



EB 100 M single-fluted gun drills

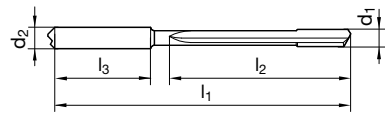
Article no. **5647**

solid carbide shank with MQL shank end • head form G

Cutting data page 438

P	M	K	N	S	H
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Deep hole drills



Article no.

5647

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.
1.000		3.0	90.0	57.0	28.0	5647 1.000
1.191	3/64	3.0	100.0	68.0	28.0	5647 1.190
1.500		4.0	120.0	86.0	28.0	5647 1.500
1.588	1/16	4.0	125.0	91.0	28.0	5647 1.590
1.984	5/64	4.0	145.0	114.0	28.0	5647 1.980
2.000		4.0	145.0	115.0	28.0	5647 2.000
2.381	3/32	4.0	160.0	130.0	28.0	5647 2.380
2.500		4.0	185.0	155.0	28.0	5647 2.500
2.778	7/64	4.0	185.0	155.0	28.0	5647 2.780
3.000		6.0	230.0	190.0	36.0	5647 3.000
3.175	1/8	6.0	230.0	190.0	36.0	5647 3.170
3.500		6.0	230.0	190.0	36.0	5647 3.500
3.572	9/64	6.0	260.0	220.0	36.0	5647 3.570
3.969	5/32	6.0	260.0	220.0	36.0	5647 3.970
4.000		6.0	260.0	220.0	36.0	5647 4.000
4.366	11/64	6.0	290.0	245.0	36.0	5647 4.370
4.763	3/16	6.0	310.0	268.0	36.0	5647 4.760
5.000		6.0	370.0	330.0	36.0	5647 5.000

Article no.

5647

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.
5.159	13/64	6.0	370.0	330.0	36.0	5647 5.160
5.556	7/32	6.0	370.0	330.0	36.0	5647 5.560
5.953	15/64	6.0	370.0	330.0	36.0	5647 5.950
6.000		6.0	370.0	330.0	36.0	5647 6.000
6.350	1/4	8.0	430.0	385.0	36.0	5647 6.350
6.500		8.0	430.0	385.0	36.0	5647 6.500
6.747	17/64	8.0	430.0	385.0	36.0	5647 6.750
7.000		8.0	430.0	385.0	36.0	5647 7.000
7.144	9/32	8.0	485.0	440.0	36.0	5647 7.140
7.541	19/64	8.0	485.0	440.0	36.0	5647 7.540
7.938	5/16	8.0	485.0	440.0	36.0	5647 7.940
8.000		8.0	485.0	440.0	36.0	5647 8.000
9.000		10.0	555.0	506.0	40.0	5647 9.000
10.000		10.0	615.0	562.0	40.0	5647 10.000

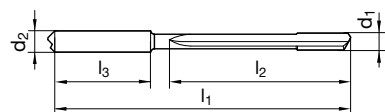
EB 100 M single-fluted gun drills

Article no. **5686**

solid carbide shank with MQL shank end • head form G

Cutting data page 438

P	M	K	N	S	H
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Article no.

5686

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1.000		3.0	90.0	57.0	28.0	5686 1.000
1.191	3/64	3.0	100.0	68.0	28.0	5686 1.190
1.500		4.0	120.0	86.0	28.0	5686 1.500
1.588	1/16	4.0	125.0	91.0	28.0	5686 1.590
1.984	5/64	4.0	145.0	114.0	28.0	5686 1.980
2.000		4.0	145.0	115.0	28.0	5686 2.000
2.381	3/32	4.0	160.0	130.0	28.0	5686 2.380
2.500		4.0	185.0	155.0	28.0	5686 2.500
2.778	7/64	4.0	185.0	155.0	28.0	5686 2.780
3.000		6.0	230.0	190.0	36.0	5686 3.000
3.175	1/8	6.0	230.0	190.0	36.0	5686 3.170
3.500		6.0	230.0	190.0	36.0	5686 3.500
3.572	9/64	6.0	260.0	220.0	36.0	5686 3.570
3.969	5/32	6.0	260.0	220.0	36.0	5686 3.970
4.000		6.0	260.0	220.0	36.0	5686 4.000
4.366	11/64	6.0	290.0	245.0	36.0	5686 4.370
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5.953	15/64	6.0	370.0	330.0	36.0	5686 5.950
6.000		6.0	370.0	330.0	36.0	5686 6.000
6.350	1/4	8.0	430.0	385.0	36.0	5686 6.350
6.500		8.0	430.0	385.0	36.0	5686 6.500
6.747	17/64	8.0	430.0	385.0	36.0	5686 6.750
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8.000		8.0	485.0	440.0	36.0	5686 8.000
9.000		10.0	555.0	506.0	40.0	5686 9.000
10.000		10.0	615.0	562.0	40.0	5686 10.000



Single-fluted gun drills EB 100 M, EB 100

Cutting data



Correction of length diameter ratio:

< 25xD	100 %	< 45xD	90 %	< 65xD	75 %
< 80xD	60 %	< 150xD	50 %		

Machining group			f (mm/rev) with nom. Ø															
	v _c (m/min)		1	2	3	4	5	6	7	8	10	12	14	16				
P1.1.1 Unalloyed steel, annealed, 0.15 % C, Rm 420 N/mm ² , 125 HB	90	95	0.004	0.010	0.020	0.025	0.030	0.035	0.040	0.040	0.050	0.060	0.065	0.075				
P1.1.2 Unalloyed steel, heat-treated, 0.15 % C, Rm 420 N/mm ² , 125 HB	80	85	0.003	0.009	0.015	0.020	0.025	0.030	0.035	0.040	0.045	0.050	0.060	0.065				
P1.1.3 Unalloyed steel, annealed, 0.45 % C, Rm 640 N/mm ² , 190 HB	80	85	0.003	0.009	0.015	0.020	0.025	0.030	0.035	0.040	0.045	0.050	0.060	0.065				
P1.1.4 Unalloyed steel, heat-treated, 0.45 % C, Rm 640 N/mm ² , 190 HB	75	80	0.003	0.009	0.015	0.020	0.025	0.030	0.030	0.035	0.045	0.050	0.055	0.060				
P1.1.5 Unalloyed steel, heat-treated, 0.45 % C, Rm 850 N/mm ² , 250 HB	75	80	0.003	0.009	0.015	0.020	0.025	0.030	0.030	0.035	0.045	0.050	0.055	0.060				
P1.1.6 Unalloyed steel, annealed, 0.75 % C, Rm 915 N/mm ² , 270 HB	70	75	0.003	0.008	0.015	0.020	0.025	0.025	0.030	0.035	0.040	0.045	0.050	0.060				
P1.1.7 Unalloyed steel, heat-treated, 0.75 % C, Rm 1020 N/mm ² , 300 HB	70	70	0.003	0.008	0.015	0.020	0.020	0.025	0.030	0.030	0.040	0.045	0.050	0.055				
P2.1.1 Low-alloy steel, annealed, Rm 610 N/mm ² , 180 HB	75	80	0.003	0.009	0.015	0.020	0.025	0.030	0.035	0.035	0.045	0.050	0.060	0.065				
P2.1.2 Low-alloy steel, heat-treated, Rm 930 N/mm ² , 275 HB	75	80	0.003	0.009	0.015	0.020	0.025	0.030	0.035	0.035	0.045	0.050	0.060	0.065				
P2.1.3 Low-alloy steel, heat-treated, Rm 1020 N/mm ² , 300 HB	65	65	0.003	0.008	0.015	0.020	0.020	0.025	0.030	0.030	0.035	0.045	0.050	0.055				
P2.1.4 Low-alloy steel, heat-treated, Rm 1190 N/mm ² , 350 HB	55	60	0.002	0.007	0.015	0.015	0.020	0.020	0.025	0.030	0.035	0.040	0.045	0.050				
P3.1.1 High-alloy steel and tool steel, annealed, Rm 680 N/mm ² , 200 HB	60	65	0.003	0.009	0.015	0.020	0.025	0.030	0.035	0.035	0.045	0.050	0.060	0.065				
P3.1.2 High-alloy steel and tool steel, hardened and tempered, Rm 1100 N/mm ² , 325 HB	50	55	0.003	0.008	0.015	0.020	0.020	0.025	0.030	0.030	0.035	0.045	0.050	0.055				
M1.1.1 Stainless steel, ferritic/martensitic, with machining additives	50	55	0.003	0.008	0.015	0.020	0.025	0.025	0.030	0.035	0.040	0.045	0.050	0.060				
M1.1.2 Stainless steel, ferritic/martensitic, annealed, Rm 680 N/mm ² , 200 HB	45	45	0.003	0.007	0.015	0.015	0.020	0.025	0.025	0.030	0.035	0.040	0.045	0.050				
M1.1.3 Stainless steel, ferritic/martensitic, heat-treated, Rm 810 N/mm ² , 240 HB	45	45	0.002	0.007	0.015	0.015	0.020	0.025	0.025	0.030	0.035	0.040	0.045	0.050				
M2.1.1 Stainless steel, austenitic, quenched, 180 HB	40	40	0.002	0.006	0.011	0.015	0.015	0.020	0.025	0.025	0.030	0.035	0.040	0.045				
M2.2.1 Duplex steel, high-strength stainless steels	35	35	0.002	0.005	0.010	0.012	0.015	0.015	0.020	0.020	0.025	0.030	0.035	0.035				
K1.1.1 Grey cast iron, pearlitic/ferritic, 180 HB	80	85	0.006	0.015	0.030	0.040	0.045	0.055	0.060	0.065	0.080	0.095	0.105	0.115				
K1.1.2 Grey cast iron, pearlitic/martensitic, 260 HB	70	70	0.005	0.015	0.025	0.035	0.040	0.045	0.050	0.055	0.070	0.080	0.090	0.100				
K1.2.1 Cast iron with spheroidal graphite, ferritic, 160 HB	70	70	0.005	0.015	0.025	0.035	0.040	0.045	0.050	0.055	0.070	0.080	0.090	0.100				
K1.2.2 Cast iron with spheroidal graphite, pearlitic, 250 HB	65	65	0.005	0.015	0.025	0.030	0.035	0.045	0.050	0.055	0.065	0.075	0.085	0.095				
K1.3.1 Malleable cast iron, ferritic, 130 HB	65	65	0.005	0.015	0.025	0.030	0.035	0.045	0.050	0.055	0.065	0.075	0.085	0.095				
K1.3.2 Malleable cast iron, pearlitic, 230 HB	55	60	0.004	0.012	0.020	0.025	0.030	0.035	0.040	0.045	0.055	0.065	0.075	0.080				
K2.1.1 Vermicular graphite cast iron (GJV)	65	70	0.004	0.012	0.025	0.030	0.035	0.040	0.045	0.050	0.060	0.070	0.080	0.085				
K2.2.1 Austenitic-ferritic spheroidal graphite cast iron (ADI)	50	50	0.003	0.009	0.015	0.020	0.025	0.030	0.035	0.040	0.045	0.050	0.060	0.065				
N1.1.1 Wrought aluminium alloys, non-hardened, 60 HB	100	105	0.006	0.015	0.030	0.040	0.045	0.055	0.060	0.065	0.080	0.095	0.105	0.115				
N1.1.2 Wrought aluminium alloys, hardened, 100 HB	100	105	0.006	0.015	0.030	0.040	0.045	0.055	0.060	0.065	0.080	0.095	0.105	0.115				
N2.1.1 Aluminium casting alloys, non-hardened, ≤ 12 % Si, 75 HB	160	170	0.025	0.075	0.135	0.170	0.200	0.235	0.265	0.295	0.350	0.405	0.460	0.510				
N2.1.2 Aluminium casting alloys, hardened, ≤ 12 % Si, 90 HB	160	170	0.025	0.075	0.135	0.170	0.200	0.235	0.265	0.295	0.350	0.405	0.460	0.510				
N2.1.3 Aluminium casting alloys, non-hardened, > 12 % Si, 130 HB	135	145	0.020	0.060	0.115	0.145	0.170	0.200	0.225	0.250	0.295	0.345	0.390	0.435				
N3.1.1 Copper and copper alloys: Free-machining alloy, Pb > 1 %	80	85	0.008	0.025	0.045	0.055	0.065	0.075	0.085	0.095	0.115	0.135	0.150	0.165				
N3.1.2 Copper and copper alloys: CuZn, CuSnZn	70	70	0.007	0.020	0.035	0.045	0.055	0.065	0.075	0.080	0.100	0.115	0.130	0.140				
N3.1.3 Copper and copper alloys: CuSn, lead-free copper and copper electrolyte	65	65	0.007	0.020	0.035	0.045	0.055	0.060	0.070	0.075	0.090	0.105	0.120	0.135				
N4.1.1 Non-metallic materials: Duroplastics, fibre-reinforced plastics	60	65	0.006	0.015	0.030	0.040	0.045	0.055	0.060	0.065	0.080	0.095	0.105	0.115				
N4.1.2 Non-metallic materials: Hard rubber, wood, etc.	60	65	0.006	0.015	0.030	0.040	0.045	0.055	0.060	0.065	0.080	0.095	0.105	0.115				
N4.1.3 Non-metallic materials: Graphite	60	65	0.006	0.015	0.030	0.040	0.045	0.055	0.060	0.065	0.080	0.095	0.105	0.115				
S1.1.1 Heat-resistant alloys, Fe-based, annealed, 200 HB	40	40	0.002	0.005	0.010	0.012	0.015	0.015	0.020	0.020	0.025	0.030	0.035	0.035				
S1.1.2 Heat-resistant alloys, Fe-based, hardened, 280 HB	30	35	0.002	0.004	0.008	0.010	0.012	0.015	0.015	0.020	0.020	0.025	0.030	0.030				
S1.1.3 Heat-resistant alloys, Ni- or Co-based, annealed, 250 HB	25	25	0.001	0.004	0.007	0.009	0.011	0.012	0.015	0.015	0.020	0.020	0.025	0.025				
S1.1.4 Heat-resistant alloys, Ni- or Co-based, hardened, 350 HB	20	25	0.001	0.004	0.007	0.008	0.010	0.012	0.015	0.015	0.020	0.020	0.025	0.025				
S1.1.5 Heat-resistant alloys, Ni- or Co-based, cast, 320 HB	20	20	0.001	0.003	0.006	0.008	0.009	0.011	0.012	0.015	0.015	0.020	0.020	0.025				
S2.1.1 Titanium alloys, pure titanium, Rm 400 N/mm ²	30	30	0.001	0.004	0.008	0.010	0.011	0.015	0.015	0.015	0.020	0.025	0.025	0.030				
S2.1.2 Titanium alloys, Alpha and Beta alloys, hardened, Rm 1050 N/mm ²	25	30	0.001	0.004	0.007	0.009	0.010	0.012	0.015	0.015	0.020	0.020	0.025	0.025				
H1.1.1 Hardened steel, hardened and tempered, < 55 HRC	30	30	0.002	0.005	0.010	0.012	0.015	0.015	0.020	0.020	0.025	0.030	0.035	0.035				
H1.1.2 Hardened steel, hardened and tempered, < 60 HRC	20	20	0.001	0.004	0.008	0.010	0.011	0.015	0.015	0.015	0.020	0.025	0.025	0.030				
H1.1.3 Hardened steel, hardened and tempered, > 60 HRC	20	20	0.001	0.004	0.007	0.009	0.011	0.012	0.015	0.015	0.020	0.020	0.025	0.025				
H2.1.1 Chilled cast iron, 400 HB	20	20	0.001	0.004	0.008	0.010	0.011	0.015	0.015	0.015	0.020	0.025	0.025	0.030				
H2.1.2 Chilled cast iron, hardened and tempered, < 55 HRC	15	15	0.001	0.003	0.005	0.007	0.008	0.009	0.011	0.012	0.015	0.015	0.020	0.020				

The drilling process

A brief introduction to the subject of deep hole drilling

In the machining world, drilling depths of $10 \times D$ 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!

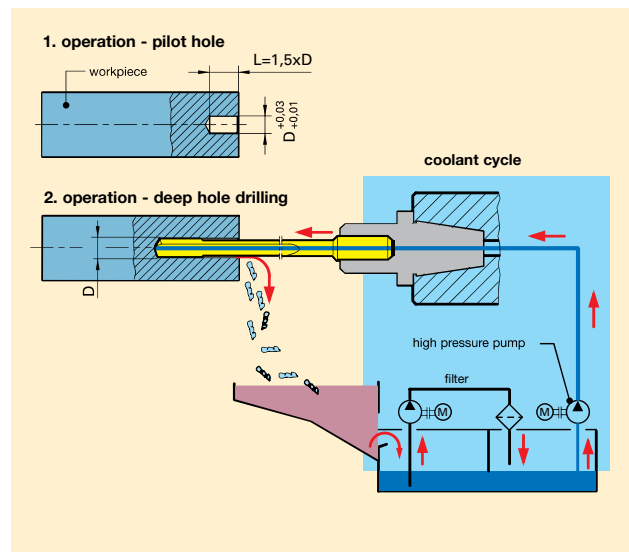
Typical procedure with all gun drills on conventional machine tools:

- production of pilot hole ($L = 3 \times D$, tolerance H8)
- enter at low revolutions, approx. 200 rev./min, feed rate approx. 500 mm/min. With tools for drilling depths in excess than $40 \times D$ 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

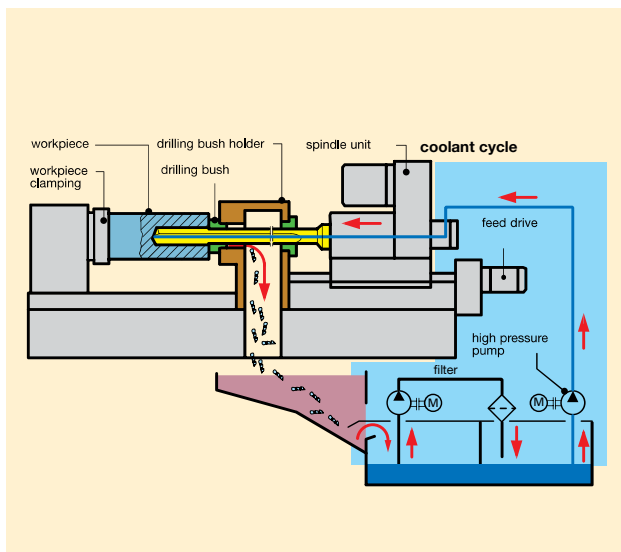
Application advice

- For drilling depths in excess than $40 \times D$ we recommend the use of two or more gun drills, e. g. $\varnothing 10 \times 400$ mm and $\varnothing 9.95 \times 800$ mm.
- Gun drills for drilling depths of more than $40 \times D$ should enter the pilot hole revolving in the left hand direction.
- When changing tools for drilling depths of more than $40 \times D$, 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



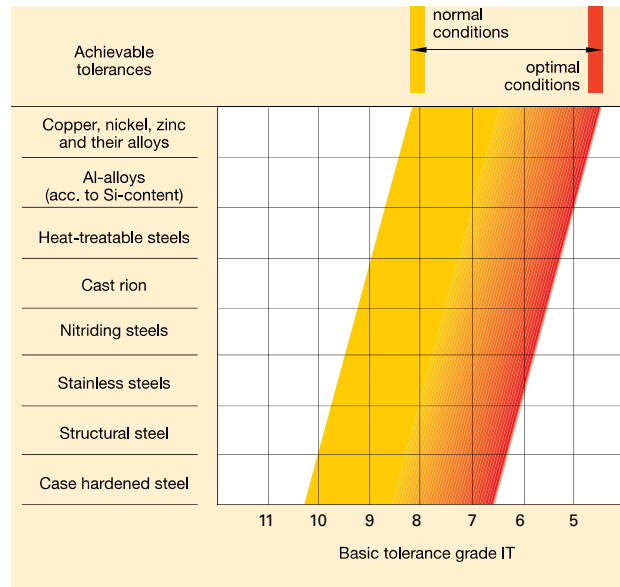
Deep hole drilling machines



Precision of single-fluted gun drills

Basic tolerances*

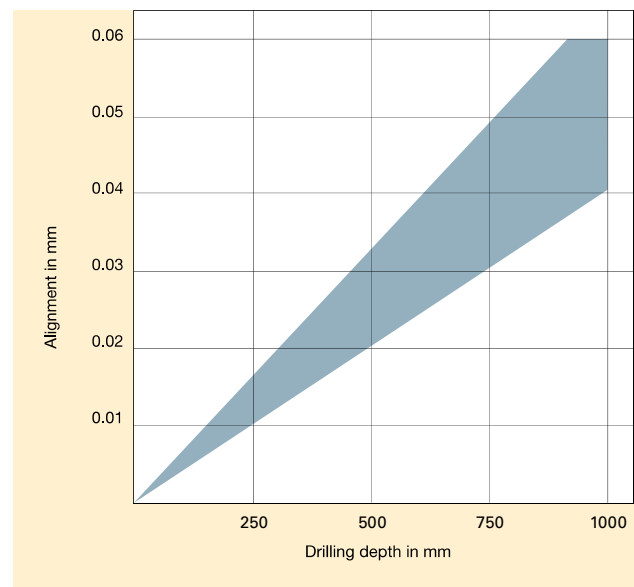
The application of single-fluted gun drills can achieve a lower basic tolerance, as the cutting forces at the cutting edge are absorbed by the guide pads, unlike twist drills where the slightest deviation of the two cutting edges causes a larger hole.



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.

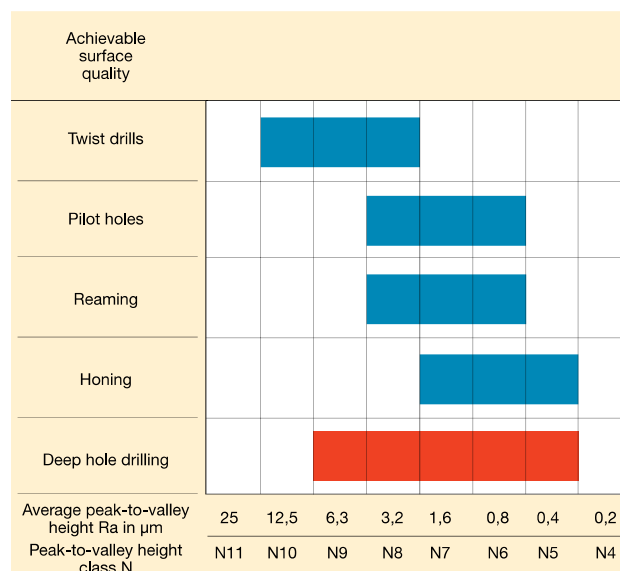


Surface quality*

The forces at the cutting edge are absorbed by the support bushes, which in return burnishes the surface.

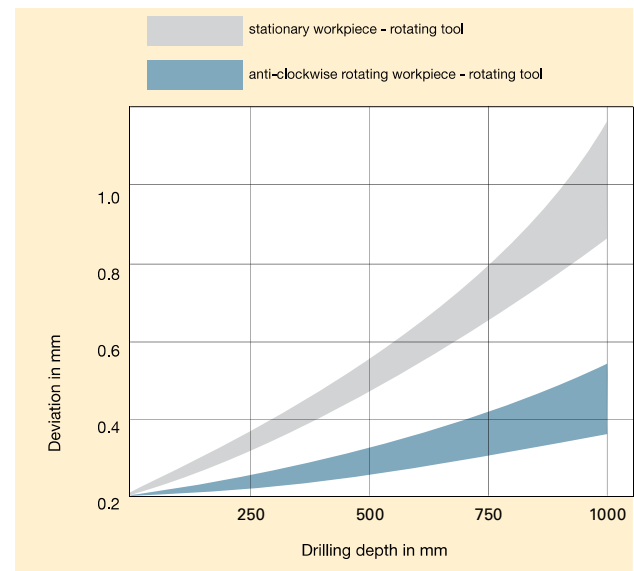
Lubrication between the guide pads and hole surface is therefore very important.

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.



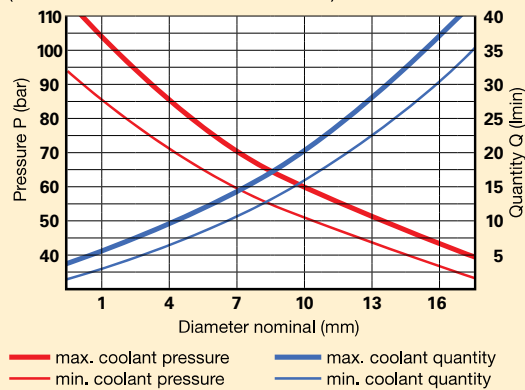
* gun drills with two cutting edges – straight-fluted as well as spiral-fluted – achieve approx. 50% of the values stated

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 dependent 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.

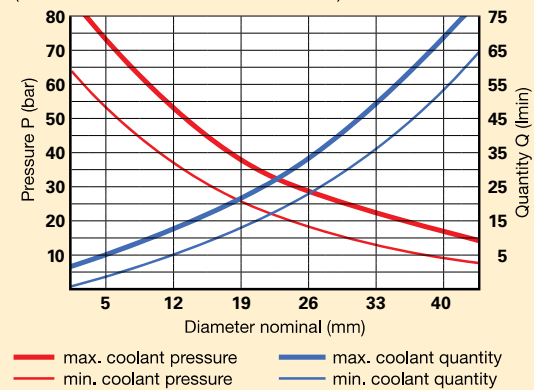
Coolant values EB 100

(recommended values for soluble oil)



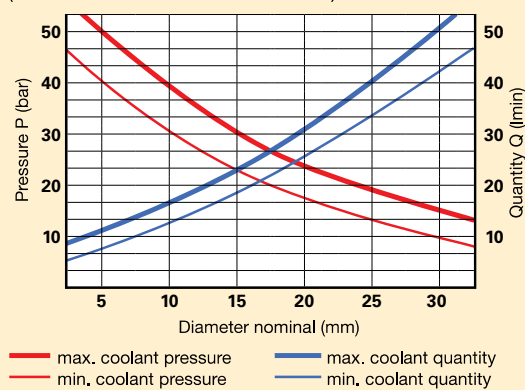
Coolant values EB 80

(recommended values for soluble oil)



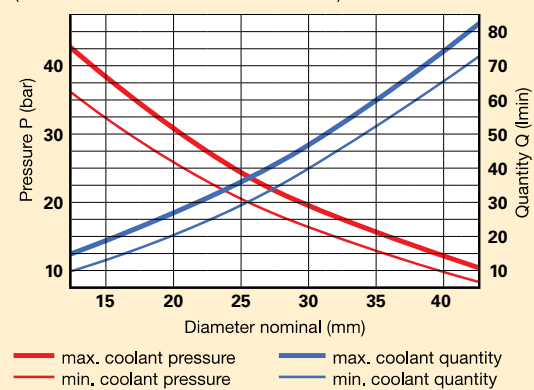
Coolant values ZB 80

(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. Hardness N/mm ²	Cool- ant	rec. coating*	≤50xD		>50xD	
					V _c m/min	Feed col. no.	V _c m/min	Feed col. no.
Common structural steels	1.0035 S185, 1.0486 P275N, 1.0345 P235GH, 1.0425 1.0050 E295, 1.0070 E360, 1.8937 P500NH	≤500 ≤1000	○ ●		100 85	15 15	100 85	15 15
Free-cutting steels	1.0718 11SMnPb30, 1.0736 11SMn37	≤850 ≤1000	○ ●		90 80	15 15	90 80	15 15
Unalloyed heat-treatable steels	1.0727 46S20, 1.0728 60S20, 1.0757 46SPb20	≤700 ≤850 ≤1000	○ ● ●		80 80 75	14 14 14	80 80 75	14 14 14
Alloyed heat-treatable steels	1.0402 C22, 1.1178 C30E 1.0503 C45, 1.1191 C45E 1.0601 C60, 1.1221 C60E	≤1000 ≤1400	○ ● ●		75 65 80	14 14 15	75 65 80	14 14 15
Unalloyed case hard. steels	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4	≤850	○		75	14	75	14
Alloyed case hardened steels	1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	≤1000 ≤1400	○ ●		65 80	14 15	65 80	14 15
Nitriding steels	1.0301, 1.1121 C10E	≤850	○		75	14	75	14
Tool steels	1.7276 10CrMo11, 1.5125 11MnSi6 1.5752 15NiCr13, 1.7131 16MnCr5, 1.7264 20CrMo5	≤1000 ≤1400	○ ●		65 75	14 13	65 75	14 13
High speed steels	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≤850 ≤1400	○ ●		65 65	14 13	65 65	14 13
Spring steels	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 , 1.2767	≤1400 ≤350 HB	○ ●		55 65	12 13	55 65	12 13
Stainless steels, sulphured	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 S 6-5-3	≤1400	○		55	12	55	12
Stainless steels, austenitic	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4	≤900 ≤1100 ≤1500	○ ● ●		40 35 35	14 14 14	40 35 35	14 14 14
Stainless steels, martensitic	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 1.4301 X5CrNi18-10, 1.4541 X6CrNiTi18-10, 1.4571 1.4057 X20CrNi172, 1.4122 X39CrMo17-1, 1.4521	≤48 HRC ≤66 HRC	○ ● ●		30 25 20	13 10 12	30 25 20	13 10 12
Hardened steels	Special alloys	≤2000	○		85 80	16 16	85 80	16 16
Cast iron	Nimonic, Inconel, Monel, Hastelloy	≤240 HB ≤350 HB	○ ○		80 80	15 15	80 80	15 15
Spheroidal graphite iron and malleable cast iron	0.6010 EN-GJL-100, 0.6020 EN-GJL-200 0.6025 EN-GJL-250, 0.6035 EN-GJL-350	≤240 HB ≤350 HB	○ ○		70 70	15 15	70 70	15 15
Chilled cast iron	0.7050 EN-GJS-500-7, 0.8035 EN-GJMW-350-4 0.7070 EN-GJS-700-2, 0.8170 EN-GJMB-700-2	≤350 HB ≤350 HB	○ ○		55 35	14 12	55 35	14 12
Ti and Ti-alloys	3.7024 Ti99.5, 3.7114 TiAl5Sn2.5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7165 TiAl6V4, 3.7184	≤850 ≤1400	○ ○		30 150	12 17	30 150	12 17
Aluminium and Al-alloys	3.0255 Al99.5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400	○		120	19	120	19
Al wrought alloys	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245, 3.4365	≤650	○		120	20	120	20
Al cast alloys ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600	○		130	18	130	18
Al cast alloys ≤ 24 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600	○		110	17	110	17
Magnesium alloys	3.5200 MgMn2, 3.5812.05 G-MgAl8Zn1, 3.5612.05	≤400	○		75	15	75	15
Copper, low-alloyed	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤500	○		120	18	120	18
Brass, short-chipping	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410	≤600	○		90	18	90	18
Brass, long-chipping	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0.5	≤600	○		95	17	95	17
Bronze, short-chipping	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176	≤600 ≤850	○ ○		75 70	17 17	75 70	17 17
Bronze, long-chipping	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 ≤1000	○ ○		60 75	17 15	60 75	17 15
Duroplastics	Bakelint, Resopal, Pertinax, Moltopren	≤150	○		70	15	70	15
Thermoplastics	Plexiglas, Hostalen, Novodur, Makralon	≤100	○					
New cast materials GGV	EN-GJV250 (GGV25), EN-GJV350 (GGV35) EN-GJV400 (GGV40), EN-GJV500 (GGV50), SiMo 6	≤220 HB ≤300 HB	○ ○					
New cast materials ADI	EN-GJS-800-8 (ADI800), EN-GJS-1000-5 (ADI1000) EN-GJS-1200-2 (ADI1200), EN-GJS-1400-1 (ADI1400)	≤1000 ≤1400	○ ○					
Kevlar	Kevlar	≤1000	○		60	14	60	14
Glass, carbon concentr, plastics	GFK/CFK	≤1000	○		50	14	50	14

Ⓐ TiAlN SuperA

Ⓒ TiCN

Ⓕ FIRE

Ⓗ 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 $v_c > 160$ 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



ZB80

two-fluted gun drill
solid carbide head

6.0 ... 27.0



EB800

single-fluted gun drill
with indexable inserts

12.0 ... 40.0



rec. coating*	≤35xD		>35xD		rec. coating*	≤35xD		>35xD		rec. coating*	≤35xD		>35xD	
	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.
S	100	14	95	13	S					S	90	15	85	15
	85	14	80	13							80	15	75	15
S	90	14	85	13	S					S	85	16	80	16
	80	14	75	13							75	16	70	16
S	90	13	85	12	S					S	85	15	80	15
	80	13	75	12							80	15	75	15
S	75	13	70	12	S					S	75	15	70	15
	75	13	70	12							75	15	70	15
S	65	13	60	12	S					S	65	15	60	15
	80	14	75	13							80	15	75	15
S	75	13	70	12	S					S	75	15	70	15
	65	13	60	12							65	15	60	15
C	75	13	70	12	S					S	70	15	65	15
	65	13	60	12							70	15	65	15
C	75	12	70	11	S					S	60	15	55	15
	65	12	60	11							65	14	60	14
C	55	11	50	11	S					S	60	14	55	14
	65	12	60	12							55	14	50	14
C	55	13	50	12	S					S	65	15	60	15
	45	13	40	12							50	14	45	14
C	35	13	35	12	F					F	45	14	40	14
	30	12	25	11							40	14	35	14
C	25	11	20	11	S					S	30	13	25	13
	20	11	20	11							25	12	20	12
C	85	15	80	14	F	85	18	80	17	F	25	13	20	13
	80	15	75	14		80	18	75	17		85	16	80	16
C	80	14	75	13	S	75	17	70	16	S	80	16	75	16
	70	14	65	13		70	17	65	16		75	16	70	16
C	55	13	50	12	F	65	16	60	15	F	70	16	65	16
	35	11	30	11							55	15	50	15
C	30	11	25	11	F					F	35	13	30	13
	150	16	140	15		120	18	115	17		30	12	25	12
C	120	15	115	14	F	110	18	105	17	F	140	16	135	16
	150	16	140	15		135	18	130	17		125	16	120	16
C	130	16	120	15	F	120	17	115	16	F	170	17	165	17
	110	16	100	15							140	17	135	17
C	75	14	70	13	F					F	115	16	110	16
	120	17	115	16		130	18	125	17		75	15	70	15
C	90	17	85	16	F	120	18	115	17	F	120	17	115	17
	95	16	90	15		110	17	105	16		90	17	85	17
C	75	16	70	15	F	110	17	105	16	F	95	17	90	17
	70	16	65	15		95	17	90	16		75	17	70	17
C	60	16	55	15	F	95	17	90	16	F	70	17	65	17
	75	14	70	13							60	17	55	17
C	70	14	65	13	F					F	75	16	70	16
											70	16	65	16
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