

## Solid carbide end mills

### Slot drills (3-fluted)



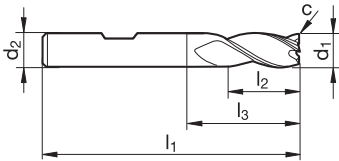
Catalog no. 64523



P	M	K	N	S	H
•	•	•	○	•	

Application  
recomm. p. 568

- centre cutting
- universal application

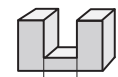


d1 h10 mm	d2 h6 mm	l1 mm	l2 mm	l3 mm	c mm x 45°	Z	Code no.
2.000	6.000	57.000	6.000	9.400	0.025	3	2.000
2.500	6.000	57.000	7.000	10.400	0.050	3	2.500
3.000	6.000	57.000	7.000	11.900	0.050	3	3.000
3.500	6.000	57.000	7.000	12.400	0.050	3	3.500
4.000	6.000	57.000	8.000	13.400	0.050	3	4.000
4.500	6.000	57.000	8.000	14.900	0.050	3	4.500
5.000	6.000	57.000	10.000	16.900	0.050	3	5.000
6.000	6.000	57.000	10.000	21.000	0.050	3	6.000
8.000	8.000	63.000	16.000	27.000	0.100	3	8.000
10.000	10.000	72.000	19.000	32.000	0.100	3	10.000
12.000	12.000	83.000	22.000	38.000	0.100	3	12.000
14.000	14.000	83.000	22.000	38.000	0.150	3	14.000
16.000	16.000	92.000	26.000	44.000	0.150	3	16.000
18.000	18.000	92.000	26.000	44.000	0.150	3	18.000
20.000	20.000	104.000	32.000	54.000	0.150	3	20.000

# Application recommendations for Carbide Slot Drills

		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> = 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		■ ■
long-chipping	<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			- □

# Slot drilling

Catalog no.	54521 54519	54523 64523	64478	64570 64571	74404	74424	54404	54424	64080	64180
Tool mat.	Solid carbide		Solid carbide		Solid carbide		Solid carbide		Solid carbide	
Std.	6527 L		6527 L	6527 K/L	Stock std.		Stock std.		Stock std.	
Type	N		NH		N		N		NH	
Page	592/590	599/601	606	604/607	593	602	594	603	595	596



V <sub>c</sub> m/min	Feed col.	V <sub>c</sub> m/min	Feed col.	V <sub>c</sub> m/min	Feed col.	V <sub>c</sub> m/min	Feed col.	V <sub>c</sub> m/min	Feed col.	V <sub>c</sub> m/min	Feed col.
105	N	105	N	50	J	80	J	95	M	105	N
99	M	99	M	45	H	75	I	90	L	100	M
105	M	105	M	50	H	80	I	95	L	105	M
77	N	77	N	35	I	60	J	70	M	75	N
105	M	105	M	50	H	80	I	95	L	105	M
94	M	94	M	40	H	70	I	85	L	95	M
77	N	77	N	35	I	60	J	70	M	75	N
94	N	94	N	40	I	70	J	85	M	95	N
77	N	77	N	35	I	60	J				
110	M	110	M	45	H	75	I	100	L	110	M
94	M	94	M	40	H	70	I	85	L	95	M
66	N	66	N	30	I	50	J				
105	M	105	M	50	H	80	I	95	L	105	M
94	L	94	L	40	H	70	H				
94	M	94	M	40	H	70	I	85	L	95	M
77	L	77	L	35	H	60	H	70	K	75	L
55	N	55	N	38	I	45	J	50	M	55	N
55	L	55	L								
55	L	55	L								
55	N	55	N					50	M	55	N
50	L	50	L					45	K	50	L
44	M	44	M					40	L	45	M
132	M	132	M	60	H	105	I	120	L	130	M
121	L	121	L	55	H	95	H	110	K	120	L
110	M	110	M	55	H	90	I	100	L	110	M
99	L	99	L	45	H	75	H	90	K	100	L
66	L	66	L					60	K	65	L
33	L	33	L							35	L
55	L	55	L	40	H	65	H	50	K	55	L
44	L	44	L	20	H	35	H	40	K	45	L
495	O	495	O					330	Q	330	Q
605	O	605	O					400	Q	400	Q
242	N	242	N					160	P	245	N
198	O	198	O					130	Q	200	O
275	P	275	P					185	R	185	R
132	O	132	O					90	Q	130	O
110	O	110	O					80	Q	110	O
99	N	99	N					70	P	75	P
110	N	110	N					80	P	110	N
88	M	88	M					70	O	90	M
88	N	88	N					70	P	70	P
77	L	77	L					60	N	60	N
132	L	132	L					90	N	90	N
121	L	121	L					80	N	80	N