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KENNAMETAL®

MASTER CATALOG 2018

VOLUME TWO | **ROTATING** TOOLS

HOLEMAKING | TAPPING | SOLID END MILLING | INDEXABLE MILLING

DUO-λOCK®

High-Performance Modular Finishing Solid Carbide End Mills

Primary Application

Duo-Lock™ high-performance finishing tools are designed for machining titanium, steels, and stainless steels with excellent surface finishes at maximum Metal Removal Rates (MRR) in two basic geometries. The FMDF geometry is perfectly suited for finishing steels and stainless steels. The Duo-Lock™ RSM II geometry is designed for high-speed peel milling with secure chip formation and evacuation in deep cavities with the maximum amount of edges at a given diameter.

- Specifically designed geometries for finishing in a wide range of materials.
- Higher number of flutes and higher helix angles for super finishing applications.
- High metal removal rates for fewer passes, longer tool life, and superior surface finishes.

Features and Benefits

Advanced Technology

- RSM II FSDE geometry:
  - — Maximum number of flutes increases feed rates and reduces vibration.
  - — Proprietary W-shaped flute form improves chip formation and reduces cutting forces.
  - — Unequal flute spacing increases tool life and surface quality.
- FMDF geometry:
  - — Excellent geometry for steels and stainless steel.
  - — Protection radii helps extend tool life.

Tailored Grades

- KCPM15™ Beyond™ grade for outstanding wear protection in stainless steel to mitigate cratering, depth-of-cut notching, and flank wear.
- KC643M™ grade provides highest fine finishing and longest tool life.

Customization

- Intermediate diameters are available from 3/8–1".

Extensive Standard Offering

- Diameter ranges 3/8–1 1/4".
- Necked and corner radii tips available.
- Integral adapters reduce the amount of interface for maximum accuracy. Steel extensions with Safe-Lock™ by HAIMER shanks prevent pullout.
- Cut-to-size extra-long extensions available upon request off the shelf.

For highest surface quality.

45° Helix Angle with FMDF
Specifically engineered for fine finishing steels and stainless steels.

KCPM15™ Grade
Longest tool life.
Enables higher cutting speeds.

36° Helix Angle with FSDE
Specifically engineered for fine finishing titanium and other ISO S-M materials.

Intelligent Thread
Ensures stress levels remain below critical values.

DUO-LOCK®
by HAIMER® and Kennametal

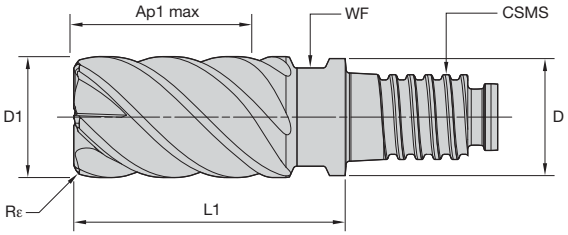
3rd Contact Surface
Delivers high stiffness and highest accuracy below .0002" runout.

W-Shaped Flute Design with FSDE
Wider flute space for optimized chip evacuation.

KC643M™ Grade
Unmatched fine finishing and tool life.

Double Cone
Eliminates expensive presetting processes by providing axial .0004" repeatability.

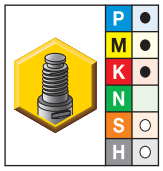
- Center cutting.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance e8
13/32–23/32"	-0,00126"/-0,00232"
23/32–1-3/16"	-0,00157"/-0,00287"

FMDF • Inch

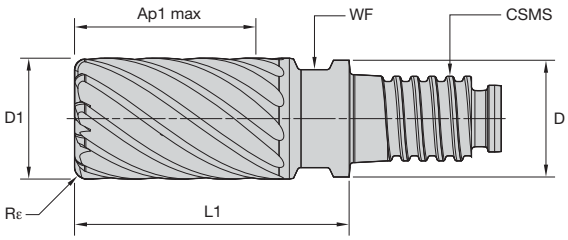


● first choice
○ alternate choice

KCPM15	D1	D	Ap1 max	L1	CSMS system size	WF	Rε
FMDF0375Y6CQA	3/8	.359	9/16	.843	DL10	.315	.015
FMDF0500Y6CQB	1/2	.480	3/4	1.126	DL12	.374	.030
FMDF0625Y6CQB	5/8	.605	15/16	1.406	DL16	.512	.030
FMDF0750Y6CQB	3/4	.730	1 1/8	1.689	DL20	.630	.030
FMDF1000Y6CQB	1	.961	1 1/2	2.252	DL25	.827	.030

NOTE: For application data, please see page O44.

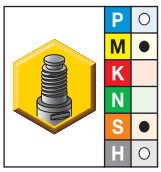
- Non-center cutting.
- Optimized geometry for titanium machining.
- Unequal flute spacing minimizes chatter for smoother machining.
- Standard items listed. Additional styles and coatings made-to-order.



End Mill Tolerances

D1	tolerance e8
13/32–23/32"	-0,00126"/-0,00232"
23/32–1-3/16"	-0,00157"/-0,00287"

FSDE • Inch



● first choice
○ alternate choice

KC643M	D1	D	Ap1 max	L1	CSMS system size	WF	Rε	Z U
FSDE0375Y9CQA	3/8	.359	9/16	.843	DL10	.315	.015	9
FSDE0375Y9CQB	3/8	.359	9/16	.843	DL10	.315	.030	9
FSDE0375Y9CQC	3/8	.359	9/16	.843	DL10	.315	.060	9
FSDE0375Y9CQD	3/8	.359	9/16	.843	DL10	.315	.090	9
FSDE0500Y9CQA	1/2	.480	3/4	1.126	DL12	.374	.015	9
FSDE0500Y9CQB	1/2	.480	3/4	1.126	DL12	.374	.030	9
FSDE0500Y9CQC	1/2	.480	3/4	1.126	DL12	.374	.060	9
FSDE0500Y9CQD	1/2	.480	3/4	1.126	DL12	.374	.090	9
FSDE0500Y9CQE	1/2	.480	3/4	1.126	DL12	.374	.120	9
FSDE0625Y11CQA	5/8	.605	15/16	1.406	DL16	.512	.015	11
FSDE0625Y11CQB	5/8	.605	15/16	1.406	DL16	.512	.030	11
FSDE0625Y11CQC	5/8	.605	15/16	1.406	DL16	.512	.060	11
FSDE0625Y11CQD	5/8	.605	15/16	1.406	DL16	.512	.090	11
FSDE0625Y11CQE	5/8	.605	15/16	1.406	DL16	.512	.120	11
FSDE0750Y15CQB	3/4	.730	1 1/8	1.689	DL20	.630	.030	15
FSDE0750Y15CQC	3/4	.730	1 1/8	1.689	DL20	.630	.060	15
FSDE0750Y15CQD	3/4	.730	1 1/8	1.689	DL20	.630	.090	15
FSDE0750Y15CQE	3/4	.730	1 1/8	1.689	DL20	.630	.120	15
FSDE1000Y19CQB	1	.961	1 1/2	2.252	DL25	.827	.030	19
FSDE1000Y19CQC	1	.961	1 1/2	2.252	DL25	.827	.060	19
FSDE1000Y19CQD	1	.961	1 1/2	2.252	DL25	.827	.090	19
FSDE1000Y19CQE	1	.961	1 1/2	2.252	DL25	.827	.120	19
FSDE1000Y19CQF	1	.961	1 1/2	2.252	DL25	.827	.250	19

NOTE: For application data, please see page O45.

FMDF • Inch

Material Group		Side Milling (A)		short			medium			long			Recommended feed per tooth (IPT = inch/th) for side milling (A).					
		A		adapter reach									D1 — Diameter					
				KCPM15			KCPM15			KCPM15								
				Cutting Speed — vc SFM			Cutting Speed — vc SFM			Cutting Speed — vc SFM			frac.	3/8	1/2	5/8	3/4	1
		ap	ae	min		max	min		max	min		max	dec.	.375	.500	.625	.750	1.000
P	0	1.5 x D	0.1 x D	490	–	660	441	–	594	441	–	594	IPT	.0027	.0034	.0039	.0044	.0049
	1	1.5 x D	0.1 x D	490	–	660	441	–	594	441	–	594	IPT	.0027	.0034	.0039	.0044	.0049
	2	1.5 x D	0.1 x D	460	–	620	414	–	558	414	–	558	IPT	.0027	.0034	.0039	.0044	.0049
	3	1.5 x D	0.1 x D	390	–	520	351	–	468	351	–	468	IPT	.0023	.0029	.0034	.0039	.0045
	4	1.5 x D	0.1 x D	300	–	490	270	–	441	270	–	441	IPT	.0020	.0026	.0030	.0034	.0039
	5	1.5 x D	0.1 x D	200	–	330	170	–	280.5	160	–	264	IPT	.0018	.0023	.0027	.0031	.0036
	6	1.5 x D	0.1 x D	160	–	250	136	–	212.5	128	–	200	IPT	.0015	.0019	.0022	.0025	.0028
M	1	1.5 x D	0.1 x D	300	–	380	240	–	304	210	–	266	IPT	.0023	.0029	.0034	.0039	.0045
	2	1.5 x D	0.1 x D	200	–	260	160	–	208	140	–	182	IPT	.0018	.0023	.0027	.0031	.0036
	3	1.5 x D	0.1 x D	200	–	230	160	–	184	140	–	161	IPT	.0015	.0019	.0022	.0025	.0028
K	1	1.5 x D	0.1 x D	390	–	490	351	–	441	351	–	441	IPT	.0027	.0034	.0039	.0044	.0049
	2	1.5 x D	0.1 x D	360	–	460	324	–	414	324	–	414	IPT	.0023	.0029	.0034	.0039	.0045
	3	1.5 x D	0.1 x D	360	–	430	324	–	387	324	–	387	IPT	.0018	.0023	.0027	.0031	.0036
S	1	1.5 x D	0.1 x D	160	–	300	128	–	240	96	–	180	IPT	.0023	.0029	.0034	.0039	.0045
	2	1.5 x D	0.1 x D	80	–	130	64	–	104	48	–	78	IPT	.0012	.0015	.0018	.0021	.0024
	3	1.5 x D	0.1 x D	80	–	130	64	–	104	48	–	78	IPT	.0012	.0015	.0018	.0021	.0024
	4	1.5 x D	0.15 x D	160	–	200	128	–	160	96	–	120	IPT	.0017	.0021	.0025	.0028	.0033
H	1	1.5 x D	0.1 x D	260	–	460	208	–	368	156	–	276	IPT	.0020	.0026	.0030	.0034	.0039
	2	1.5 x D	0.1 x D	230	–	390	184	–	312	138	–	234	IPT	.0015	.0019	.0022	.0025	.0028

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. Please adjust parameters according to system stability.
For side milling with Ap bigger than 1 x D, reduce fz by 20%!
Cylindrical shanks not recommended for full slotting.

FSDE • Inch

Material Group		Side Milling (A)		short			medium			long			Recommended feed per tooth (IPT = inch/th) for side milling (A).					
		A		adapter reach									D1 — Diameter					
				KC643M			KC643M			KC643M								
				Cutting Speed — vc SFM			Cutting Speed — vc SFM			Cutting Speed — vc SFM			frac.	3/8	1/2	5/8	3/4	1
		ap	ae	min		max	min		max	min		max	dec.	.375	.500	.625	.750	1.000
P	4	Ap max	0.008–0.012"	445	–	1628	401	–	1465	401	–	1465	IPT	.0045	.0053	.0058	.0061	.0066
	5	Ap max	0.008–0.012"	295	–	1078	251	–	916	236	–	862	IPT	.0040	.0048	.0052	.0056	.0061
M	1	Ap max	0.008–0.012"	445	–	1243	356	–	994	312	–	870	IPT	.0050	.0060	.0066	.0070	.0077
	2	Ap max	0.008–0.012"	295	–	869	236	–	695	207	–	608	IPT	.0040	.0048	.0052	.0056	.0061
	3	Ap max	0.008–0.012"	295	–	759	236	–	607	207	–	531	IPT	.0033	.0040	.0043	.0045	.0048
S	1	Ap max	0.008–0.012"	245	–	979	196	–	783	147	–	587	IPT	.0050	.0060	.0066	.0070	.0077
	2	Ap max	0.008–0.012"	125	–	429	100	–	343	75	–	257	IPT	.0026	.0032	.0035	.0037	.0041
	3	Ap max	0.008–0.012"	125	–	429	100	–	343	75	–	257	IPT	.0026	.0032	.0035	.0037	.0041
	4	Ap max	0.008–0.012"	245	–	649	196	–	519	147	–	389	IPT	.0037	.0044	.0048	.0051	.0056
H	1	Ap max	0.008–0.012"	395	–	1518	316	–	1214	237	–	911	IPT	.0045	.0053	.0058	.0061	.0066
	2	Ap max	0.008–0.012"	345	–	1298	276	–	1038	207	–	779	IPT	.0033	.0040	.0043	.0045	.0048

NOTE: For better surface, finish reduce feed per tooth.
For side milling with Ap bigger than 1 x D, reduce fz by 20%!
Cylindrical shanks not recommended for full slotting.