EB 80 single-fluted gun drills

80xD | EB 80 | WN | R | h5

Tool material	Carbide
Surface	◯
Shank form	HB

NEW

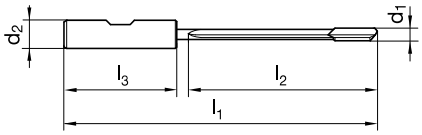
P	○
M	○
K	○
N	●
S	●
H	○

head form G

max. flute length per tool 40 x D, for larger drilling depths apply art. no. 5689 as first tool

GÜHRINGNAVIGATOR

Cutting data page 184



Article no. **5690**

d1 h5		d2 h6	l1	l2	l3	Code no.
mm	inch	mm	mm	mm	mm	
3.969	5/32	10.000	390.00	350.00	40.00	3.970
4.950		16.000	480.00	432.00	48.00	4.950
5.953	15/64	16.000	560.00	512.00	48.00	5.950
6.950		16.000	740.00	692.00	48.00	6.950
7.950		16.000	740.00	692.00	48.00	7.950
8.950		16.000	910.00	860.00	48.00	8.950
9.950		20.000	910.00	860.00	50.00	9.950
11.950		20.000	1080.00	1030.00	50.00	11.950

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!

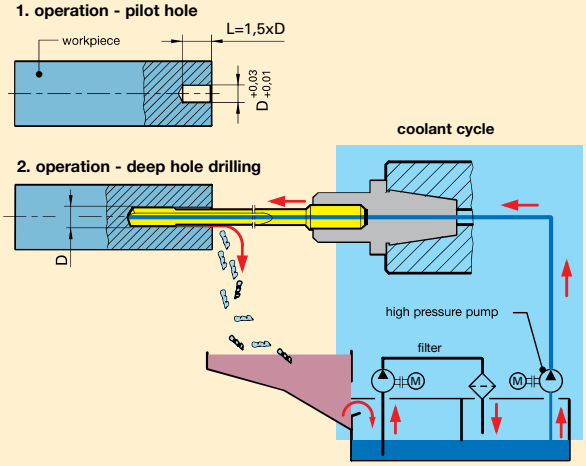
Typical procedure with all gun drills on conventional machine tools:

- 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

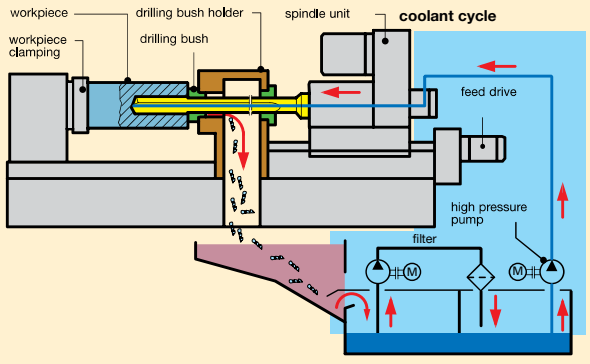
Application advice

- 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

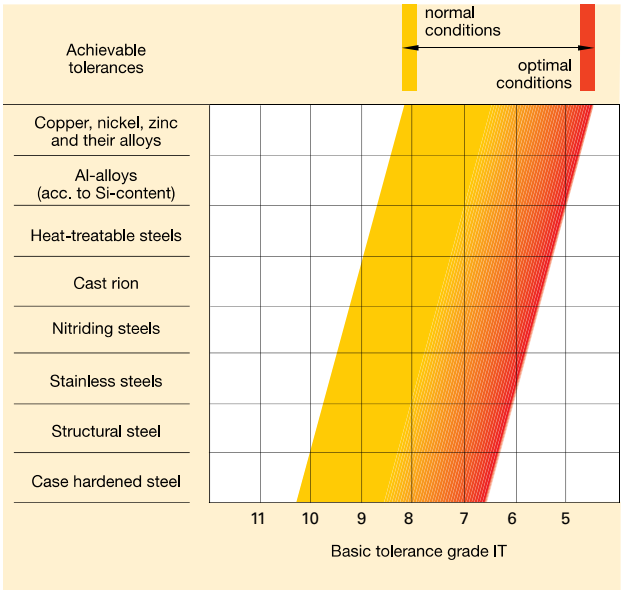


Deep hole drilling machines



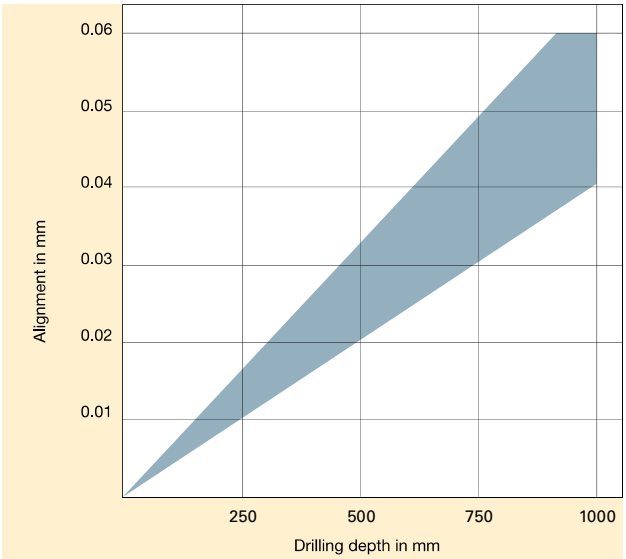
Basic tolerances*

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.



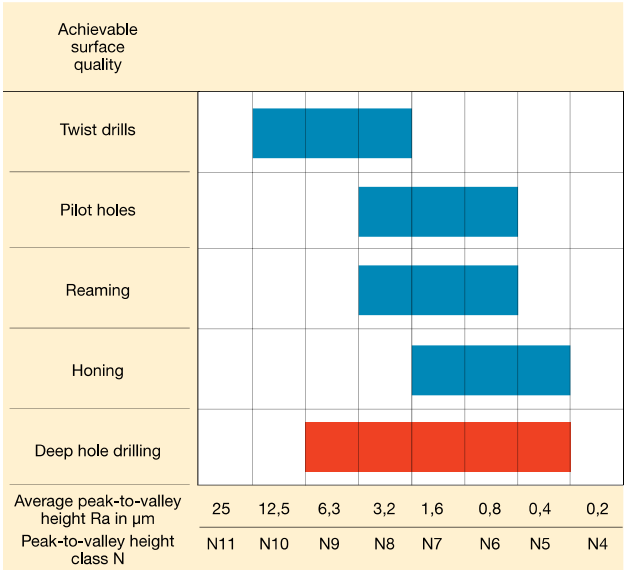
Alignment accuracy*

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.



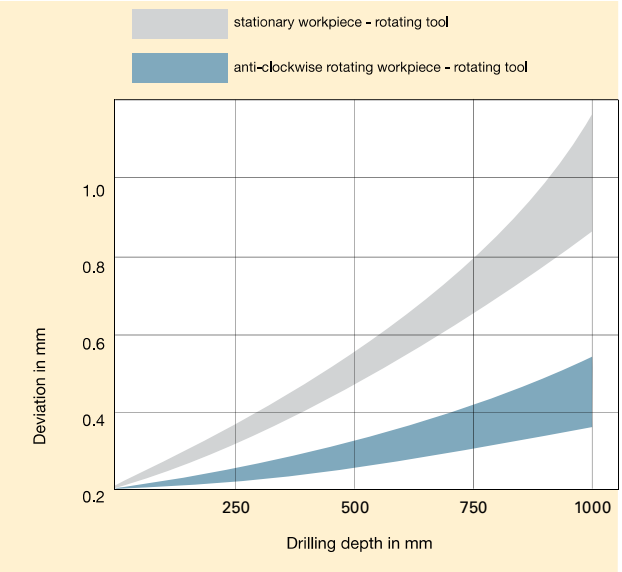
Surface quality*

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.



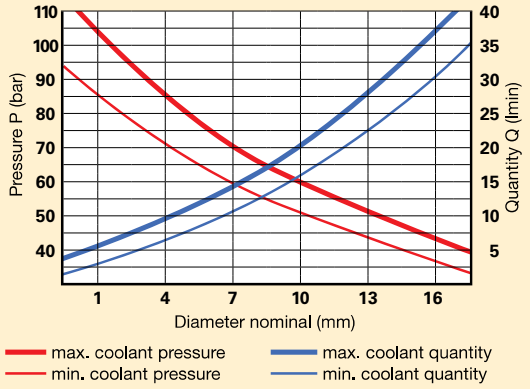
* gun drills with two cutting edges – straight-fluted as well as spiral-fluted – achieve approx. 50% of the values stated

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.

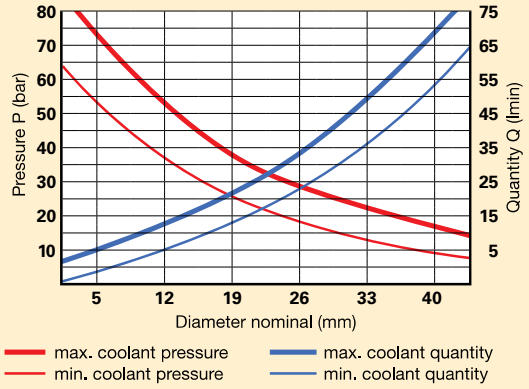
Coolant values EB 100

(recommended values for soluble oil)



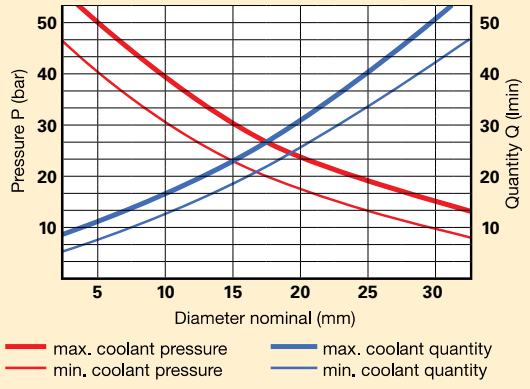
Coolant values EB 80

(recommended values for soluble oil)



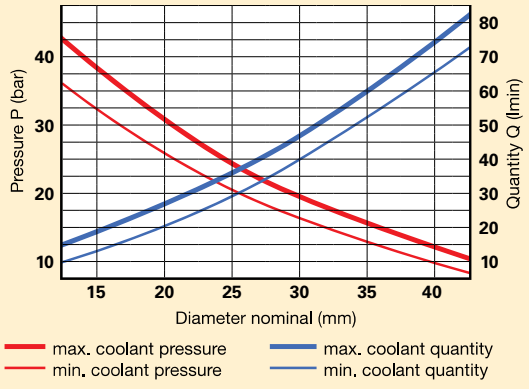
Coolant values ZB 80

(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