EB 80 single-fluted gun drills

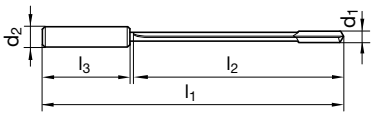
Article no. **5022**

HM | S | EB 80 | 40xD | WN | h5 | R | HA

with recessed coolant chamber • head form G • with lateral chip breaker

Cutting data page 79

P	M	K	N	S	H
●	○	●	○	○	○



Article no. **5022**

	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.
NEW	3.969	5/32	10.0	230.0	185.0	40.0	5022 3.970
	4.000		12.0	230.0	185.0	45.0	5022 4.000
	4.200		12.0	240.0	195.0	45.0	5022 4.200
NEW	4.366	11/64	12.0	250.0	205.0	45.0	5022 4.370
	4.500		12.0	250.0	205.0	45.0	5022 4.500
NEW	4.763	3/16	12.0	275.0	225.0	45.0	5022 4.760
	5.000		16.0	280.0	232.0	48.0	5022 5.000
NEW	5.159	13/64	16.0	280.0	252.0	48.0	5022 5.160
	5.500		16.0	300.0	252.0	48.0	5022 5.500
NEW	5.556	7/32	16.0	315.0	262.0	48.0	5022 5.560
NEW	5.953	15/64	16.0	330.0	277.0	48.0	5022 5.950
	6.000		16.0	320.0	272.0	48.0	5022 6.000
NEW	6.350	1/4	16.0	340.0	292.0	48.0	5022 6.350
	6.500		16.0	340.0	292.0	48.0	5022 6.500
NEW	6.747	17/64	16.0	365.0	312.0	48.0	5022 6.750
	7.000		16.0	370.0	322.0	48.0	5022 7.000
NEW	7.144	9/32	16.0	385.0	332.0	48.0	5022 7.140
NEW	7.500		16.0	395.0	345.0	48.0	5022 7.500
NEW	7.541	19/64	16.0	395.0	345.0	48.0	5022 7.540
NEW	7.938	5/16	16.0	420.0	372.0	48.0	5022 7.940
	8.000		16.0	420.0	372.0	48.0	5022 8.000
NEW	8.334	21/64	16.0	440.0	387.0	48.0	5022 8.330
NEW	8.500		16.0	445.0	390.0	48.0	5022 8.500
NEW	8.731	11/32	16.0	450.0	402.0	48.0	5022 8.730
	9.000		16.0	450.0	402.0	48.0	5022 9.000
NEW	9.128	23/64	16.0	475.0	422.0	48.0	5022 9.130
NEW	9.500		16.0	490.0	435.0	48.0	5022 9.500
NEW	9.525	3/8	16.0	480.0	432.0	48.0	5022 9.530
NEW	9.922	25/64	16.0	510.0	460.0	48.0	5022 9.920
	10.000		20.0	510.0	460.0	50.0	5022 10.000
NEW	10.319	13/32	20.0	530.0	475.0	50.0	5022 10.320
NEW	10.500		20.0	540.0	485.0	50.0	5022 10.500
NEW	10.716	27/64	20.0	545.0	490.0	50.0	5022 10.720
NEW	11.000		20.0	550.0	500.0	50.0	5022 11.000
NEW	11.113	7/16	20.0	550.0	500.0	50.0	5022 11.110
NEW	11.500		20.0	585.0	530.0	50.0	5022 11.500
NEW	11.906	15/32	20.0	600.0	550.0	50.0	5022 11.910
	12.000		20.0	600.0	550.0	50.0	5022 12.000
NEW	12.303	31/64	20.0	615.0	560.0	50.0	5022 12.300
NEW	12.500		20.0	630.0	575.0	50.0	5022 12.500
NEW	12.700	1/2	20.0	635.0	585.0	50.0	5022 12.700
NEW	13.000		20.0	650.0	595.0	50.0	5022 13.000
NEW	13.097	33/64	20.0	650.0	595.0	50.0	5022 13.100
NEW	13.500		20.0	660.0	605.0	50.0	5022 13.500
NEW	13.891	35/64	20.0	675.0	620.0	50.0	5022 13.890
NEW	14.000		20.0	680.0	625.0	50.0	5022 14.000
NEW	14.288	9/16	25.0	700.0	639.0	56.0	5022 14.290
NEW	14.500		25.0	710.0	645.0	56.0	5022 14.500

Article no. **5022**

	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.
NEW	14.684	37/64	25.0	715.0	654.0	56.0	5022 14.680
NEW	15.000		25.0	730.0	670.0	56.0	5022 15.000
NEW	15.081	19/32	25.0	730.0	670.0	56.0	5022 15.080
NEW	15.478	39/64	25.0	755.0	690.0	56.0	5022 15.480
NEW	15.500		25.0	755.0	690.0	56.0	5022 15.500
NEW	15.875	5/8	25.0	765.0	704.0	56.0	5022 15.880
NEW	16.000		25.0	775.0	715.0	56.0	5022 16.000
NEW	16.272	41/64	25.0	785.0	724.0	56.0	5022 16.270
NEW	16.500		25.0	795.0	734.0	56.0	5022 16.500
NEW	16.669	21/32	25.0	800.0	739.0	56.0	5022 16.670
NEW	17.000		25.0	815.0	754.0	56.0	5022 17.000
NEW	17.066	43/64	25.0	820.0	759.0	56.0	5022 17.070
NEW	17.463	11/16	25.0	835.0	774.0	56.0	5022 17.460
NEW	17.859	45/64	25.0	850.0	789.0	56.0	5022 17.860
NEW	18.000		25.0	860.0	799.0	56.0	5022 18.000
NEW	18.256	23/32	25.0	870.0	809.0	56.0	5022 18.260
NEW	18.653	47/64	25.0	885.0	824.0	56.0	5022 18.650
NEW	19.000		25.0	900.0	839.0	56.0	5022 19.000
NEW	19.050	3/4	32.0	905.0	840.0	60.0	5022 19.050
NEW	19.447	49/64	32.0	925.0	860.0	60.0	5022 19.450
NEW	19.844	25/32	32.0	940.0	875.0	60.0	5022 19.840
NEW	20.000		32.0	950.0	885.0	60.0	5022 20.000
NEW	20.241	51/64	32.0	950.0	885.0	60.0	5022 20.240
NEW	20.638	13/16	32.0	965.0	900.0	60.0	5022 20.640
NEW	21.000		32.0	980.0	915.0	60.0	5022 21.000
NEW	21.034	53/64	32.0	980.0	915.0	60.0	5022 21.030
NEW	21.431	27/32	32.0	1000.0	935.0	60.0	5022 21.430
NEW	21.828	55/64	32.0	1015.0	950.0	60.0	5022 21.830
NEW	22.000		32.0	1020.0	955.0	60.0	5022 22.000
NEW	22.225		32.0	1030.0	965.0	60.0	5022 22.230
NEW	22.622	57/64	32.0	1050.0	985.0	60.0	5022 22.620
NEW	23.000		32.0	1065.0	1000.0	60.0	5022 23.000
NEW	23.019	29/32	32.0	1065.0	1000.0	60.0	5022 23.020
NEW	23.416	59/64	32.0	1080.0	1015.0	60.0	5022 23.420
NEW	23.813	15/16	32.0	1100.0	1035.0	60.0	5022 23.810
NEW	24.000		32.0	1105.0	1040.0	60.0	5022 24.000
NEW	24.209	61/64	32.0	1115.0	1050.0	60.0	5022 24.210
NEW	24.606	31/32	32.0	1130.0	1065.0	60.0	5022 24.610
NEW	25.000	63/64	32.0	1150.0	1085.0	60.0	5022 25.000
NEW	25.400	1	32.0	1165.0	1100.0	60.0	5022 25.400

Single-fluted gun drills EB 80, EB 80 XXL

Machining group	◯	S C	f (mm/rev) with nom. Ø								
	v_c (m/min)		4	8	10	12	14	16	20	25	32
P1.1.1 Unalloyed steel, annealed, 0.15 % C, Rm 420 N/mm², 125 HB	80	85	0.020	0.040	0.045	0.050	0.060	0.065	0.080	0.095	0.110
P1.1.2 Unalloyed steel, heat-treated, 0.15 % C, Rm 420 N/mm², 125 HB	70	75	0.020	0.035	0.040	0.045	0.055	0.060	0.070	0.085	0.100
P1.1.3 Unalloyed steel, annealed, 0.45 % C, Rm 640 N/mm², 190 HB	70	75	0.020	0.035	0.040	0.045	0.055	0.060	0.070	0.085	0.100
P1.1.4 Unalloyed steel, heat-treated, 0.45 % C, Rm 640 N/mm², 190 HB	70	70	0.020	0.030	0.040	0.045	0.050	0.055	0.065	0.080	0.095
P1.1.5 Unalloyed steel, heat-treated, 0.45 % C, Rm 850 N/mm², 250 HB	70	70	0.020	0.030	0.040	0.045	0.050	0.055	0.065	0.080	0.095
P1.1.6 Unalloyed steel, annealed, 0.75 % C, Rm 915 N/mm², 270 HB	65	65	0.015	0.030	0.035	0.040	0.045	0.050	0.065	0.075	0.090
P1.1.7 Unalloyed steel, heat-treated, 0.75 % C, Rm 1020 N/mm², 300 HB	60	65	0.015	0.030	0.035	0.040	0.045	0.050	0.060	0.070	0.085
P2.1.1 Low-alloy steel, annealed, Rm 610 N/mm², 180 HB	70	75	0.020	0.035	0.040	0.045	0.050	0.060	0.070	0.085	0.100
P2.1.2 Low-alloy steel, heat-treated, Rm 930 N/mm², 275 HB	70	75	0.020	0.035	0.040	0.045	0.050	0.060	0.070	0.085	0.100
P2.1.3 Low-alloy steel, heat-treated, Rm 1020 N/mm², 300 HB	60	60	0.015	0.030	0.035	0.040	0.045	0.050	0.060	0.070	0.085
P2.1.4 Low-alloy steel, heat-treated, Rm 1190 N/mm², 350 HB	55	55	0.015	0.025	0.030	0.035	0.040	0.045	0.050	0.060	0.075
P3.1.1 High-alloy steel and tool steel, annealed, Rm 680 N/mm², 200 HB	60	65	0.020	0.035	0.040	0.045	0.050	0.060	0.070	0.085	0.100
P3.1.2 High-alloy steel and tool steel, hardened and tempered, Rm 1100 N/mm², 325 HB	50	55	0.015	0.030	0.035	0.040	0.045	0.050	0.060	0.070	0.085
M1.1.1 Stainless steel, ferritic/martensitic, with machining additives	50	55	0.015	0.025	0.030	0.035	0.040	0.045	0.050	0.060	0.075
M1.1.2 Stainless steel, ferritic/martensitic, annealed, Rm 680 N/mm², 200 HB	45	45	0.015	0.025	0.025	0.030	0.035	0.040	0.045	0.055	0.065
M1.1.3 Stainless steel, ferritic/martensitic, heat-treated, Rm 810 N/mm², 240 HB	45	45	0.012	0.020	0.025	0.030	0.035	0.035	0.045	0.055	0.060
M2.1.1 Stainless steel, austenitic, quenched, 180 HB	40	40	0.012	0.020	0.025	0.030	0.035	0.035	0.045	0.050	0.060
M2.2.1 Duplex steel, high-strength stainless steels	35	35	0.010	0.020	0.020	0.025	0.030	0.030	0.035	0.045	0.050
K1.1.1 Grey cast iron, pearlitic/ferritic, 180 HB	80	85	0.030	0.050	0.060	0.070	0.080	0.085	0.105	0.125	0.145
K1.1.2 Grey cast iron, pearlitic/martensitic, 260 HB	70	70	0.025	0.045	0.050	0.060	0.065	0.075	0.090	0.105	0.125
K1.2.1 Cast iron with spheroidal graphite, ferritic, 160 HB	70	70	0.025	0.045	0.050	0.060	0.065	0.075	0.090	0.105	0.125
K1.2.2 Cast iron with spheroidal graphite, pearlitic, 250 HB	65	65	0.025	0.040	0.050	0.055	0.065	0.070	0.085	0.100	0.115
K1.3.1 Malleable cast iron, ferritic, 130 HB	65	65	0.025	0.040	0.050	0.055	0.065	0.070	0.085	0.100	0.115
K1.3.2 Malleable cast iron, pearlitic, 230 HB	55	60	0.020	0.035	0.040	0.050	0.055	0.060	0.075	0.085	0.105
K2.1.1 Vermicular graphite cast iron (GJV)	65	70	0.025	0.040	0.050	0.060	0.065	0.075	0.085	0.105	0.120
K2.2.1 Austenitic-ferritic spheroidal graphite cast iron (ADI)	50	50	0.020	0.030	0.040	0.045	0.050	0.055	0.065	0.080	0.090
N1.1.1 Wrought aluminium alloys, non-hardened, 60 HB	80	85	0.035	0.060	0.070	0.080	0.090	0.100	0.120	0.145	0.170
N1.1.2 Wrought aluminium alloys, hardened, 100 HB	80	85	0.035	0.060	0.070	0.080	0.090	0.100	0.120	0.145	0.170
N2.1.1 Aluminium casting alloys, non-hardened, ≤ 12 % Si, 75 HB	120	125	0.095	0.165	0.200	0.230	0.260	0.290	0.350	0.415	0.490
N2.1.2 Aluminium casting alloys, hardened, ≤ 12 % Si, 90 HB	120	125	0.095	0.165	0.200	0.230	0.260	0.290	0.350	0.415	0.490
N2.1.3 Aluminium casting alloys, non-hardened, > 12 % Si, 130 HB	100	105	0.080	0.140	0.170	0.195	0.225	0.250	0.295	0.355	0.415
N3.1.1 Copper and copper alloys: Free-machining alloy, Pb > 1 %	70	75	0.040	0.065	0.080	0.095	0.105	0.115	0.140	0.165	0.195
N3.1.2 Copper and copper alloys: CuZn, CuSnZn	60	60	0.035	0.055	0.070	0.080	0.090	0.100	0.120	0.140	0.165
N3.1.3 Copper and copper alloys: CuSn, lead-free copper and copper electrolyte	55	60	0.030	0.055	0.065	0.075	0.085	0.095	0.110	0.135	0.155
N4.1.1 Non-metallic materials: Duroplastics, fibre-reinforced plastics	60	65	0.025	0.040	0.050	0.060	0.065	0.075	0.085	0.105	0.120
N4.1.2 Non-metallic materials: Hard rubber, wood, etc.	60	65	0.025	0.040	0.050	0.060	0.065	0.075	0.085	0.105	0.120
N4.1.3 Non-metallic materials: Graphite	60	65	0.025	0.040	0.050	0.060	0.065	0.075	0.085	0.105	0.120
S1.1.1 Heat-resistant alloys, Fe-based, annealed, 200 HB	40	40	0.010	0.015	0.020	0.025	0.025	0.030	0.035	0.040	0.050
S1.1.2 Heat-resistant alloys, Fe-based, hardened, 280 HB	30	35	0.008	0.015	0.015	0.020	0.020	0.025	0.030	0.035	0.040
S1.1.3 Heat-resistant alloys, Ni- or Co-based, annealed, 250 HB	25	25	0.007	0.015	0.015	0.015	0.020	0.020	0.025	0.030	0.035
S1.1.4 Heat-resistant alloys, Ni- or Co-based, hardened, 350 HB	20	25	0.007	0.012	0.015	0.015	0.020	0.020	0.025	0.030	0.035
S1.1.5 Heat-resistant alloys, Ni- or Co-based, cast, 320 HB	20	20	0.006	0.011	0.015	0.015	0.015	0.020	0.025	0.025	0.030
S2.1.1 Titanium alloys, pure titanium, Rm 400 N/mm²	30	30	0.007	0.015	0.015	0.015	0.020	0.020	0.025	0.030	0.035
S2.1.2 Titanium alloys, Alpha and Beta alloys, hardened, Rm 1050 N/mm²	25	30	0.006	0.011	0.015	0.015	0.020	0.020	0.025	0.030	0.035
H1.1.1 Hardened steel, hardened and tempered, < 55 HRC	30	30	0.007	0.015	0.015	0.015	0.020	0.020	0.025	0.030	0.035
H1.1.2 Hardened steel, hardened and tempered, < 60 HRC	20	20	0.006	0.010	0.012	0.015	0.015	0.015	0.020	0.025	0.030
H1.1.3 Hardened steel, hardened and tempered, > 60 HRC	20	20	0.005	0.009	0.011	0.015	0.015	0.015	0.020	0.025	0.030
H2.1.1 Chilled cast iron, 400 HB	20	20	0.007	0.015	0.015	0.015	0.020	0.020	0.025	0.030	0.035
H2.1.2 Chilled cast iron, hardened and tempered, < 55 HRC	15	15	0.005	0.009	0.011	0.012	0.015	0.015	0.020	0.020	0.025

All the values stated are guide values. You can find detailed cutting values online in our Gühring Navigator at webnavigator.guehring.de/en.

A brief introduction to the subject of deep hole drilling

In the machining world, drilling depths of 10 x D and deeper are regarded as deep hole drilling operations, whereby smaller drilling depths can naturally also be produced with gun drills. Advantage is taken of the positive side effects, as for example good surface quality, low deviation from concentricity and optimised alignment accuracy.

High pressure cooling - has become a matter of course.

In recent years, internal cooling has established itself for all drilling tools. Coolants are now living up to their name and being supplied via coolant ducts to where they are urgently required. Considerable improvements in tool life and less breakages have been achieved by this measure for twist drills, taps etc.

Every conventional machine tool currently on the market can be supplied with high pressure internal cooling and is therefore also suitable for deep hole drilling.

The share of gun drills on machining centres, lathes etc. is forever gaining more importance. The process is therefore increasing in popularity in the machining world.

All gun drills must have support for the pilot hole.

Gun drills must never operate at full speed without support in the machine shop.

Deep hole drilling is not a closed book, but can be mastered by anybody as long as certain conditions are adhered to.

Recommended cutting rates for the application of Guhring gun drills can be found on the pages for the individual types!

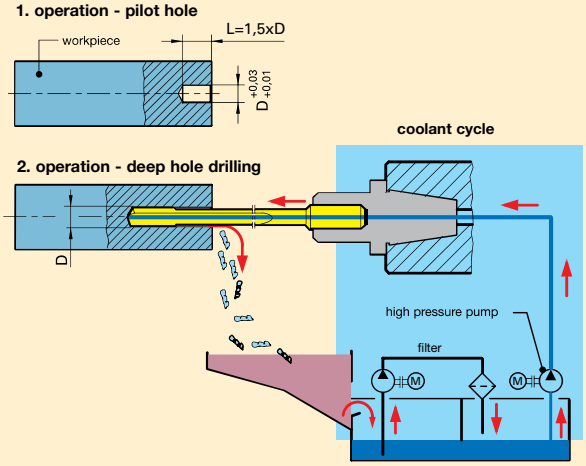
Typical procedure with all gun drills on conventional machine tools:

- production of pilot hole (L = 3 x D, tolerance H8)
- enter at low revolutions, approx. 200 rev./min, feed rate approx. 500 mm/min. With tools for drilling depths in excess than 40 x D enter the pilot hole revolving in left hand direction.
- At cutting speeds higher than 120 m/min we recommend to advance to final speed in several steps.
- setting of coolant pressure and revolutions
- uninterrupted drilling to required drilling depth without wood pecking. When applying gun drills with increased length-diameter-ratio, we recommend machining with reduced cutting parameters (approx. 75% of the optimal cutting speed) up to a drilling depth of approx. 25 mm.
- switching off coolant supply after reaching the required hole depth
- withdrawal in top gear with stationary spindle

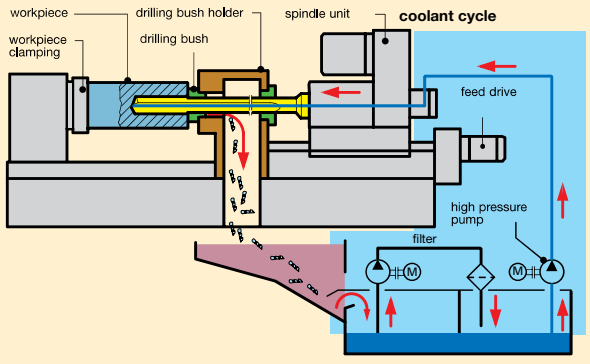
Application advice

- For drilling depths in excess than 40 x D we recommend the use of two or more gun drills, e. g. Ø 10 x 400 mm and Ø 9.95 x 800 mm.
- Gun drills for drilling depths of more than 40 x D should enter the pilot hole revolving in the left hand direction.
- When changing tools for drilling depths of more than 40 x D, the tool can be damped by switching on coolant supply for just one second.
- For machining of long-chipping materials we recommend the use of gun drills with polished flutes.
- Generally we recommend the use of soluble oil with a minimum oil content of 10 %.
- Single-fluted gun drills for long-chipping aluminium should be supplied with point grind 180° and coolant chamber.

Deep hole drilling on conventional machine tools

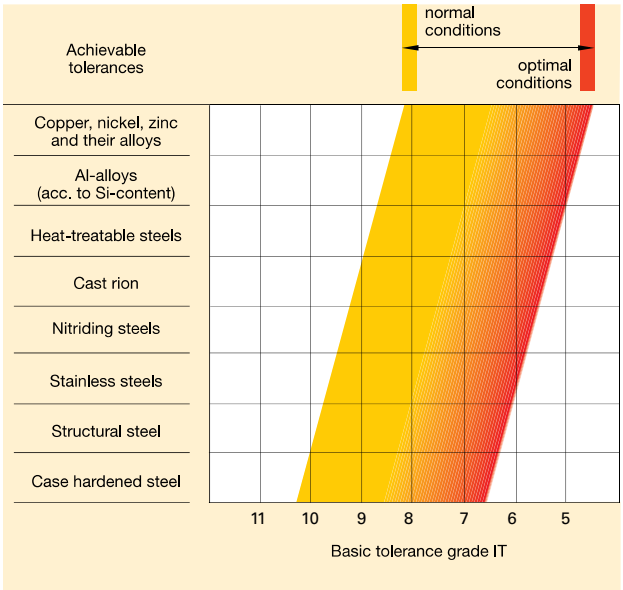


Deep hole drilling machines



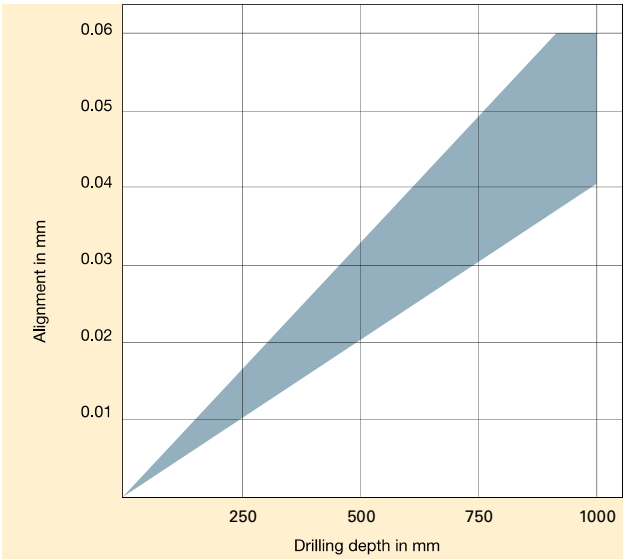
Basic tolerances*

The application of single-fluted gun drills can achieve a lower basic tolerance, as the cutting forces at the cutting edge are absorbed by the guide pads, unlike twist drills where the slightest deviation of the two cutting edges causes a larger hole.



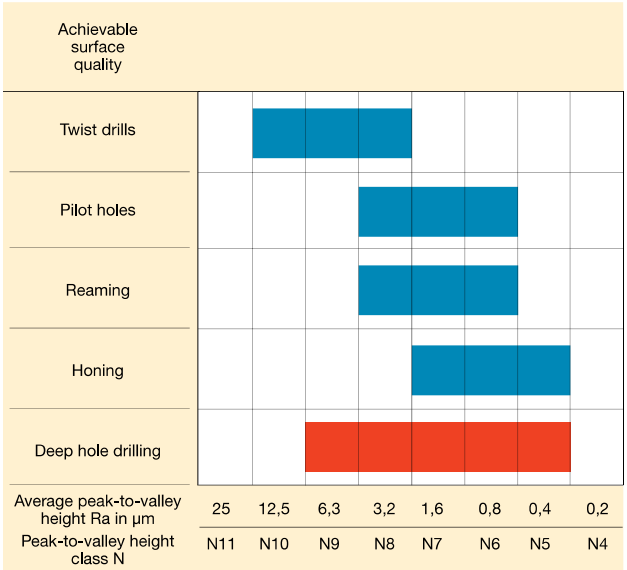
Alignment accuracy*

Because brazed single-fluted gun drills always have the precision carbide head brazed on to a flexible tube, the tool achieves very accurate aligned holes remaining unaffected by possible concentricity errors.
However, extreme material fluctuations and other influencing factors can impair the alignment accuracy.



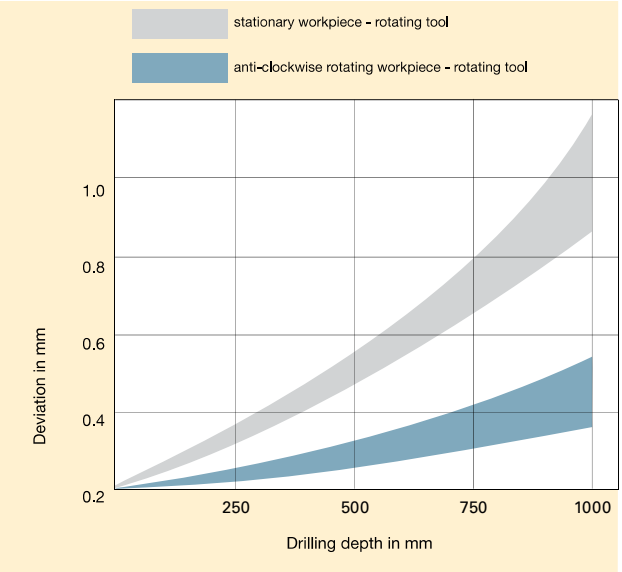
Surface quality*

The forces at the cutting edge are absorbed by the support bushes, which in return burnishes the surface.
Lubrication between the guide pads and hole surface is therefore very important.
The better the lubricant, the better the surface quality.



Deviation from concentricity*

When a hole is produced with, for example, a commercial twist drill, the quality of the point grind affects the concentricity of the hole. An imbalance of forces is created at the cutting edges. With gun drills, these cutting forces are absorbed by the guide pads, resulting in excellent concentricity.



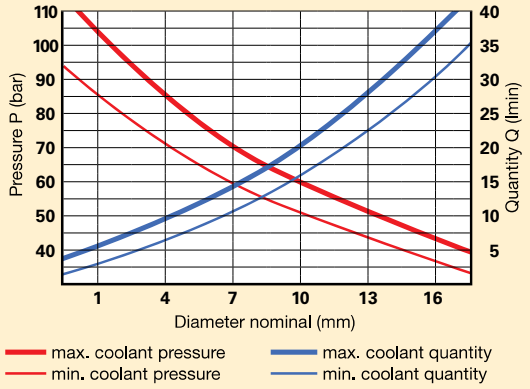
* gun drills with two cutting edges – straight-fluted as well as spiral-fluted – achieve approx. 50% of the values stated

Please note:

- All gun drills must be applied with internal cooling, either air, water or oil. Without internal cooling the chips cannot be evacuated.
- All gun drills can be applied with oil as the medium for internal cooling. However, in this case a 30% higher pressure is required in order to achieve the same coolant volume.
- When MQL is applied with gun drills an increase in pressure may be necessary for smaller nominal diameters de pendent on the pressure of the MQL system.
- If the cooling lubricant data is insufficient the cutting parameters may be reduced. Pressure boosting systems are also possible.

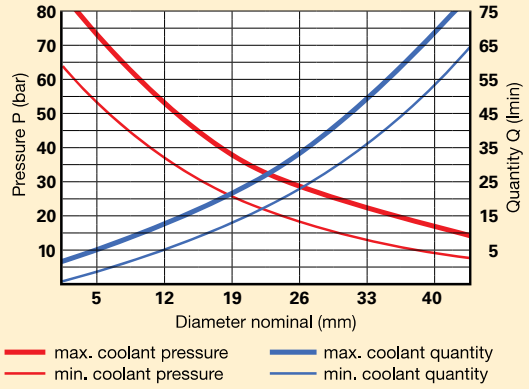
Coolant values EB 100

(recommended values for soluble oil)



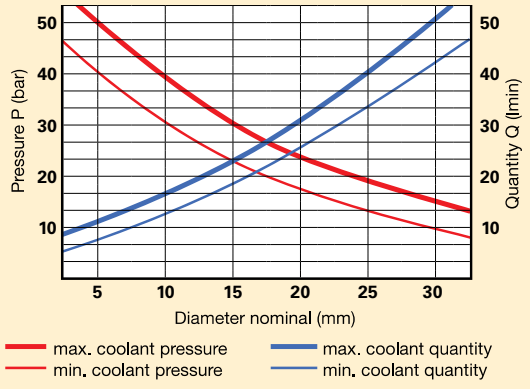
Coolant values EB 80

(recommended values for soluble oil)



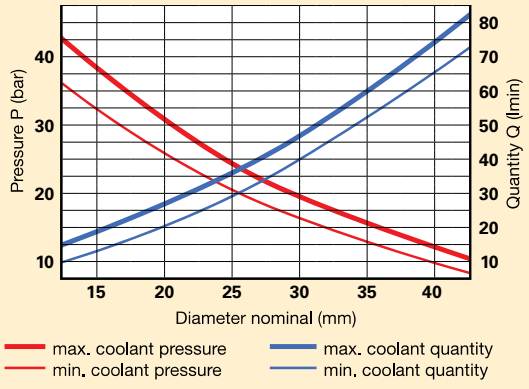
Coolant values ZB 80

(recommended values for soluble oil)



Coolant values EB 800

(recommended values for soluble oil)



Gun drills

Drill Ø mm from	Feed column no.									
	11	12	13	14	15	16	17	18	19	20
	f (mm/rev.)									
1.50	0.002	0.004	0.006	0.008	0.012	0.020	0.032	0.045	0.045	0.075
2.00	0.003	0.005	0.007	0.010	0.016	0.028	0.046	0.055	0.050	0.100
2.50	0.004	0.006	0.008	0.012	0.018	0.030	0.054	0.070	0.075	0.125
4.00	0.005	0.007	0.010	0.016	0.025	0.043	0.065	0.085	0.120	0.240
6.00	0.007	0.009	0.013	0.024	0.035	0.061	0.085	0.120	0.180	0.360
8.00	0.010	0.014	0.022	0.032	0.045	0.068	0.100	0.150	0.240	0.480
10.00	0.012	0.016	0.028	0.040	0.055	0.075	0.120	0.160	0.300	0.600
14.00	0.020	0.025	0.035	0.050	0.065	0.085	0.130	0.180	0.420	0.700
18.00	0.025	0.030	0.040	0.055	0.070	0.095	0.145	0.200		
20.00	0.026	0.035	0.045	0.060	0.080	0.110	0.180	0.250		
24.00	0.027	0.036	0.047	0.065	0.085	0.130	0.185	0.300		
28.00	0.028	0.038	0.049	0.068	0.090	0.140	0.195	0.350		
30.00	0.030	0.040	0.050	0.070	0.100	0.150	0.200	0.400		
35.00	0.035	0.045	0.055	0.075	0.120	0.180	0.250	0.450		
40.00	0.040	0.050	0.060	0.080	0.150	0.200	0.300	0.500		

*The feed rates always relate to tools with the recommended coating. In some cases the successful application of un-coated tools cannot be guaranteed.

All deep hole drills must have support for the pilot hole.
Deep hole drills must never operate at full speed without support in the machine shop.

The sequence of operations for deep hole drilling

- production of pilot hole (L ≈ 3 x D, tolerance H8)
- enter at low revolutions, approx. 200 rev./min, feed rate approx. 500 mm/min. With tools for drilling depths in excess than 40 x D enter the pilot hole revolving in left hand direction.
- at cutting speeds higher than 120 m/min we recommend to advance to final speed in several steps.
- setting of coolant pressure and revolutions
- uninterrupted drilling to required drilling depth without wood pecking. When applying gun drills with increased length-diameter-ratio, we recommend machining with reduced cutting parameters (approx. 75% of the optimal cutting speed) up to a drilling depth of approx. 25 mm.
- switching off coolant supply after reaching the required hole depth
- withdrawal in top gear with stationary spindle
- for EB100 gun drills > 50xD please note: up to drilling depth 50xD the feed has to be reduced to 60%

EB100

single-fluted gun drill

solid carbide

0.9 ... 12.0

Material dependent coolants
air ○
neat oil ●
soluble oil ◐

Material group	Material examples Figures in bold = material no. to DIN EN	Tens.str. N/mm² / Hardness	Cool-ant	rec. coating*	≤50xD v_c m/min	≤50xD Feed col. no.	>50xD v_c m/min	>50xD Feed col. no.
Common structural steels	**1.0035** S185, **1.0486** P275N, **1.0345** P235GH, **1.0425**	≤500	◐		100	15	100	15
	1.0050 E295), **1.0070** E360, **1.8937** P500NH	≤1000	◐		85	15	85	15
Free-cutting steels	**1.0718** 11SMnPb30, **1.0736** 11SMn37	≤850	◐		90	15	90	15
	1.0727 46S20, **1.0728** 60S20, **1.0757** 46SPb20	≤1000	◐		80	15	80	15
Unalloyed heat-treatable steels	**1.0402** C22, **1.1178** C30E	≤700	◐		80	14	80	14
	1.0503 C45, **1.1191** C45E	≤850	◐		75	14	75	14
	1.0601 C60, **1.1221** C60E	≤1000	◐		75	14	75	14
Alloyed heat-treatable steels	**1.5131** 50MnSi4, **1.7003** 38Cr2, **1.7030** 28Cr4	≤1000	◐		75	14	75	14
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400	◐	A	65	14	65	14
Unalloyed case hard. steels	**1.0301**, **1.1121** C10E	≤850	◐	A	80	15	80	15
Alloyed case hardened steels	**1.7276** 10CrMo11, **1.5125** 11MnSi6	≤1000	●		75	14	75	14
	1.5752 15NiCr13, **1.7131** 16MnCr5, **1.7264** 20CrMo5	≤1400	●		65	14	65	14
Nitriding steels	**1.8504** 34CrAl6	≤1000	◐		75	14	75	14
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400	●	A	65	14	65	14
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850	◐		75	13	75	13
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419**, **1.2767**	≤1400	●	A	65	13	65	13
High speed steels	**1.3243** S 6-5-2-5, **1.3343** S 6-5-2, **1.3344** S 6-5-3	≤1400	●	A	55	12	55	12
Spring steels	**1.5026** 55Si7, **1.7176** 55Cr3, **1.8159** 51CrV4	≤350 HB	●	A	65	13	65	13
Stainless steels, sulphured	**1.4005** X12CrS13, **1.4104** X14CrMoS17, **1.4105**	≤900	●		40	14	40	14
austenitic	**1.4301** X5CrNi18-10, **1.4541** X6CrNiTi18-10, **1.4571**	≤1100	●	A	35	14	35	14
martensitic	**1.4057** X20CrNi172, **1.4122** X39CrMo17-1, **1.4521**	≤1500	●		35	14	35	14
Hardened steels	–	≤48 HRC	●		30	13	30	13
		≤66 HRC	●		25	10	25	10
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤2000	●		20	12	20	12
Cast iron	**0.6010** EN-GJL-100, **0.6020** EN-GJL-200	≤240 HB	◐○		85	16	85	16
	0.6025 EN-GJL-250, **0.6035** EN-GJL-350	≤350 HB	◐○		80	16	80	16
Spheroidal graphite iron and	**0.7050** EN-GJS-500-7, **0.8035** EN-GJMW-350-4	≤240 HB	◐		80	15	80	15
malleable cast iron	**0.7070** EN-GJS-700-2, **0.8170** EN-GJMB-700-2	≤350 HB	◐		70	15	70	15
Chilled cast iron	–	≤350 HB	◐		55	14	55	14
Ti and Ti-alloys	**3.7024** Ti99,5, **3.7114** TiAl5Sn2,5, **3.7124** TiCu2	≤850	●		35	12	35	12
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184**	≤1400	●	A	30	12	30	12
Aluminium and Al-alloys	**3.0255** Al99,5, **3.2315** AlMgSi1, **3.3515** AlMg1	≤400	◐		150	17	150	17
Al wrought alloys	**3.0615** AlMgSiPb, **3.1325** AlCuMg1, **3.3245**, **3.4365**	≤650	◐		120	19	120	19
Al cast alloys ≤ 10 % Si	**3.2131** G-AlSi5Cu1, **3.2153** G-AlSi7Cu3, **3.2573** G-AlSi9	≤600	◐		120	20	120	20
≤ 24 % Si	**3.2581** G-AlSi12, **3.2583** G-AlSi12Cu, - G-AlSi12CuNiMg	≤600	◐		130	18	130	18
Magnesium alloys	**3.5200** MgMn2, **3.5812.05** G-MgAl8Zn1, **3.5612.05**	≤400	○		110	17	110	17
Copper, low-alloyed	**2.0070** SE-Cu, **2.1020** CuSn6, **2.1096** G-CuSn5ZnPb	≤500	◐	A	75	15	75	15
Brass, short-chipping	**2.0380** CuZn39Pb2, **2.0401** CuZn39Pb3, **2.0410**	≤600	◐		120	18	120	18
long-chipping	**2.0250** CuZn20, **2.0280** CuZn33, **2.0332** CuZn37Pb0,5	≤600	◐		90	18	90	18
Bronze, short-chipping	**2.1090** CuSn7ZnPb, **2.1170** CuPb5Sn5, **2.1176**	≤600	◐●		95	17	95	17
	2.0790 CuNi18Zn19Pb	≤850	●		75	17	75	17
Bronze, long-chipping	**2.0916** CuAl5, **2.0960** CuAl9Mn, **2.1050** CuSn10	≤850	●		70	17	70	17
	2.0980 CuAl11Ni, **2.1247** CuBe2	≤1000	●		60	17	60	17
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren	≤150	○		75	15	75	15
Thermoplastics	Plexiglas, Hostalen, Novodur, Makralon	≤100	◐○		70	15	70	15
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	◐○					
Kevlar	Kevlar	≤1000	○		60	14	60	14
Glass, carbon concentr. plastics	GFK/CFK	≤1000	○		50	14	50	14

(A) TiAlN SuperA (C) TiCN (F) FIRE (S) TiN

Application advice
- For drilling depths in excess than 40 x D we recommend the use of two or more gun drills, e. g. Ø 10 x 400 mm and Ø 9.95 x 800 mm.
- Gun drills for drilling depths of more than 40 x D should enter the pilot hole revolving in the left hand direction.
- When changing tools for drilling depths of more than 40 x D, the tool can be damped by switching on coolant supply for just one second.
- For machining of long-chipping materials we recommend the use of gun drills with polished flutes.
- Generally we recommend the use of soluble oil with a minimum oil content of 10 %.
- Single-fluted gun drills for long-chipping aluminium should be supplied with point grind 180° and coolant chamber.
- When spotting in aluminium with an Si-content of less than 1%, i.e. with recommended cutting rates vc > 160 m/min we recommend to advance to the final speed in several steps. In addition, a deeper pilot hole of approximately 3 x D should be produced.

EB80

single-fluted gun drill
solid carbide head
2.0 ... 40.0

rec. coating*	≤35xD v_c m/min	≤35xD Feed col. no.	>35xD v_c m/min	>35xD Feed col. no.
S	100	14	95	13
	85	14	80	13
S	90	14	85	13
	80	14	75	13
	90	13	85	12
S	80	13	75	12
	75	13	70	12
S	75	13	70	12
	65	13	60	12
S	80	14	75	13
S	75	13	70	12
	65	13	60	12
C	75	13	70	12
	65	13	60	12
C	75	12	70	11
	65	12	60	11
C	55	11	50	11
C	65	12	60	12
	55	13	50	12
C	45	13	40	12
	35	13	35	12
C	30	12	25	11
	25	11	20	11
C	20	11	20	11
	85	15	80	14
	80	15	75	14
	80	14	75	13
	70	14	65	13
	55	13	50	12
C	35	11	30	11
	30	11	25	11
	150	16	140	15
	120	15	115	14
	150	16	140	15
	130	16	120	15
	110	16	100	15
C	75	14	70	13
	120	17	115	16
	90	17	85	16
	95	16	90	15
	75	16	70	15
	70	16	65	15
	60	16	55	15
	75	14	70	13
	70	14	65	13
	60	13	55	12
	50	13	45	12

ZB80

two-fluted gun drill
solid carbide head
6.0 ... 27.0

rec. coating*	≤35xD v_c m/min	≤35xD Feed col. no.	>35xD v_c m/min	>35xD Feed col. no.
	85	18	80	17
	80	18	75	17
	75	17	70	16
	70	17	65	16
	65	16	60	15
	120	18	115	17
	110	18	105	17
	135	18	130	17
	120	17	115	16
	130	18	125	17
	120	18	115	17
	110	17	105	16
	110	17	105	16
	95	17	90	16
	95	17	90	16

EB800

single-fluted gun drill
with indexable inserts
12.0 ... 40.0

rec. coating*	≤35xD v_c m/min	≤35xD Feed col. no.	>35xD v_c m/min	>35xD Feed col. no.
S	90	15	85	15
	80	15	75	15
S	85	16	80	16
	75	16	70	16
	85	15	80	15
S	80	15	75	15
	75	15	70	15
S	75	15	70	15
	65	15	60	15
S	80	15	75	15
S	75	15	70	15
	70	15	65	15
S	70	15	65	15
	60	15	55	15
S	65	14	60	14
	60	14	55	14
S	55	14	50	14
S	65	15	60	15
	50	14	45	14
F	45	14	40	14
	40	14	35	14
S	30	13	25	13
	25	12	20	12
F	25	13	20	13
	85	16	80	16
	80	16	75	16
S	75	16	70	16
	70	16	65	16
	55	15	50	15
F	35	13	30	13
	30	12	25	12
	140	16	135	16
	125	16	120	16
	170	17	165	17
	140	17	135	17
	115	16	110	16
F	75	15	70	15
	120	17	115	17
	90	17	85	17
	95	17	90	17
	75	17	70	17
	70	17	65	17
	60	17	55	17
	75	16	70	16
	70	16	65	16
	60	15	55	15
	50	15	45	15