EB 100 single-fluted gun drills

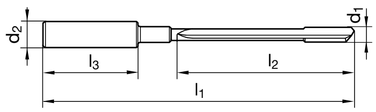
Article no. **5026**

VHM | EB 100 | SPL 120,00 | WN | h5 | R | HA

flute length 120 mm • head form G

Cutting data page 438

P	M	K	N	S	H
○	○	○	●	●	○



Article no. **5026**

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.
1.500		4.0	165.0	120.0	28.0	5026 1.500
1.588	1/16	4.0	165.0	120.0	28.0	5026 1.590
1.600		4.0	165.0	120.0	28.0	5026 1.600
1.984	5/64	4.0	165.0	120.0	28.0	5026 1.980
2.000		4.0	165.0	120.0	28.0	5026 2.000
2.500		10.0	175.0	120.0	40.0	5026 2.500
2.700		10.0	175.0	120.0	40.0	5026 2.700
3.000		10.0	175.0	120.0	40.0	5026 3.000
3.200		10.0	175.0	120.0	40.0	5026 3.200
3.500		10.0	175.0	120.0	40.0	5026 3.500
4.000		10.0	175.0	120.0	40.0	5026 4.000
4.200		10.0	175.0	120.0	40.0	5026 4.200
4.500		10.0	175.0	120.0	40.0	5026 4.500
5.000		10.0	175.0	120.0	40.0	5026 5.000

EB 100 single-fluted gun drills

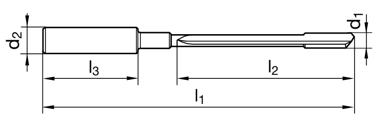
Article no. **5637**

VHM | A | EB 100 | SPL 120,00 | WN | h5 | R | HA

flute length 120 mm • head form G

Cutting data page 438

P	M	K	N	S	H
●	●	●	○	○	○



Article no. **5637**

d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.
1.500		4.0	165.0	120.0	28.0	5637 1.500
1.588	1/16	4.0	165.0	120.0	28.0	5637 1.590
1.600		4.0	165.0	120.0	28.0	5637 1.600
1.984	5/64	4.0	165.0	120.0	28.0	5637 1.980
2.000		4.0	165.0	120.0	28.0	5637 2.000
2.500		10.0	175.0	120.0	40.0	5637 2.500
2.700		10.0	175.0	120.0	40.0	5637 2.700
3.000		10.0	175.0	120.0	40.0	5637 3.000
3.200		10.0	175.0	120.0	40.0	5637 3.200
3.500		10.0	175.0	120.0	40.0	5637 3.500
4.000		10.0	175.0	120.0	40.0	5637 4.000
4.200		10.0	175.0	120.0	40.0	5637 4.200
4.500		10.0	175.0	120.0	40.0	5637 4.500
5.000		10.0	175.0	120.0	40.0	5637 5.000

Single-fluted gun drills EB 100 M, EB 100

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/mm², 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/mm², 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/mm², 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/mm², 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/mm², 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/mm², 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/mm², 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/mm², 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/mm², 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/mm², 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/mm², 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/mm², 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/mm², 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/mm², 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/mm², 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/mm²	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/mm²	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

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

The drilling process

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!

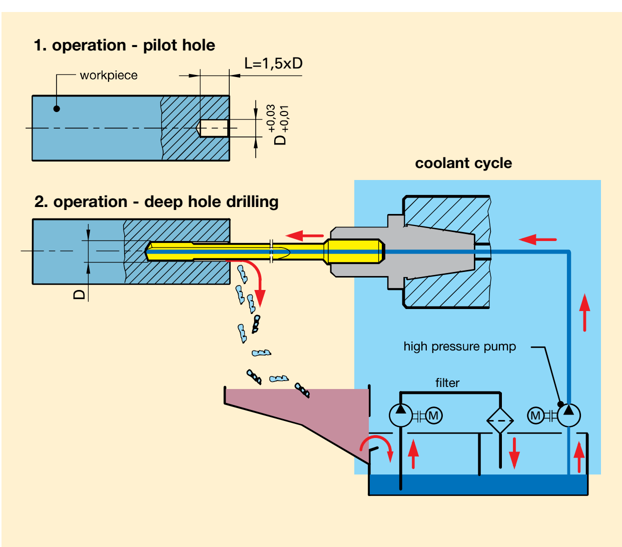
Typical procedure with all gun drills on conventional machine tools:

- 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

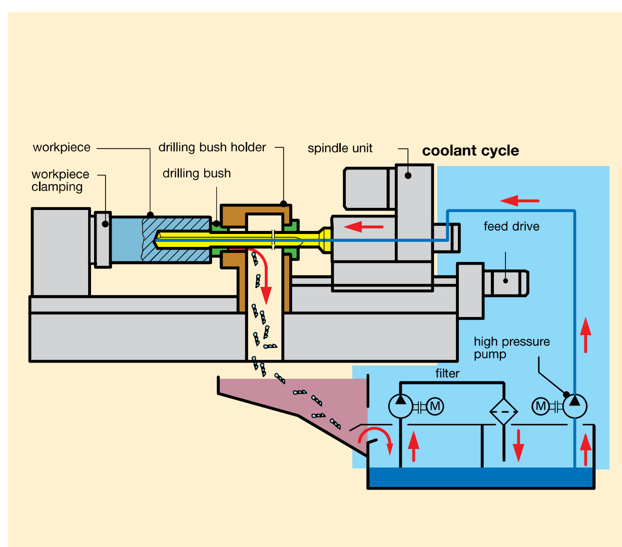
Application advice

- 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



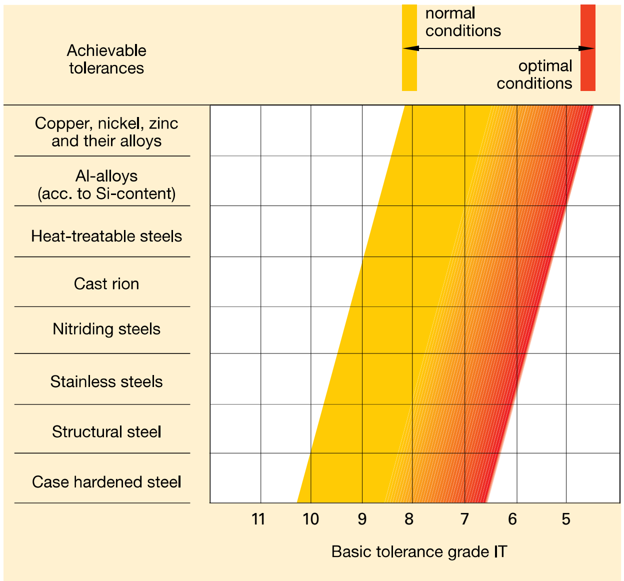
Deep hole drilling machines



Precision of single-fluted gun drills

Basic tolerances*

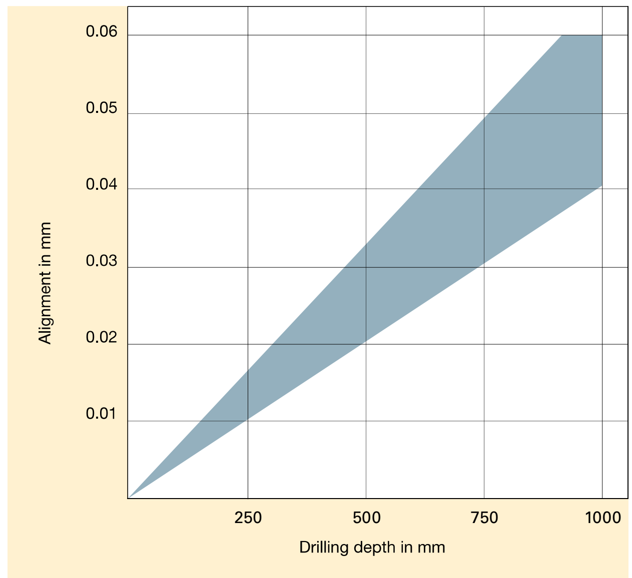
The application of single-fluted gun drills can achieve a lower basic tolerance, as the cutting forces at the cutting edge are absorbed by the guide pads, unlike twist drills where the slightest deviation of the two cutting edges causes a larger hole.



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.

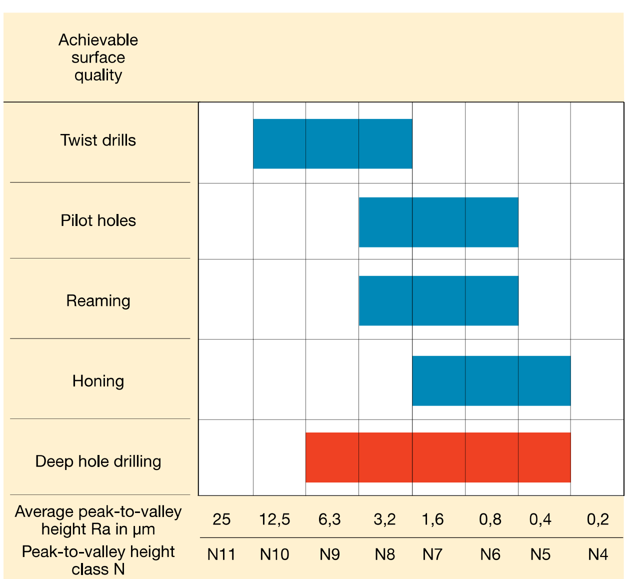


Surface quality*

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

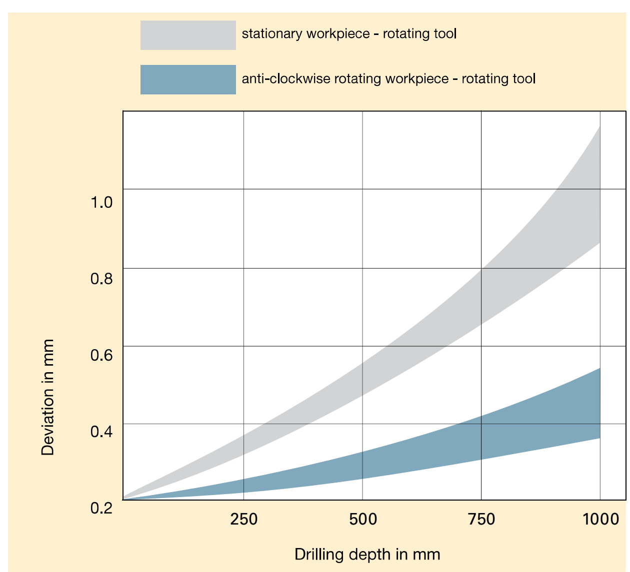
Lubrication between the guide pads and hole surface is therefore very important.

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.

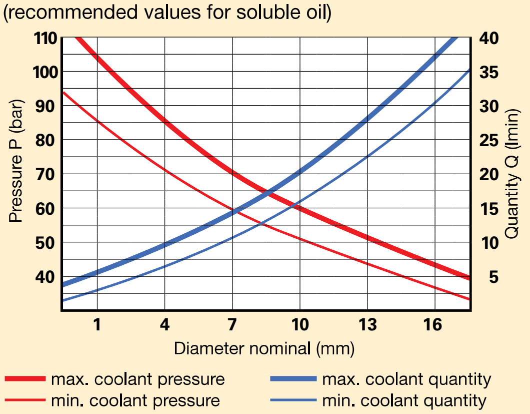


* gun drills with two cutting edges – straight-fluted as well as spiral-fluted – achieve approx. 50% of the values stated

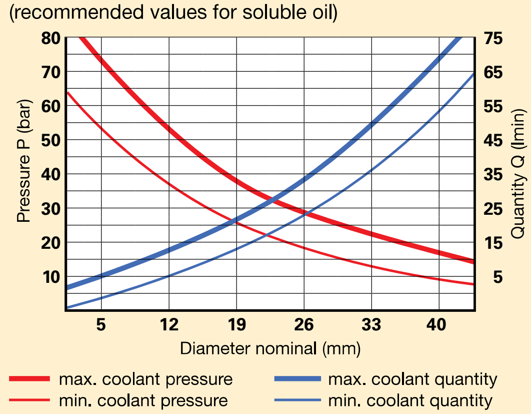
Please note:

- 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 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.

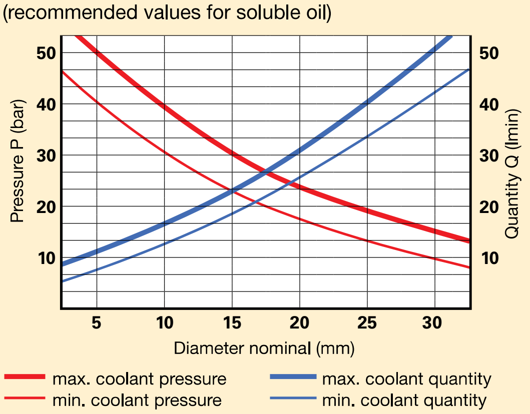
Coolant values EB 100
(recommended values for soluble oil)



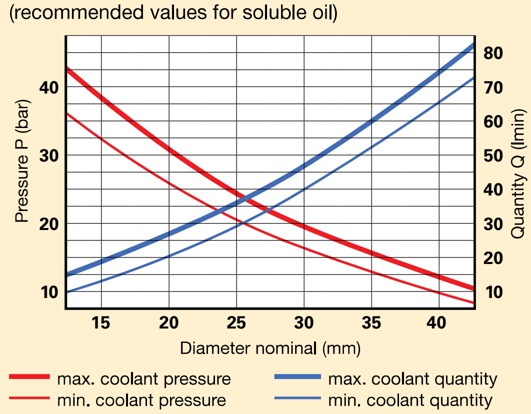
Coolant values EB 80
(recommended values for soluble oil)



Coolant values ZB 80
(recommended values for soluble oil)



Coolant values EB 800
(recommended values for soluble oil)



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.

STOP 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 ◍

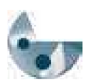
Material group	Material examples Figures in bold = material no. to DIN EN	Tens.str. N/mm²	Hardness	Coolant	rec. coating*	≤50xD v_c m/min	≤50xD Feed col. no.	>50xD v_c m/min	>50xD Feed col. no.
Common structural steels	**1.0035** S185, **1.0486** P275N, **1.0345** P235GH, **1.0425**	≤500		◍		*100*	15	*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		◍	A	*75*	14	*75*	14
	1.5710 36NiCr6, **1.7035** 41Cr4, **1.7225** 42CrMo4	≤1400		◍		*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		◍	A	*75*	14	*75*	14
	1.8519 31CrMoV9, **1.8550** 34CrAlNi7	≤1400		●		*65*	14	*65*	14
Tool steels	**1.1750** C75W, **1.2067** 102Cr6, **1.2307** 29CrMoV9	≤850		◍	A	*75*	13	*75*	13
	1.2080 X210Cr12, **1.2083** X42Cr13, **1.2419**, **1.2767**	≤1400		●		*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		●	A	*35*	12	*35*	12
	3.7154 TiAl6Zr5, **3.7165** TiAl6V4, **3.7184**	≤1400		●		*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

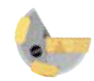


ZB80

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

EB800

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



EB80					ZB80					EB800				
	≤35xD		>35xD			≤35xD		>35xD			≤35xD		>35xD	
rec. coating*	v_c m/min	**Feed col. no.**	v_c m/min	**Feed col. no.**	rec. coating*	v_c m/min	**Feed col. no.**	v_c m/min	**Feed col. no.**	rec. coating*	v_c m/min	**Feed col. no.**	v_c m/min	**Feed col. no.**
S	100	14	95	13						S	90	15	85	15
	85	14	80	13							80	15	75	15
S	90	14	85	13						S	85	16	80	16
	80	14	75	13							75	16	70	16
S	90	13	85	12						S	85	15	80	15
	80	13	75	12							80	15	75	15
	75	13	70	12							75	15	70	15
S	75	13	70	12						S	75	15	70	15
	65	13	60	12							65	15	60	15
S	80	14	75	13						S	80	15	75	15
S	75	13	70	12						S	75	15	70	15
	65	13	60	12							70	15	65	15
C	75	13	70	12						S	70	15	65	15
	65	13	60	12							60	15	55	15
C	75	12	70	11						S	65	14	60	14
	65	12	60	11							60	14	55	14
C	55	11	50	11						S	55	14	50	14
C	65	12	60	12						S	65	15	60	15
C	55	13	50	12						F	50	14	45	14
	45	13	40	12							45	14	40	14
	35	13	35	12							40	14	35	14
C	30	12	25	11						S	30	13	25	13
	25	11	20	11							25	12	20	12
C	20	11	20	11						F	25	13	20	13
	85	15	80	14		85	18	80	17	S	85	16	80	16
	80	15	75	14		80	18	75	17		80	16	75	16
	80	14	75	13		75	17	70	16		75	16	70	16
	70	14	65	13		70	17	65	16		70	16	65	16
	55	13	50	12		65	16	60	15		55	15	50	15
C	35	11	30	11						F	35	13	30	13
	30	11	25	11							30	12	25	12
	150	16	140	15		120	18	115	17		140	16	135	16
	120	15	115	14		110	18	105	17		125	16	120	16
	150	16	140	15		135	18	130	17		170	17	165	17
	130	16	120	15		120	17	115	16		140	17	135	17
	110	16	100	15							115	16	110	16
C	75	14	70	13						F	75	15	70	15
	120	17	115	16		130	18	125	17		120	17	115	17
	90	17	85	16		120	18	115	17		90	17	85	17
	95	16	90	15		110	17	105	16		95	17	90	17
	75	16	70	15		110	17	105	16		75	17	70	17
	70	16	65	15		95	17	90	16		70	17	65	17
	60	16	55	15		95	17	90	16		60	17	55	17
	75	14	70	13							75	16	70	16
	70	14	65	13							70	16	65	16
	60	13	55	12							60	15	55	15
	50	13	45	12							50	15	45	15