

## Taper shank twist drills

### Twist drills



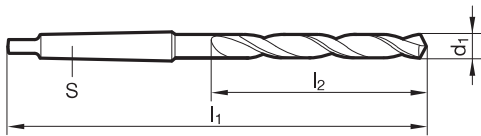
Catalog no. 71313



P	M	K	N	S	H
•	•	•		•	

Application  
recomm. p. 182

- web thinning  $\geq \varnothing 11.000$
- relieved cone
- high rigidity
- oversize shank



d1 mm	S	l1 mm	l2 mm
11.000	MK-2	192.000	94.000
12.000	MK-2	199.000	101.000
12.500	MK-2	199.000	101.000
12.800	MK-2	199.000	101.000
13.000	MK-2	199.000	101.000
13.500	MK-2	206.000	108.000
14.000	MK-2	206.000	108.000
20.000	MK-3	261.000	140.000
20.500	MK-3	266.000	145.000
21.500	MK-3	271.000	150.000
23.000	MK-3	276.000	155.000
26.000	MK-4	314.000	165.000

d1 mm	S	l1 mm	l2 mm
27.000	MK-4	319.000	170.000
29.000	MK-4	324.000	175.000

# Application recommendations for drills

Feed column										
Code-letter	A	B	C	D	E	F	G	H	I	
Drill-Ø mm	<b>0,50</b>	0,004	0,006	0,007	0,008	0,010	0,012	0,014	0,016	0,019
	<b>1,00</b>	0,006	0,008	0,012	0,014	0,016	0,018	0,020	0,023	0,025
	<b>2,00</b>	0,020	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125
	<b>2,50</b>	0,025	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160
	<b>3,15</b>	0,032	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,160
	<b>4,00</b>	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,200
	<b>5,00</b>	0,040	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250
	<b>6,30</b>	0,050	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315
	<b>8,00</b>	0,063	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,315
	<b>10,00</b>	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,400
	<b>12,50</b>	0,080	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500
	<b>16,00</b>	0,100	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630
	<b>20,00</b>	0,125	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,630
	<b>25,00</b>	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	0,800
	<b>31,50</b>	0,160	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000
	<b>40,00</b>	0,200	0,250	0,315	0,400	0,500	0,630	0,800	1,000	1,250

Tools with feed column no. in bold are preferred choices for listed material group.

### Lubricants:

- cutting oil, highly activated
- soluble oil (emulsion)
- without lubricant
- air only

Material group	Materials examples, new designations (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		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Unalloyed case hardened steels	<b>1.0301</b> (C10), <b>1.1121</b> C10E (Ck10)	≤750		<input checked="" type="checkbox"/>
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		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Nitriding steels	<b>1.8504</b> 34CrAl6 <b>1.8519</b> 31CrMoV9, <b>1.8550</b> 34CrAlNi7	≥850-≤1000 >1000-1200		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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	≥850-1000		<input checked="" type="checkbox"/>
Spring steels	<b>1.5026</b> 55Si7, <b>1.7176</b> 55Cr3, <b>1.8159</b> 51CrV4 (51CrV4)		≤330 HB	<input checked="" type="checkbox"/>
Hardened steels	-		≤40-48 HRC >48-60 HRC	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Chilled cast iron	-		≤350 HB	<input checked="" type="checkbox"/>
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			<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200		<input checked="" type="checkbox"/>
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		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Aluminium and Al-alloys	<b>3.0255</b> Al99,5, <b>3.2315</b> AlMgSi1, <b>3.3515</b> AlMg1	≤400		<input checked="" type="checkbox"/>
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		<input checked="" type="checkbox"/>
Al cast alloys ≤ 10 % Si > 10 % Si	<b>3.2131</b> G-AlSi5Cu1, <b>3.2153</b> G-AlSi7Cu3, <b>3.2573</b> G-AlSi9 <b>3.2581</b> G-AlSi12, <b>3.2583</b> G-AlSi12Cu, - G-AlSi12CuNiMg	≤600 ≤600		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Magnesium alloys	<b>3.5200</b> MgMn2, <b>3.5812.05</b> G-MgAl8Zn1, <b>3.5612.05</b> G-MgAl6Zn1	≤450		<input type="checkbox"/>
Copper, low alloyed	<b>2.0070</b> SE-Cu, <b>2.1020</b> CuSn6, <b>2.1096</b> G-CuSn5ZnPb	≤400		<input checked="" type="checkbox"/>
Brass, short-chipping long-chipping	<b>2.0380</b> CuZn39Pb2, <b>2.0401</b> CuZn39Pb3, <b>2.0410</b> CuZn43Pb2 <b>2.0250</b> CuZn20, <b>2.0280</b> CuZn33, <b>2.0332</b> CuZn37Pb0,5	≤600 ≤600		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Bronze, short-chipping	<b>2.1090</b> CuSn7ZnPb, <b>2.1170</b> CuPb5Sn5, <b>2.1176</b> CuPb10Sn <b>2.0790</b> CuNi18Zn19Pb	≤600 >600-850		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
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		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
Duroplastics	Epoxy resin, Resopal, Pertinax, Moltopren			<input type="checkbox"/>
Thermoplastics	Plexiglas, Hostalen, Novodur, Makralon			<input checked="" type="checkbox"/>
Kevlar	Kevlar			<input type="checkbox"/>
Glass/carbon-concentr. plastics	GFK/CFK			<input type="checkbox"/>

# ≤5×D drilling depth

Catalog no.	<b>71416</b>	<b>71149</b>	<b>71158</b>	<b>71123</b>	<b>71122</b>	<b>71312</b>	<b>71313</b>	<b>71148</b>	<b>71221</b>	<b>61221</b>
Tool material	<b>HSS-Co</b>	<b>HSS-Co</b>	<b>HSS-Co</b>	<b>HSS-Co</b>	<b>HSS-Co</b>	<b>HSS-Co</b>	<b>HSS-Co</b>	<b>M42</b>	<b>HSS-Co</b>	<b>HSS-Co</b>
Surface finish	steam	bright/st.	nitr. I.	bright/nitr.I.	bright	bright	bright	bright	bright	TiN
DIN/Form	345	338	338	338	338	345	346	338	338	338
Type	<b>N</b>	<b>N</b>	<b>V70</b>	<b>V66</b>	<b>V66 Ti</b>	<b>V66 Ti</b>	<b>V66 Ti</b>	<b>N</b>	<b>NX</b>	<b>NX</b>
Page	301	222	245	232	234	303	304	224	228	230



$v_c$ m/min	Feed column no.								$v_c$ m/min	Feed column no.	$v_c$ m/min	Feed column no.
35	E	E						E	35	F	45	F
30	E	E						E	30	E	35	E
40	E	E						E	40	F	50	F
40	E	E	E					E	30	F	40	F
40	E	E						E	32	F	44	F
40	E	E	E					E	28	F	44	F
35	D	D	D					E	20	E	40	E
20	D	D	D					D	15	D	27	D
16	C	C	C	C	C	C	C	C	13	C	22	C
36	F	F		F	F	F	F	F	30	F	44	F
20	D	D	D					C	16	D	22	D
15	C	C	C	C	C	C	C	C	12	C	18	C
16	D	D	D					C	15	D	22	D
12	C	C	C	C	C	C	C	C	10	C	16	C
15	D	D	D					C	15	D	20	D
12	C	C	C	C	C	C	C	C	10	C	15	C
15	C	C	C	C	C	C	C	C	10	C	13	C
8	B	B		B	B	B	B	B				
4								A				
18	D	D	D	D	D	D	D	C	14	D	20	D
14	C	C		C	C	C	C	C	10	D	16	D
16	C	C	C	C	C	C	C	C	12	D	18	D
35	F	F	F					E	36	F	45	F
30	F	F	F					E	30	F	40	F
30	F	F	F					E	30	F	40	F
28	F	F	F					E	22	F	30	F
10	C	C	C	C	C	C	C	C				
8				A	A	A	A	A				
10				B	B	B	B	B				
6				B	B	B	B	B				
90								G	50	G	70	G
90								G	50	G	70	G
80			G					G	65	G	85	G
70			F					F	60	F	70	F
70								F	60	F	70	F
40	E	E	E					E	25	E	80	E
60		E						E	70	E	77	E
40	E	E	E					E	30	E	44	E
35	D	D						D	36	D	50	D
33	D	D						D	30	D	40	D
20	D	D	D					D	30	D	32	D
15	D	D	D					D	25	D	28	D
20	D	D	D					D	20	D	25	D
									15	D	27	D