0000" to -.0005"
over 1/4"	+.000" to -.003"	+.0000" to -.0005"

Order Example:
DBNEC375S4 KC610M

High-Performance Ball Nose End Mills



HPHVBN – HARVI 4-Flute Ball Nose with Unequal Flute Spacing

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

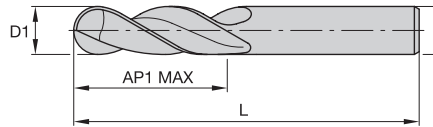
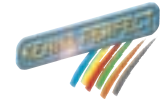
INDEX

Features

- Kennametal standard.
- Plain and Weldon shank.
- Ball nose - center cutting.

Application

- Side cutting and 3-dimensional milling.
- For use in aerospace, general engineering, and medical applications.



4-Flute, 38° Helix

- first choice
- alternate choice

H	■	○
S	■	●
N	■	○
K	■	●
M	■	○
P	■	●

D1	D1	D	AP1max	L	mounting style	catalog number	KC633M
1/8	.125	1/8	1/2	2	Plain	HPHVBN125S4050	●
3/16	.188	3/16	5/8	2 1/4	Plain	HPHVBN188S4063	●
1/4	.250	1/4	3/4	2 1/2	Plain	HPHVBN250S4075	●
5/16	.312	5/16	3/4	2 1/2	Plain	HPHVBN312S4075	●
3/8	.375	3/8	7/8	2 1/2	Plain	HPHVBN375S4088	●
7/16	.438	7/16	7/8	2 1/2	Plain	HPHVBN438S4088	●
1/2	.500	1/2	1	3	Weldon	HPHVBN500S4100	●
1/2	.500	1/2	1 1/4	3	Weldon	HPHVBN500S4125	●
5/8	.625	5/8	1 1/4	3 1/2	Weldon	HPHVBN625S4125	●
3/4	.750	3/4	1 1/2	4	Weldon	HPHVBN750S4150	●
1	1.000	1	1 1/2	4	Weldon	HPHVBN1000S4150	●

For application data, see page 70.

End Mill Tolerances

D1	D1 Tolerance	D Tolerance
All	+.000" to -.002"	h6

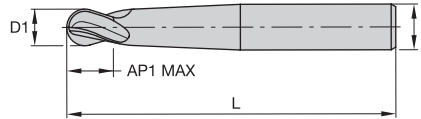
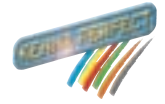
Order Example:
HPHVBN375S4088 KC633M

Features

- Kennametal standard.
- Plain shank.
- Ball nose - center cutting.

Application

- Side cutting and 3-dimensional milling.



■ 4-Flute, 15° Helix

- first choice
- alternate choice

H	●
S	○
N	●
K	●
M	●
P	●

D1	D1	D	Ap1 max	L	catalog number	KC633M
1/8	.125	1/4	1/8	3	HPBNDM125S4013	●
3/16	.188	1/4	3/16	3	HPBNDM188S4019	●
1/4	.250	3/8	1/4	4	HPBNDM250S4025	●
3/8	.375	1/2	3/8	5	HPBNDM375S4038	●
1/2	.500	5/8	1/2	5	HPBNDM500S4050	●
5/8	.625	5/8	5/8	5	HPBNDM625S4063	●
3/4	.750	3/4	3/4	6	HPBNDM750S4075	●

For application data, see page 70.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance
All	+ .000" to - .002"	h6

Order Example:
HPBNDM375S4038 KC633M

High-Performance Ball Nose End Mills



BNEC 2-Flute Ball Nose – with Diamond Coating

SOLID CARBIDE

INSERTS

FACE MILLS

90° MILLS

SLOTTING

DIE AND MOLD

CERAMIC MILLS

CLASSIC MILLS

THREAD MILLS

TECHNICAL DATA

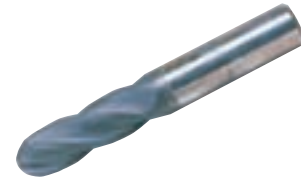
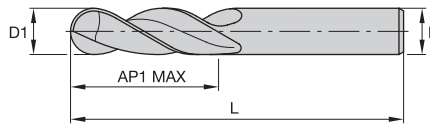
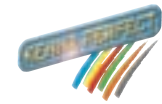
INDEX

Features

- Kennametal standard.
- Plain shank.
- Ball nose - center cutting.

Application

- Slotting.
- For use in die and mold, aerospace, and general engineering applications.



2-Flute, 30° Helix

- first choice
- alternate choice

H	Grey	
S	Orange	
N	Green	●
K	Red	
M	Yellow	
P	Blue	

D1	D	Ap1 max	L	catalog number	KDF300
1/16	1/8	1/4	1 1/2	BNEC062S2025	●
3/32	1/8	3/8	1 1/2	BNEC094S2038	●
1/8	1/8	1/2	1 1/2	BNEC125S2050	●
3/16	3/16	5/8	2	BNEC188S2063	●
1/4	1/4	3/4	2 1/2	BNEC250S2075	●
5/16	5/16	13/16	2 1/2	BNEC312S2081	●
3/8	3/8	1	2 1/2	BNEC375S2100	●
1/2	1/2	1	3	BNEC500S2100	●

For application data, see page 70.

End Mill Tolerances

D1	D1 Tolerance	D Tolerance	Runout
1/4" and under	+ .000" to - .002"	+ .000" to - .0004"	.001"
over 1/4"	+ .000" to - .002"	+ .000" to - .0004"	.001"

Machining highly abrasive non-ferrous materials has improved as a result of the evolution of the KDF300 diamond coating.

This coating is a pure diamond with no metallic binders. It is highly recommended for use in die and mold operations where graphite is a key component.

The associated gains in productivity far outweigh the differences in tool costs. The graph illustrates that any cost savings in labor and overhead affects 53% of the cost to machine a part. A lower tool cost will impact only 3% of the machining costs.



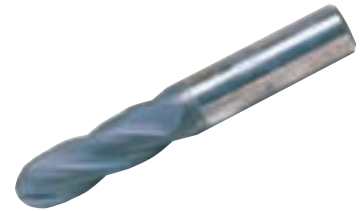
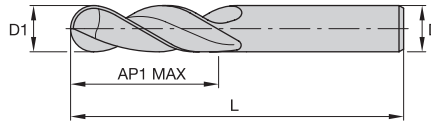
Ordering Example:
BNEC375S2100 KDF300

Features

- Kennametal standard.
- Plain shank.
- Ball nose - center cutting.

Application

- Side cutting and 3-dimensional milling.
- For use in die and mold, aerospace, and general engineering applications.



H	Grey
S	Orange
N	Green
K	Red
M	Yellow
P	Blue

- first choice
- alternate choice

■ 4-Flute, 30° Helix

D1	D	Ap1 max	L	catalog number	KDF300
1/32	1/8	3/32	1 1/2	BNEC031S4009	●
3/64	1/8	3/16	1 1/2	BNEC047S4019	●
1/16	1/8	1/4	1 1/2	BNEC062S4025	●
3/32	1/8	3/8	1 1/2	BNEC094S4038	●
1/8	1/8	1/2	1 1/2	BNEC125S4050	●
1/8	1/8	1	3	BNEC125S4100	●
3/16	3/16	5/8	2	BNEC188S4063	●
3/16	3/16	1	4	BNEC188S4100	●
3/16	3/16	1 1/8	3	BNEC188S4300	●
1/4	1/4	3/4	2 1/2	BNEC250S4075	●
1/4	1/4	1 1/2	4	BNEC250S4150	●
5/16	5/16	13/16	2 1/2	BNEC312S4081	●
5/16	5/16	1 1/2	4	BNEC312S4150	●
3/8	3/8	1	2 1/2	BNEC375S4100	●
3/8	3/8	1 1/2	4	BNEC375S4150	●
3/8	3/8	1 3/4	4	BNEC375S4400	●
1/2	1/2	1	3	BNEC500S4100	●
1/2	1/2	1 1/2	4	BNEC500S4150	●
1/2	1/2	3	6	BNEC500S4300	●
3/4	3/4	1 1/2	4	BNEC750S4150	●
1	1	1 1/2	4	BNEC1000S4150	●

For application data, see page 70.

■ End Mill Tolerances

D1	D1 Tolerance	D Tolerance	Runout
1/4" and under	+ .000" to - .002"	+ .000" to - .0004"	.001"
over 1/4"	+ .000" to - .002"	+ .000" to - .0004"	.001"

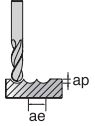

Ordering Example:
BNEC375S4100 KDF300

SOLID CARBIDE
 INSERTS
 FACE MILLS
 90° MILLS
 SLOTTING
 DIE AND MOLD
 CERAMIC MILLS
 CLASSIC MILLS
 THREAD MILLS
 TECHNICAL DATA
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Group	Material	Description	
P2	Medium and high carbon steels > 0.3% C	AISI:	1008, 1010, 1020, 1026, 1035, 1040, 1045, 1080, 1525, 1541, 1551, 1561, 1572
P3	Alloy steels and tool steels <330HB, <35HRC	AISI:	1300, 2000, 3000, 4000, 5000, 6000, 7000, and 8000 series steels.
		Tool Steels:	SAE classes M and T hot and cold work SAE classes: A, D, H, O, and S; Wrought high carbon/low alloy W1, W2, L2, P1, P6, and P20
P4	Alloy steels and tool steels 340-450HB, 36-48HRC	AISI:	1300, 2000, 3000, 4000, 5000, 6000, 7000, and 8000 series steels.
		Tool Steels:	SAE classes M and T hot and cold work SAE classes: A, D, H, O, and S; Wrought high carbon/low alloy W1, W2, L2, P1, P6, and P20
P5	Ferritic, martensitic and PH stainless steels <330HB, <35HRC	AISI:	410, 416, 416F, 416 Se, 420F, 15-5 PH, 17-4 PH, 13-8 PH
P6	Ferritic, martensitic and PH stainless steels >330HB, >35HRC	AISI:	410, 416, 416F, 416 Se, 420F, 15-5 PH, 17-4 PH, 13-8 PH
M1	Austenitic stainless steel	AISI:	200, 201, 202, 209, 219, 301, 302, 303, 304, 304L, 305
M2	Austenitic stainless steel	AISI:	310, 314, 316, 316L, 317, 321, 347, 384, ASTM: XM-1, XM-5 XM-7, XM-21, CF-8M
M3	Austenitic stainless steel: Duplex (ferritic and austenitic mixture)	AISI:	323, 329, F55, 2205, S329000
K1	Grey cast iron (GG)	ASTM A48:	Class 20, 25, 30, 35, 40, 45, 50, 55, 60, SAE J431: grade G1800, G3000, G3500
		SAE J431:	grade G1800, G3000, G3500
K2	Ductile, CGI, and malleable cast iron <80KSI	SAE J431:	60-40-18, 65-45-12
		SAE J434:	D4018, D4512, D5506
		ASTM A47:	grade 32510, 35018
		SAE J58:	grade M3210, M4504, M5503
		ASTM A842:	grade 250, 300, 350, 400, 450
N1	Aluminum alloys <12.2% Si	Low silicon aluminum, 6061-T6, 7075-T6	
N2	Aluminum alloys >12.2% Si	High silicon aluminum, 6061-T6, 7075-T6	
S1	Iron-based heat-resistant alloys	Wrought:	A-286, Discaloy, Incoloy 801, N-155, 16-25-6, 19-9 DL
		Cast:	ASTM A297, A351, A608, A567
S2	Cobalt-based heat-resistant alloys	Wrought:	AiResist 213, Haynes 25 (L605), Haynes 188, J-1570, Stellite
		Cast:	AiResist 13, Haynes 21, MAR-M302, MAR-M509, NASA Co-W-Re, WI-52
S3	Nickel-based heat-resistant alloys	Astroloy, Hastelloy C/C/C-276/X, Inconel 6061/617-625/700/706/718	
		IN102, Incoloy 901, Mar-M200, Nimonic, Rene 41, Udimet, Waspaloy, Monel	
S4	Alpha-Beta titanium alloys	Pure: Ti98.9, Ti99.9 Alloyed Ti-5Al-2.5Sn, Ti-6Al-4V, Ti-6Al-2SN-4Zr-2Mo, Ti-3Al-8V-6Cr-4Mo-4Zr, Ti-10V-2Fe-3Al, Ti-13V-11Cr-3Al	
H1	Hardened steels <48HRC	Tool steels: H10, H11, H13, D2, D3, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	
H2	Hardened steels 48-55HRC	Tool steels: H10, H11, H13, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	
H3	Hardened steels 56-60HRC	Tool steels: H10, H11, H13, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	
H4	Hardened steels >60HRC	Tool steels: H10, H11, H13, Alloy steels AISI: 1335, 4140, 4150, 4320, 4340, Die steels P20, P21	

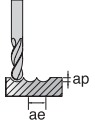

See page 516 for complete material listing.

BNEC

			Reduce speed by 20% for slotting applications												
	Application		Vc K600	Vc KC610M	Vc KC635M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.									
	3D Milling					D1- Diameter (Inch)									
Group	ap	ae	SFM	SFM	SFM	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
P2	0.2xD	0.5XD	200~300	300~400	350~450	.0004	.0006	.001	.0015	.0020	.0025	.0030	.0035	.0040	.0045
P3	0.2xD	0.5XD	175~300	175~300	250~350	.0003	.0005	.0007	.0010	.0015	.0020	.0024	.0028	.0030	.0035
P4	0.2xD	0.5XD	N/A	N/A	175~325	.0002	.0004	.0005	.0010	.0011	.0015	.0020	.0025	.0027	.0030
P5	0.2xD	0.5XD	N/A	200~350	250~450	.0002	.0004	.0006	.0010	.0015	.0020	.0024	.0026	.0030	.0035
M1	0.2xD	0.5XD	N/A	225~400	275~500	.0004	.0006	.0008	.0012	.0015	.0020	.0025	.0030	.0035	.0040
M2	0.2xD	0.5XD	N/A	N/A	200~450	.0002	.0003	.0004	.0007	.0010	.0015	.0017	.0025	.0030	.0035
M3	0.2xD	0.5XD	N/A	N/A	175~400	.0002	.0003	.0004	.0007	.0010	.0015	.0017	.0025	.0030	.0035
K1	0.2xD	0.5XD	300~550	N/A	425~725	.0005	.0007	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0070
K2	0.2xD	0.5XD	200~300	N/A	400~600	.0005	.0007	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0070
S1	0.2xD	0.5XD	N/A	N/A	65~125	.0002	.0004	.0006	.0009	.0012	.0015	.0018	.0020	.0024	.0027
S2	0.2xD	0.5XD	N/A	N/A	65~125	.0002	.0004	.0006	.0009	.0012	.0015	.0018	.0020	.0024	.0027
S3	0.2xD	0.5XD	N/A	N/A	65~125	.0002	.0004	.0006	.0009	.0012	.0015	.0018	.0020	.0024	.0027
S4	0.2xD	0.5XD	N/A	N/A	100~200	.0002	.0004	.0007	.0010	.0012	.0015	.0018	.0020	.0025	.0030

These guidelines may require variations to achieve optimum results.

DBNEC

			Reduce speed by 20% for slotting applications												
	Application		Vc KC610M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%.											
	3D Milling			D1- Diameter (Inch)											
Group	ap	ae	SFM	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"		
P2	0.2xD	0.5XD	300~400	.0004	.0006	.001	.0015	.0020	.0025	.0030	.0035	.0040	.0045		
P3	0.2xD	0.5XD	175~300	.0003	.0005	.0007	.0010	.0015	.0020	.0024	.0028	.0030	.0035		
P5	0.2xD	0.5XD	200~350	.0002	.0004	.0006	.0010	.0015	.0020	.0024	.0026	.0030	.0035		
M1	0.2xD	0.5XD	225~400	.0004	.0006	.0008	.0012	.0015	.0020	.0025	.0030	.0035	.0040		

These guidelines may require variations to achieve optimum results.

SOLID CARBIDE
INSERTS
FACE MILLS
90° MILLS
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HPHVBN

			Reduce speed by 20% for slotting applications									
	Application 3D Milling			Vc KC633M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)							
Group	ap	ae	SFM		1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
P2	0.5xD	0.5XD	450~550	0.0010	0.0011	0.0014	0.0021	0.0023	0.0025	0.0027	0.0032	0.0034
P3	0.5XD	0.5XD	450~550	0.0010	0.0011	0.0014	0.0021	0.0023	0.0025	0.0027	0.0032	0.0034
M1	0.5XD	0.5XD	200~300	0.0010	0.0011	0.0014	0.0018	0.0021	0.0023	0.0025	0.0027	0.0029
M2	0.5XD	0.5XD	175~250	0.0008	0.0009	0.0012	0.0016	0.0018	0.0019	0.0021	0.0023	0.0025
M3	0.5XD	0.5XD	150~225	0.0008	0.0009	0.0012	0.0016	0.0018	0.0019	0.0021	0.0023	0.0025
K1	0.5XD	0.5XD	425~600	0.0010	0.0011	0.0014	0.0021	0.0023	0.0025	0.0027	0.0032	0.0034
K2	0.5XD	0.5XD	400~500	0.0010	0.0011	0.0014	0.0021	0.0023	0.0025	0.0027	0.0032	0.0034
S1	0.5XD	0.5XD	100~150	0.0008	0.0009	0.0012	0.0016	0.0018	0.0019	0.0021	0.0023	0.0025
S2	0.5XD	0.5XD	100~150	0.0005	0.0006	0.0007	0.0011	0.0015	0.0025	0.0027	0.0032	0.0034
S3	0.5XD	0.5XD	100~150	0.0005	0.0006	0.0007	0.0011	0.0015	0.0025	0.0027	0.0032	0.0034
S4	0.5XD	0.5XD	125~175	0.0005	0.0006	0.0007	0.0011	0.0015	0.0025	0.0027	0.0032	0.0034

These guidelines may require variations to achieve optimum results.

HPBNDM

			Reduce speed by 20% for slotting applications						
	Application 3D Milling			Vc KC633M	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)				
Group	ap	ae	SFM		1/64"	1/32"	1/16"	1/8"	3/16"
P4	0.01XD	0.01XD	825~850	.0024	.0031	.0040	.0055	.0063	.0071
P6	0.01XD	0.01XD	825~850	.0024	.0031	.0040	.0055	.0063	.0071
H1	0.01XD	0.01XD	825~850	.0024	.0031	.0040	.0055	.0063	.0071
H2	0.01XD	0.01XD	650~675	.0018	.0020	.0024	.0028	.0031	.0035
H3	0.01XD	0.01XD	450~500	.0012	.0016	.0020	.0024	.0028	.0031
H4	0.01XD	0.01XD	320~350	.0012	.0016	.0020	.0024	.0028	.0031

These guidelines may require variations to achieve optimum results.

BNEC-DIAMOND COATED

			Reduce speed by 20% for slotting applications									
	Application 3D Milling			Vc KDF300	Recommended fz- Feed Per Tooth (Inch/th) for side cutting operations. For slotting operations, reduce fz by 20%. D1- Diameter (Inch)							
Group	ap	ae	SFM		1/64"	1/32"	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"
N1 - Aluminum alloys	.5XD	0.25XD	100~500			.0006	.0007	.0008	.0010	.0011	.0012	.0016
N1 - Graphite	.5XD	0.25XD	100~1200	.0002	.0004	.0007	.0009	.0012	.0013	.0015	.0017	.0019
N1 - Thermoset plastics	.5XD	0.25XD	50~750	.0003	.0005	.0007	.0011	.0012	.0013	.0015	.0017	.0019
N1 - Fiber-filled plastics	.5XD	0.25XD	75~400			.0007	.0011	.0012	.0013	.0015	.0017	.0021

These guidelines may require variations to achieve optimum results.

If the radial width of cut (a_e) is less than $.5 \times D1$, the actual chipload at the cutting edge is less than the programmed chipload.

To obtain the correct chipload at the cutting edge, follow the simple 4-step process.

Step 1: Determine the following values from your application:

$D1$ = end mill cutting diameter

a_e = radial width of cut

f_z = desired chipload per tooth at the cutting edge

Step 2: Determine the radial width engagement ratio:

radial width engagement ratio = $a_e/D1$

Step 3: Determine the chipload factor from the table below using the radial width engagement ratio from Step 2:

Step 4: Calculate what the programmed chipload should be to get the desired chipload at the cutting edge:

$f_z \text{ programmed} = f_z \times \text{chipload factor}$

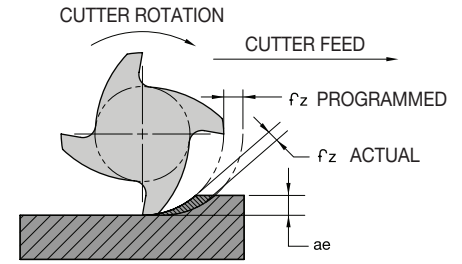
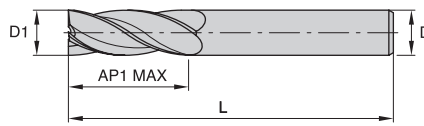
Example: What is the programmed chipload to achieve a desired chipload of .002"/tooth using a 1/2"-diameter end mill with a radial width of cut of .05"?

Step 1: $D1 = .500"$ $a_e = .05"$ $f_z = .002"$

Step 2: Radial width engagement ratio = $a_e/D1 = .05"/.500" = .1$

Step 3: Chipload factor for a .1 radial width engagement ratio = **1.73**

Step 4: The programmed chipload = $f_z \times \text{chipload factor} = .002" \times 1.73 = .0034"$



Radial Width Engagement Ratio = $a_e/D1$	Chip Load Factor
0.3	1.1
0.25	1.15
0.2	1.25
0.15	1.41
0.1	1.73
0.07	2.0
0.05	2.33
0.03	2.93
0.02	3.6
0.01	5.0

Ball Nose

Effective Cutting Diameter Calculation

When the axial depth of cut is less than half of the cutting diameter ($a_p < .5D1$), the end mill diameter used to determine speed and feed rate is smaller than the cutting diameter ($D1$). This smaller end mill diameter is known as the effective cutting diameter (D_{eff}). This effective cutting diameter can be calculated using a simple 4-step process.

Step 1: Determine the following values from your application:

$D1$ = end mill cutting diameter

a_p = axial depth of cut

Step 2: Determine the depth of cut ratio:

depth of cut ratio = $a_p/D1$

Step 3: Determine the diameter factor from the table below using the depth of cut ratio from Step 2:

Step 4: Calculate the effective cutting diameter (D_{eff}):

$D_{eff} = D1$ multiplied by the diameter factor

Example: What is the effective cutting diameter

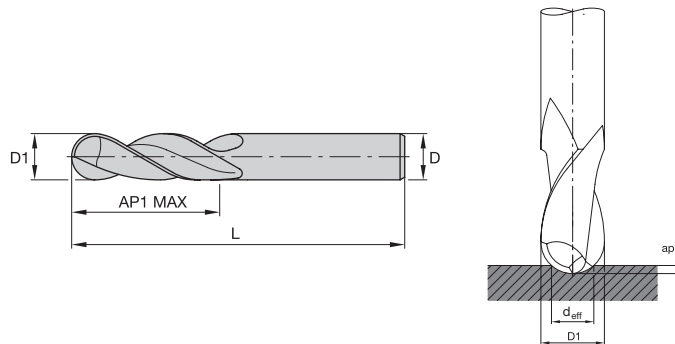
for a 1/2"-diameter ball nose end mill running at a .05" axial depth of cut?

Step 1: $D = 1/2"$ $a_p = .05"$

Step 2: Depth-of-cut ratio = $.05/.5 = .1$

Step 3: Diameter factor = **.6**

Step 4: Effective cutting diameter = $.5 \times .6 = .3"$



Depth of cut ratio = $a_p/D1$	Diameter factor
0.40	0.98
0.30	0.917
0.25	0.87
0.20	0.8
0.15	0.71
0.10	0.6
0.08	0.54
0.05	0.44
0.04	0.39
0.03	0.34
0.02	0.28
0.01	0.19