

## High speed steel milling cutters

### End mills (multiple fluted)



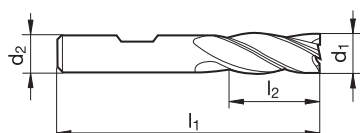
Catalog no. 74617



P	M	K	N	S	H
●	●	○	○		

Application  
recomm. p. 582

- centre cutting
- for materials with tensile strengths of up to approx. 1200 N/mm<sup>2</sup>



d1 k10 mm	d2 mm	l1 mm	l2 mm	Z	Code no.
2.000	6.000	51.000	7.000	4	2.000
3.000	6.000	52.000	8.000	4	3.000
4.000	6.000	55.000	11.000	4	4.000
5.000	6.000	57.000	13.000	4	5.000
6.000	6.000	57.000	13.000	4	6.000
8.000	10.000	69.000	19.000	4	8.000
9.000	10.000	69.000	19.000	4	9.000
10.000	10.000	72.000	22.000	4	10.000
12.000	12.000	83.000	26.000	4	12.000
14.000	12.000	83.000	26.000	4	14.000
15.000	12.000	83.000	26.000	4	15.000
16.000	16.000	92.000	32.000	4	16.000
18.000	16.000	92.000	32.000	4	18.000
20.000	20.000	104.000	38.000	4	20.000
25.000	25.000	121.000	45.000	5	25.000

# Application recommendations for HSS End Mills

		Feed column																Feed f (mm/tooth)
Code-letter	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W		
tool-Ø mm	<b>2.00</b>	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.018	0.020	
	<b>3.00</b>	0.002	0.002	0.003	0.003	0.004	0.007	0.010	0.010	0.010	0.015	0.016	0.013	0.019	0.022	0.024	0.030	
	<b>5.00</b>	0.005	0.006	0.007	0.009	0.010	0.014	0.020	0.020	0.022	0.025	0.026	0.026	0.028	0.030	0.032	0.038	
	<b>6.00</b>	0.006	0.008	0.009	0.011	0.013	0.017	0.024	0.025	0.027	0.031	0.029	0.033	0.039	0.036	0.041	0.047	
	<b>8.00</b>	0.010	0.012	0.014	0.016	0.019	0.024	0.032	0.032	0.035	0.042	0.042	0.047	0.053	0.052	0.058	0.064	
	<b>10.00</b>	0.013	0.015	0.018	0.021	0.025	0.030	0.038	0.039	0.044	0.050	0.053	0.059	0.065	0.066	0.073	0.080	
	<b>12.00</b>	0.010	0.018	0.022	0.026	0.030	0.036	0.046	0.048	0.052	0.059	0.063	0.072	0.079	0.085	0.090	0.100	
	<b>16.00</b>	0.020	0.023	0.027	0.032	0.038	0.045	0.054	0.058	0.063	0.071	0.079	0.088	0.095	0.100	0.110	0.120	
	<b>20.00</b>	0.023	0.028	0.033	0.038	0.045	0.057	0.066	0.073	0.080	0.090	0.097	0.100	0.110	0.120	0.130	0.140	
	<b>25.00</b>	0.030	0.035	0.040	0.045	0.055	0.065	0.075	0.100	0.120	0.130	0.140	0.150	0.165	0.170	0.180	0.190	

a<sub>e</sub> = Width of cut  
a<sub>p</sub> = Cutting depth



a<sub>e</sub> = 0.5 x D



a<sub>e</sub> = 1.0 x D

Feed rate codes in bold are the preferred choice for the respective material group.

### Oblique plunging and slot milling

For oblique plunging the feed rate (v<sub>f</sub> = mm/min) should be reduced as illustrated.

In addition, chip evacuation is required for drilling depths in excess of 1 x D. This also applies to the transition to radial machining.

slot milling

a<sub>p</sub> = cut. depth 0.5 x D = f<sub>z</sub> 100%

a<sub>p</sub> = cut. depth 1.0 x D = f<sub>z</sub> 75%

### Drilling

For drilling the feed rate (v<sub>f</sub> = mm/min) should be reduced as illustrated.

In addition, chip evacuation is required for larger drilling depths in excess of 0.5 x D.



### Lubricants:

- cutting oil, highly activated ■
- soluble oil (emulsion) ■
- air only

Material group	Materials examples, <b>new designations</b> (old designation in brackets) Figures in bold = material no. to DIN EN	Tensile strength MPa (N/mm <sup>2</sup> )	Hardness	Coolant
General purpose steels	<b>1.0035</b> S185(St33), <b>1.0486</b> P275N(StE285), <b>1.0345</b> P235GH(H1), <b>1.0425</b> P265GH(H2) <b>1.0050</b> E295 (St50-2), <b>1.0070</b> E360 (St70-2), <b>1.8937</b> P500NH (WStE500)	≤500 >500-850		■
Free-cutting steels	<b>1.0718</b> 11SMnPB30 (9SMnPB28), <b>1.0736</b> 11SMn37 (9SMn36) <b>1.0727</b> 46S20 (45S20), <b>1.0728</b> (60S20), <b>1.0757</b> 46SPb20 (45SPb20)	≤850 850-1000		■
Unalloyed tempering steels	<b>1.0402</b> C22, <b>1.1178</b> C30E (Ck30) <b>1.0503</b> C45, <b>1.1191</b> C45E (Ck45) <b>1.0601</b> C60, <b>1.1221</b> C60E (Ck60)	≤ 700 700-850 850-1000		■
Alloyed tempering steels	<b>1.5131</b> 50MnSi4, <b>1.7003</b> 38Cr2, <b>1.7030</b> 28Cr4 <b>1.5710</b> 36NiCr6, <b>1.7035</b> 41Cr4, <b>1.7225</b> 42CrMo4	850-≤1000 1000-1200		■
Unalloyed case hardened steels	<b>1.0301</b> (C10), <b>1.1121</b> C10E (Ck10)	≤750		■
Alloyed case hardened steels	<b>1.7043</b> 38Cr4 <b>1.5752</b> 15NiCr13 (15NiCr13), <b>1.7131</b> 16MnCr5, <b>1.7264</b> 20CrMo5	850-≤1000 1000-1200		■ ■
Nitriding steels	<b>1.8504</b> 34CrAl6 <b>1.8519</b> 31CrMoV9, <b>1.8550</b> 34CrAlNi7	≥850-≤1000 >1000-1200		■ ■
Tool steels	<b>1.1750</b> C75W, <b>1.2067</b> 102Cr6, <b>1.2307</b> 29CrMoV9 <b>1.2080</b> X210Cr12, <b>1.2083</b> X42Cr13, <b>1.2419</b> 105WCr6, <b>1.2767</b> X45NiCrMo4	≤850 >850-1000		■ ■
High speed steels	<b>1.3243</b> S 6-5-2-5, <b>1.3343</b> S 6-5-2, <b>1.3344</b> S 6-5-3	≥650-1000		■
Spring steels	<b>1.5026</b> 55Si7, <b>1.7176</b> 55Cr3, <b>1.8159</b> 51CrV4 (51CrV4)		≤330 HB	■ ■
Hardened steels	-		≤40-48 HRC >48-60 HRC	■ ■
Stainless steels, sulphured austenitic martensitic	<b>1.4005</b> X12CrS13, <b>1.4104</b> X14CrMoS17, <b>1.4105</b> X6CrMoS17, <b>1.4305</b> X8CrNiS18-9 <b>1.4301</b> X5CrNi18-10 (V2A), <b>1.4541</b> X6CrNiTi18-10, <b>1.4571</b> X6CrNiMoTi 17-12-2 (V4A) <b>1.4057</b> X20CrNi17.2 (X17CrNi16-2), <b>1.4122</b> X39CrMo17-1, <b>1.4521</b> X2CrMoTi18-2	≤850 ≤850 ≤850		■ ■ ■
Cast iron	<b>0.6010</b> EN-GJL-100(GG10), <b>0.6020</b> EN-GJL-200(GG20) <b>0.6025</b> EN-GJL-250(GG25), <b>0.6035</b> EN-GJL-350(GG35)	850-≤1000 1000-1200		■ □
Spheroidal graphite iron and malleable cast iron	<b>0.7050</b> EN-GJS-500-7(GGG50), <b>0.8035</b> EN-GJMW-350-4(GTW35) <b>0.7070</b> EN-GJS-700-2(GGG70), <b>0.8170</b> EN-GJMB-700-2(GTS70)		≤240 HB <300 HB	■ ■
Chilled cast iron	-		≤350 HB	■
New Cast iron GGV	<b>EN-GJV250</b> (GGV25), <b>EN-GJV350</b> (GGV35) <b>EN-GJV400</b> (GGV40), <b>EN-GJV500</b> (GGV50), SiMo6			■ □
New Cast iron ADI	<b>EN-GJS-800-8</b> (ADI800), <b>EN-GJS-1000-5</b> (ADI1000) <b>EN-GJS-1200-2</b> (ADI1200), <b>EN-GJS-1400-1</b> (ADI1400)	800-1000 1200-1400		■ □
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		■
Ti and Ti-alloys	<b>3.7024</b> Ti99.5, <b>3.7114</b> TiAl5Sn2.5, <b>3.7124</b> TiCu2 <b>3.7154</b> TiAl6Zr5, <b>3.7165</b> TiAl6V4, <b>3.7184</b> TiAl4Mo4Sn2.5, - TiAl8Mo1V1	≤850 >850-1200		■ ■
Aluminium and Al-alloys	<b>3.0255</b> Al99.5, <b>3.2315</b> AlMgSi1, <b>3.3515</b> AlMg1	≤400		■
Al wrought alloys	<b>3.0615</b> AlMgSiPb, <b>3.1325</b> AlCuMg1, <b>3.3245</b> AlMg3Si, <b>3.4365</b> AlZnMgCu1.5	≤450		■
Al cast alloys ≤ 10 % Si	<b>3.2131</b> G-AlSi5Cu1, <b>3.2153</b> G-AlSi7Cu3, <b>3.2573</b> G-AlSi9	≤600		■
> 10 % Si	<b>3.2581</b> G-AlSi12, <b>3.2583</b> G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		■
Magnesium alloys	<b>3.5200</b> MgMn2, <b>3.5812.05</b> G-MgAl8Zn1, <b>3.5612.05</b> G-MgAl6Zn1	≤450		□
Copper, low alloyed	<b>2.0070</b> SE-Cu, <b>2.1020</b> CuSn6, <b>2.1096</b> G-CuSn5ZnPb	≤400		■ ■
Brass, short-chipping	<b>2.0380</b> CuZn39Pb2, <b>2.0401</b> CuZn39Pb3, <b>2.0410</b> CuZn43Pb2	≤600		■ ■
long-chipping	<b>2.0250</b> CuZn20, <b>2.0280</b> CuZn33, <b>2.0332</b> CuZn37Pb0.5	≤600		■ ■
Bronze, short-chipping	<b>2.1090</b> CuSn7ZnPb, <b>2.1170</b> CuPb5Sn5, <b>2.1176</b> CuPb10Sn	≤600		■ ■
	<b>2.0790</b> CuNi18Zn19Pb	>600-850		■ ■
Bronze, long-chipping	<b>2.0916</b> CuAl5, <b>2.0960</b> CuAl9Mn, <b>2.1050</b> CuSn10 <b>2.0980</b> CuAl11Ni, <b>2.1247</b> CuBe2	≤850 >850-1000		■ ■
Duroplastics	Epoxy resin, Resopal, Pertinax, Moltopren			- □
Thermoplastics	Plexiglas, Hostalen, Novodur, Makralon			- ■ □
Kevlar	Kevlar			- □
Glass/carbon-concentr. plastics	GFK/CFK			- □

