

GÜHRINGNAVIGATOR Ratio drills

Generally recommendations:

For safety reasons it is very important, that a drill does not exceed a speed of $n = 6,000 \text{ rev./min}$ when unsupported. The centrifugal forces can break these long tools before reaching the workpiece surface!

Application recommendations for 7xD, 10xD and 12xD drills:

Pilot holes are necessary for extra length SL drills $\geq 7xD$:
 1.) the pilot hole can be produced with a short, rigid drill. The diameter should be 0,01 - 0,02 mm larger than the diameter of the SL drill, the drilling depth $> 1xD$.

2.) alternatively SL drills can produce their own pilot hole. Cutting speed and feed rate should be reduced by 30-40%.

The recommended minimum coolant pressure is 40 bar.

Article no. HA
Article no. HE
Article no. HB
Standard/DIN
Tool material
Carbide grade
Type
Surface finish
Cooling
Std. range page

Tools with **bold** feed column no. are preferred choice.

Drill Ø mm	Feed column no.								
	1	2	3	4	5	6	7	8	9
	f (mm/rev.)								
0.50	0.004	0.006	0.007	0.008	0.010	0.012	0.014	0.016	0.019
1.00	0.006	0.008	0.012	0.014	0.016	0.018	0.020	0.023	0.025
2.00	0.020	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125
2.50	0.025	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160
3.15	0.032	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.160
4.00	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.200
5.00	0.040	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250
6.30	0.050	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.315
8.00	0.063	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.315
10.00	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.400
12.50	0.080	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.500
16.00	0.100	0.125	0.160	0.200	0.250	0.315	0.400	0.500	0.630
20.00	0.125	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.630
25.00	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.800	0.800
31.50	0.160	0.200	0.250	0.315	0.400	0.500	0.630	0.800	1.000
40.00	0.200	0.250	0.315	0.400	0.500	0.630	0.800	1.000	1.250
50.00	0.250	0.310	0.400	0.500	0.630	0.800	1.000	1.250	1.250
63.00	0.315	0.400	0.500	0.630	0.800	1.000	1.250	1.600	1.600
80.00	0.400	0.500	0.630	0.800	1.000	1.250	1.600	1.600	2.000

Cooling:

- without coolant ducts
- with coolant ducts

Coolant:

- Air
- Neat oil
- Soluble oil

Drill Ø mm	Feed column no. Art. no. 5652						
	60	61	62	63	64	65	66
	f (mm/rev.)						
0.50	0.030	0.035	0.040	0.045	0.050	0.050	0.055
0.80	0.040	0.050	0.060	0.070	0.080	0.080	0.080
1.00	0.060	0.070	0.080	0.090	0.100	0.100	0.110
1.50	0.090	0.100	0.120	0.130	0.150	0.150	0.160
2.00	0.120	0.140	0.160	0.180	0.200	0.210	0.220
2.50	0.150	0.170	0.200	0.220	0.250	0.260	0.270
3.00	0.180	0.210	0.240	0.270	0.300	0.310	0.330

Material group	Material examples Figures in bold = material no. to DIN EN 10 027	Tensile strength N/mm ²	Hardness	Coolant
Common structural steels	1.0035 S185(St33), 1.0486 P275N(StE285), 1.0345 P235GH(H1), 1.0425 P265GH(H2)	≤500		○
	1.0050 E295 (St50-2), 1.0070 E360 (St70-2), 1.8937 P500NH (WStE500)	≤1000		○
Free-cutting steels	1.0718 11SMnPb30 (9SMnPb28), 1.0736 11SMn37 (9SMn36)	≤850		○
	1.0727 46S20 (45S20), 1.0728 (60S20), 1.0757 46SPb20 (45SPb20)	≤1000		○
Unalloyed heat-treatable steels	1.0402 C22, 1.1178 C30E (Ck30)	≤700		○
	1.0503 C45, 1.1191 C45E (Ck45)	≤850		○
	1.0601 C60, 1.1221 C60E (Ck60)	≤1000		○
Alloyed heat-treatable steels	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4	≤1000		○
	1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1400		○
Unalloyed case hard. steels	1.0301 (C10), 1.1121 C10E (Ck10)	≤850		○
Alloyed case hardened steels	1.7276 10CrMo11, 1.5125 11MnSi6	≤1000		●
	1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1400		●
Nitriding steels	1.8504 34CrAl6	≤1000		○
	1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤1400		●
Tool steels	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9	≤850		○
	1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WCr6, 1.2767 X45NiCrMo4	≤1400		●
High speed steels	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400		●
Spring steels	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4 (51CrV4)		≤350 HB	●
Hardened steels	-		≤48 HRC	●
			≤66 HRC	●
Stainless steels, sulphured	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.86681 X6CrMoS17, 1.4305 X8CrNiS18-9	≤900		●
austenitic	1.4301 X5CrNi18-10 (V2A), 1.4541 X6CrNiTi18-10, 1.4571 X6CrNiMoTi17-12-2 (V4A)	≤1100		●
martensitic	1.4057 X20CrNi172 (X17CrNi16-2), 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18-2	≤1500		●
Cast iron	0.6010 EN-GJL-100 (GG10), 0.6020 EN-GJL-200 (GG20)		≤240 HB	○
	0.6025 EN-GJL-250 (GG25), 0.6035 EN-GJL-350 (GG35)		≤350 HB	○
Spheroidal graphite iron and malleable cast iron	0.7050 EN-GJS-500-7 (GGG50), 0.8035 EN-GJMW-350-4 (GTW35)		≤240 HB	○
	0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)		≤350 HB	○
Chilled cast iron	-		≤350 HB	○
New cast materials GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35)		≤220 HB	○
	EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6		≤300 HB	○
New cast materials ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000)	≤1000		○
	EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1400		○
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000		●
Ti and Ti-alloys	3.7024 Ti99.5, 3.7114 TiAl5Sn2.5, 3.7124 TiCu2	≤850		●
	3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184 TiAl4Mo4Sn2.5, - TiAl8Mo1V1	≤1400		●
Aluminium and Al-alloys	3.0255 Al99.5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400		○
Al wrought alloys	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si, 3.4365 AlZnMgCu1.5	≤650		○
Al cast alloys ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600		○
≤ 24 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600		○
Magnesium alloys	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05 G-MgAl6Zn1	≤400		○
Copper, low-alloyed	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500		○
Brass, short-chipping	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600		○
long-chipping	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0.5	≤600		○
Bronze, short-chipping	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn	≤600		○
	2.0790 CuNi18Zn19Pb	≤850		○
Bronze, long-chipping	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10	≤850		○
	2.0980 CuAl1Ni, 2.1247 CuBe2	≤1000		○
Duroplastics	Epoxy resin, Resopal, Pertinax, Moltopren	≤150		○
Thermoplastics	Plexiglass, Hostalen, Novodur, Makralon	≤100		○
Kevlar	Kevlar	≤1000		○
Glass, carbon concentr. plastics	GFK/CFK	≤1000		○



≤3xD				≤5xD				≤7xD	≤10xD	≤12xD	SL Twist drills
5652	5510	5514	5526	5511	5515	5580	5518	5512	5513	5525	
WN	6537K	6537K	6537K	6537L	6537L	6537L	6537L	C. Std.	C. Std.	C. Std.	
Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	Sol. carb.	
K/P	K/P	K/P	K/P	K/P	K/P	K/P	K	K/P	K	K/P	
N	RT100U	RT100U	RT100VA	RT100U	RT100U	RT100VA	FT200G	RT100U	RT100GG	RT100	
68	16	37	19	22	40	26	43	29	35	32	



V _c m/min	Feed col. no.	V _c m/min	Feed col. no.	V _c m/min	Feed col. no.	V _c m/min	Feed col. no.	V _c m/min	Feed col. no.	V _c m/min	Feed col. no.	V _c m/min	Feed col. no.	V _c m/min	Feed col. no.	V _c m/min	Feed col. no.				
100	62	145	7	130	7			145	7	130	7			145	6	110	6				
100	62	120	6	110	6			120	6	110	6			120	5	110	5				
100	62	170	8	145	8			170	8	145	8			170	7	110	7				
90	61	145	8	110	7			145	8	110	7			145	7	100	7				
90	62	130	8	120	7			130	8	120	7			130	7	110	7				
90	62	125	7	110	7			125	7	110	7			125	6	110	6				
90	61	120	7	105	7			120	7	105	7			120	6	100	6				
90	61	120	7	105	7			120	7	105	7			120	6	110	6				
70	60	105	7	100	6			105	7	100	6			105	6	105	6				
100	61	145	8	130	8			145	8	130	8			145	7	110	7				
85	61	120	7	120	7			120	7	120	7			120	6	110	6				
70	60	85	5	85	5			85	5	85	5			85	4	85	4				
70	60	110	7	100	6			105	7	100	6			110	6	100	6				
60	60	105	5	90	5			100	5	90	5			105	4	80	4				
50	60	80	6	65	6			70	6	65	6			80	5	80	5				
60	60	65	5	55	5			55	5	55	5			65	4	65	4				
		60	4					60	5					60	4	50	4				
		60	3	45	3			60	3	45	3			60	2	50	2				
		55	3	40	1			55	2	35	1			55	2						
		35	2	20	1			35	2	20	1			35	1						
		60	5	40	2	80	5	60	5	40	2	80	5	60	4		60	4			
		55	2	15	1	60	2-3	55	5	15	1	60	2-3	55	2		55	2			
		45	5	35	2	80	5	45	5	35	2	80	5	45	4		45	4			
130	66	210	9	210	8			210	9	210	8			100	6	195	8	120	6	120	8
130	66	160	9	155	8			160	9	155	8			80	6	160	8	100	6	120	8
130	66	140	9	155	7			140	9	145	7			80	6	140	8	90	6	100	8
120	65	130	8	125	7			130	8	125	7			70	6	130	7	80	6	90	7
		40	3	35	3			40	3	35	3					40	2	40	2		
		35	4	25	4	30	4	35	4	25	4	30	4			35	3				
		45	4	15	1	45	4	45	4	15	1	45	4			40	3				
		40	3	15	1	40	3	40	3	15	1	40	3			40	2				
		310	9	260	9			310	9	260	9			180	7	310	8	410	8	150	8
		310	9	260	9			310	9	260	9			160	7	310	8	410	8	150	8
		260	9	220	8			260	9	235	9			150	7	260	8	380	8	150	8
		220	9	180	8			220	9	170	8			120	6	220	8	330	8	120	8
		280	8	260	8			280	8	260	8			180	6	280	7			150	7
		125	7	105	7			125	7	105	7					125	6			80	6
		325	8	270	8			325	8	270	8			180	6	325	7	280	7	120	7
		220	7	180	7			220	7	180	7					220	6			120	6
		125	7	105	6			125	7	105	6					125	6			40	6
		105	6	85	6			105	6	85	6					105	5				
		90	6	80	5			90	6	80	5					90	5				
		80	6	60	5			80	6	60	5					80	5			40	5