



HARTNER

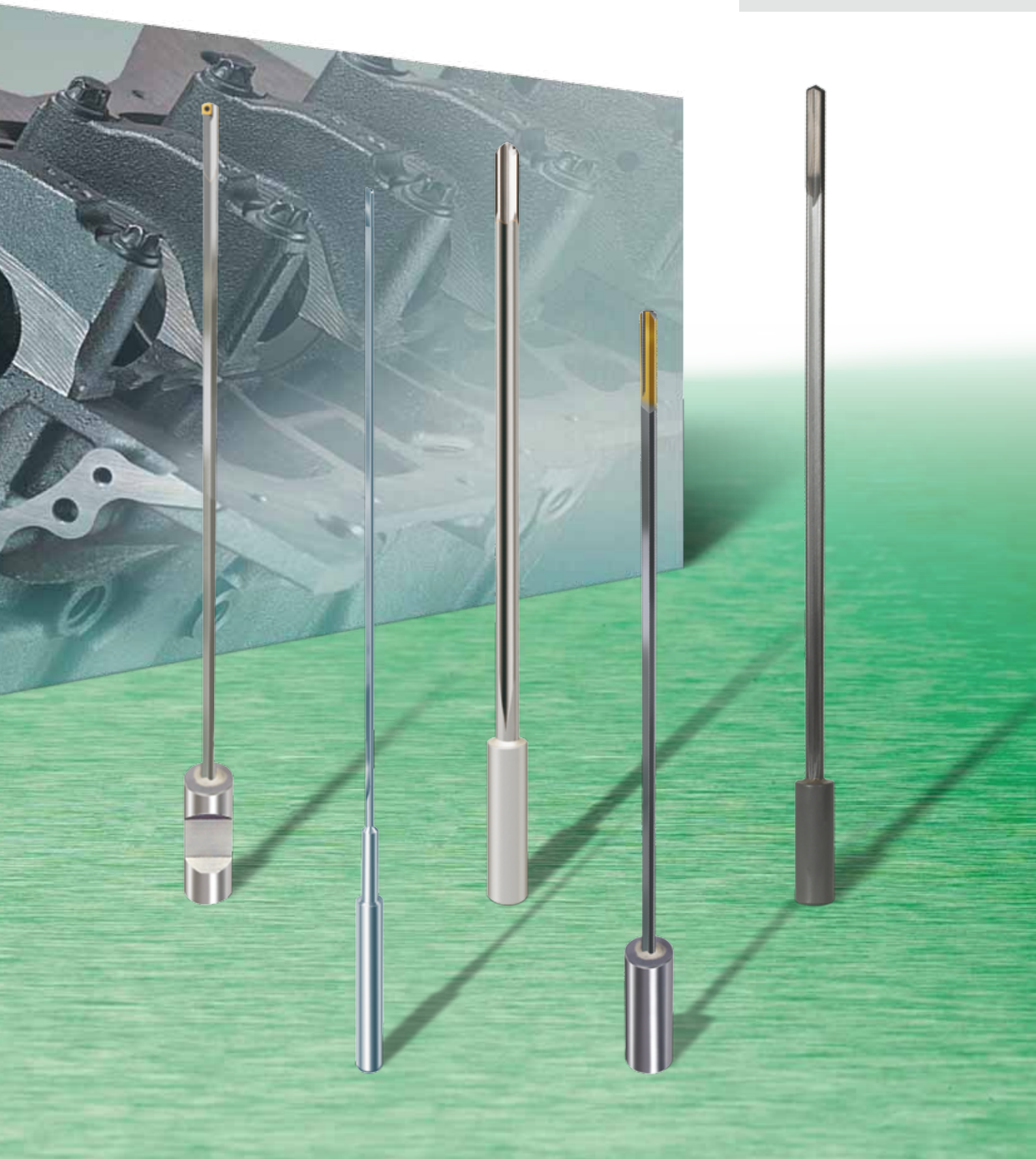
Precision Cutting Tools

Gun Drills

The complete programme

New: Extended range

2011





Gun drills

Standard	Type	Tool material	Surface finish	Cutting direction	Flute length (mm)	Drilling depth	Diameter range	Order no.	Discount group	page
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Gun drills E100, flute length depending on drilling depth



Hartner std.	TLB E 100	Solid carbide		right-hand		25xD	1.000 - 12.000	89520	123	6
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Hartner std.	TLB E 100	Solid carbide		right-hand		50xD	1.000 - 8.000	89521	123	7
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Hartner std.	TLB E 100	Solid carbide		right-hand		75xD	1.000 - 6.000	89522	123	7
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Gun drills E100, flute length in mm



Hartner std.	TLB E 100	Solid carbide		right-hand	45.00		1.200 - 3.200	89503	123	8
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Hartner std.	TLB E 100	Solid carbide		right-hand	45.00		2.000 - 3.200	89510	123	8
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Hartner std.	TLB E 100	Solid carbide		right-hand	80.00		1.200 - 5.000	89501	123	8
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Hartner std.	TLB E 100	Solid carbide		right-hand	80.00		2.000 - 5.000	89511	123	8
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Hartner std.	TLB E 100	Solid carbide		right-hand	120.00		1.500 - 5.000	89504	123	9
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Hartner std.	TLB E 100	Solid carbide		right-hand	120.00		2.000 - 5.000	89512	123	9
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Hartner std.	TLB E 100	Solid carbide		right-hand	160.00		1.500 - 5.000	89502	123	9
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Hartner std.	TLB E 100	Solid carbide		right-hand	160.00		2.000 - 8.000	89513	123	9
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bright

TiCN

AiTiN

nanoA

TiN





Gun drills

Standard	Type	Tool material	Surface finish	Cutting direction	Flute length (mm)	Drilling depth	Diameter range	Order no.	Discount group	page
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Gun drills E80



Hartner std.	TLB E 80	Carbide	T	right-hand		20 x D	4.000 - 12.000	89505	123	12
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Hartner std.	TLB E 80	Carbide	C	right-hand		20 x D	3.970 - 12.700	89514	123	12
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Hartner std.	TLB E 80	Carbide	T	right-hand		30 x D	4.000 - 12.000	89509	123	13
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Hartner std.	TLB E 80	Carbide	C	right-hand		30 x D	3.970 - 12.700	89515	123	13
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Hartner std.	TLB E 80	Carbide	T	right-hand		40 x D	4.000 - 12.000	89506	123	14
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Hartner std.	TLB E 80	Carbide	C	right-hand		40 x D	3.970 - 12.700	89516	123	14
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Hartner std.	TLB E 80	Carbide	T	right-hand		80 x D	4.950 - 11.950	89507	123	15
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Hartner std.	TLB E 80	Carbide	C	right-hand		80 x D	3.970 - 12.700	89517	123	15
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Gun drills with 2 cutting lips Z80



Hartner std.	TLB Z 80	Carbide	○	right-hand		30 x D	8.000 - 12.000	89508	123	17
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Hartner std.	TLB Z 80	Carbide	○	right-hand		30 x D	8.000 - 12.000	89518	123	17
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Gun drills E800



Hartner std.	TLB E 800	Carbide		right-hand		30 x D	16.000 - 24.000	89530	123	19
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○ bright ● TICN ● A AlTiN ● a nanoA ● T TiN



HARTNER

Solid carbide single-fluted gun drill E 100

suitable for almost every material, from \varnothing 0.9 - 12.0 mm,
max. flute length 500 mm

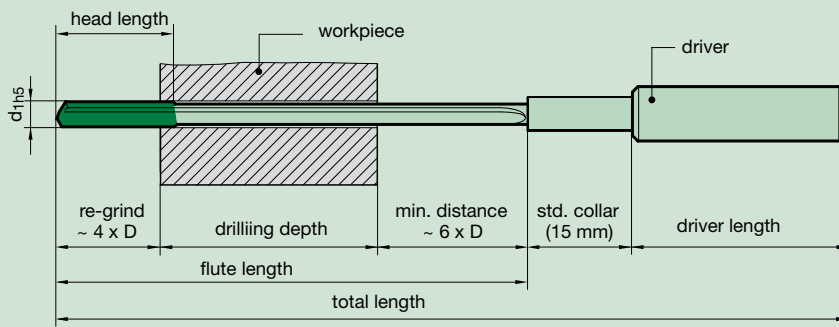


To ask for or to order Hartner solid carbide single-fluted gun drills E 100 especially suited to your application, please complete the fax inquiry on page 28.

For certain materials a coating is required, as the successful application of gun drills with a bright surface finish cannot be guaranteed. For coating definitions see Hartnerguide page 30/31.

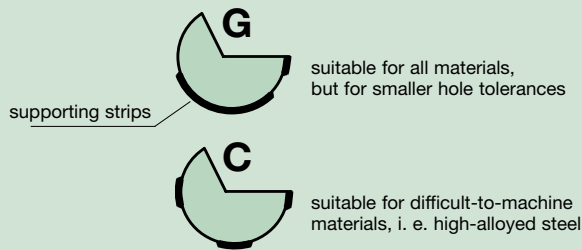
T TiN **A** TiAlN **C** TiCN **F** FIRE **M** MolyGlide **A** AlTiN **a** nanoA

The dimensions required to calculate the length for conventional machine tools



Head forms

(Position of supporting strips. Special head forms on request.)

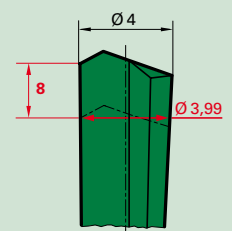
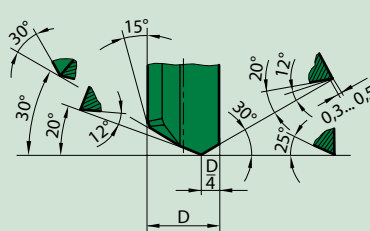
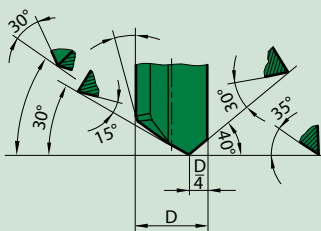


Standard point grinds (special point grinds on request)

\varnothing 2...4,00 mm

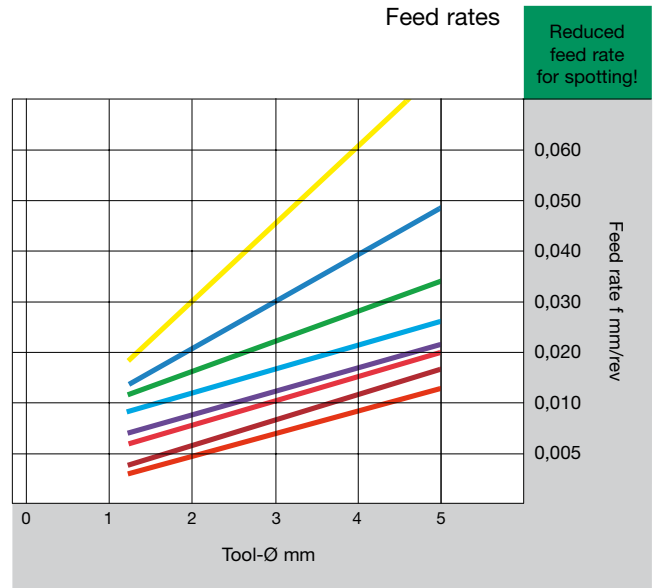
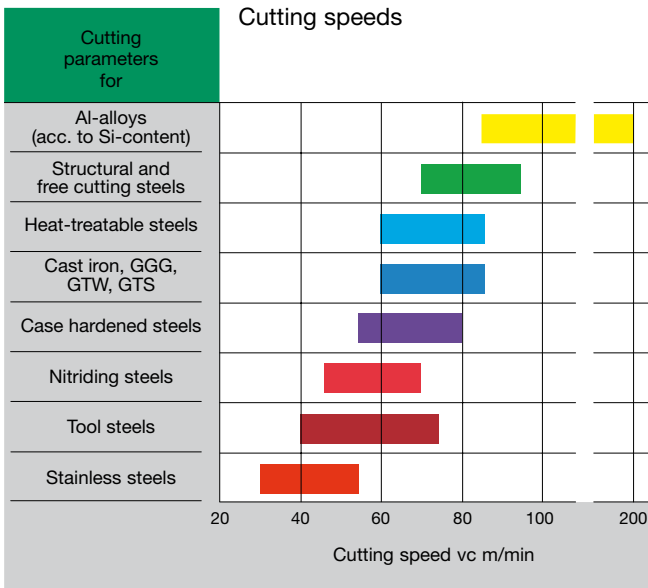
\varnothing > 4,01...20 mm

Back taper ratio 1:800 (standard) (dimensions in mm)

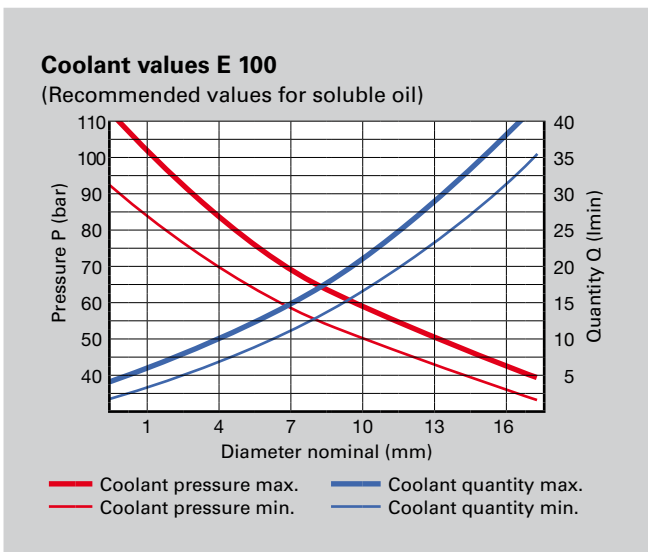




Solid carbide single-fluted gun drill E 100



(Detailed cutting parameters see page 30/31)



E100 solid carbide from tip to shank



TiAlN nanoA-coated design for almost every material



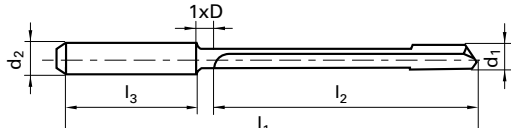
Solid carbide solid shank with conical MQL shank end





HARTNER

Single-fluted gun drills E100



					89520
					Solid carbide
					123
					right-hand
					25xD
					a
					Availability
d1h5	d2	l1	l2	l3	
mm	mm	mm	mm	mm	
1.000	3.000	60.00	30.00	28.00	●
1.500	4.000	80.00	50.00	28.00	●
1.590	4.000	80.00	50.00	28.00	●
1.980	4.000	100.00	70.00	28.00	●
2.000	4.000	100.00	70.00	28.00	●
2.380	4.000	100.00	70.00	28.00	●
2.500	4.000	115.00	85.00	28.00	●
2.780	4.000	115.00	85.00	28.00	●
3.000	6.000	145.00	105.00	36.00	●
3.170	6.000	145.00	105.00	36.00	●
3.500	6.000	145.00	105.00	36.00	●
3.970	6.000	160.00	120.00	36.00	●
4.000	6.000	160.00	120.00	36.00	●
5.000	6.000	220.00	180.00	36.00	●
5.560	6.000	220.00	180.00	36.00	●
6.000	6.000	220.00	180.00	36.00	●
6.350	8.000	260.00	210.00	36.00	●
7.000	8.000	260.00	210.00	36.00	●
7.140	8.000	285.00	240.00	36.00	●
8.000	8.000	285.00	240.00	36.00	●
9.000	10.000	350.00	300.00	40.00	●
10.000	10.000	350.00	300.00	40.00	●
11.000	12.000	420.00	360.00	45.00	●
12.000	12.000	420.00	360.00	45.00	●



HARTNER

Single-fluted gun drills E100



					89521
					Solid carbide
					123
					right-hand
					50xD
					a
					Availability
d1h5	d2	l1	l2	l3	
mm	mm	mm	mm	mm	
1.000	3.000	85.00	55.00	28.00	●
1.500	4.000	120.00	85.00	28.00	●
1.590	4.000	120.00	85.00	28.00	●
1.980	4.000	160.00	130.00	28.00	●
2.000	4.000	160.00	130.00	28.00	●
2.380	4.000	160.00	130.00	28.00	●
2.500	4.000	185.00	155.00	28.00	●
2.780	4.000	185.00	155.00	28.00	●
3.000	6.000	230.00	190.00	36.00	●
3.170	6.000	230.00	190.00	36.00	●
3.500	6.000	230.00	190.00	36.00	●
3.970	6.000	260.00	220.00	36.00	●
4.000	6.000	260.00	220.00	36.00	●
5.000	6.000	370.00	330.00	36.00	●
5.560	6.000	370.00	330.00	36.00	●
6.000	6.000	370.00	330.00	36.00	●
6.350	8.000	430.00	385.00	36.00	●
7.000	8.000	430.00	385.00	36.00	●
7.140	8.000	485.00	440.00	36.00	●
8.000	8.000	485.00	440.00	36.00	●

					89522
					Solid carbide
					123
					right-hand
					75xD
					a
					Availability
d1h5	d2	l1	l2	l3	
mm	mm	mm	mm	mm	
1.000	3.000	110.00	80.00	28.00	●
1.500	4.000	155.00	125.00	28.00	●
1.590	4.000	155.00	125.00	28.00	●
1.980	4.000	220.00	190.00	28.00	●
2.000	4.000	220.00	190.00	28.00	●
2.380	4.000	220.00	190.00	28.00	●
2.500	4.000	255.00	220.00	28.00	●
2.780	4.000	255.00	220.00	28.00	●
3.000	6.000	320.00	280.00	36.00	●
3.170	6.000	320.00	280.00	36.00	●
3.500	6.000	320.00	280.00	36.00	●
3.970	6.000	360.00	320.00	36.00	●
4.000	6.000	360.00	320.00	36.00	●
5.000	6.000	525.00	485.00	36.00	●
5.560	6.000	525.00	485.00	36.00	●
6.000	6.000	525.00	485.00	36.00	●

○ bright

● TICN

● AlTiN

● nanoA

● TiN





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Single-fluted gun drills E100

					89503	89510
					Solid carbide	
					123	123
					right-hand	right-hand
					45 mm	45 mm
d1h5	d2	l1	l2	l3	Availability	
mm	mm	mm	mm	mm		
1.200	4.000	90.00	45.00	28.00	●	
1.500	4.000	90.00	45.00	28.00	●	
1.600	4.000	90.00	45.00	28.00	●	
2.000	4.000	90.00	45.00	28.00	●	●
2.500	10.000	100.00	45.00	40.00	●	●
2.700	10.000	100.00	45.00	40.00	●	●
3.000	10.000	100.00	45.00	40.00	●	●
3.200	10.000	100.00	45.00	40.00	●	●

					89501	89511
					Solid carbide	
					123	123
					right-hand	right-hand
					80 mm	80 mm
d1h5	d2	l1	l2	l3	Availability	
mm	mm	mm	mm	mm		
1.200	4.000	125.00	80.00	28.00	●	
1.500	4.000	125.00	80.00	28.00	●	
1.600	4.000	125.00	80.00	28.00	●	
2.000	4.000	125.00	80.00	28.00	●	●
2.500	10.000	135.00	80.00	40.00	●	●
2.700	10.000	135.00	80.00	40.00	●	●
3.000	10.000	135.00	80.00	40.00	●	●
3.200	10.000	135.00	80.00	40.00	●	●
3.500	10.000	135.00	80.00	40.00	●	●
4.000	10.000	135.00	80.00	40.00	●	●
4.200	10.000	135.00	80.00	40.00	●	●
4.500	10.000	135.00	80.00	40.00	●	●
5.000	10.000	135.00	80.00	40.00	●	●

○ bright ● TICN ● A TiTiN ● a nanoA ● T TiN



HARTNER

Single-fluted gun drills E100

					89504	89512
					Solid carbide	
					123	123
					right-hand	right-hand
					120 mm	120 mm
					○	Ⓐ
d1h5	d2	l1	l2	l3	Availability	
mm	mm	mm	mm	mm		
1.500	4.000	165.00	120.00	28.00	●	
1.600	4.000	165.00	120.00	28.00	●	
2.000	4.000	165.00	120.00	28.00	●	●
2.500	10.000	175.00	120.00	40.00	●	●
2.700	10.000	175.00	120.00	40.00	●	●
3.000	10.000	175.00	120.00	40.00	●	●
3.200	10.000	175.00	120.00	40.00	●	●
3.500	10.000	175.00	120.00	40.00	●	●
4.000	10.000	175.00	120.00	40.00	●	●
4.200	10.000	175.00	120.00	40.00	●	●
4.500	10.000	175.00	120.00	40.00	●	●
5.000	10.000	175.00	120.00	40.00	●	●

					89502	89513
					Solid carbide	
					123	123
					right-hand	right-hand
					160 mm	160 mm
					○	Ⓐ
d1h5	d2	l1	l2	l3	Availability	
mm	mm	mm	mm	mm		
1.500	4.000	205.00	160.00	28.00	●	
1.600	4.000	205.00	160.00	28.00	●	
2.000	4.000	205.00	160.00	28.00	●	●
2.500	10.000	215.00	160.00	40.00	●	●
2.700	10.000	215.00	160.00	40.00	●	●
3.000	10.000	215.00	160.00	40.00	●	●
3.200	10.000	215.00	160.00	40.00	●	●
3.500	10.000	215.00	160.00	40.00	●	●
4.000	10.000	215.00	160.00	40.00	●	●
4.200	10.000	215.00	160.00	40.00	●	●
4.500	10.000	215.00	160.00	40.00	●	●
5.000	10.000	215.00	160.00	40.00	●	●
6.000	16.000	225.00	160.00	48.00	●	●
8.000	16.000	225.00	160.00	48.00	●	●

○ bright Ⓒ TiCN Ⓐ AlTiN a nanoA T TiN



Single-fluted gun drills with solid carbide head E 80

suitable for almost every material, from $\varnothing 2 - 40.0$ mm,
max. total length 3000 mm



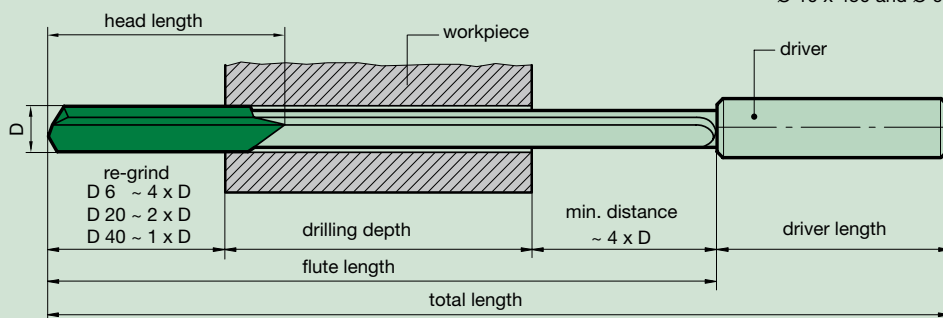
To ask for or to order Hartner single-fluted gun drills E 80 with solid carbide head especially suited to your application, please complete the fax inquiry on page 28.
From $\varnothing 6.0 \dots 20.0$ mm we can fit PCD or CBN cutting edges on request.
With AISI-alloys for example, tool life subsequently increases multi-fold.

For certain materials a coating is required, as the successful application of gun drills with a bright surface finish cannot be guaranteed.
For coating definitions see Hartnerguide page 30/31.

T TiN **A** TiAlN **C** TiCN **F** FIRE **M** MolyGlide **A** AlTiN **a** nanoA

The dimensions required to calculate the length for conventional machine tools

* max. flute length per tool $40 \times D$, for larger drilling depths apply two tools. (i.e. $\varnothing 10 \times 450$ and $\varnothing 9,95 \times 850$ mm)



Head forms

(Position of supporting strips.)



Standard designs

Suitable for all materials, but for smaller hole tolerances



Suitable for difficult-to-machine materials, i.e. high-alloyed steels

Supporting strip



Special designs

Suitable for all materials, but for larger hole tolerances

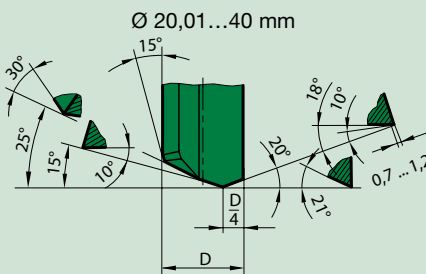
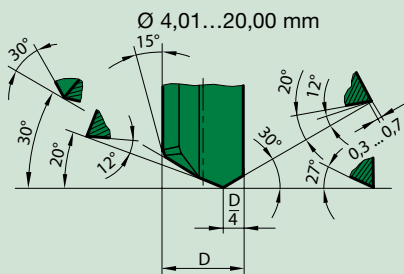
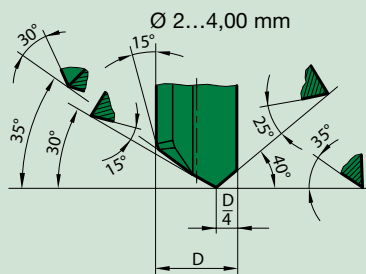


Suitable for all materials, but only when spotting conditions are unfavourable



This design is predominantly suitable for grey cast iron

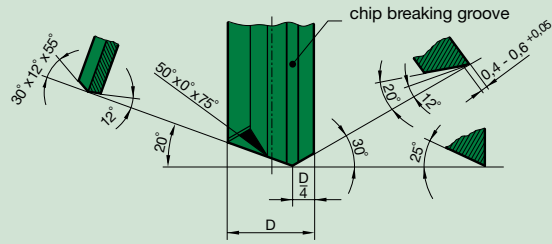
Standard point grinds (special point grinds available, see page 20)





Single-fluted gun drills with solid carbide head E 80

EB 80 standard point grind with chip breaker groove
for Art.-Nr. 89505, 89509, 89506 and 89507



Fast service for brazed single-fluted gun drills

In addition to the ex-stock range Hartner offers a fast service for gun drills with standard point grind and standard driver in following dimensions. Delivery time is max. 3 weeks.

nom.-Ø-mm	in increments of mm	head form	total length	Prices on request
2,00...13,90	0,1	G	≤ 7,5 mm Ø 650 max	
4,00...13,90	0,1	C	> 7,5 mm Ø 1200 max	
14,00...22,00	0,5	G	1200 max	
14,00...22,00	0,5	C		

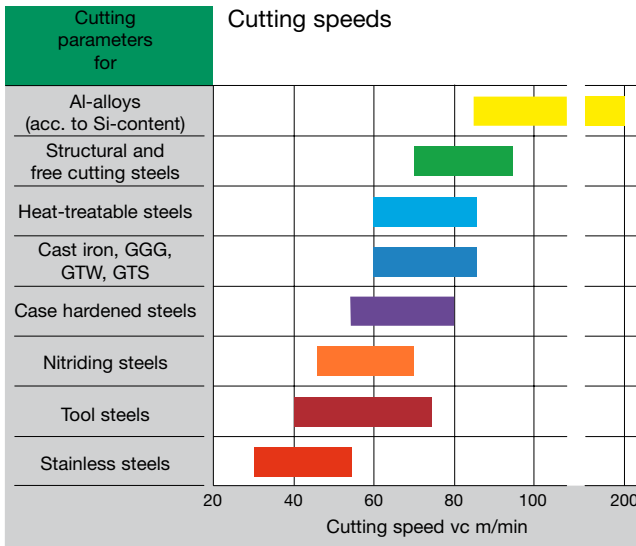
Tool material: solid carbide/K15

Surface finish: ○

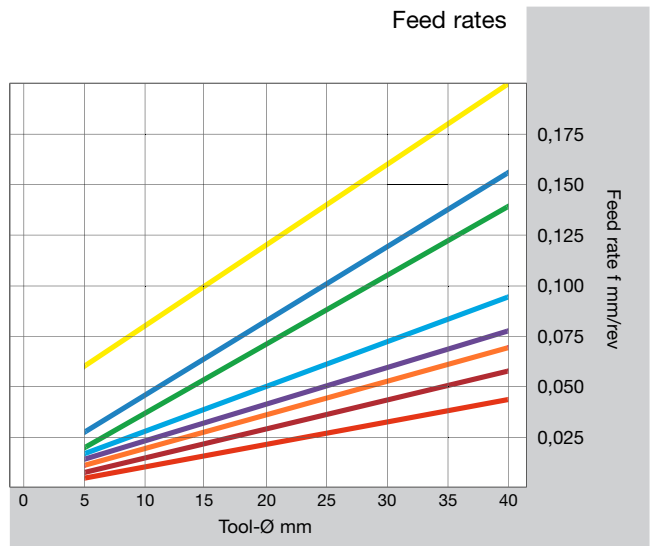
Standard-head lengths (mm)

Ø-range	length	Ø-range	length
2,00...2,49	15	10,00...10,99	35
2,50...2,99	18	11,00...17,00	40
3,00...3,99	20	17,01...20,00	45
4,00...5,19	25	20,01...23,00	50
5,20...6,99	30	23,01...26,00	55
7,00...9,99	35	26,01...40,00	65

Flute length: min. 20 x D

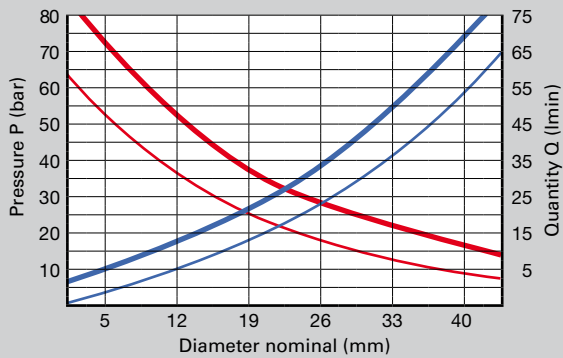


(Detailed cutting parameters see pages 30/31)



Coolant values E 80

(Recommended values for soluble oil)



— Coolant pressure max. — Coolant quantity max.
— Coolant pressure min. — Coolant quantity min.



TiN-coated design with chip breaker for long-chipping steels



TiCN-coated design without chip breaker for alloyed and high-alloyed steels



HARTNER

Single-fluted gun drills E80

						89505	89514
						Carbide	
						123	123
						right-hand	right-hand
						20xD	20xD
						T	C
						Availability	
d1h5	d1h5	d2	l1	l2	l3		
inch	mm	mm	mm	mm	mm		
5/32	3.970	10.000	150.00	100.00	40.00		● NEW
	4.000	10.000	150.00	100.00	40.00	●	●
	4.200	10.000	160.00	110.00	40.00	●	
13/64	4.500	10.000	170.00	120.00	40.00	●	
	5.000	16.000	180.00	130.00	48.00	●	●
	5.156	16.000	180.00	130.00	48.00		● NEW
1/4	5.500	16.000	190.00	140.00	48.00	●	
	6.000	16.000	210.00	160.00	48.00	●	●
	6.350	16.000	220.00	170.00	48.00		● NEW
15/16	6.500	16.000	220.00	170.00	48.00	●	
	7.000	16.000	235.00	185.00	48.00	●	● NEW
	7.938	16.000	260.00	210.00	48.00		● NEW
3/8	8.000	16.000	260.00	210.00	48.00	●	●
	9.000	16.000	280.00	230.00	48.00	●	● NEW
	9.525	16.000	290.00	240.00	48.00		● NEW
7/16	10.000	20.000	320.00	260.00	50.00	●	●
	11.000	20.000	340.00	290.00	50.00		●
	11.113	20.000	340.00	290.00	50.00		● NEW
1/2	12.000	20.000	370.00	310.00	50.00	●	●
	12.700	20.000	385.00	330.00	50.00		● NEW

○ bright

● C TiCN

● A AlTiN

● a nanoA

● T TiN





HARTNER

Single-fluted gun drills E80

						89509	89515
						Carbide	
						123	123
						right-hand	right-hand
						30xD	30xD
						T	C
d1h5	d1h5	d2	l1	l2	l3	Availability	
inch	mm	mm	mm	mm	mm		
5/32	3.970	10.000	200.00	155.00	40.00		● NEW
	4.000	10.000	200.00	155.00	40.00	●	●
	4.200	10.000	210.00	165.00	40.00	●	
13/64	4.500	10.000	220.00	175.00	40.00	●	
	5.000	16.000	230.00	182.00	48.00	●	● NEW
	5.156	16.000	230.00	182.00	48.00		● NEW
1/4	5.500	16.000	245.00	197.00	48.00	●	
	6.000	16.000	260.00	212.00	48.00	●	●
	6.350	16.000	275.00	227.00	48.00		● NEW
15/16	6.500	16.000	275.00	227.00	48.00	●	
	7.000	16.000	290.00	242.00	48.00	●	● NEW
	7.938	16.000	320.00	272.00	48.00		● NEW
3/8	8.000	16.000	320.00	272.00	48.00	●	●
	9.000	16.000	350.00	302.00	48.00	●	● NEW
	9.525	16.000	380.00	330.00	48.00		● NEW
7/16	10.000	20.000	400.00	350.00	50.00	●	●
	11.000	20.000	430.00	380.00	50.00		● NEW
	11.113	20.000	430.00	380.00	50.00		● NEW
1/2	12.000	20.000	450.00	400.00	50.00	●	●
	12.700	20.000	500.00	450.00	50.00		● NEW

○ bright

● TICN

● AlTiN

● nanoA

● TiN





HARTNER

Single-fluted gun drills E80

						89506	89516
						Carbide	
						123	123
						right-hand	right-hand
						40xD	40xD
						T	C
						Availability	
d1h5	d1h5	d2	l1	l2	l3		
inch	mm	mm	mm	mm	mm		
5/32	3.970	10.000	230.00	185.00	40.00		● NEW
	4.000	10.000	230.00	185.00	40.00	●	
	4.200	10.000	240.00	195.00	40.00	●	
13/64	4.500	10.000	250.00	205.00	40.00	●	
	5.000	16.000	280.00	232.00	48.00	●	
	5.156	16.000	280.00	232.00	48.00	●	NEW
1/4	5.500	16.000	300.00	252.00	48.00	●	
	6.000	16.000	320.00	272.00	48.00	●	
	6.350	16.000	340.00	292.00	48.00	●	NEW
15/16	6.500	16.000	340.00	292.00	48.00	●	
	7.000	16.000	370.00	322.00	48.00	●	NEW
	7.938	16.000	430.00	372.00	48.00	●	NEW
3/8	8.000	16.000	430.00	372.00	48.00	●	
	9.000	16.000	450.00	402.00	48.00	●	NEW
	9.525	16.000	480.00	432.00	48.00	●	NEW
7/16	10.000	20.000	510.00	460.00	50.00	●	
	11.000	20.000	550.00	500.00	50.00	●	NEW
	11.113	20.000	550.00	500.00	50.00	●	NEW
1/2	12.000	20.000	600.00	550.00	50.00	●	
	12.700	20.000	635.00	585.00	50.00		● NEW

○ bright

● C TiCN

● A AlTiN

● a nanoA

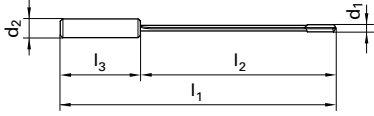
● T TiN





HARTNER

Single-fluted gun drills E80



						89507	89517		
						Carbide		123	
						right-hand		right-hand	
						80xD		80xD	
						T		C	
d1h5	d1h5	d2	l1	l2	l3	Availability			
inch	mm	mm	mm	mm	mm				
13/64	4.950	16.000	480.00	432.00	48.00	●	●		
	5.106	16.000	480.00	432.00	48.00		● NEW		
	5.950	16.000	560.00	512.00	48.00	●	●		
1/4	6.300	16.000	590.00	542.00	48.00		● NEW		
	6.450	16.000	590.00	542.00	48.00		● NEW		
	6.950	16.000	650.00	602.00	48.00		● NEW		
15/16	7.888	16.000	740.00	692.00	48.00		● NEW		
	7.950	16.000	740.00	692.00	48.00	●	●		
	8.950	16.000	820.00	772.00	48.00		● NEW		
3/8	9.475	16.000	870.00	822.00	48.00		● NEW		
	9.950	20.00	910.00	860.00	50.00	●	●		
	10.950	20.00	995.00	945.00	50.00		● NEW		
7/16	11.063	20.00	995.00	945.00	50.00		● NEW		
	11.950	20.00	1080.00	1030.00	50.00	●	●		
1/2	12.650	20.00	1140.00	1090.00	50.00		● NEW		

○ bright

● C TiCN

● A AlTiN

● a nanoA

● T TiN





Two-fluted gun drills with solid carbide head Z 80

suitable for cast iron, aluminium and short-chipping nonferrous metals, from Ø 6.0 - 27.0 mm, max. total length 1000 mm



To ask for or to order Hartner two-fluted gun drills Z 80 with solid carbide head especially suited to your application, please complete the fax inquiry on page 28.

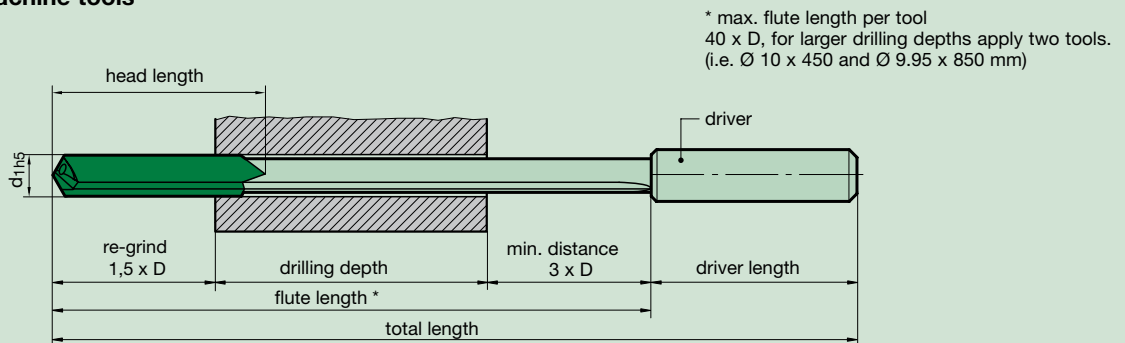
M MolyGlide

For certain materials a coating is required, as the successful application of gun drills with a bright surface finish cannot be guaranteed. For chilled cast iron and Al cast alloys with a Si-content above 10% we recommend our MolyGlide-coating. However, two-fluted gun drills can only be coated with MolyGlide up to an overall length of maximum 500 mm due to the technical production process.

The main advantage of two-fluted gun drills compared to single-fluted gun drills is the substantially higher feed rate that can be applied during the production of the hole. This is due to the design of the two-fluted gun drill, it has two cutting edges and two flutes. Holes can therefore be produced considerably faster. However, this increase in machining speed is combined with a reduction in hole accuracy. This is also a direct consequence

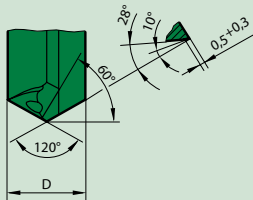
of a drill design with two cutting edges. As the cutting edges are positioned opposite each other, there is less of a smoothing effect and less support in comparison to a single-fluted gun drill. For drilling depths $\leq 10 \times D$ we recommend our TS Drill TS 150 GG, available ex stock and more cost-effective for these drilling depths than brazed gun drills. In addition, TS 150 GG does not require a pilot hole in most applications.

The dimensions required to calculate the length for conventional machine tools

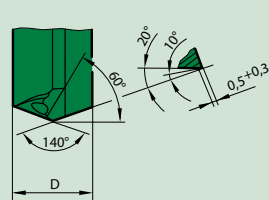


Standard point grinds (special point grinds available)

Point grind G for machining cast iron

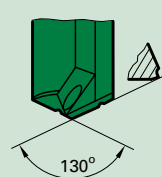


Point grind A for machining aluminium

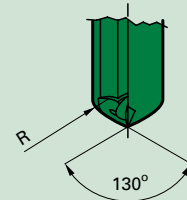


Special point grinds, e.g.:

Aluminium



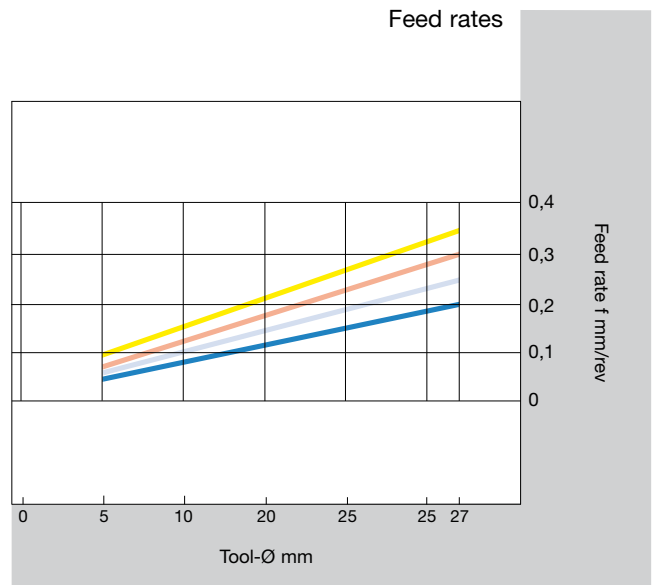
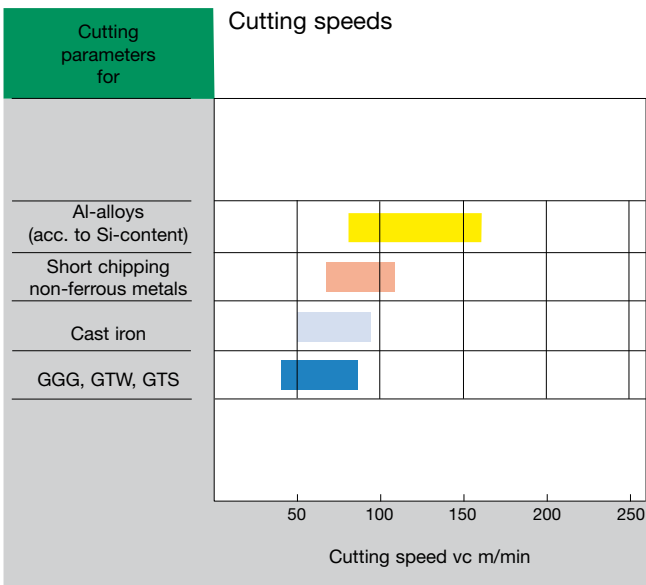
cast materials



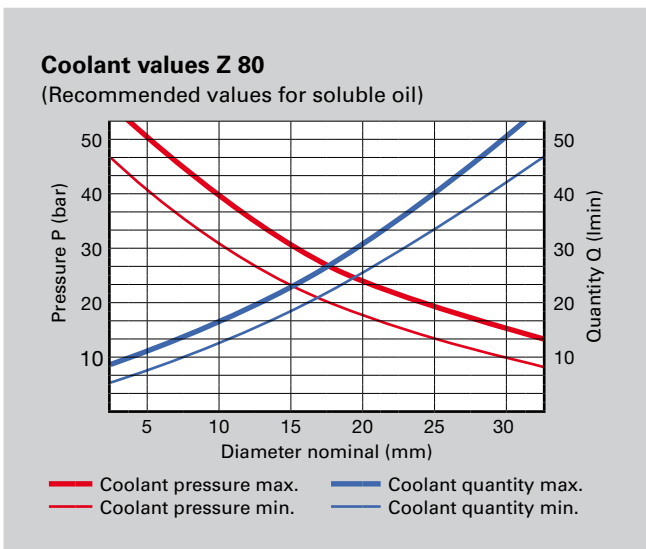


Two-fluted gun drills with solid carbide head Z 80

					89508	89518
					Carbide	
					123	123
					right-hand	right-hand
					TLB Z 80	TLB Z 80
					○	○
d1	d2	l1	l2	l3	Availability	
mm	mm	mm	mm	mm		
8.000	16.000	330.00	280.00	48.00	●	●
10.000	20.000	390.00	340.00	50.00	●	●
12.000	20.000	450.00	400.00	50.00	●	●



(Detailed cutting parameters see pages 30/31)



Art. no. 89508 with point grind for cast materials

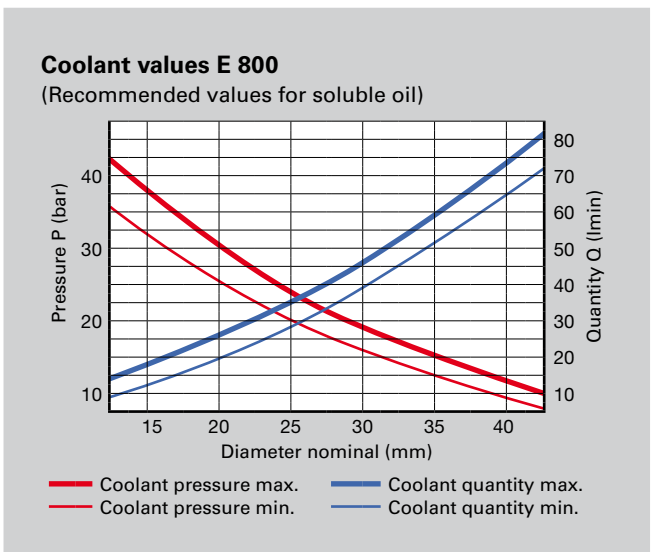
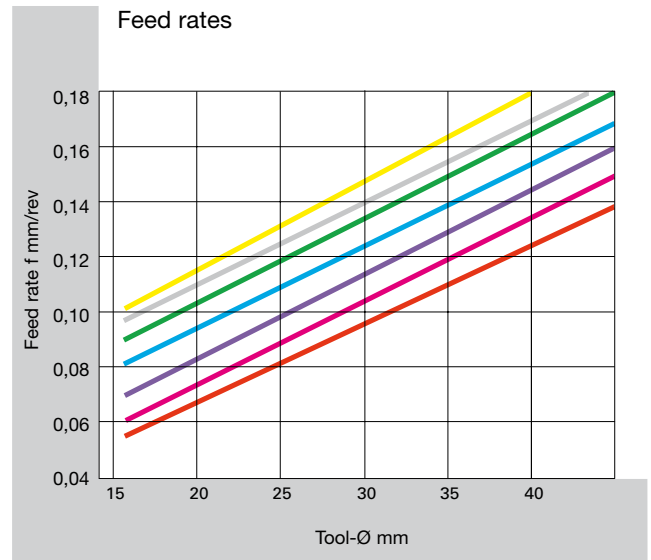
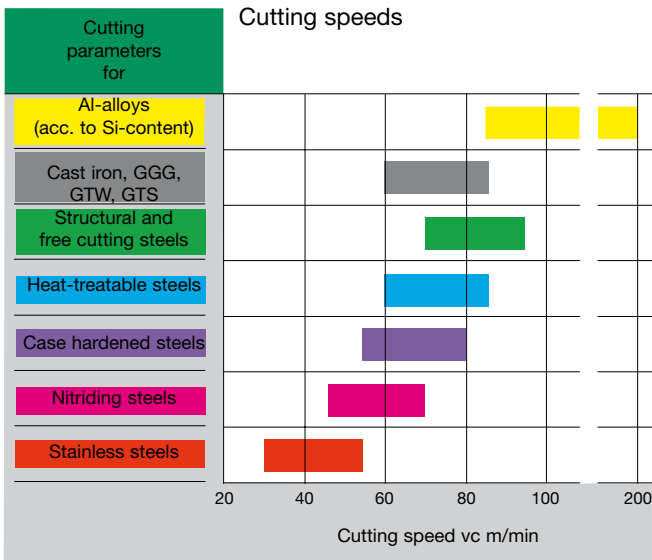


Art. no. 89518 with point grind for aluminium



Single-fluted gun drills E 800

with interchangeable inserts and supporting strips, suitable for almost all materials, from Ø 12.0 - 40.0 mm, max. total length 3000 mm





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Single-fluted gun drills E 800



					89530
					Carbide
					123
					right-hand
					30xD
					T
					Availability
d1h5	d2	l1	l2	l3	
mm	mm	mm	mm	mm	
16.000	25.000	580.00	512.00	56.00	●
18.000	25.000	644.00	576.00	56.00	●
20.000	32.000	712.00	640.00	60.00	●
24.000	32.000	840.00	768.00	60.00	●

Accessories

With the initial order the E 800 gun drill with interchangeable inserts is delivered as a complete tool with interchangeable inserts, supporting strips and accessories. For your repeat order please use the following article numbers:

Ø	Interchangeable insert	Screw for insert	Screwdriver for insert	Supporting strips	Screw for supporting strips	Screwdriver for supporting strips
16	No. 89535 Ø 16.0 +TiN	89537 3,002	89538 9,001	No. 89536 Ø 16.0 +TiN	89537 2,203	89538 7,001
18	No. 89535 Ø 18.0 +TiN	89537 3,002	89538 9,001	No. 89536 Ø 18.0 +TiN	89537 2,203	89538 7,001
20	No. 89535 Ø 20.0 +TiN	89537 4,001	89538 15,001	No. 89536 Ø 20.0 +TiN	89537 2,502	89538 8,001
24	No. 89535 Ø 24.0 +TiN	89537 4,001	89538 15,001	No. 89536 Ø 24.0 +TiN	89537 2,502	89538 8,001

Every single-fluted gun drill E 800 with interchangeable parts – from the ex stock range as well as special tools – can be modified in the diameter range below.

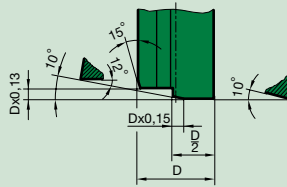
Size	Diameter range (mm)	Size	Diameter range (mm)
0.00	12.00 - 12.49	3.02	27.00 - 27.49
0.01	12.50 - 12.99	3.03	27.50 - 27.99
0.02	13.00 - 13.49	3.04	28.00 - 28.49
0.03	13.50 - 13.99	3.05	28.50 - 28.99
0.04	14.00 - 14.49	3.06	29.00 - 29.49
0.05	14.50 - 14.99	3.07	29.50 - 29.99
0.06	15.00 - 15.49	4.00	30.00 - 30.49
0.07	15.50 - 15.99	4.01	30.50 - 30.99
1.00	16.00 - 16.49	4.02	31.00 - 31.49
1.01	16.50 - 16.99	4.03	31.50 - 31.99
1.02	17.00 - 17.49	4.04	32.00 - 32.49
1.03	17.50 - 17.99	4.05	32.50 - 32.99
1.04	18.00 - 18.49	4.06	33.00 - 33.49
1.05	18.50 - 18.99	4.07	33.50 - 33.99
1.06	19.00 - 19.49	5.00	34.00 - 34.49
1.07	19.50 - 19.99	5.01	34.50 - 34.99
2.00	20.00 - 20.49	5.02	35.00 - 35.49
2.01	20.50 - 20.99	5.03	35.50 - 35.99
2.02	21.00 - 21.49	5.04	36.00 - 36.49
2.03	21.50 - 21.99	5.05	36.50 - 36.99
2.04	22.00 - 22.49	5.06	37.00 - 37.49
2.05	22.50 - 22.99	5.07	37.50 - 37.99
2.06	23.00 - 23.49	6.00	38.00 - 38.49
2.07	23.50 - 23.99	6.01	38.50 - 38.99
2.08	24.00 - 24.49	6.02	39.00 - 39.49
2.09	24.50 - 24.99	6.03	39.50 - 40.00
2.10	25.00 - 25.49		
2.11	25.50 - 25.99		
3.00	26.00 - 26.49		
3.01	26.50 - 26.99		



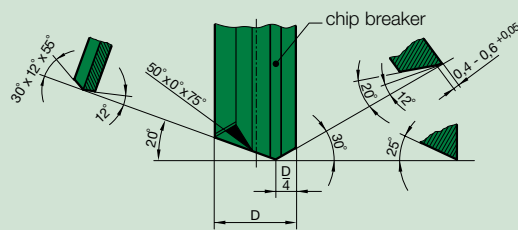
Additional technical parameters

Special point grinds for single-fluted gun drills

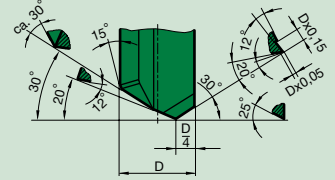
with recessed coolant chamber



with chip breaker



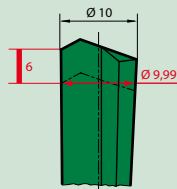
with chip guiding step



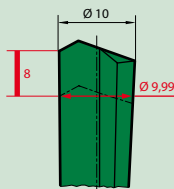
Backtaper ratio for gun drills

(dimensions in mm)

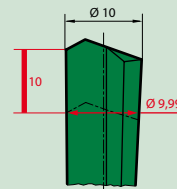
1:600



1:800 (Standard)

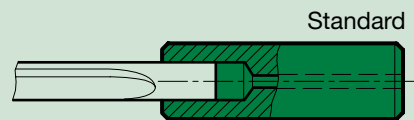


1:1000

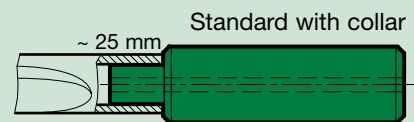


Variations for drivers at gun drills with tube shank

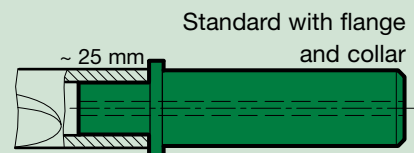
Solution for $\text{nom.-}\varnothing < \text{driver-}\varnothing$
(difference must be appr. 6 mm):
tube shank installed in driver



Solution for $\text{nom.-}\varnothing - \text{driver-}\varnothing$
(close to parallel):
tube shank installed over collar



Solution for $\text{nom.-}\varnothing > \text{driver-}\varnothing$:
tube shank installed over collar,
inside- \varnothing of tube shank $>$ driver- \varnothing ,
tube shank fits against flange shoulder.





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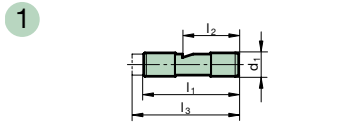
Drivers

Attachments

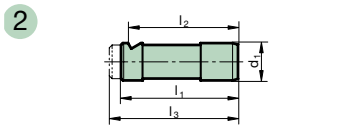
The range of drivers introduced below is available ex stock. However, it only represents a small selection of drivers from our complete range. We naturally also produce individual drivers of

the highest precision to customer drawings. **Attention! Single-fluted solid carbide gun drills** require drivers with positioning lugs. Further information on request.

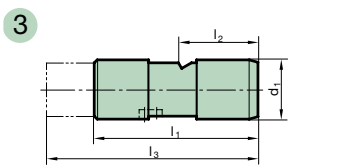
Drivers for deep hole drilling machines



code no.	d ₁	l ₁	l ₂	l ₃
1.1	10	40	24	-
1.2	10	40	24	45
1.3	10	40	24	55
1.4	16	45	31,2	-
1.5	25	70	34	-
1.6	25	70	34	78



code no.	d ₁	l ₁	l ₂	l ₃
2.1	16	50	47	-
2.2	16	50	47	55
2.3	16	50	47	70

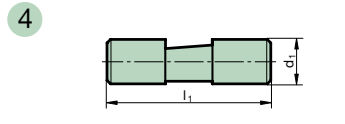


code no.	d ₁	l ₁	l ₂	l ₃
3.1	25	70	34	100

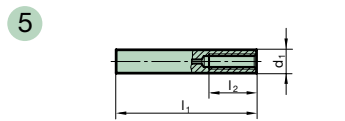


Accessories for deep hole drilling machines

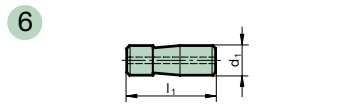
In contrast to conventional machine tools, certain accessories, i.e. drilling bushes, seal discs, steady rest bushings etc., are part of the standard equipment on deep hole drilling machines. A selection of these products are shown above. Because of the multitude of accessories currently available, it is impossible to list tables with dimensions for each item in this brochure. However, we can supply most of products generally applied on request (with drawing if possible).



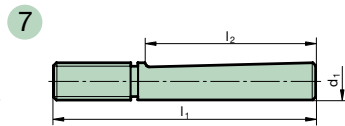
code no.	d ₁	l ₁
4.1	19,05	70



code no.	d ₁	l ₁	l ₂
5.1	10	60	20
5.2	16	80	28
5.3	25	100	50

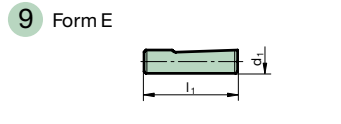


code no.	d ₁ (inch)	l ₁
6.1	1/2	38
6.2	3/4	70



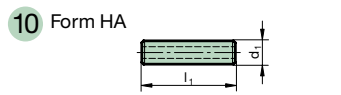
code no.	d ₁	l ₁	l ₂
7.1	16	112	73
7.2	20	126	82

Drivers to DIN 1835

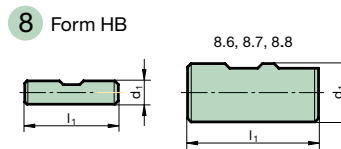


code no.	d ₁	l ₁
9.1	8	36
9.2	10	40
9.3	12	45
9.4	16	48
9.5	20	50
9.6	25	56
9.7	32	60

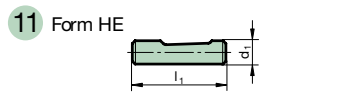
Drivers to DIN 6535



code no.	d ₁	l ₁
10.1	8	40
10.2	10	40
10.3	12	45
10.4	16	48
10.5	20	50
10.6	25	56
10.7	32	60

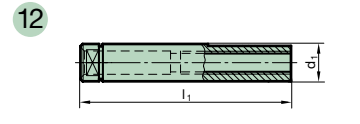


code no.	d ₁	l ₁
8.1	8	36
8.2	10	40
8.3	12	45
8.4	16	48
8.5	20	50
8.6	25	56
8.7	32	60
8.8	40	70



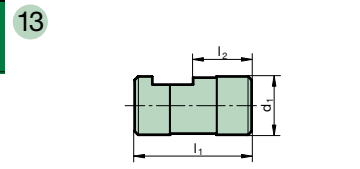
code no.	d ₁	l ₁
11.1	8	36
11.2	10	40
11.3	12	45
11.4	16	48
11.5	20	50

Drivers to VDI draft



code no.	d ₁	l ₁
12.1	10	68
12.2	16	90
12.3	25	112

Drivers to Speed-Bit-System



code no.	d ₁	l ₁	l ₂
13.1	16	40	16
13.2	25	50	25



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.

(Figure above right)

Typical procedure with all gun drills on conventional machine tools:

- production of pilot hole. Enter at low revolutions, approx. 200 rev./min, feed rate approx. 500 mm/min.
- setting coolant pressure and speed.
- continuous drilling to complete hole depth without chip removal. When applying gun drills with increased length-diameter-ratio (e.g. single fluted, solid carbide gun drills from flute length 160 mm), we recommend machining with reduced cutting parameters (approx. 75% of the optimal cutting speed) up to a drilling depth of approx. 25 mm.
- switch off coolant supply after reaching hole depth.
- withdrawal in rapid feed with stationary spindle.

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.

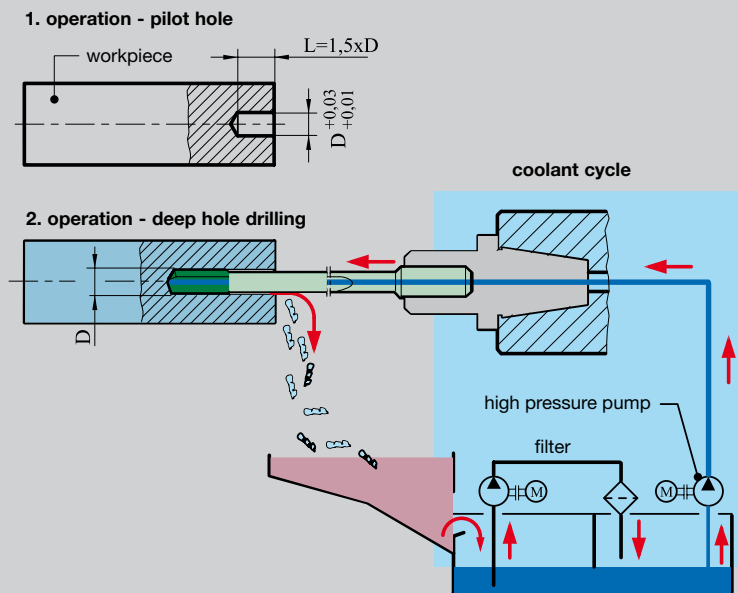
Deep hole drilling is not a closed book, but can be mastered by anybody as long as certain conditions are adhered to.

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

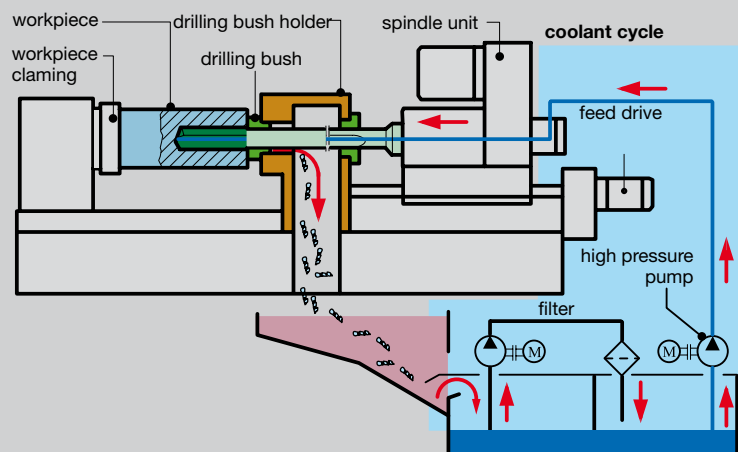


Schematic diagrams

Deep hole drilling on conventional machine tools



Deep hole drilling on deep hole drilling machines

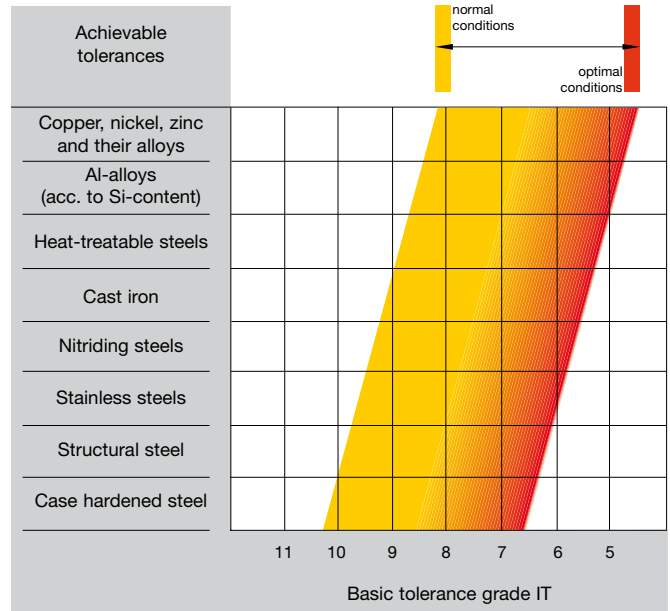




of single-fluted deep hole gun drills

Basic tolerances

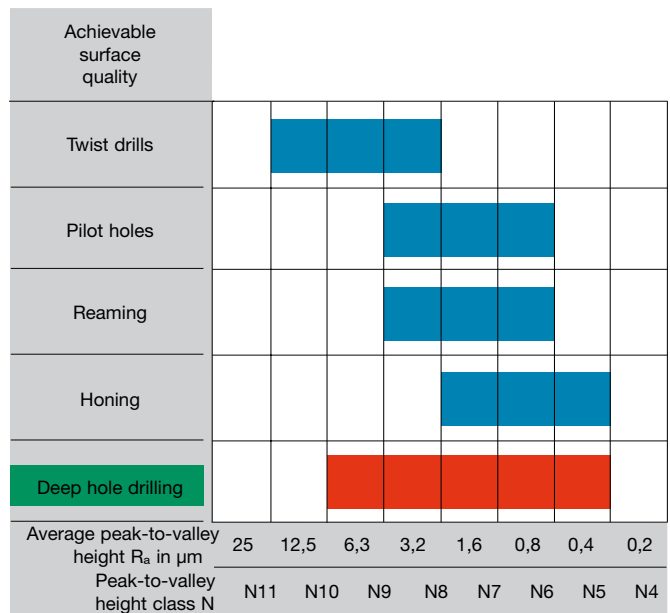
The application of single-fluted gun drills can achieve a lower basic tolerance, as the cutting forces at the cutting edge are absorbed by the supporting strips, unlike twist drills where the slightest deviation of the two cutting edges causes a larger hole.



Surface quality

The forces at the cutting edge are absorbed by the support bushes, which in return burnishes the surface. Lubrication between the supporting strips and hole surface is therefore very important.

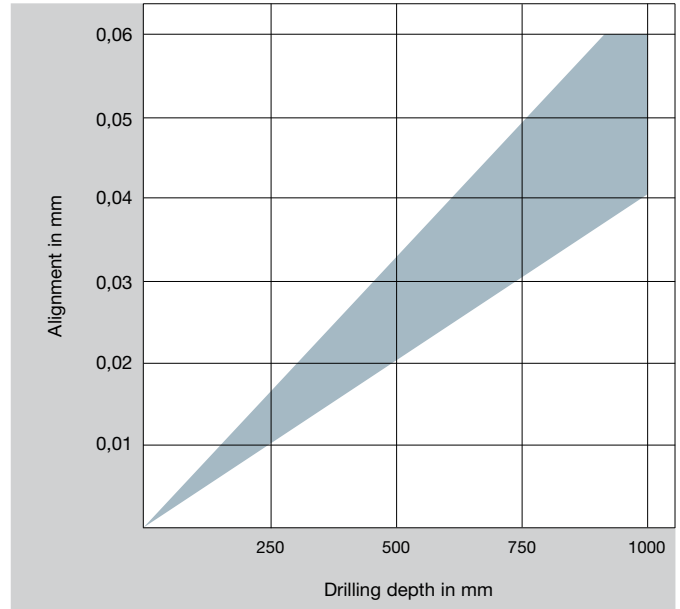
The better the lubricant, the better the surface quality.





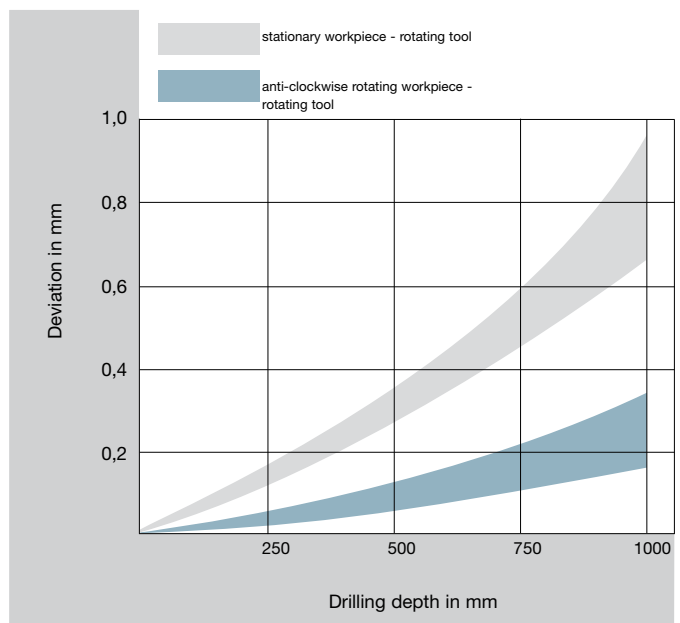
Alignment accuracy

Because brazed single-fluted gun drills always have the precision carbide head brazed onto 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.



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 supporting strips, resulting in excellent concentricity.





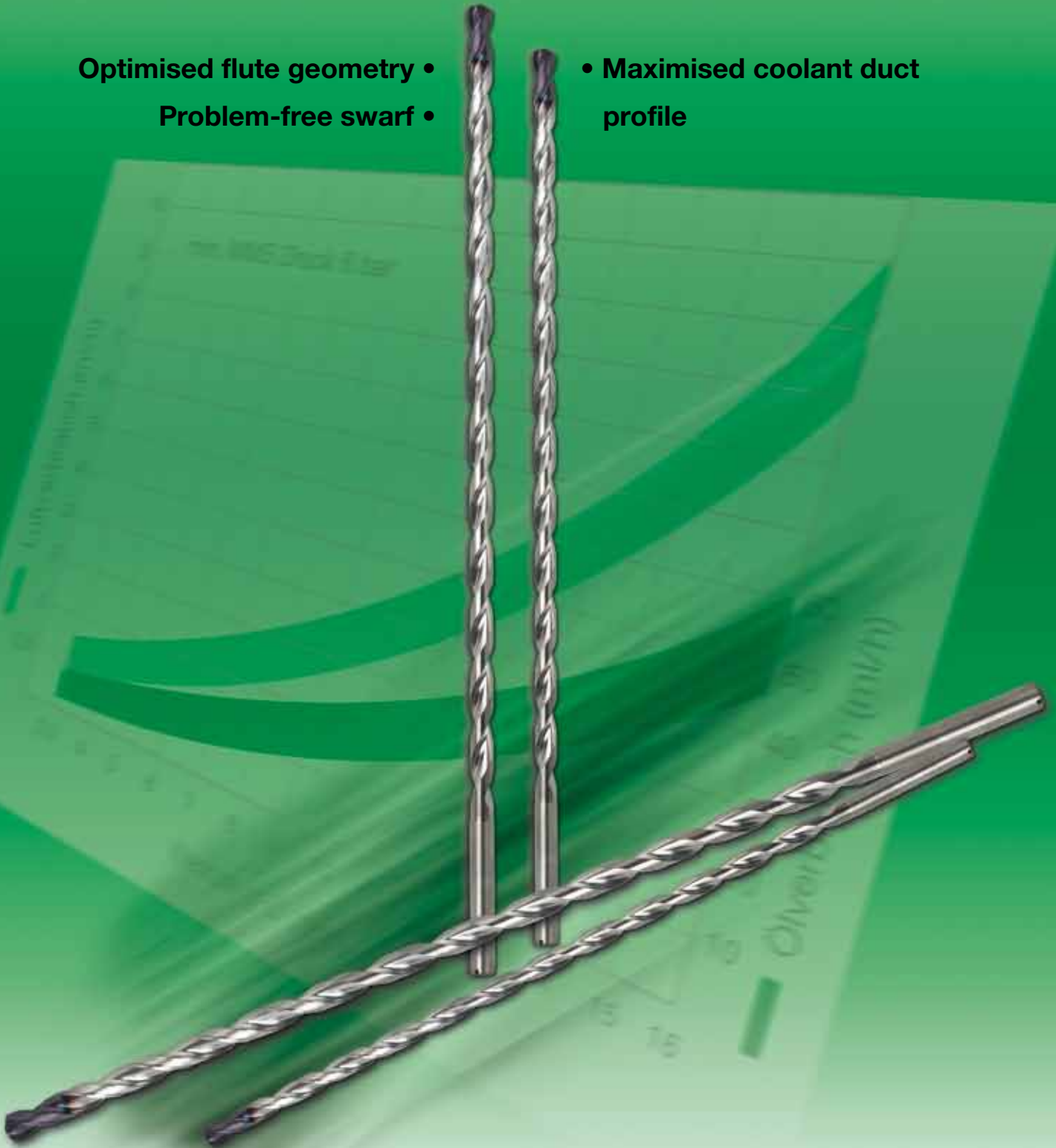
HARTNER

Precision Cutting Tools

TS 100 T **SPIRAL-FLUTE DEEP HOLE DRILLS** **FOR DRILLING DEPTHS 15/20/25/30/40XD**

Optimised flute geometry •
Problem-free swarf •

• Maximised coolant duct
profile





Grinding equipment for gun drills

TBM 116

TBM 116 is a manually operated, universal grinding machine. Its compact design combined with Hartner's single-fluted gun drill grinding system and Hartner's double grinding wheel makes this a perfect unit to re-grind single-fluted gun drills. It is especially suitable for the re-grinding of a small to medium number of items of varying diameters and lengths. Furthermore, it also allows the fairly simple addition of transverse chip breakers to single-fluted gun drills as well as other modifications.

Supplied items:

Grinding machine with two high-powered light units as well as two 220 V sockets (grinding system and grinding wheel not included)

Machine data:

Input power requirements 380 V/50 Hz, Grinding wheel 2850 rev./min, Max. diameter of grinding wheel 150 mm



TBV 116

The fixture is designed for the re-grinding of single-fluted gun drills in the diameter range from 3 mm to 30 mm. It is ideally suitable for standard and special point grinds. A minimum flute length is of no importance thanks to a short center sleeve. In addition, the fixture is supplied with a supporting bar for long tools. TBV 116 is therefore truly universal and can be applied on any commercial, manual tool grinding machine.

For the use with TBV 116 we recommend our double grinding wheel DSS 125.

Attention:

Single-fluted gun drills have a flute spacing angle of 120° and can therefore not be clamped in a collet in a separate unit. You could possibly destroy the tool.



TBV 216

The new TBV 216 universal grinding fixture for small diameter single-fluted gun drills from 1.0 to 6.0 mm and a maximum length of 350 mm is simple to handle and enables the re-grinding or modifying of single-fluted gun drills in only four operations. Grinding is achieved with a 3-axis swivel mechanism, enabling the grinding of various point angles. It is possible to adjust and if necessary correct any angle individually.

We recommend the application of our single grinding wheel ESS 125.

Scope of delivery:

- A set of guide bushes with the diameters 1.0 / 1.5 / 2.0 / 2.5 / 3.0 / 3.5 mm
- Various adaptors
- Centering microscope
- Spotlight and magnifier





HARTNER

Fax Inquiry / Order

Inquiry Order by Fax to: +497431 125 - 21547

Ansprechpartner

Hartner GmbH
P. O. Box 10 04 27
D-72425 Albstadt
Tel.: +497431 125-0
Fax: +497431 125-21547
www.hartner.de

Customer no. _____ New customer

Company _____

Street no. _____

Telephone _____

Date _____

Order no. _____

Contact _____

Town/post code _____

Fax _____

Signature _____

Deep hole gun drill:

- E 100 Single-fluted solid carbide gun drill E 80 Single-fluted gun drill with solid carbide head Z 80 Two-fluted gun drill with sol. carb. head
- Head form: _____ Number required: _____ items

Single-fluted gun drill

two-fluted gun drill

point grind G point grind A

Drawing of lay-out

required in special cases only

Driver: no code no.: to enclosed drawing

Coating: TiN FIRE TiAlN nanoA TiCN _____

Workpiece: **drilling depth:** _____ **hole tolerance:** _____ **material:** _____

bling hole through hole transverse hole

Machine type: deep hole drilling machine conventional machine tool

Coolant: deep drilling oil soluble oil

pressure _____ bar pressure _____ bar



Fax Inquiry / Order Gun Drill

Inquiry Order by Fax to: +497431 125 - 21547

Ansprechpartner

Hartner GmbH
P. O. Box 10 04 27
D-72425 Albstadt
Tel.: +497431 125-0
Fax: +497431 125-21547
www.hartner.de

Customer no. New customer

Company

Street no.

Telephone

Date

Order no.

Contact

Town/post code

Fax

Signature

Workpiece

Material:

Description:

Quantity/Year:

Hole diameter:

Tolerance on diameter:

Drilling depth:

Surface quality required:

Protruding edge:
No Yes mm

Additional information:

Machine

Machining centre:

Tool holder:

No. of spindles:

Deep drilling machine:

Tool holder:

No. of spindles:

Overall length of tool:

Coolant/lubrication:
soluble oil neat oil

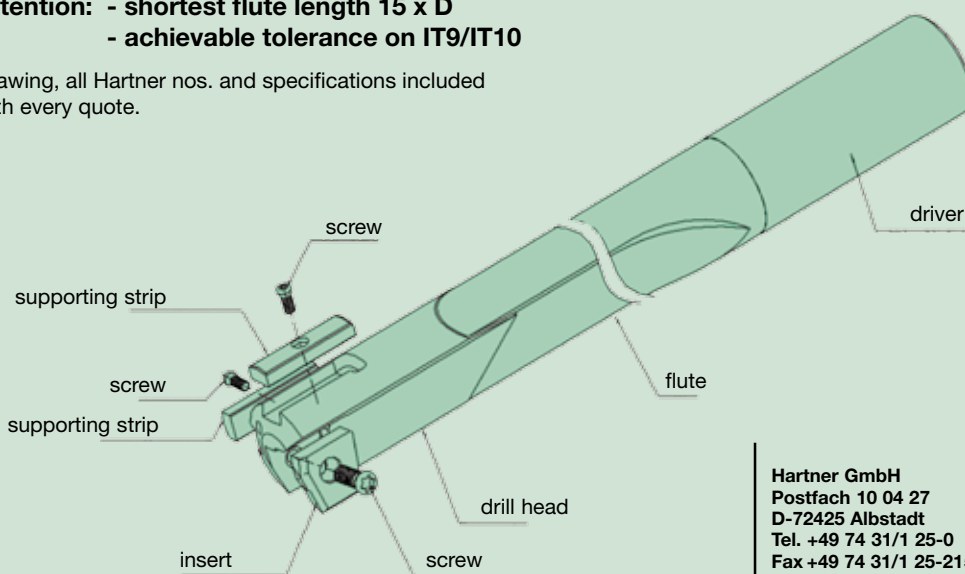
Pressure: bar

Volume: l/min

The Hartner E 800 for your application

Attention: - shortest flute length 15 x D
- achievable tolerance on IT9/IT10

Drawing, all Hartner nos. and specifications included with every quote.



Hartner GmbH
Postfach 10 04 27
D-72425 Albstadt
Tel. +49 74 31/1 25-0
Fax +49 74 31/1 25-21547

Gun Drill with interchangeable insert and supporting strip, internal cooling
Diameter range: 16.00 - 40.00mm



Application recommendations for gun drills

Drill Ø mm from	Feed column no.							
	11	12	13	14	15	16	17	18
	f (mm/rev)							
1.50	0.002	0.004	0.006	0.008	0.012	0.020	0.032	0.045
2.00	0.003	0.005	0.007	0.010	0.016	0.028	0.046	0.055
2.50	0.004	0.006	0.008	0.012	0.018	0.030	0.054	0.070
4.00	0.005	0.007	0.010	0.016	0.025	0.043	0.065	0.085
6.00	0.007	0.009	0.013	0.024	0.035	0.061	0.085	0.120
8.00	0.010	0.014	0.022	0.032	0.045	0.068	0.100	0.150
10.00	0.012	0.016	0.028	0.040	0.055	0.075	0.120	0.160
14.00	0.020	0.025	0.035	0.050	0.065	0.085	0.130	0.180
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 uncoated tools cannot be guaranteed.

Surface finish:

- bright
- TiN-coated
- TiAlN-coated
- TiCN-coated
- FIRE-coated
- MolyGlide®-coated
- TiAlN-coated
- nanoA-coated

Material dependent coolants

- soluble oil
- neat oil
- air

Cutting parameters can be reduced if cooling parameters are insufficient. Pressure increase systems are also an option.



Gun drills must be guided during spot-drilling.
Gun 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 = 1.5 x D, tolerance H8/+0,01/+0,03)
- enter at low revolutions, approx. 200 rev./min, feed rate approx. 500 mm/min
- setting of coolant pressure and revolutions
- uninterrupted drilling to required drilling depth without wood pecking.
When applying gun drills with increased length-diameter-ratio (e.g. single-fluted solid carbide gun drills from flute length 160 mm), 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

Material group	Material examples <i>Figures in bold = material no. to DIN EN 10 027</i>	Tens. strength Hardness N/mm ²	Coolant
Common structural steels	1.0035 S185, 1.0486 StE P275N, 1.0345 P235GH, 1.0425 P265GH 1.0050 E295, 1.0070 E360, 1.8937 P500NH	≤500 >500-850	○
Free-cutting steels	1.0718 11SMnPb30, 1.0736 115Mn37 1.0727 46 S20, 1.0728 60 S20, 1.0757 46SPb20	≤850 850-1000	○
Unalloyed heat-treatable steels	1.0402 C22, 1.1178 C30E 1.0503 C45, 1.1191 C45E 1.0601 C60, 1.1221 C60E	≤ 700 700-850 850-1000	○
Alloyed heat-treatable steels	1.5131 50MnSi4, 1.7003 38Cr2, 1.7030 28Cr4 1.5710 36NiCr6, 1.7035 41Cr4, 1.7225 42CrMo4	850-1000 1000-1200	○
Unalloyed case hardened steels	1.0301 C10, 1.1121 C10E	≤750	○
Alloyed case hardened steels	1.7043 38Cr4 1.5752 14NiCr14, 1.7131 16MnCr5, 1.7264 20CrMo5	850-1000 1000-1200	●
Nitriding steels	1.8504 34CrAl6 1.8519 31CrMoV9, 1.8550 34CrAlNi7	≥850-1000 1000-1200	○
Tool steels	1.1750 C75W, 1.2067 102Cr6, 1.2307 29CrMoV9 1.2080 X210Cr12, 1.2083 X42Cr13, 1.2419 105WC6, 1.2767 X45NiCrMo4	≤850 850-1000	○
High speed steels	1.3243 S 6-5-2-5, 1.3343 S 6-5-2, 1.3344 61CrV4	≥650-1000	●
Spring steels	1.5026 55Si7, 1.7176 55Cr3, 1.8159 51CrV4	≤330 HB	●
Stainless steels, sulphured austenitic martensitic	1.4005 X12CrS13, 1.4104 X14CrMoS17, 1.4105 X6CrMoS17 1.4301 X5CrNi18 10, 1.4541 X6CrNiTi18 10, 1.4571 X6CrNiMoTi 17 12 2 1.4057 X17CrNi16-1, 1.4122 X39CrMo17-1, 1.4521 X2CrMoTi18 2	≤850 ≤850 ≤850	●
Hardened steels	-	≤40-48 HRC >48-60 HRC	●
Special alloys	Nimonic, Inconel, Monel, Hastelloy	≤1200	●
Cast iron	EN-GJL-100 ... EN-GJL-200 EN-GJL-250 ... EN-GJL-350	≤240 HB <300 HB	○
Spheroidal graphite iron and malleable cast iron	EN-GJMW-350-4, EN-GJMB-550-4, EN-GJS-500-7 EN-GJMB-700-2, EN-GJS-700-2	≤240 HB <300 HB	○
Chilled cast iron	-	≤350 HB	○
Ti and Ti alloys	3.7024 Ti99,5, 3.7114 TiAl5Sn2,5, 3.7124 TiCu2 3.7154 TiAl6Zr5, 3.7164 TiAl6V4, 3.7184 TiAl4Mo4Sn2,5, - TiAl8Mo1V1	≤850 850-1200	●
Aluminium and Al-alloys	3.0255 Al99,5, 3.2315 AlMgSi1, 3.3515 AlMg1	≤400	○
Al-wrought alloys	3.0615 AlMgSiPb, 3.1325 AlCuMg1, 3.3245 AlMg3Si	≤450	○
Al-cast alloys ≤ 10 % Si	3.2131 G-AlSi5Cu1, 3.2153 G-AlSi7Cu3, 3.2573 G-AlSi9	≤600	○
Al-cast alloys > 10 % Si	3.2581 G-AlSi12, 3.2583 G-AlSi12Cu, - G-AlSi12CuNiMg	≤600	○
Magnesium-alloys	MgMn2, G-MgAl8Zn1, G-MgAl6Zn3	≤450	○
Copper, low alloyed	2.0070 SE-Cu, 2.1020 CuSn6, 2.1096 G-CuSn5ZnPb	≤400	○
Brass, short-chipping	2.0380 CuZn39Pb2, 2.0401 CuZn39Pb3, 2.0410 CuZn43Pb2	≤600	○
Brass, long-chipping	2.0250 CuZn20, 2.0280 CuZn33, 2.0332 CuZn37Pb0,5	≤600	○
Bronze, short-chipping	2.1090 CuSn7ZnPb, 2.1170 CuPb5Sn5, 2.1176 CuPb10Sn 2.0790 CuNi18Zn19Pb	≤600 >600-850	○
Bronze, long-chipping	2.0916 CuAl5, 2.0960 CuAl9Mn, 2.1050 CuSn10 2.0980 CuAl11Ni, 2.1247 CuBe2	≤850 850-1000	○
Duroplastics	Bakelit, Resopal, Pertinax, Moltopren	-	○
Thermoplastics	Plexiglas, Hostalen, Novodur, Makralon	-	○
Kevlar	Kevlar	-	○
Glass/carbon fibre.	GFK/CFK	-	○

Single-fl carbide gun



single-fluted
solid
1,2 ...

≤35xD

recom- mended coating	V _c m/min	Feed col. no.
	100	15
	85	15
	90	15
	80	15
	90	14
	80	14
	75	14
●	75	14
●	65	14
●	80	15
●	75	14
●	65	14
●	75	14
●	65	14
●	75	13
●	65	13
●	55	12
●	65	13
●	55	14
●	45	14
●	35	14
●	30	13
●	25	10
●	35	12
○	85	16
○	80	16
○	80	15
○	70	15
○	55	14
●	35	12
●	30	12
○	150	17
○	120	17
○	150	18
○	130	18
○	110	17
●	75	15
○	120	18
○	90	18
○	95	17
○	75	17
○	70	17
○	60	17
○	75	15
○	70	15
○	60	14
○	50	14



Application recommendations for gun drills

uted solid n drill E 100			Single-fluted gun drill with solid carbide head E 80						Two-fluted gun drill with solid carbide head Z 80						Single-fluted gun drill with interchangeable inserts E 800					
gun drill carbide			single-fluted gun drill solid carbide head						two-fluted gun drill solid carbide head						single-fluted gun drill with indexable inserts					
5,0			2,0 ... 40,0						6,0 ... 27,0						16,0 ... 40,0					
>35×D			≤35×D			>35×D			≤35×D			>35×D			≤35×D			>35×D		
V _c m/min	Feed col. no.	recom- mended coating	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.	recom- mended coating	V _c m/min	Feed col. no.	V _c m/min	Feed col. no.	V _c m/min	Feed col. no.	
95	14	Ⓢ	100	14	95	13							Ⓢ	90	15	85	15			
80	14		85	14	80	13								80	15	75	15			
85	14	Ⓢ	90	14	85	13							Ⓢ	85	16	80	16			
75	14		80	14	75	13								75	16	70	16			
85	13	Ⓢ	90	13	85	12							Ⓢ	85	15	80	15			
75	13		80	13	75	12								80	15	75	15			
70	13		75	13	70	12								75	15	70	15			
70	13	Ⓢ	75	13	70	12							Ⓢ	75	15	70	15			
60	13		65	13	60	12								65	15	60	15			
75	14	Ⓢ	80	14	75	13							Ⓢ	80	15	75	15			
70	13		75	13	70	12								75	15	70	15			
60	13	Ⓢ	65	13	60	12							Ⓢ	70	15	65	15			
70	13		75	13	70	12								70	15	65	15			
60	13	Ⓢ	65	13	60	12							Ⓢ	60	15	55	15			
70	12	Ⓢ	75	12	70	11								65	14	60	14			
60	12		65	12	60	11								60	14	55	14			
50	11	Ⓢ	55	11	50	11							Ⓢ	55	14	50	14			
60	12		65	12	60	12								65	15	60	15			
50	13	Ⓢ	55	13	50	12							Ⓢ	50	14	45	14			
40	13		45	13	40	12								45	14	40	14			
35	13	Ⓢ	35	13	35	12							Ⓢ	40	14	35	14			
25	12		30	12	25	11								30	13	25	13			
20	11	Ⓢ	25	11	20	11							Ⓢ	25	12	20	12			
30	11		35	11	30	11								25	13	20	13			
80	15		85	15	80	14	85	18	80	17				85	16	80	16			
75	15		80	15	75	14	80	18	75	17				80	16	75	16			
75	14		80	14	75	13	75	17	70	16			Ⓢ	75	16	70	16			
65	14		70	14	65	13	70	17	65	16				70	16	65	16			
50	13		55	13	50	12	65	16	60	15				55	15	50	15			
30	11	Ⓢ	35	11	30	11								35	13	30	13			
25	11		30	11	25	11								30	12	25	12			
140	16		150	16	140	15	120	18	115	17				140	16	135	16			
115	16		120	15	115	14	110	18	105	17				125	16	120	16			
140	17		150	16	140	15	135	18	130	17				170	17	165	17			
120	17		130	16	120	15	120	17	115	16				140	17	135	17			
100	16		110	16	100	15								115	16	110	16			
70	14	Ⓢ	75	14	70	13								75	15	70	15			
115	17		120	17	115	16	130	18	125	17				120	17	115	17			
85	17		90	17	85	16	120	18	115	17				90	17	85	17			
90	16		95	16	90	15	110	17	105	16				95	17	90	17			
70	16		75	16	70	15	110	17	105	16				75	17	70	17			
65	16		70	16	65	15	95	17	90	16				70	17	65	17			
55	16		60	16	55	15	95	17	90	16				60	17	55	17			
70	14		75	14	70	13								75	16	70	16			
65	14		70	14	65	13								70	16	65	16			
55	13		60	13	55	12								60	15	55	15			
45	13		50	13	45	12								50	15	45	15			

Our programme:



FU 500/FN500



Gun Drills



INOX Drills



Standard Solid Carbide De-burring Tools



Micro Precision Drills



Multiplex



TS-Drills



Standard Range



Highlights



TM Vending Machines



Special Drills

Hartner GmbH

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