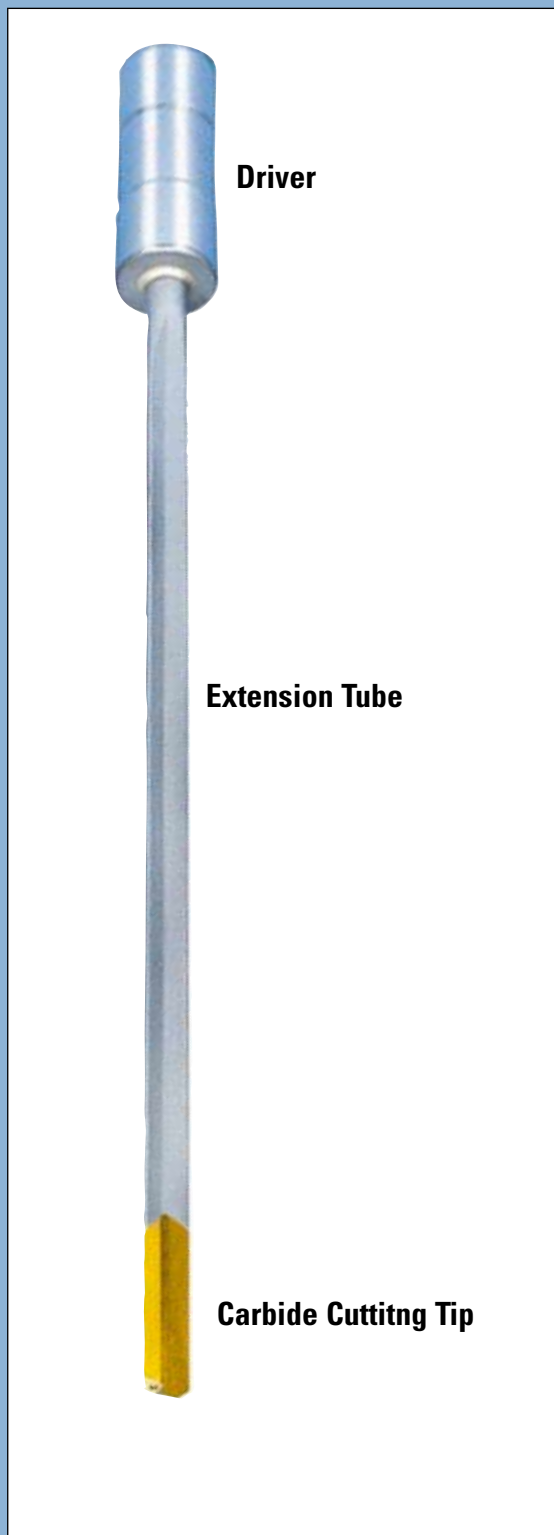


■ QWIKOGUN™ SINGLE FLUTE BRAZED GUNDRILLS



Diameter Range (inch): Ø0.100" to Ø1.575"

Length Range (inch): 5.9" to 118.0"

Advantages:

- Hole tolerance of IT7 to IT9 attainable
- Excellent straightness and concentricity
- Reduced true position deviation
- Surface finish Ra 0.4 to 1.6 easily achieved
- Often eliminates secondary reaming operation

The Carbide Cutting Tip

Available with 4 different standard cutting geometries, 8 different standard pad forms and 4 coating options for a multitude of possibilities.

The Extension Tube

Designed with a crimped "V" flute and large coolant ports. The hardened steel extension tube provides the optimal conditions for twist resistance, coolant flow and chip evacuation.

The Driver

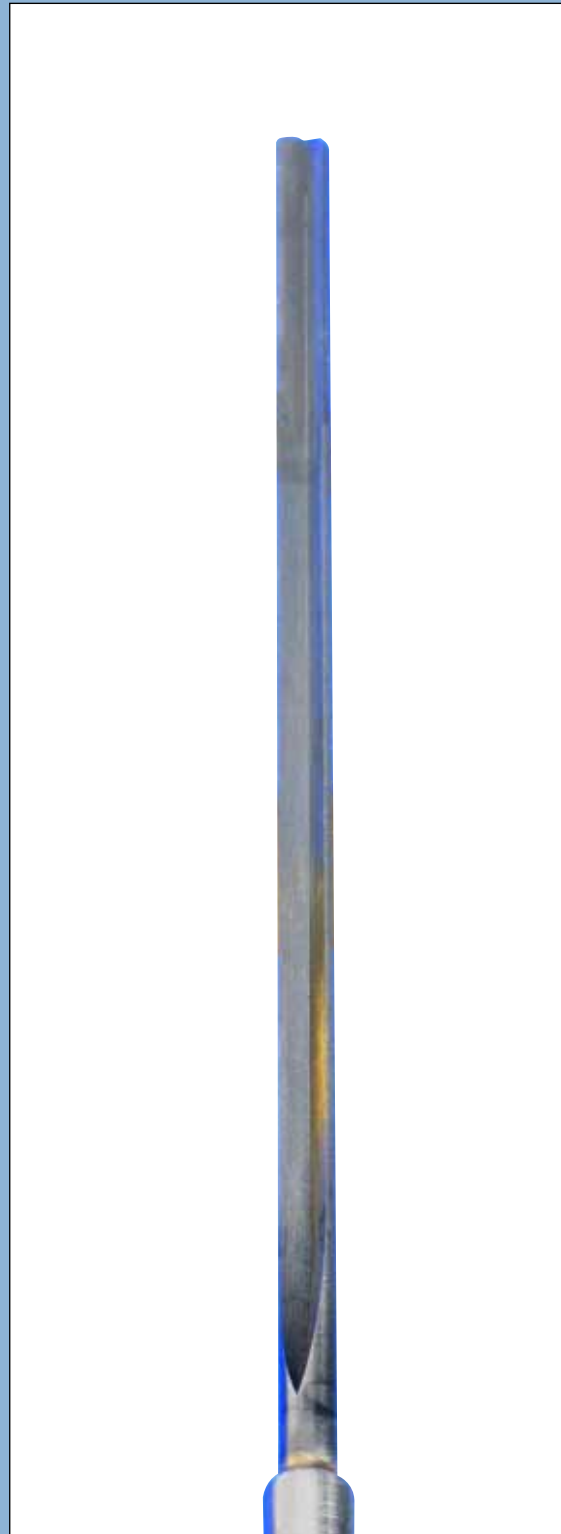
The steel driver provides the means to clamp the gundrill into the machine tool.

SOLID CARBIDE GUNDRILLS

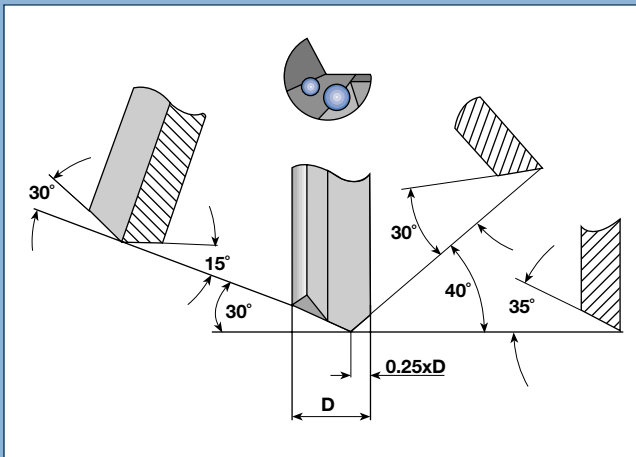
Diameter Range (inch): Ø.055" to Ø.630"

Length Range (inch): 40 x Drill Diameter up to 7.874" flute length

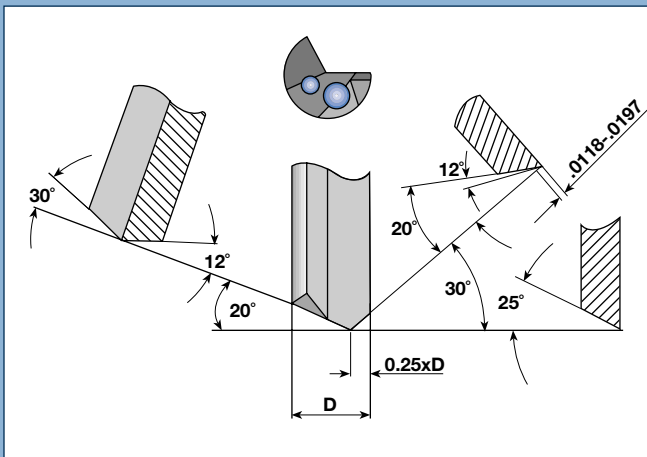
Made with an integral cutting tip and extension tube with either a steel or carbide driver. The solid carbide gun drill is designed for use in conventional machining centers and lathes. These drills provide superior rigidity with optimum coolant flow. As a result, speeds and feeds up to 100% faster may be obtained.



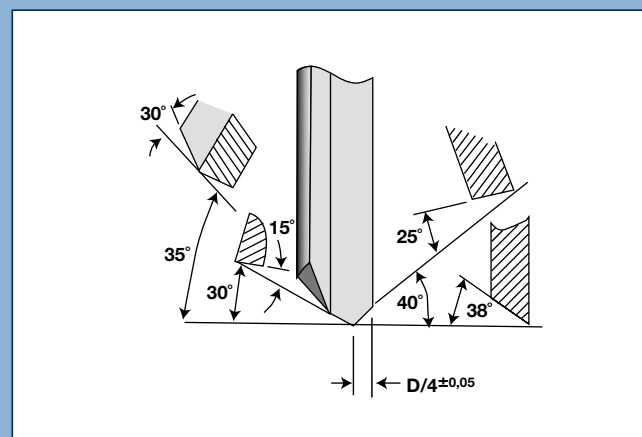
STANDARD GUNDRILL SHARPENING ANGLES



Standard sharpening for diameters less than .157"



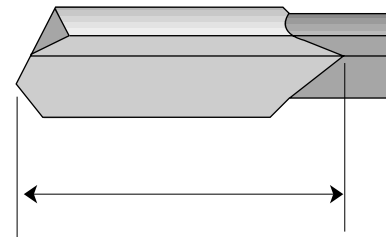
Standard sharpening for diameters greater than .157"



Optional sharpening for materials where it is difficult to break a chip.

Depending on the required tolerance, cutting performance and desired chip shape, the following standard sharpening angles are recommended

Standard Gundrill Carbide Length



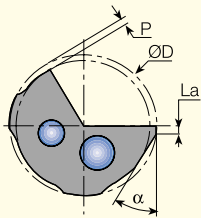
Diameter Range	Head Length
.098" - .149"	.787"
.150" - .159"	.906"
.160" - .199"	.994"
.200" - .258"	1.181"
.259" - .435"	1.378"
.436" - .722"	1.575"
.723" - .841"	1.772"
.842" - .919"	1.970"
.920" - 1.037"	2.165"
1.038" - 1.260"	2.560"

Regrindable Length = Length-Dia.

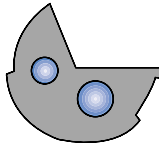
STANDARD GUNDRILL PAD FORMS

Drilling capacity and hole finish are dependent on the geometrical shape of the drill head. Both the pad form and the sharpening must be matched to the workpiece material. The pad form is determined when the tool is manufactured. Regrinding may change the cutting geometry, but the pad form will remain the same.

All cross section profile parameters such as: P, La and α must be precisely matched to the workpiece material properties.



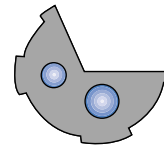
Universal G Form



Applications:

For all material groups
Works well in materials that tend to shrink
Maintains precision bore tolerance and straightness

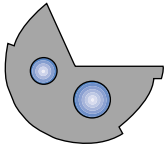
Standard A Form



Applications:

For cast iron & aluminum alloys (coated)
Drilling through cross holes and angled entry and exits
Large gap between pads ensures good lubrication

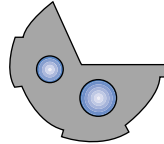
Standard B Form



Applications:

For cast iron & aluminum alloys
Maintains high precision hole tolerances
Excellent surface finish

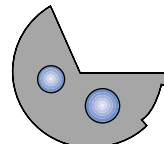
Standard C Form



Applications:

With larger back taper for use in materials that tend to shrink. (Some alloys and stainless)
Drilling through cross holes and angled entry and exit
Not recommended for precise straightness control

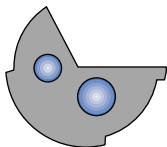
Standard D Form



Applications:

For cast iron only (with coating)
Works very well in grey cast iron

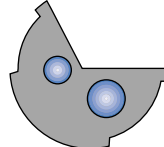
Standard E Form



Applications:

General purpose for all materials
Commonly used in crankshaft and other forged materials
Precise straightness control

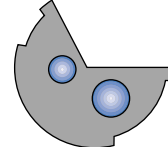
Standard H Form



Applications:

For all non-ferrous materials
For cast iron greater than .200" hole diameter
Can be used in wood & plastic with a larger back taper

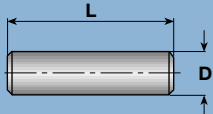
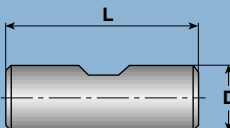
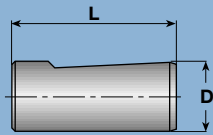
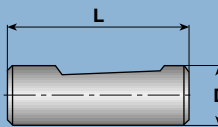
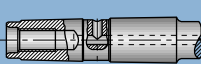
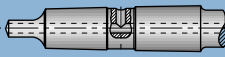
Standard I Form



Applications:

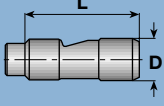
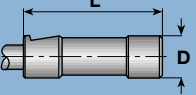
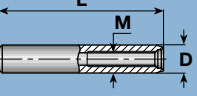
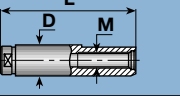
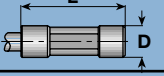
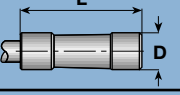
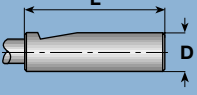
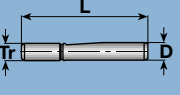
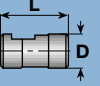
For aluminum and brass when best surface finish is required
Can be used in cross hole and interrupted cut applications

STANDARD GUNDRILL DRIVERS FOR MACHINING CENTERS, LATHES, ETC.

Driver Type	Drawing	ØD x L	Driver Code	Carbide Tipped Gun Drills	Solid Carbide Gun Drills
Cylindrical DIN1835A DIN6535HA		.157x1.102	01	•	•
		.197x1.102	02		•
		.236x1.417	03	•	•
		.315x1.417	04	•	•
		.394x1.575	05	•	•
		.472x1.772	06	•	•
		.551x1.772	07		•
		.630x1.890	08	•	•
		.709x1.890	09		
		.787x1.968	10	•	
		.984x2.205	11	•	
		1.260x2.362	12	•	
		1.575x2.756	13		
		1.969x3.150	14		
		2.480x3.543	15		
Weldon DIN1835B		.236x1.417	16	•	
		.315x1.417	17	•	
		.394x1.575	18	•	•
		.472x1.772	19	•	•
		.630x1.890	20	•	•
		.709x1.890	21		
		.787x1.968	22	•	•
		.984x2.205	23	•	
		1.260x2.362	24	•	
		1.575x2.756	25		
		1.968x3.150	26		
		2.48x3.543	27		
Whistle Notch DIN1835E		.236x1.417	28	•	
		.315x1.417	29	•	
		.394x1.575	30	•	•
		.472x1.772	31	•	•
		.630x1.890	32	•	•
		.709x1.890	33		
		.787x1.968	34	•	•
		.984x2.205	35	•	
		1.26x2.362	36	•	
		1.575x2.756	37		
Whistle Notch DIN6535HE		.236x1.417	38	•	
		.315x1.417	39	•	
		.394x1.575	40	•	•
		.472x1.772	41	•	•
		.630x1.890	42	•	•
		.709x1.890	43		
		.787x1.968	44	•	•
DIN228AK		CM1	45		
		CM2	46	•	
		CM3	47		
		CM4	48		
DIN228BK		CM1	49		
		CM2	50	•	
		CM3	51		
		CM4	52		

• Recommended style

STANDARD GUNDRILL DRIVERS FOR GUN DRILL MACHINES

Driver Type	Drawing	D x L	Driver Code	Carbide Tipped Gun Drills	Solid Carbide Gun Drills
Central Clamping Surface 15°		.236x1.181	53		•
		.394x1.575	54	•	•
		.630x1.772	55	•	
		.750x2.748	56	•	
		.984x2.756	57	•	
		1.00x2.748	58	•	
		1.25x2.748	59	•	
		1.50x2.748	60		
Frontal Clamping Surface 15°		.630x1.968	61	•	
Cylindrical with Thread		.394x1.968 M6X0.5	62		•
		.394x2.362 M6X0.5	63	•	
		.500x1.968 M6x0.5	64		•
		.630x3.150 M10X1	65	•	•
		.984x3.937 M16x1.5	66	•	
		1.417x4.724 M24x1.5	67		
VDI Design		.394x2.677 M6x0.5	68	•	
		.630x3.543 M10x1	69	•	•
		.984x4.409 M16x1.5	70	•	
		1.417x5.315 M24x1.5	71		
Central Clamping Hexagonal		.984x2.756	72	•	
		1.26x2.756	73	•	
Central Clamping Tapered		.500x1.500	74	•	•
		.630x2.756	75		
		.750x2.748	76	•	
		.787x2.756	77		
Frontal Clamping Surface 2°		.500x1.500	78	•	
		.750x2.748	79	•	
		1.00x2.748	80	•	
		1.00x3.937	81	•	
		1.25x2.748	82	•	
		1.25x3.937	83	•	
		1.50x2.748	84		
		1.50x3.937	85		
Trapezoidal Thread		.630x4.409 Tr 16x1.5	86	•	
		.787x4.960 Tr 20x2	87	•	
		1.102x4.960 Tr 28x2	88	•	
		1.417x6.378 Tr 36x2	89		
Spraymist Driver		.630x1.575	90	•	
		.984x1.968	91	•	
		1.378x2.362	92	•	

• Recommended style



■ BRAZED GUNDRILLS

All Ingersoll brazed gun drills are made to order. Standard gun drill components, carbide tips, extension tubes and drivers are kept in stock.

STANDARD DESIGN

- Standard diameters:
 - Ø.098" to .787" available in .004" increments
 - Ø.788" to 1.260" available in .039" (1mm) increments
- Standard sub-micron carbide Grade (K15)
- Standard inch sizes in stock:
1/4, 7/16, 3/8, 1/2, 9/16, 5/8, 3/4
- Standard pad form = G form
(Standard inch sizes = E form)
- Standard back taper (0.07%)
- Standard sharpening
- Uncoated
- Standard driver

SEMI-STANDARD DESIGN

- Out of standard diameter range
- Any other pad form from the catalog other than G or E
- Special surface finish
- Any coating

SPECIAL DESIGN

- Any non-catalog specification

■ SOLID CARBIDE GUNDRILLS

All Ingersoll solid carbide gun drills are made to order. Standard solid carbide gun drills and drivers are kept in stock.

STANDARD DESIGN

- Standard sub-micron carbide Grade (K15)
- Standard pad form (G)
- Standard back taper (0.07%)
- Standard sharpening
- Uncoated
- Standard driver

SEMI-STANDARD DESIGN

- Any other pad form from the catalog
- Special surface finish
- Coating

SPECIAL DESIGN

- Any non-catalog specification

GUNDRILL REQUEST FOR QUOTATION FORM

CUSTOMER

Customer Number
Company Name
Address
Contact Person

THE PIECE PART

Name
Part Number

Hole Diameter
Tolerance
Surface Finish (Ra, Rz,...)
Concentricity (.001"/1.0")
Straightness (.001"/1.0')

Hole Depth

Hole Type (Check all that apply)			
Blind Hole ☐	Through Hole ☐		
Angled entry ☐	Angled exit ☐		
Drilling from solid ☐	Core drill ☐		
Cross holes ☐	Other (text)		

Material (Din material, spec etc.)			
Steel ☐	Iron ☐	Aluminum ☐	
Stainless steel ☐	Nickel ☐	Other ☐	
Hardness			
Long chips ☐	Short chips ☐		

Application			
Workpiece	Stationary ☐	Rotating ☐	
Tool	Stationary ☐	Rotating ☐	

THE MACHINE

Machine Type/Model
Power [hp/Kw]
Rigidity: Good ☐ Average ☐ Poor ☐

Cutting Data	Max Possible	Current
Cutting speed "Vc" (SFM)		
Revolutions per minute		
Feed "f" (in/rev)		
Feed "F" (in/min)		

Drill Guide Method	Internal Dia.	Tolerance
Pre-Drilled pilot hole		
Bushing		

Coolant
Pressure "P" (psi)
Flow Rate (gal/min)
Neat Oil ☐ Soluable ☐ %

Additional Information

Inquiry Number	
Inquiry Date	
Quantities Requested	

THE TOOL

Tool Type	Carbide Tipped ☐
Unknown ☐	Solid Carbide ☐
Single Lipped ☐	Double Lipped ☐
Customer Drawing No.	

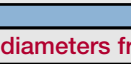
Tool Diameter	[in/mm]
Tolerance h5 ☐	Other ☐

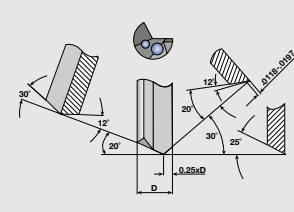
Coating of the Carbide Tip	
Uncoated ☐	TiAlN ☐
TiN ☐	AlTiN ☐
TiCN ☐	Unknown ☐
TiN + TiCN ☐	Other

Carbide Tip Length	Other
Standard ☐	

Overall Length	[in/mm]
Flute Length	[in/mm]

Driver
List Std catalog number
Other Length x Diameter
Driver Extension L x Dia

Pad Forms	
	☐ G
	☐ E
	☐ A
	☐ C
	☐ B
	☐ D
	☐ H
	☐ I

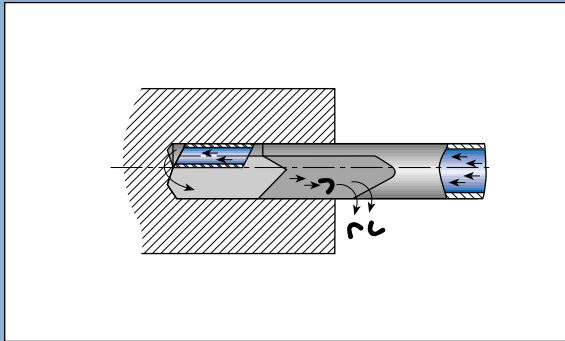
Grind Geometry


Std grind for diameters from .055" thru .157"					
—1=40	—2=30	d=D/4	—1=0	—2=30	b=0
—1=30	—2=15	—3=35	—1=0	—2=30	b=0

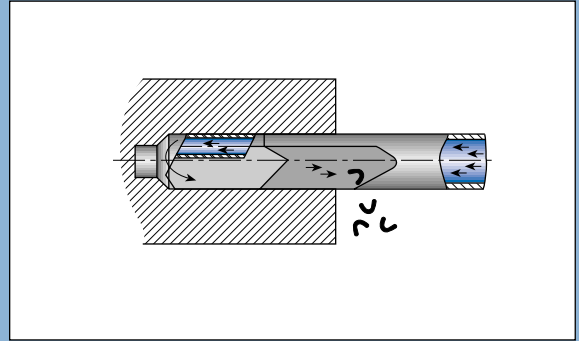
Std grind for diameters from .158" thru 1.260"					
—1=30	—2=20	d=D/4	—1=25	—2=30	b=0,3/0,5
—1=12	—2=12	—3=25	—1=25	—2=30	b=0,3/0,5

Other					
—1=	—2=	—3=	—1=	—2=	b=

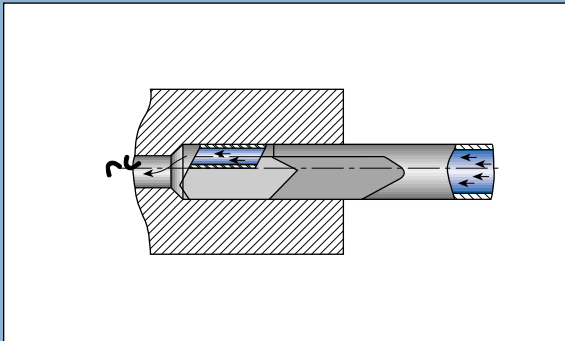
■ DEEP DRILLING APPLICATIONS



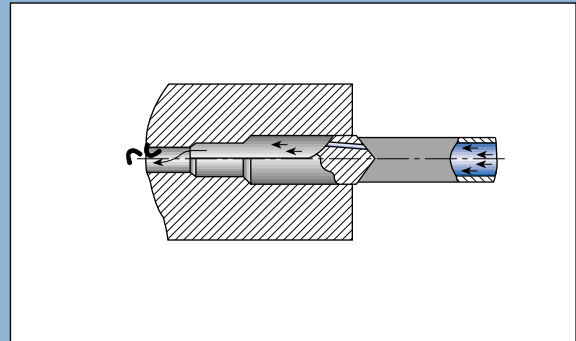
Gun drilling operation in blind hole when chips and coolant are evacuated back through the flute.



Gun drill boring operation in blind hole when chips and coolant are evacuated back through the flute.



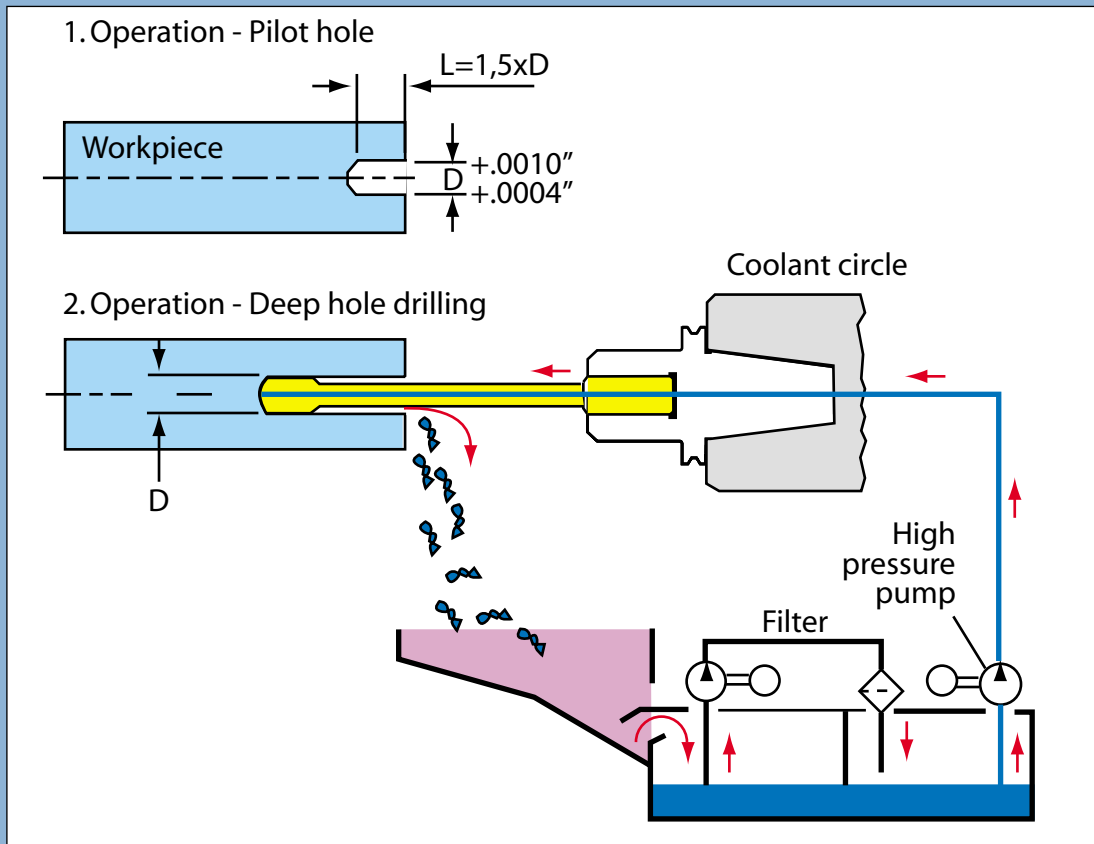
Gundrill boring operation in through hole when chips and coolant are evacuated ahead of the drill tip.



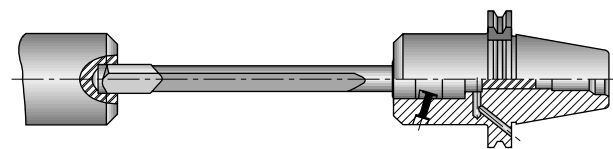
Stepped gundrill boring operation in through hole when chips and coolant are evacuated ahead of the drill tip.

■ GUNDRILL MACHINING CENTER APPLICATION

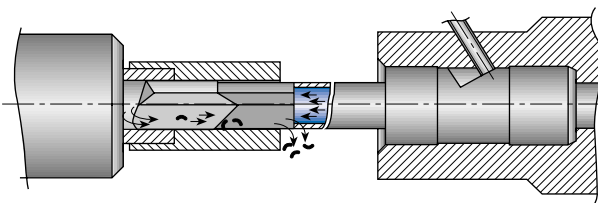
Deep Hole Drilling on Conventional Machine Tools



Gun Drills in Machining Centers



Centering/Guiding hole for
gundrill operation in
machining center



Bushing guide barrel for
Gun drill stabilizing in
machining center

■ GUNDRILL TROUBLESHOOTING GUIDE

Possible Cause	Drill Problems										Hole Problems					
	Cratering	Built-up edge	Damaged wear pad	Flute bending	Drill heat	Excessive flank wear	Excessive corner wear	Excessive margin wear	Poor drill life	Chipping	Breakage	Corved hole axis	Conical entrance	Runout	Rough surface finish	Undersized
Poor clamping								+			+	+		+		+
Insufficient coolant flow					+	+			+		+				+	+
Low coolant pressure									+		+				+	+
Incorrect coolant type	+	+	+			+	+	+	+						+	
Feed fluctuations		+		+					+	+	+	+		+	+	
Too high feed	+	+		+	+	+			+		+	+	+	+	+	+
Too low feed		+							+	+		+				
Spindle speed too high			+	+	+	+	+	+	+		+					
Spindle speed too low	+	+													+	
Material structure	+	+	+				+		+	+	+	+	+			
Material shrinking due to heat			+	+		+			+		+			+	+	+
Workpiece thin wall section									+		+					
Misalignment			+	+		+		+	+	+	+	+	+			+
Undersized hole			+		+	+		+	+	+	+			+		
Rough cutting edge finish	+	+					+		+	+	+	+	+			
Built up edge							+		+		+			+		+
Worn out edge	+	+					+	+	+	+	+	+	+	+		
Interrupted chip flow			+	+		+		+	+	+	+	+	+	+		+
Too small flute clearance			+		+	+		+	+	+		+	+			
Incoorrect drill profile	+	+	+	+			+	+	+		+	+	+	+	+	+
Incorrect head angles	+	+		+		+	+		+	+	+	+	+	+	+	+
Vibrations	+	+	+	+			+		+	+	+	+	+	+	+	+
Oversized bushing									+		+	+	+	+		+
A gap between bushing and workpiece						+			+		+	+	+	+	+	+
Bushing undersized			+	+		+		+	+	+	+			+	+	
Loss of coolant pressure		+	+	+	+				+		+		+		+	+
High coolant pressure												+				+
Overheating coolant	+		+		+	+	+	+	+					+		
Insufficient coolant	+	+	+	+	+				+		+	+	+	+	+	+
Head inside angle excessive wear			+	+					+					+	+	+
Head outside angle excessive wear		+		+			+		+					+	+	+
Too short carbide head	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Tool heel drag			+	+	+	+		+	+	+	+	+	+	+	+	+
Worn supporting pads	+		+	+	+		+		+		+		+		+	+
Tool whip - Reverse tool rotation	+	+	+	+		+		+	+	+	+		+	+	+	+



INGERSOLL ISO MATERIAL GROUPS

ISO	Material	Condition	Tensile Strength (Kpsi)	Hardness HB	Material Number
P	Non - Alloy Steels <0.25% C	Annealed	61	125	1
	Steel Castings =>0.25% C	Annealed	94	190	2
	Free Machining Steel	<0.55% C Quenched & Tempered	123	250	3
		=>0.55% C Annealed	109	220	4
		=>0.55% C Quenched & Tempered	145	300	5
	Low - Alloy Steels and Steel Castings (less than 5% of alloying elements)	Annealed	87	200	6
		Quenched & Tempered	135	275	7
			145	300	8
			174	350	9
	High - Alloy Steels, Steel Castings & Tool Steels	Annealed	99	200	10
		Quenched & Tempered	160	325	11
M	Stainless Steels and Stainless Steel Castings	Ferritic/Martensitic	99	200	12
		Martensitic	119	240	13
		Austenitic & P.H.	87	180	14
K	Nodular Cast Iron (GGG)	Ferritic / Pearlitic		180	15
		Pearlitic		260	16
	Grey Cast Iron (GG)	Ferritic		160	17
		Pearlitic		250	18
	Malleable Cast Iron	Ferritic		130	19
		Pearlitic		230	20
N	Aluminum wrought alloy	As cast		60	21
		Forged		100	22
	Cast Aluminum alloyed	<=12% Si As cast		75	23
		> 12% Si Forged		90	24
		High Temperature		130	25
		Free Cutting		110	26
	Copper Alloys	Brass		90	27
		Electrolitic Copper		100	28
	Non Metallic	Duroplastics & Fiberplastics			29
		Hard Rubber			30
S	High Temp Alloys	Fe Based Annealed		200	31
		Cured		280	32
		Ni or Co Based Annealed		250	33
		Cured		350	34
		Cast		320	35
	Titanium and Ti Alloys		58		36
		Alpha+Beta alloys cured	152		37
H	Hardened Steel			55 HRc	38
				60 HRc	39
	Chilled Cast Iron	Cast		400	40
	Cast Iron	Hardened		55 HRc	41

● = P ● = M ● = K ● = N ● = S ● = H

INGERSOLL MATERIAL GROUPS

Material Group	AISI/SAE Material Spec	DIN Material Spec
1	1010	Ck10
1	1025	C25E, Ck25
1	1213	9SMn28
1	1215	9SMn36
1	1015, 1017	CK15
1	1016	C15
1	1020, 1023	C22
1	1022, 1518	20Mn5
1	11 L 08	10SPb20
1	12 L 13	9SMnPb28
1	12 L 14	9SMnPb36
1	A27 65-35	GS-45
2	1035	C35, Cf35
2	1039	40Mn4
2	1040	C40
2	1042	Ck45
2	1043, 1045	C45
2	1050	Cf53
2	1140	35S20
2	1146	45S20
2	A148 80 40	GS-60
2	A27 70-36	GS-52
2	A537 1	19Mn6
2	A662 C	Ast45
2	A738	Ast52
2	1335	36Mn5
2	1330	28Mn6
4	1055	C55, Ck55
4	1060	C60
4	1064	Ck60
4	1070	Ck67
4	1080	Ck75
4	1095	Ck101
4	W110	C105W1
4	9255	55Si7
6	1006	St36
6	A515 65	H1
6	A573 81	St44-3
6	A573 81 65	St37-3
6	8620, 8617	21NiCrMo2
6	8740, 8640, 8742	40NiCrMo22
6	4317	17CrNiMo6
6	5015	15Cr3
6	5132	34Cr4
6	5140	41Cr4
6	5155	55Cr3
6	5120	St52-3
6	9262	1.0961

Material Group	AISI/SAE Material Spec	DIN Material Spec
6	4520	16Mo5
6	ASTM A350LF5	14Ni6
6	L1	34MoCrS4G
6	5140	42Cr4
6	5115	16MnCr5
6		14MoV6 3
6		31CeMo12
6		39CrMoV13 9
6-7	4130	25CrMo4
6-7	4135, 4137	34CrMo4
6-7	4142	41CrMo4
6-7	4140	42CrMo4
6-9	L3	100Cr6
6-9		105WCr6
6-9	L6	55NiCrMoV6
6-9	L6	50NiCr13
6-9	9840	36CrNiMo4
6-9	6150	50CrV4
6-9	ASTM A290	41CrAlMo7
7		15CrMo5
7	A570-36	RSt37-2
7	4340	35CrNiMo6
9	52100	100Cr6
9	ASTM A204 Gr. A	15Mo3
9	3135	36NiCr6
9	3415	14NiCr10
9	3310	14NiCr14
9	ASTM A182 F-12	13CrMo44
9	ASTM A387 12-2	16CrMo44
9		32CrMo12
10	ASM A353	X8Ni9
10	2515, 2517	12Ni19
10	9310	14NiCrMo13-4
10	D3	X210Cr12
10		X42Cr13
10	H13	X40CrMoV51
10	A2	X100CrMoV51
10	S1	45WCrV7
10	H21	X30WCrV93
10		X165CrMoV12
10	M35	S6/5/2/5
10	M2	S6/5/2
10	M7	S2/9/2
10	HW3	X45CrSi93
11	D2	X155CrVMo121
11	D4, D6	X210CrW12
11	630	1.4542/1.4548
12	430F	X12CrMoS17

INGERSOLL MATERIAL GROUPS

Material Group	AISI/SAE Material Spec	DIN Material Spec
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12		X5CrNi134
12	430	X10CrA118
12	405	X10CrA113
12	434	X6CrMo17
12	HNV6	X80CrNiSi20
12	446	X10CrA124
12	EV8	X53CrMnNiN219
12	S32900	X8CrNiMo
12	440B	X90CrMoV18
12		X46Cr13
12	403	X7Cr13
12	410	X10Cr13
12	420	1.4021
12	431	X22CrNi17
13	ASTM A128 75	G-X120Mn12
14	303	X12CrNiS188
14	304L	X2CrNiN189
14	304	X5CrNi189
14	301	X12CrNi177
14	304LN	X4CrNiN1810
14	316	X5CrNiMo1810
14	316LN	X2CrNiMoN1813
14	316L	X2CrNiMo1812
14	317L	X2CrNiMo1816
14	S32304	X2CrNiN234
14	S31803	X2CrNiMoN2253
14	321	X10CrNiTi189
14	347	X10CrNiNb
14	316Ti	X10CrNiMoTi18
14	318	X10CrNiMoNb18
14	309	X15CrNiSi2012
14	310S	X12CrNi2521
14	S31254	
14	17-7PH	1.4568/1.4504
15		GGG 35.3
15	60-40-18	GGG 40
15		GGG 40.3
15	80-55-06	GGG 50
16		GGG 60
16	100-70-03	GGG 70
17	A48 20B	GG 10
17	A48 25B	GG15
17	A48 30B	GG 20
18	A48 40B	
18	A48 35B	GG 25
18	A48 45B	GG 30
18	A48 50B	GG 35
18	A48 60B	GG 40

Material Group	AISI/SAE Material Spec	DIN Material Spec
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19	32510	GTS-35
20	40010	GTS-45
20	50005	GTS-55
20	70003	GTS-65
23-24	A356-72	
23-24	356.1	
23-24	A360.2	G-AlSi10Mg
23-24	A413.2	G-AlSi12
23-24	A413.1	G-AlSi12(Cu)
23-24	A413.0	GD-AlSi12
23-24	A380.1	GD-AlSi8Cu3
31	330	X12NiCrSi
31		G-X40NiCrSi
33	5390A	2.4603
33		NiCr20Ti
33	5666	NiCr22Mo9N
34	5537C	CoCr20W15
34	4676	NiCu30Al
34		NiCr20TiAk
34	AMS 5399	NiCr19Co11
34	5391	S-NiCr13A16
34	5660	NiFe35Cr14
34	5383	NiCr19Fe19
34	AMS 5544	NiCr19Fe19
34	AMS 5772	CoCr22W14
35	AMS 5397	NiCo15Cr10
37		TiAl4Mo4Sn4Si0.5
37	AMS R54520	TiAl5Sn2.5
37	AMS R56400	TiAl6V4
37	AMS R56401	TiAl6V4ELI

■ GUNDRILL OPERATING GUIDELINES

ISO	Material Number	Cutting Speed (SFM) ø.078 - ø.197	Cutting Speed (SFM) ø.198 - ø.512	Cutting Speed (SFM) ø.513 - ø1.575
P	1	230 - 300	260 - 360	230 - 330
	2	230 - 300	260 - 360	230 - 330
	3	165 - 230	200 - 260	165 - 230
	4	230 - 300	260 - 360	230 - 330
	5	165 - 230	200 - 260	165 - 230
	6	200 - 260	230 - 300	200 - 260
	7	165 - 230	200 - 260	165 - 230
	8	165 - 230	200 - 260	165 - 230
	9	165 - 230	200 - 260	165 - 230
	10	165 - 230	200 - 260	165 - 230
	11	165 - 230	200 - 260	165 - 230
M	12	165 - 230	165 - 230	165 - 230
	13	165 - 230	165 - 230	165 - 230
	14	165 - 230	165 - 230	165 - 230
K	15	200 - 260	230 - 300	230 - 300
	16	200 - 260	230 - 300	230 - 300
	17	200 - 260	230 - 300	230 - 300
	18	200 - 260	230 - 300	230 - 300
	19	200 - 260	230 - 300	230 - 300
	20	200 - 260	230 - 300	230 - 300
N	21	230 - 590	330 - 1000	330 - 1000
	22	230 - 590	330 - 1000	330 - 1000
	23	230 - 590	330 - 1000	330 - 1000
	24	230 - 590	330 - 1000	330 - 1000
	25	230 - 590	330 - 1000	330 - 1000
	26	230 - 390	330 - 520	260 - 530
	27	230 - 390	330 - 520	260 - 530
	28	230 - 390	330 - 520	260 - 530
	29			
	30			
S	31			
	32			
	33			
	34			
	35			
	36			
	37			
H	38			
	39			
	40			
	41			

GUNDRILL COOLANT AND OPERATING GUIDELINES

THE RIGHT COOLANT

Neat Oil

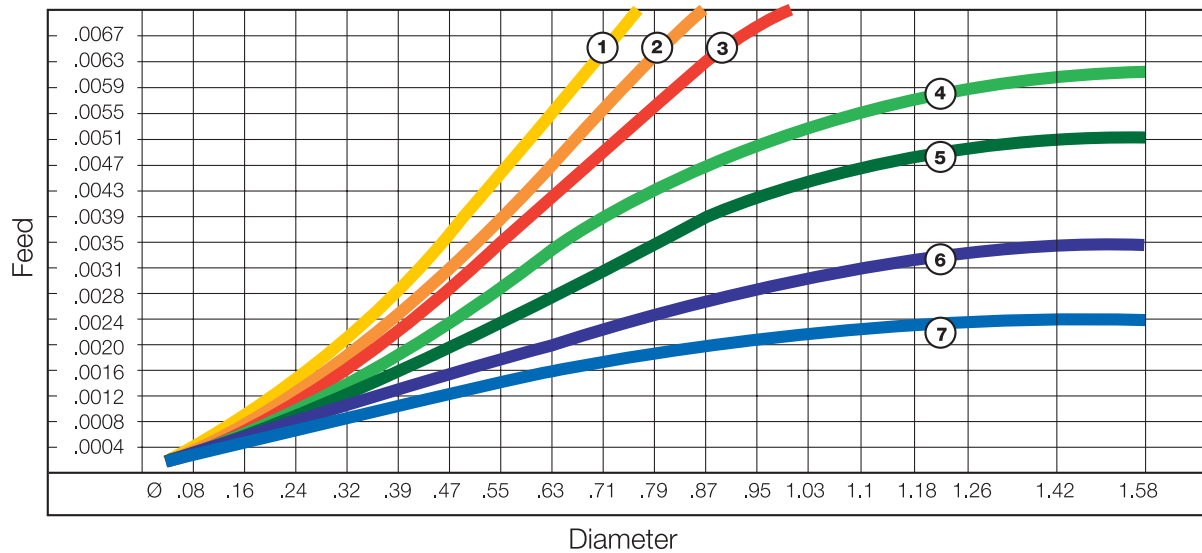
- Oil is preferred over water soluble coolant
- Most conventional gundrilling machines use oil
- Provides superior lubricity, better tool life and surface finish
- No worry about concentration levels
- Does not evaporate

Water Soluable

- Used on most CNC machines

<8% = unacceptable
10-12% = acceptable
12-15% = preferred

CUTTING CONDITIONS

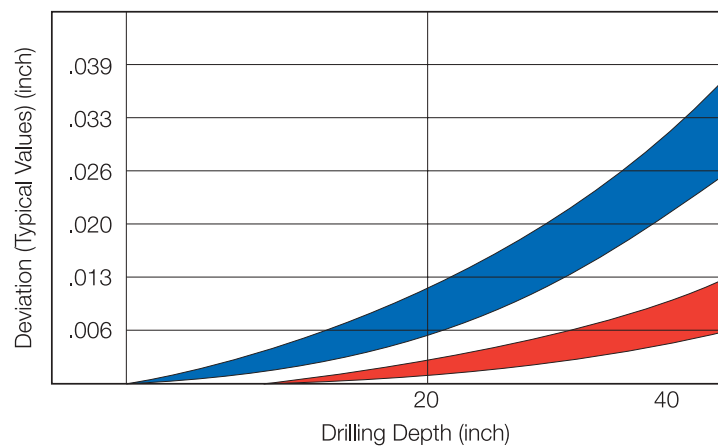
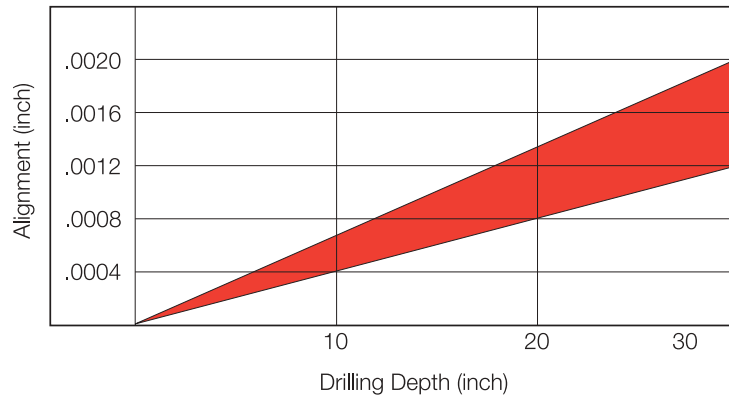


- ① Aluminum Alloy
- ② Grey Cast Iron
- ③ Nodular Cast Iron
- ④ Structural and Free Cutting Steel
- ⑤ High Temper Alloys
- ⑥ Super Alloys
- ⑦ Ferritic and Austenitic Stainless Steel

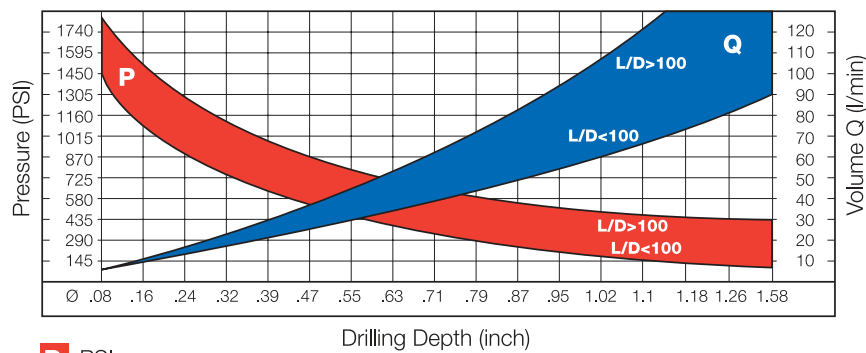
Ingersoll

■ GUNDRILL OPERATING GUIDELINES

CUTTING CONDITIONS



- Stationary workpiece - rotating tool
- Anti clockwise revolving workpiece - rotating tool



- P PSI
- Q l/min