DEEP DRILLING
BTA SYSTEM

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Indexable Drill Heads

Applications			STS (Single Tube System)			DTS (Double Tube System)		
			TRIDEEP DEEP DRILLING	FINEBEAM	ISCARDEEPDRILL	TRIDEEP DEEP DRILLING	FINEBEAM	ISCARDEEPDRILL
			DSD...FT	DSD...FB	DSD-EC\IC	DDD...FT	DDD...FB	DDD-EC
Drill heads for solid drilling								
Drill diameter (mm)			ø16 - 40	ø25 - 89	ø38 - 291.99	ø18.4 - 28	ø25 - 65	ø38 - 183.99
Thread types	External 4-start thread		✓	✓	✓	✓	✓	✓
	Internal single-start thread		✓	✓	✓	-	-	-
Hole tolerance			IT10	IT10	IT10	IT10	IT10	IT10
Surface finish Ra (µm)			2	2	3	2	2	3
Machines	Deep hole drilling machines		✓	✓	✓	✓	✓	✓
	NC machines		-	-	-	✓	✓	✓
	Lathes		-	-	-	✓	✓	✓
	Machining centers M/C		-	-	-	✓	✓	✓
Workpiece materials	P	Steel	•••	•••	•••	•••	•••	•••
	M	Stainless	•••	•••	•••	•••	•••	•••
	K	Cast iron	•••	•••	•••	•••	•••	•••
	N	Non-ferrous	•••	•••	•••	•••	•••	•••
	S	Superalloys	••	••	••	••	••	••
	H	Hard materials (≥40HRC)	••	••	••	••	••	••
Insert type			TOGT	NPHT / NPMT	NPMX / TPMX	TOGT	NPHT / NPMT	NPMX / TPMX
Plus Cartridge and Guide pad +1 mm - +5 mm			-	-	✓	-	-	✓
Page			192	201	209	193	202	211

••• (Excellent) ◄—► • (Standard)

Brazed Drill Heads

Applications			STS (Single Tube System)			DTS (Double Tube System)
			DSD-E0	DSD-E1	DSD-E2/E3	DDD-E3
Brazed drill heads						
Drill diameter (mm)			ø8 - 14.79	ø12.6 - 20	ø12.6 - 65	ø18.4 - 65
Thread type	External single-start thread		✓	-	-	-
	External 2-start thread		-	ø12.6 - 15.59 mm	ø12.6 - 15.59 mm	-
	External 4-start thread		-	ø15.6 - 20 mm	ø15.6 - 65 mm	✓
Hole tolerance			IT9	IT9	IT9	IT9
Surface finish Ra (µm)			2	2	2	2
Machine	Deep hole drilling machines		✓	✓	✓	✓
	NC machines		-	-	-	✓
	Lathes		-	-	-	✓
	Machining centers M/C		-	-	-	✓
Workpiece material	P	Steel	•••	•••	•••	•••
	M	Stainless	•••	•••	•••	•••
	K	Cast iron	•••	•••	•••	•••
	N	Non-ferrous	•••	•••	•••	•••
	S	Superalloys	••	••	••	••
	H	Hard materials (≥40HRC)	••	••	••	••
Page			230	230	231	232

••• (Excellent) ◄—► • (Standard)

Indexable Counterboring Heads

Applications			STS (Single Tube System)				DTS (Double Tube System)	
			DSC - EA	DSC - EC	DSC – IA/IC		DDC - EA/EC	
Drill head								
Drill diameter (mm)			ø25 - 39.99	ø40 - 291.99	ø25 - 39.99	ø40 - 293.99	ø25 - 39.99	ø40 - 183.99
Thread type	External 4-start thread		✓	✓	-	-	✓	✓
	Internal single-start thread		-	-	✓	✓	-	-
Hole tolerance			IT10	IT10	IT10	IT10	IT10	IT10
Surface finish Ra (µm)			2	2	2	2	2	2
Machine	Deep hole drilling machines		✓	✓	✓	✓	✓	✓
	NC machines		-	-	-	-	✓	✓
	Lathes		-	-	-	-	✓	✓
	Machining centers M/C		-	-	-	-	✓	✓
Workpiece material	P	Steel	•••	•••	•••	•••	•••	•••
	M	Stainless	•••	•••	•••	•••	•••	•••
	K	Cast iron	•••	•••	•••	•••	•••	•••
	N	Non-ferrous	•••	•••	•••	•••	•••	•••
	S	Superalloys	••	••	••	••	••	••
	H	Hard materials (≥40HRC)	••	••	••	••	••	••
Insert type			XPMT	TPMX	XPMT	TPMX	XPMT	TPMX
Plus Cartridge and Guide pad +1 mm - +5 mm			-	✓	-	✓	-	✓
Page			233	236	240	242	246	249

•••(Excellent) ◄► •(Standard)

Indexable Trepanning Heads

Applications			STS (Single Tube System)	
			DSTR	
			EC	IC
Drill head				
Drill diameter (mm)			ø100 - 328	ø100 - 305.99
Thread type	External 4-start thread		✓	-
	Internal single-start thread		-	✓
Hole tolerance			IT10	IT10
Surface finish Ra (µm)			2	2
Machine	Deep hole drilling machines		✓	✓
	Lathes		-	-
	Machining centers M/C		-	-
Workpiece material	P	Steel	•••	•••
	M	Stainless	•••	•••
	K	Cast iron	•••	•••
	N	Non-ferrous	•••	•••
	S	Superalloys	••	••
	H	Hard materials (≥40HRC)	••	••
Insert type			TPMX	TPMX
Page			255	258

•••(Excellent) ◄► •(Standard)

DEEP HOLE DRILLING Index

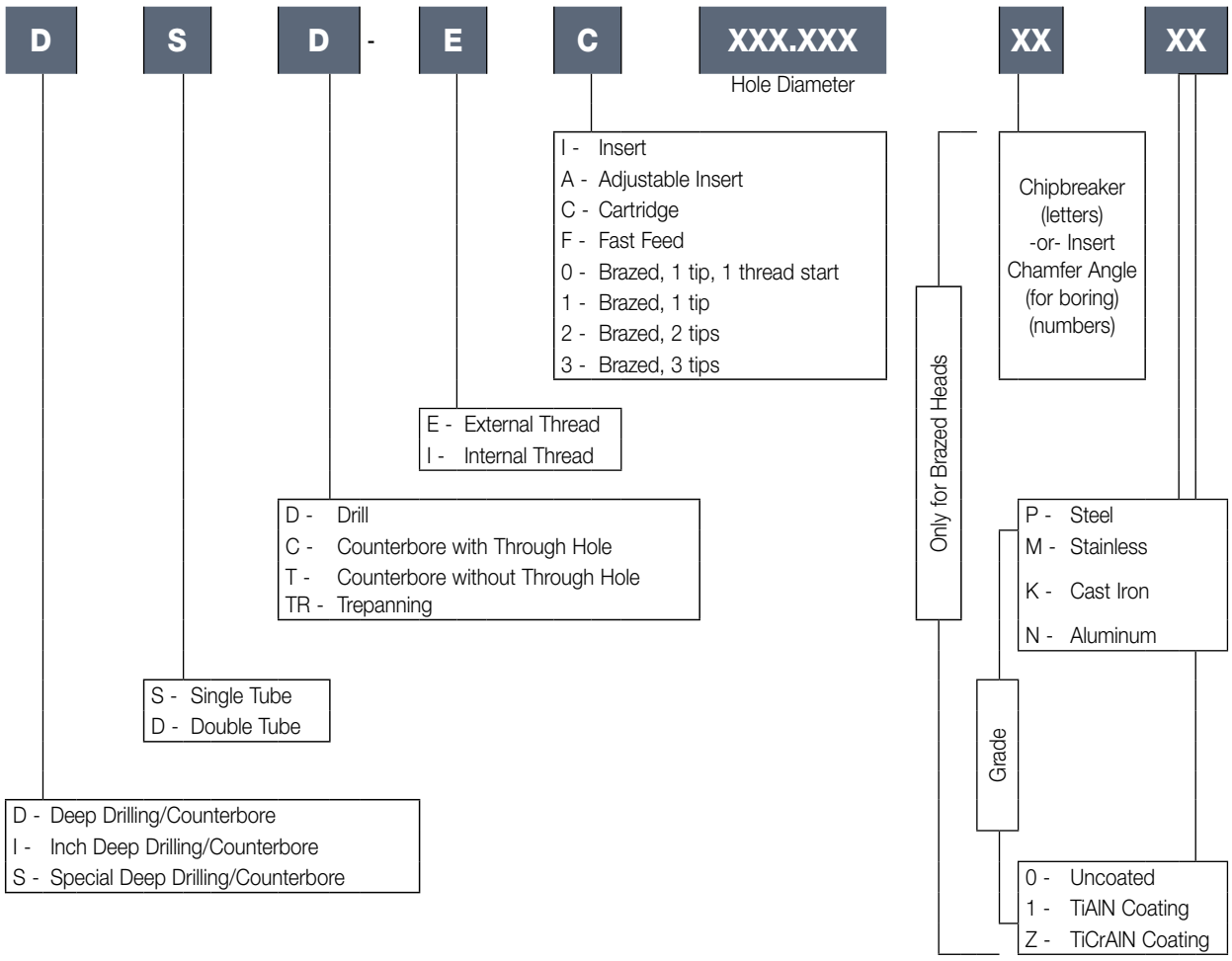
Single Tube System

Single Tube System (STS) –
Cooling fluid is induced through the gap between the drill and the hole. Conveying the chips through the tube requires the use of dedicated machines.

Double Tube System

Double Tube System (DTS) -
Cooling fluid is induced between the coaxial tubes, conveying the chips through the inner tube and can be applied on standard machines.

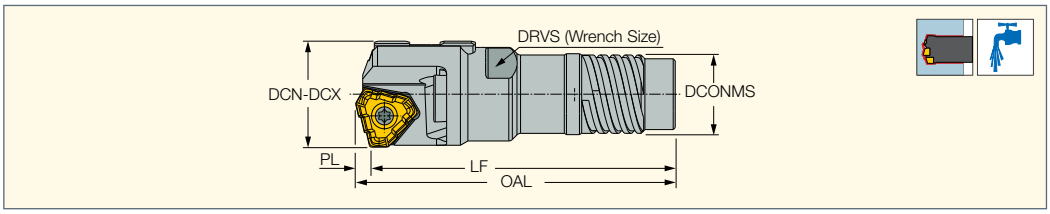
Deep Drilling Heads Identification System



TRIDEEP DEEP DRILLING

DSD-EF-FT

Deep Single Tube Drills with External 4-Start Thread Connection Carrying Triangular Inserts (16-40 dia.)



Designation	DCN(1)	DCX(2)	LF	OAL	PL	DCONMS	THOD(3)
DSD-EF 16.00-16.70-FT	16.00	16.70	55.00	57.20	2.20	12.60	TS-I0
DSD-EF 16.71-17.70-FT	16.71	17.70	55.00	57.20	2.20	13.60	TS-I1
DSD-EF 17.71-18.90-FT	17.71	18.90	56.00	59.00	3.00	14.50	TS-I2
DSD-EF 18.91-20.00-FT	18.91	20.00	56.00	59.00	3.00	15.50	TS-I3
DSD-EF 20.01-21.80-FT	20.01	21.80	60.00	63.20	3.20	16.00	TS-I4
DSD-EF 21.81-21.99-FT	21.81	21.99	63.50	66.70	3.20	18.00	TS-I5
DSD-EF 22.00-24.10-FT	22.00	24.10	65.50	68.90	3.40	18.00	TS-I5
DSD-EF 24.11-25.00-FT	24.11	25.00	65.50	68.90	3.40	19.50	TS-I6
DSD-EF 25.01-26.40-FT	25.01	26.40	67.50	71.10	3.60	19.50	TS-I6
DSD-EF 26.41-28.00-FT	26.41	28.00	67.50	71.10	3.60	21.00	TS-I7
DSD-EF 28.01-28.70-FT	28.01	28.70	70.00	74.57	4.57	21.00	TS-I7
DSD-EF 28.71-31.00-FT	28.71	31.00	75.00	79.57	4.57	23.50	TS-I8
DSD-EF 31.01-32.00-FT	31.01	32.00	75.00	79.57	4.57	25.50	TS-I9
DSD-EF 32.01-33.30-FT	32.01	33.30	74.50	74.93	5.43	25.50	TS-I9
DSD-EF 33.31-36.20-FT	33.31	36.20	79.50	84.93	5.43	28.00	TS-I10
DSD-EF 36.21-39.60-FT	36.21	39.60	89.50	94.93	5.43	30.00	TS-I11
DSD-EF 39.61-40.00-FT	39.61	40.00	94.50	99.93	5.43	33.00	TS-I12

• Note: Each item in the attached catalog page represents a diameter range • For spare parts, insert information and user guide, see pages 196-200 • Inserts and guide pads should be ordered separately • Ordering example: DSD-EF 16.50-FT

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Tube designation

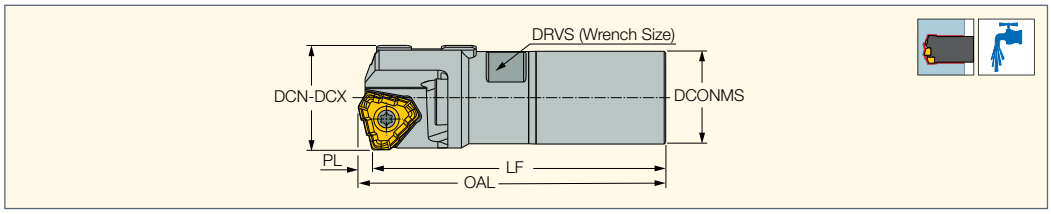
For inserts, see pages: TOGT-DT (194) • TOGT-GF (194)

For holders, see pages: TS-I** (264)

TRIDEEP DEEP DRILLING

DSD-IF-FT

Deep Single Tube Drills with Internal Single-Start Thread Connection Carrying Triangular Inserts (16-32 dia.)



Designation	DCN(1)	DCX(2)	LF	OAL	PL	DCONMS	THID(3)
DSD-IF 16.01-16.50-FT	16.00	16.50	53.50	55.70	2.20	12.70	TS-O3
DSD-IF 16.51-17.25-FT	16.51	17.25	53.50	55.70	2.20	13.40	TS-O4
DSD-IF 17.26-18.00-FT	17.26	18.00	53.50	55.70	2.20	13.70	TS-O5
DSD-IF 18.01-19.00-FT	18.01	19.00	53.50	56.50	3.00	14.40	TS-O6
DSD-IF 19.01-19.99-FT	19.01	19.99	53.50	56.70	3.20	15.40	TS-O7
DSD-IF 20.00-21.99-FT	20.00	21.99	58.00	61.20	3.20	16.50	TS-O8
DSD-IF 22.00-24.99-FT	22.00	24.99	60.00	63.40	3.40	19.00	TS-O9
DSD-IF 25.00-26.99-FT	25.00	26.99	65.00	68.60	3.60	20.00	TS-10
DSD-IF 27.00-28.00-FT	27.00	28.00	65.00	68.60	3.60	22.00	TS-11
DSD-IF 28.01-29.99-FT	28.01	29.99	75.00	79.57	4.57	22.00	TS-12
DSD-IF 30.00-31.99-FT	30.00	31.99	75.00	79.57	4.57	24.00	TS-13
DSD-IF 32.00-FT	32.00	32.00	75.00	79.57	4.57	26.00	TS-14

• Note: Each item in the attached catalog page represents a diameter range • For spare parts, insert information and user guide, see pages 196-200 • Inserts and guide pads should be ordered separately • Ordering example: DSD-IF 18.50-FT

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Tube designation

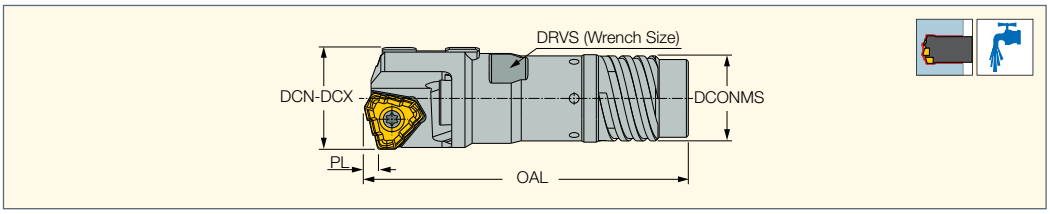
For inserts, see pages: TOGT-DT (194) • TOGT-GF (194)

For holders, see pages: TS-O** (265)

TRIDEEP DEEP DRILLING

DDD-EF-FT

Deep Double Tube Drills with External 4-Start Thread Connection Carrying Triangular Inserts (18.4-28 dia.)



Designation	DCN(1)	DCX(2)	PL	OAL	DCONMS	THOD(3)	THID(4)
DDD-EF 18.40-20.00-FT	18.41	20.00	3.00	64.00	16.00	TDO-I0	TDI-N0
DDD-EF 20.01-21.80-FT	20.01	21.80	3.20	66.70	18.00	TDO-I1	TDI-N1
DDD-EF 21.81-21.99-FT	21.81	21.99	3.20	66.70	19.50	TDO-I2	TDI-N2
DDD-EF 22.00-24.10-FT	22.00	24.10	3.40	68.90	19.50	TDO-I2	TDI-N2
DDD-EF 24.11-25.00-FT	24.11	25.00	3.40	68.90	21.00	TDO-I3	TDI-N3
DDD-EF 25.01-26.40-FT	25.01	26.40	3.60	71.10	21.00	TDO-I3	TDI-N3
DDD-EF 26.01-28.00-FT	26.41	28.00	3.60	74.10	23.50	TDO-I4	TDI-N4

• Note: Each item in the attached catalog page represents a diameter range. • For spare parts, insert information and user guide, see pages 196-200 • Inserts and guide pads should be ordered separately • Ordering example: DDD-EF 18.50-FT

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Outer tube designation

(4) Inner tube designation

For inserts, see pages: TOGT-DT (194) • TOGT-GF (194)

For holders, see pages: TDO-I (D18.41-65.00) (266)

Universal Marking for Deep Drilling Tools

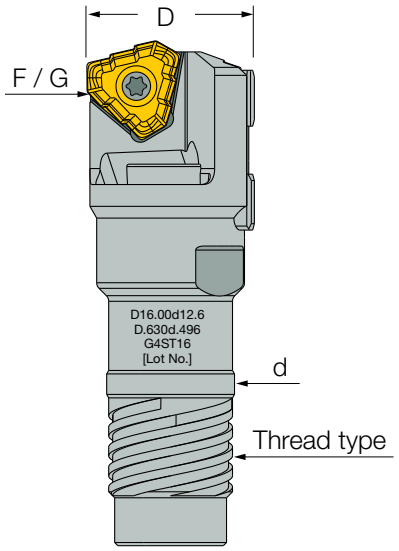
D- **Tool diameter**
Metric- D16.00
Inch- D.630

d- Pilot diameter
Metric- d12.6
Inch- d.496

Tool style
F- Fixed pocket 3-5 cutting edges
G- Fixed pocket single cutting edge

Thread type
4ST- Four-start thread single tube
1ST- Single-start thread single tube
4DT- Four-start thread double tube

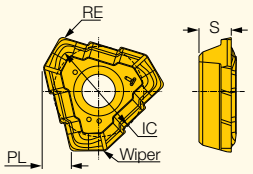
16- Tube diameter

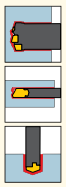


TRIDEEP DEEP DRILLING

TOGT-DT

Deep Drilling Inserts with 3 Chip Splitting Cutting Edges, a Positive Rake Chipbreaker and a Wiper





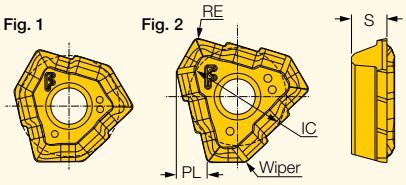
Designation	Dimensions IC	RE	PL	S	Fig.	IC908
TOGT 070304-DT	7.69	0.40	1.95	2.30	1	●
TOGT 080305-DT	8.55	0.50	2.20	2.80	1	●
TOGT 090305-DT	8.32	0.50	3.00	3.00	2	●
TOGT 100305-DT	9.23	0.50	3.20	3.30	2	●
TOGT 110405-DT	10.40	0.50	3.40	3.80	2	●
TOGT 120405-DT	11.59	0.50	3.60	4.30	2	●
TOGT 130408-DT	12.85	0.80	4.57	4.76	2	●
TOGT 140510-DT	16.85	1.00	5.43	5.26	2	●

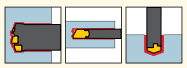
For tools, see pages: DDD-EF-FT (193) • DSD-EF-FT (192) • DSD-IF-FT (192) • GD-DH (285) • GDH-MKT (287)

TRIDEEP DEEP DRILLING

TOGT-GF

Deep Drilling Inserts with 3 Chip Splitting Cutting Edges, a Positive Rake Chipbreaker and a Wiper

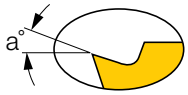




Designation	Dimensions IC	RE	PL	S	Fig.	IC908
TOGT 070304-GF	7.69	0.40	1.95	2.30	1	●
TOGT 080305-GF	8.55	0.50	2.20	2.80	1	●
TOGT 090305-GF	8.32	0.50	3.00	3.00	2	●
TOGT 100305-GF	9.23	0.50	3.20	3.30	2	●
TOGT 110405-GF	10.40	0.50	3.40	3.80	2	●
TOGT 120405-GF	11.59	0.50	3.60	4.30	2	●
TOGT 130408-GF	12.85	0.80	4.57	4.76	2	●

For tools, see pages: DDD-EF-FT (193) • DSD-EF-FT (192) • DSD-IF-FT (192) • GD-DH (285) • GDH-MKT (287)

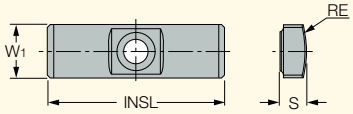
Chipbreaker Appearances

		GF	DT
1	Rake angle 	a°=25°	a°=20°
2	ID mark 	F 	T 

TRIDEEP DEEP DRILLING

GPS

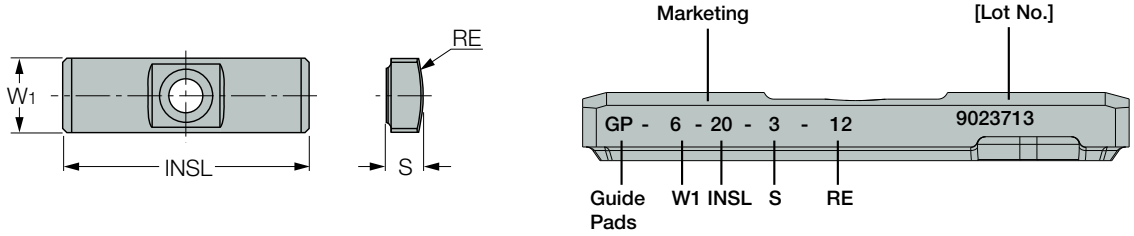
Deep Drilling Solid Carbide Guide Pads



Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC928	IC950	IC908
GPS-04-16-055-DC	4.0	16.00	2.00	5.50	•		•
GPS-05-18-060-DC	5.0	18.00	2.50	6.00	•		•
GPS-05-18-075-DC	5.0	18.00	2.50	7.50	•		•
GPS-06-20-075-DC	6.0	20.00	3.00	7.50			•
GPS-06-20-075	6.0	20.00	3.00	7.50		•	
GPS-06-20-085-DC	6.0	20.00	3.00	8.50	•		•
GPS-06-20-085	6.0	20.00	3.00	8.50		•	
GPS-06-20-100-DC	6.0	20.00	3.00	10.00	•		•
GPS-06-20-100	6.0	20.00	3.00	10.00		•	
GPS-06-20-120-DC	6.0	20.00	3.00	12.00	•		•
GPS-06-20-120	6.0	20.00	3.00	12.00		•	
GPS-07-20-120-DC	7.0	20.00	3.50	12.00	•		•
GPS-07-20-120	7.0	20.00	3.50	12.00		•	
GPS-08-25-155-DC	8.0	25.00	4.50	15.50	•		•
GPS-08-25-155	8.0	25.00	4.50	15.50		•	
GPS-10-30-200-DC	10.0	30.00	4.50	20.00	•		•
GPS-10-30-200	10.0	30.00	4.50	20.00		•	
GPS-10-35-200-DC	10.0	35.00	6.00	20.00	•		•
GPS-10-35-200	10.0	35.00	6.00	20.00		•	
GPS-12-35-250-DC	12.0	35.00	5.50	25.00	•		•
GPS-12-35-250	12.0	35.00	5.50	25.00		•	
GPS-14-40-250-DC	14.0	40.00	7.50	25.00	•		•
GPS-14-40-250	14.0	40.00	7.50	25.00		•	
GPS-18-40-300-DC	18.0	40.00	9.00	30.00	•		•

• DC- Double Chamfer

Universal Marking for Deep Drilling Tools



Guide Pad Grade Recommendation

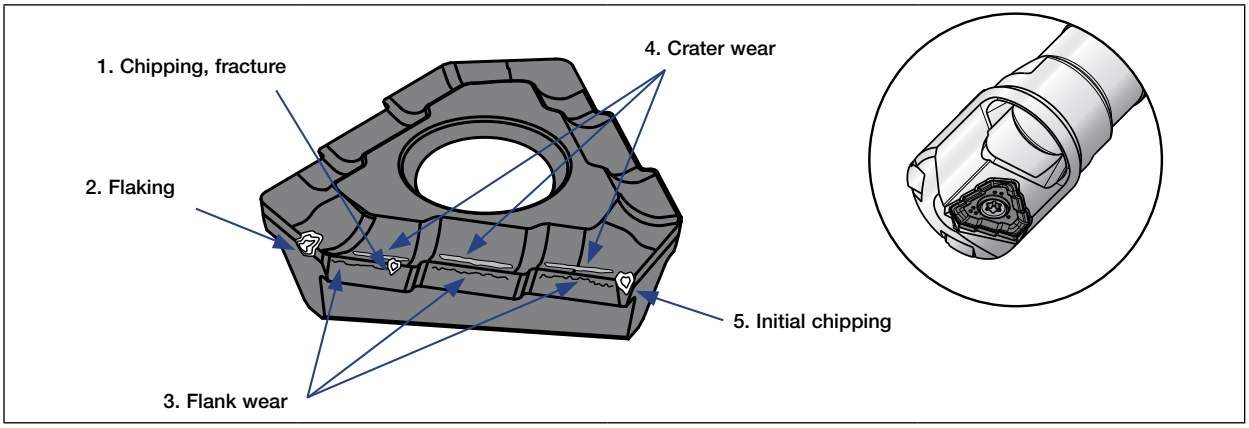
	Oil Coolant			Water Based Coolant		
Priority	1	2	3	1	2	3
ISO-P	IC950	IC908	IC928	IC928	IC908	-
ISO-K	IC950	IC908	IC928	IC928	IC908	-
ISO-M	IC928	IC908	IC950	IC928	IC908	-
ISO-S	IC928	IC908	IC950	IC928	IC908	-

Spare Parts

Diameter Range	Insert	Insert Clamping Screw	Key	N*m	Solid Carbide Guide Pad	Guide Pad Clamping Screw	Key
14.00-15.99	TOGT 070304-DT/GF	SR 14-560/S	T-8	1.2	GPS-05-18-060-DC	SR 34-508	T-7
16.00-18.00	TOGT 080305-DT/GF	SR 14-560/S	T-8	1.2	GPS-06-20-075-DC		
18.01-20.00	TOGT 090305-DT/GF	SR 14-560/S	T-8	1.2	GPS-06-20-085-DC		
20.01-20.99	TOGT 100305-DT/GF	SR 34-506	T-9	2.0	GPS-06-20-085-DC		
21.00-21.99	TOGT 100305-DT/GF				GPS-06-20-100-DC		
22.00-25.00	TOGT 110405-DT/GF	SR 14-571/S	T-15	4.8	GPS-06-20-100-DC		
25.01-28.00	TOGT 120405-DT/GF	SR 14-506	T-15	4.8	GPS-06-20-120-DC		
28.01-29.99	TOGT 130408-DT/GF	SR 16-212/L10	T20/5	10	GPS-06-20-120-DC	SR 34-508	T-7/5
30.00-32.00	TOGT 130408-DT/GF				GPS-07-20-120-DC	SR11201753-4	T-9/5
32.01-39.01	TOGT 140510-DT/GF				GPS-07-20-120-DC		
39.01-40.00	TOGT 140510-DT/GF				GPS-08-25-155-DC		

Troubleshooting for Insert Damage

Examples of trouble with the cutting edge



Problem	Cause	Solution	
		Grade	Cutting conditions / other
1. Chipping, fracture	• Excessive vibration or impact • Torn away built-up edge	• Use a tough grade	• Reduce the feed rate • Eliminate the vibration
2. Flaking	• Excessive vibration or impact	• Use a tough grade	• Reduce the feed rate • Eliminate the vibration
3. Flank wear	• Cutting speed too high • Inadequate tool toughness	• Use a grade with high wear resistance • Use a coated grade	• Reduce the cutting speed • Reduce the feed rate • Use coolant properly
4. Crater wear	• Cutting speed too high • Feed rate too high • Inadequate tool toughness	• Use a grade with high wear resistance • Use a coated grade	• Reduce the cutting speed • Reduce the feed rate • Use coolant properly
5. Initial chipping	• Inappropriate guide bush or pilot hole • Misalignment	• Use a tough grade	• Adjust or change the guide bushing or pilot hole • Reduce the feed rate • Correct the misalignment

Machining Recommendations for TRIDEEP BTA Drilling Heads

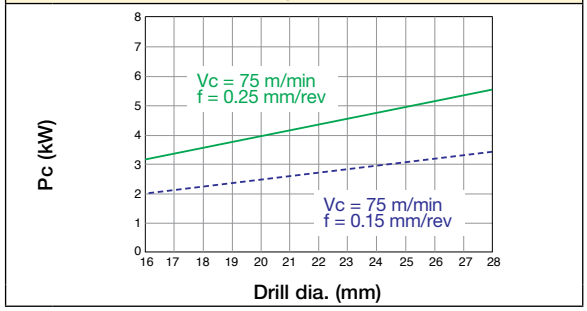
ISO	Material		Condition	Tensile Strength [N/mm²]	Material Group No. (1)	Hardness (HB)	Chipbreaker	Cutting speed V_c (m/min)	Feed : f (mm/rev) Drill dia. (mm) Ø16-18	Feed : f (mm/rev) Drill dia. (mm) Ø18.01-40
P	Non-alloy steel and cast steel, free cutting steel	< 0.25 %C	Annealed	420	1	125	GF	50-100	0.03-0.10	0.03-0.10
							DT	80-140	0.05-0.10	0.05-0.10
		>= 0.25 %C	Annealed	650	2	190	GF	50-100	0.03-0.10	0.03-0.10
							DT	80-140	0.05-0.10	0.05-0.10
		< 0.55 %C	Quenched and tempered	850	3	250	GF	50-100	0.03-0.10	0.03-0.12
							DT	80-140	0.05-0.16	0.05-0.20
		>= 0.55 %C	Annealed	750	4	220	GF	50-100	0.03-0.10	0.03-0.12
							DT	80-140	0.05-0.16	0.05-0.20
			Quenched and tempered	1000	5	300	GF	50-100	0.03-0.10	0.03-0.12
							DT	80-140	0.05-0.16	0.05-0.20
	Low alloy and cast steel (less than 5% of alloying elements)		Annealed	600	6	200	GF	50-100	0.03-0.10	0.03-0.10
							DT	80-140	0.05-0.10	0.05-0.10
			Quenched and tempered	930	7	275	GF	50-100	0.03-0.10	0.03-0.10
							DT	80-140	0.05-0.10	0.05-0.10
				1000	8	300	GF	50-100	0.03-0.10	0.03-0.10
							DT	80-140	0.05-0.10	0.05-0.10
				1200	9	350	GF	50-100	0.03-0.10	0.03-0.10
							DT	80-140	0.05-0.10	0.05-0.10
	High alloyed steel, cast steel and tool steel		Annealed	680	10	200	GF	50-100	0.03-0.10	0.03-0.12
							DT	80-120	0.05-0.16	0.05-0.20
			Quenched and tempered	1100	11	325	GF	50-100	0.03-0.10	0.03-0.12
							DT	80-120	0.05-0.16	0.05-0.20
	Stainless steel and cast steel		Ferritic/martensitic	680	12	200	GF	50-100	0.03-0.06	0.03-0.06
							DT	60-100	0.05-0.10	0.05-0.10
			Martensitic	820	13	240	GF	50-100	0.03-0.06	0.03-0.06
							DT	60-100	0.05-0.10	0.05-0.10
M	Stainless steel and cast steel		Austenitic, duplex	600	14	180	GF	50-100	0.03-0.06	0.03-0.06
							DT	60-100	0.05-0.10	0.05-0.10
K	Grey cast iron (GG)		Ferritic/pearlitic		15	180	GF	50-100	0.03-0.15	0.05-0.18
							DT	80-140	0.05-0.25	0.05-0.3
			Pearlitic/martensitic		16	260	GF	50-100	0.03-0.15	0.05-0.18
							DT	80-140	0.05-0.25	0.05-0.3
	Nodular cast iron (GGG)		Ferritic		17	160	GF	50-100	0.03-0.15	0.05-0.18
							DT	80-140	0.05-0.25	0.05-0.3
			Pearlitic		18	250	GF	50-100	0.03-0.15	0.05-0.18
							DT	80-140	0.05-0.25	0.05-0.3
	Malleable cast iron		Ferritic		19	130	GF	50-100	0.03-0.15	0.05-0.18
							DT	80-140	0.05-0.25	0.05-0.3
			Pearlitic		20	230	GF	50-100	0.03-0.15	0.05-0.18
							DT	80-140	0.05-0.25	0.05-0.3
N	Aluminum-wrought alloys		Not hardenable		21	60	GF	80-160	0.03-0.15	0.03-0.015
							DT	100-200	0.05-0.20	0.05-0.20
			Hardenable		22	100	GF	80-160	0.03-0.15	0.03-0.015
							DT	100-200	0.05-0.20	0.05-0.20
	Aluminum-cast alloys	≤ 12% Si	Not hardenable		23	75	GF	80-160	0.03-0.15	0.03-0.015
							DT	100-200	0.05-0.20	0.05-0.20
			Hardenable		24	90	GF	80-160	0.03-0.15	0.03-0.015
							DT	100-200	0.05-0.20	0.05-0.20
		>12% Si	High temperature		25	130	GF	80-160	0.03-0.15	0.03-0.015
							DT	100-200	0.05-0.20	0.05-0.20
	Copper alloys	>1% Pb	Free cutting		26	110	GF	80-160	0.03-0.15	0.03-0.015
							DT	100-200	0.05-0.20	0.05-0.20
			Brass		27	90	GF	80-160	0.03-0.15	0.03-0.015
							DT	100-200	0.05-0.20	0.05-0.20
			Electrolitic copper		28	100	GF	80-160	0.03-0.15	0.03-0.015
							DT	100-200	0.05-0.20	0.05-0.20
S	High temp. alloys	Fe base	Annealed		31	200	GF	50-100	0.03-0.06	0.03-0.06
							DT	60-100	0.05-0.10	0.05-0.10
			Hardened		32	280	GF	50-100	0.03-0.06	0.03-0.06
							DT	60-100	0.05-0.10	0.05-0.10
		Ni / Co base	Annealed		33	250	GF	20-50	0.03-0.06	0.03-0.08
							DT	20-50	0.04-0.08	0.04-0.10
			Hardened		34	350	GF	20-50	0.03-0.06	0.03-0.08
							DT	20-50	0.04-0.08	0.04-0.10
			Cast		35	320	GF	20-50	0.03-0.06	0.03-0.08
							DT	20-50	0.04-0.08	0.04-0.10
	Titanium alloys		Pure	400	36		GF	30-60	0.03-0.10	0.03-0.12
							DT	30-60	0.05-0.13	0.05-0.15
			Alpha+beta alloys hardened	1050	37		GF	30-60	0.03-0.10	0.03-0.12
							DT	30-60	0.05-0.13	0.05-0.15
H	Hardened steel	≥ 40HRC	Hardened		38		GF	40-100	0.03-0.08	0.03-0.08
							DT	50-100	0.04-0.08	0.04-0.10

(1) For material groups see pages 495-524

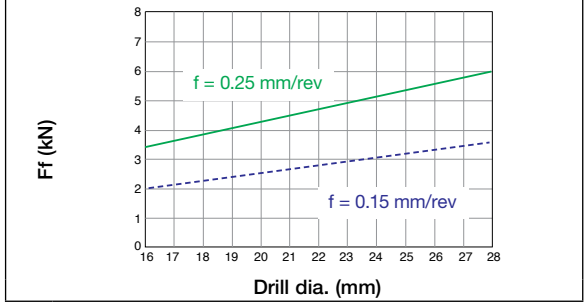
Technical Guide

STS - Machine setting for single tube system

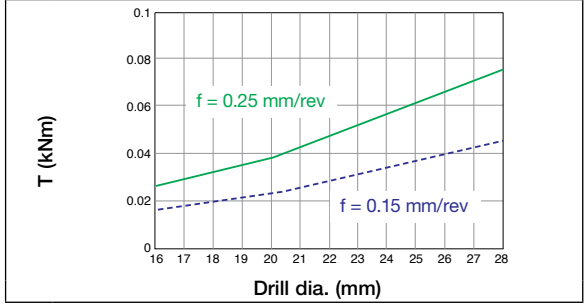
Net power



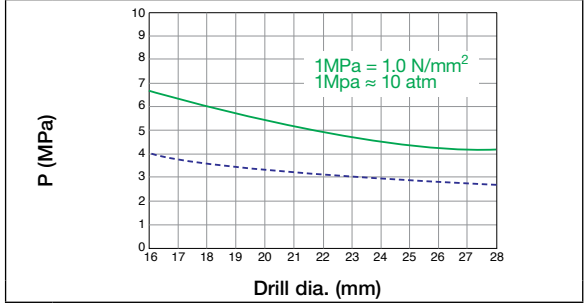
Feed force



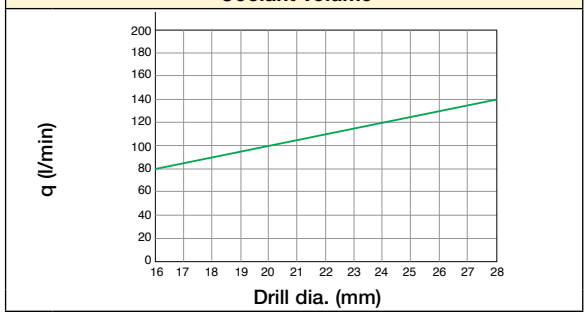
Torque



Coolant pressure

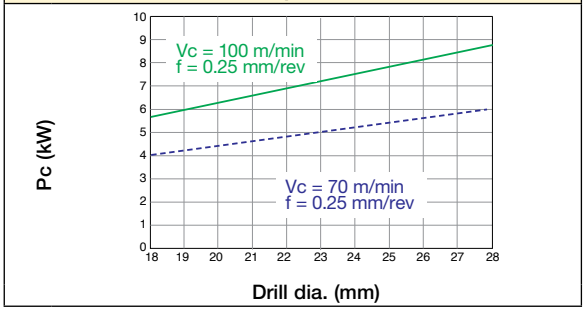


Coolant volume

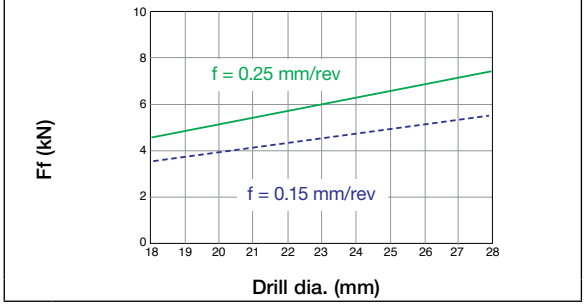


DTS - Machine setting for double tube system

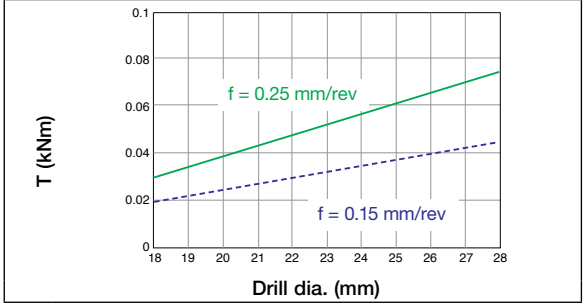
Net power



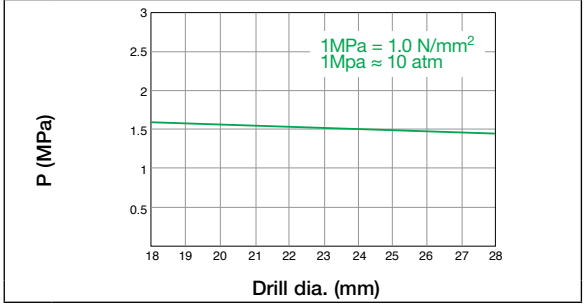
Feed force



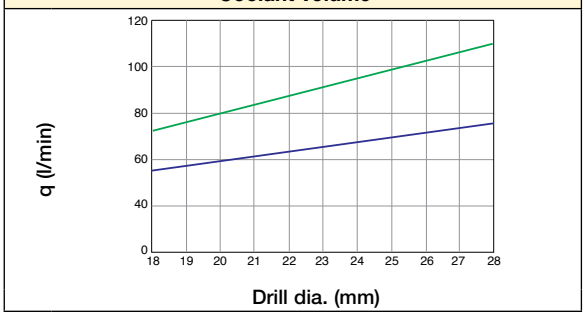
Torque



Coolant pressure



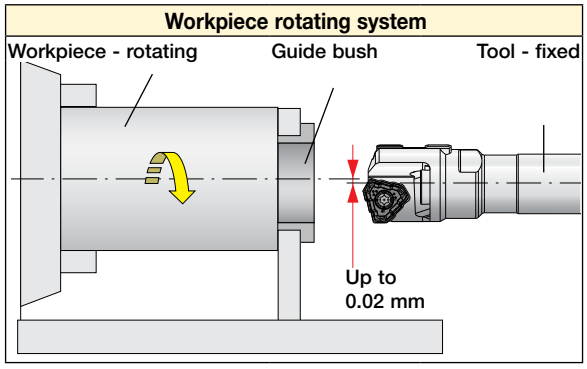
Coolant volume



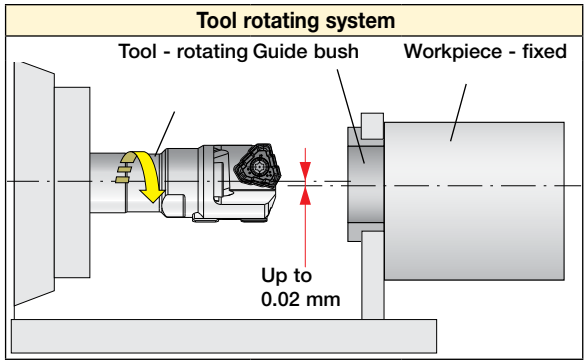
The above values should not be used as the exact recommendations.
They may need modification depending on the machining conditions, materials, etc.

Machine Setup

STS and DTS



- Only used when the workpiece and the tool axis are on the same line.
- Better hole straightness and wear resistance on guide bush are provided compared to the tool rotating system.
- Keep the alignment between guide bush and spindle within 0.02 mm.

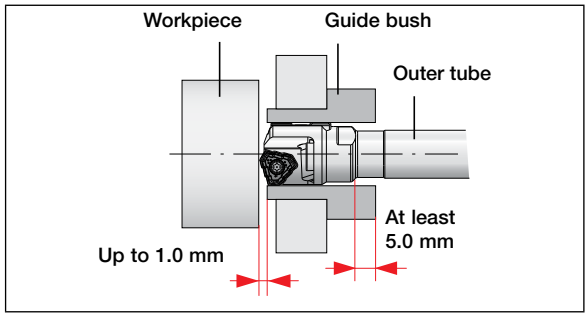


- Can be used when the workpiece and the tool axis are not on the same line.
- Keep the alignment between guide bush and spindle within 0.02 mm.

DTS

Positioning of outer tube and guide bush
Be sure to set the outer tube more than 5.0 mm into the guide bush to properly supply the coolant.

Positioning of workpiece material and guide bush
Sealing is not required for DTS because of the vacuum effect, but keep the gap between workpiece material and guide bush within 1.0 mm.



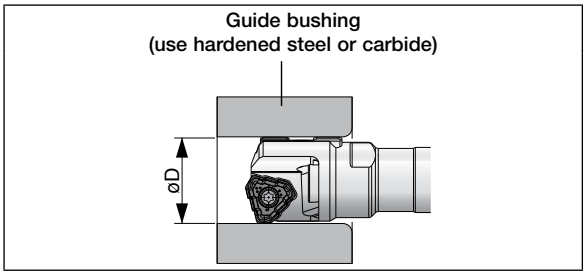
Guide bush

Tolerance
Guide bush tolerance should be G6 in order to keep consistent tool life and cutting accuracy. Diameters for G6 tolerance are shown on the right.

øD (mm)	G6 tolerance (mm)
16.00 - 18.00	+0.006 - +0.017
18.01 - 30.00	+0.007 - +0.020
30.01 - 40.00	+0.009 - +0.025

Material

Guide bush material	System	Advantage
Hardened steel	Workpiece rotating	Cost efficient (inexpensive)
Tungsten carbide	Tool rotating Workpiece rotating	Long life guide bush



Coolant

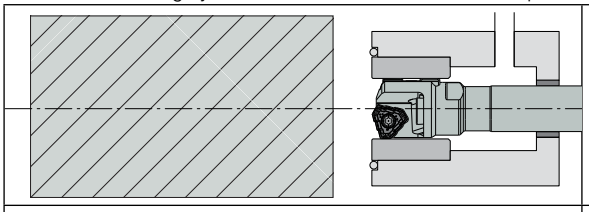
Temperature
The proper coolant temperature is 30 - 40°C (90 - 100°F). If the temperature exceeds this range, the coolant will deteriorate easily and may shorten tool life and generate poor surface finish.

Filtration
The coolant must be filtered properly in order to protect guide pads and workpiece surface.

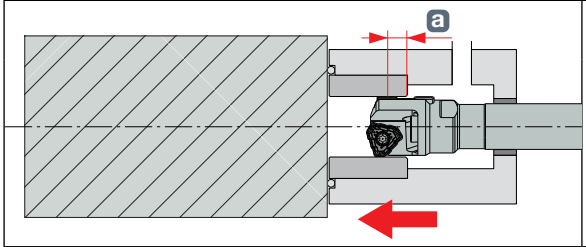
Water-soluble type
Around 10% (dilution rate 1/10) is recommended for the concentration of water-soluble coolant in order to protect guide pads.

CNC Drilling Cycle Operations

Use the CNC drilling cycle as instructed below in order to optimize the tool performance safely.

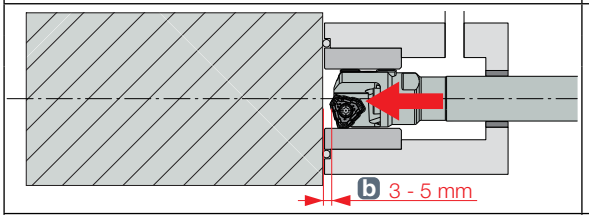


1. Start the CNC cycle operation



2. Move the oil pressure head and securely seal onto the face of the workpiece.

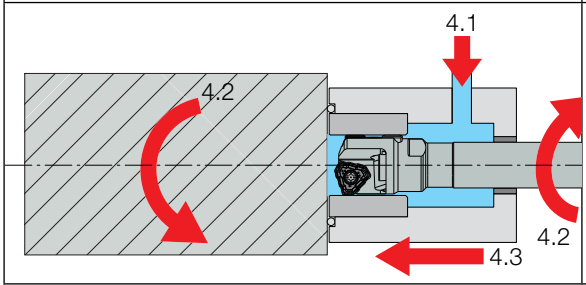
a Make sure to position the drill so that the guide pads remain inside the guide bushing when the pressure head is moved towards the workpiece face.



3. Move the BTA drill toward the workpiece

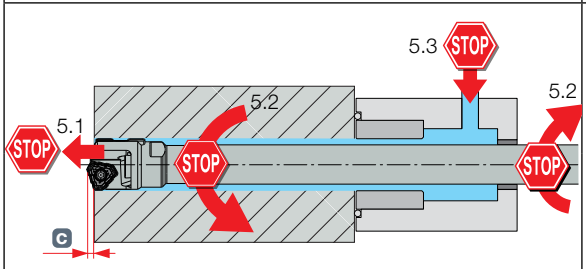
b Keep the drill 3 - 5 mm* off the face of the workpiece.

* If the machine allows this drill setting in Step 1, move on to Step 4.



4. Start the cutting

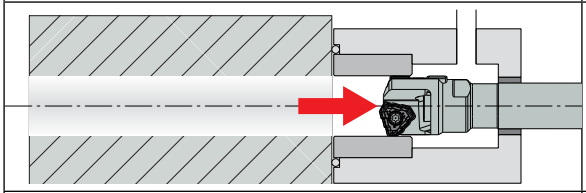
4.1 Activate the coolant supply.
4.2 Start the rotation (of the drill, the workpiece, or the drill+workpiece).
4.3 Start the drill feed.



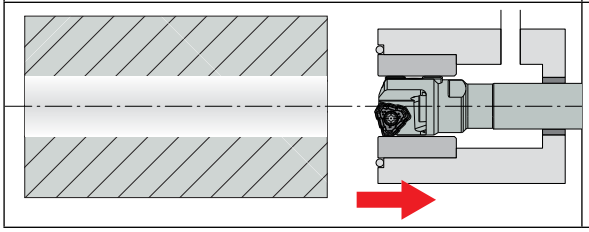
5. Stop the cutting

5.1 Stop the drill feed.
5.2 Stop the rotation.
5.3 Stop the coolant supply.

c Stop the cutting when the drill shoulder is completely through the end face of the workpiece.



6. Return the drill to the starting point

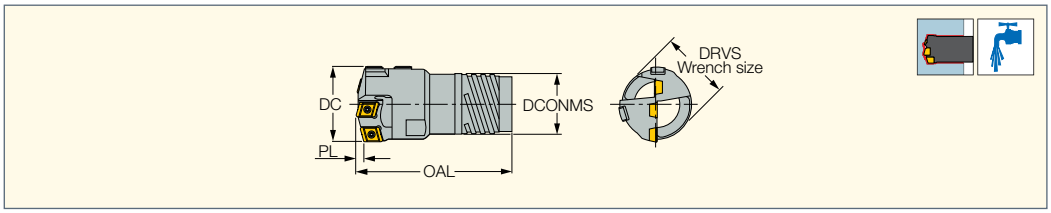


7. Return the oil pressure head to the starting point

FINEBEAM

DSD-EF-FB

Deep Single Tube Drills with External 4-Start Thread Connection for High Feed (25-89 dia.)



Designation	DCN(1)	DCX(2)	OAL	PL	DCONMS	DRVS(3)	Ts(4)
DSD-EF 25.00-26.40-FB	25.00	26.40	70.00	3.00	19.50	19.0	TS-I6
DSD-EF 26.41-28.70-FB	26.41	28.70	70.00	3.00	21.00	21.0	TS-I7
DSD-EF 28.71-31.00-FB	28.71	31.00	75.00	3.00	23.50	24.0	TS-I8
DSD-EF 31.01-33.30-FB	31.01	33.30	78.00	3.00	25.50	26.0	TS-I9
DSD-EF 33.31-36.20-FB	33.31	36.20	80.00	3.00	28.00	28.0	TS-I10
DSD-EF 36.21-39.60-FB	36.21	39.60	90.00	3.00	30.00	30.0	TS-I11
DSD-EF 39.61-43.00-FB	39.61	43.00	95.00	4.00	33.00	32.0	TS-I12
DSD-EF 43.01-47.00-FB	43.01	47.00	100.00	4.00	36.00	36.0	TS-I13
DSD-EF 47.01-51.70-FB	47.01	51.70	100.00	4.00	39.00	38.0	TS-I14
DSD-EF 51.71-56.20-FB	51.71	56.20	110.00	4.00	43.00	46.0	TS-I15
DSD-EF 56.21-60.60-FB	56.21	60.60	115.00	5.00	47.00	50.0	TS-I16
DSD-EF 60.61-65.00-FB	60.61	65.00	115.00	5.00	51.00	54.0	TS-I17
DSD-EF 65.01-66.99-FB	65.01	66.99	149.00	8.00	52.00	63.0	TS-I18
DSD-EF 67.00-72.99-FB	67.00	72.99	149.00	8.00	58.00	69.0	TS-I19
DSD-EF 73.00-79.99-FB	73.00	79.99	150.00	9.00	63.00	76.0	TS-I20
DSD-EF 80.00-86.99-FB	80.00	86.99	173.00	9.00	70.00	83.0	TS-I21
DSD-EF 87.00-89.00-FB	87.00	89.00	173.00	9.00	77.00	86.0	TS-I22

• For spare parts and insert information, see page 206 • For user guide and quotation form, see pages 207-208, 279-280 • Inserts and guide pads should be ordered separately • Ordering example: DSD-EF 43.10-FB

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Torque key size

(4) Tube designation

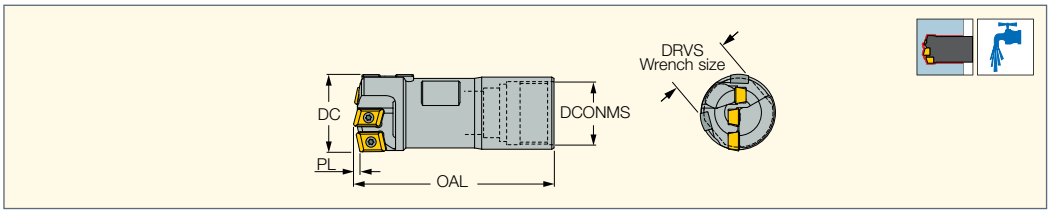
For inserts, see pages: NPHT (203) • NPMT (204)

For holders, see pages: TS-I** (264)

FINEBEAM

DSD-IF-FB

Deep Single Tube Drills with Internal Single-Start Thread Connection (25-89 dia.)



Designation	DCN(1)	DCX(2)	OAL	PL	DCONMS	Ts(3)
DSD-IF 25.00-26.99-FB	25.00	26.99	70.00	3.00	20.00	TS-010
DSD-IF 27.00-29.00-FB	27.00	29.00	70.00	3.00	22.00	TS-011
DSD-IF 29.01-29.99-FB	29.01	29.99	70.00	3.00	22.00	TS-011
DSD-IF 30.00-31.99-FB	30.00	31.99	75.00	3.00	24.00	TS-012
DSD-IF 32.00-33.99-FB	32.00	33.99	75.00	3.00	26.00	TS-013
DSD-IF 34.00-36.99-FB	34.00	36.99	90.00	3.00	27.00	TS-014
DSD-IF 37.00-39.99-FB	37.00	39.99	95.00	3.00	30.00	TS-015
DSD-IF 40.00-43.99-FB	40.00	43.99	100.00	4.00	33.00	TS-016
DSD-IF 44.00-46.99-FB	44.00	46.99	105.00	4.00	37.00	TS-017
DSD-IF 47.00-51.99-FB	47.00	51.99	105.00	4.00	41.00	TS-018
DSD-IF 52.00-56.99-FB	52.00	56.99	110.00	4.00	44.00	TS-019
DSD-IF 57.00-60.99-FB	57.00	60.99	115.00	5.00	49.00	TS-020
DSD-IF 61.00-65.00-FB	61.00	65.00	115.00	5.00	53.00	TS-021
DSD-IF 65.01-67.99-FB	65.01	67.99	112.00	8.00	53.00	TS-021
DSD-IF 68.00-74.99-FB	68.00	74.99	113.00	9.00	59.00	TS-022
DSD-IF 75.00-80.99-FB	75.00	80.99	143.00	9.00	65.00	TS-023
DSD-IF 81.00-89.00-FB	81.00	89.00	143.00	9.00	71.00	TS-024

• For spare parts and insert information, see page 206 • For user guide and quotation form, see pages 207-208, 279-280 • Inserts and guide pads should be ordered separately • Ordering example: DSD-IF 43.10-FB

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Tube designation

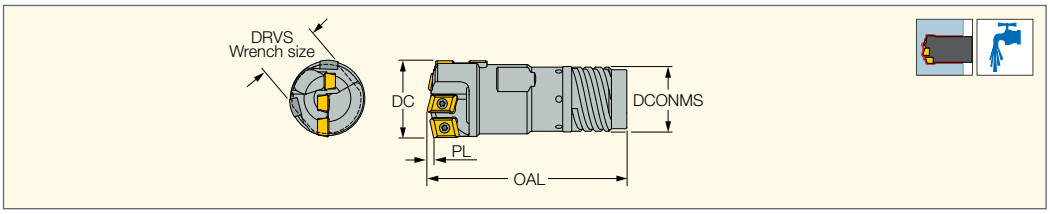
For inserts, see pages: NPHT (203) • NPMT (204)

For holders, see pages: TS-O** (265)

FINEBEAM

DDD-EF-FB

Deep Double Tube Drills with External 4-Start Thread Connection for High Feed (25-65 dia.)



Designation	DCN(1)	DCX(2)	OAL	PL	DCONMS	DRVS(3)	Ts(4)	Tsi(5)
DDD-EF 25.00-26.40-FB	25.00	26.40	70.00	3.00	21.00	19.0	TDO-I3	TDI-N3
DDD-EF 26.41-28.70-FB	26.41	28.70	75.00	3.00	23.50	21.0	TDO-I4	TDI-N4
DDD-EF 28.71-31.00-FB	28.71	31.00	75.00	3.00	25.50	24.0	TDO-I5	TDI-N5
DDD-EF 31.01-33.30-FB	31.01	33.30	80.00	3.00	28.00	26.0	TDO-I6	TDI-N6
DDD-EF 33.31-36.20-FB	33.31	36.20	90.00	3.00	30.00	28.0	TDO-I7	TDI-N7
DDD-EF 36.21-39.60-FB	36.21	39.60	95.00	4.00	33.00	30.0	TDO-I8	TDI-N8
DDD-EF 39.61-43.00-FB	39.61	43.00	100.00	4.00	36.00	32.0	TDO-I9	TDI-N9
DDD-EF 43.01-47.00-FB	43.01	47.00	100.00	4.00	39.00	36.0	TDO-I10	TDI-N10
DDD-EF 47.01-51.70-FB	47.01	51.70	110.00	4.00	43.00	38.0	TDO-I11	TDI-N11
DDD-EF 51.71-56.20-FB	51.71	56.20	115.00	5.00	47.00	46.0	TDO-I12	TDI-N12
DDD-EF 56.21-60.60-FB	56.21	60.60	115.00	5.00	51.00	50.0	TDO-I13	TDI-N13
DDD-EF 60.61-65.00-FB	60.61	65.00	115.00	5.00	51.00	54.0	TDO-I13	TDI-N13

• For spare parts and insert information, see page 206 • For user guide and quotation form see pages 207-208, 279-280 • Inserts and guide pads should be ordered separately • Ordering example: DDD-EF 43.00-FB

(1) Cutting diameter minimum
(2) Cutting diameter maximum
(3) Torque key size
(4) Outer tube designation
(5) Inner tube designation

For inserts, see pages: NPHT (203) • NPMT (204)
For holders, see pages: TDO-I (D18.41-65.00) (266)

Universal Marking for Deep Drilling Tools

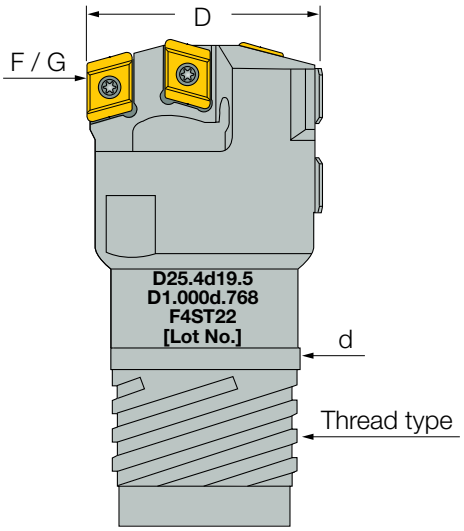
D- Tool diameter
Metric- D25.4
Inch- D1.000

d- Pilot diameter
Metric- d19.5
Inch- d.768

Tool style
F- Fixed pocket 3-5 cutting edge
G- Fixed pocket single cutting edge

Thread type
4ST- Four-start thread single tube
1ST- Single-start thread single tube
4DT- Four-start thread double tube

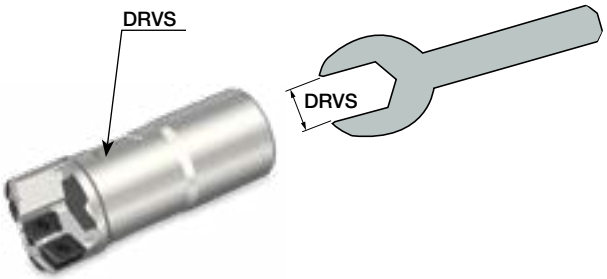
22- Tube diameter



Wrench Size

Diameter Dc (mm)	Wrench size DRVS (mm)
25.00 -26.40	19
26.41 -28.70	21
28.71 -31.00	24
31.01 -33.30	26
33.31 -36.20	28
36.21 -39.60	30
39.61 -43.00	32
43.01 -47.00	36
47.01 -51.70	38
51.71 -56.20	46
56.21 -60.60	50
60.61 -65.00	54
65.01 -67.99	64
68.00 -74.99	71
75.00 -80.99	77
81.00 -89.00	86

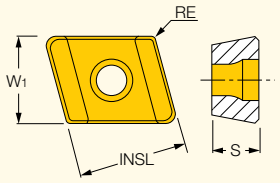
For diameter DC range larger than 65mm use hook spanner



FINEBEAM

NPHT

Peripheral Precision Inserts
for Drilling Heads DSD-EF-FB
/ DDD-EF-FB / DSD-IF-FB



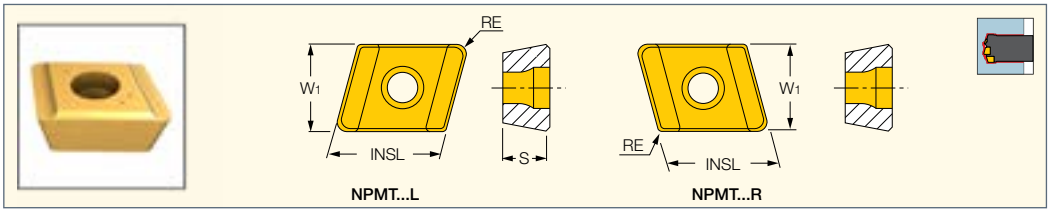
Designation	Dimensions				Tough ↔ Hard		
	W1	INSL	S	RE	IC908	IC520	IC806
NPHT 060304R-G-P	6.00	8.00	3.00	0.40	●	●	
NPHT 070404R-G-P	7.50	10.00	4.00	0.40	●	●	
NPHT 090404R-G-P	9.00	10.00	4.00	0.40	●	●	
NPHT 110404R-G-P	11.00	10.00	4.00	0.40	●	●	
NPHT 130404R-G-P	13.00	10.00	4.00	0.40	●	●	
NPHT 060308R-G-P	6.00	8.00	3.00	0.80	●		●
NPHT 070408R-G-P	7.50	10.00	4.00	0.80	●		●
NPHT 090408R-G-P	9.00	10.00	4.00	0.80	●		●
NPHT 110408R-G-P	11.00	10.00	4.00	0.80	●		●
NPHT 130408R-G-P	13.00	10.00	4.00	0.80	●		●
NPHT 060308R-HF-P	6.00	8.00	3.00	0.80	●		●
NPHT 070408R-HF-P	7.50	10.00	4.00	0.80	●		●
NPHT 090408R-HF-P	9.00	10.00	4.00	0.80	●		●
NPHT 110408R-HF-P	11.00	10.00	4.00	0.80	●		●
NPHT 130408R-HF-P	13.00	10.00	4.00	0.80	●		●

For tools, see pages: DDD-EF-FB (202) • DSD-EF-FB (201) • DSD-IF-FB (201)

FINEBEAM

NPMT

Internal and Central Inserts for Drilling Heads DSD-EF-FB / DDD-EF-FB



Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC9025	IC908	IC520	IC806
NPMT 050304R-G-I	5.50	8.00	3.00	0.40		●	●	●
NPMT 060404R-G-I	6.50	10.00	4.00	0.40	●	●	●	●
NPMT 080404R-G-I	8.00	10.00	4.00	0.40	●	●	●	●
NPMT 090404R-G-I	9.50	10.00	4.00	0.40	●	●	●	●
NPMT 120404R-G-I	12.50	10.00	4.00	0.40	●	●	●	●
NPMT 050304R-HF-I	5.50	8.00	3.00	0.40		●		●
NPMT 060404R-HF-I	6.50	10.00	4.00	0.40		●		●
NPMT 080404R-HF-I	8.00	10.00	4.00	0.40		●		●
NPMT 090404R-HF-I	9.50	10.00	4.00	0.40		●		●
NPMT 120404R-HF-I	12.50	10.00	4.00	0.40		●		●
NPMT 050308L-G-C	5.50	8.00	3.00	0.80		●	●	●
NPMT 060408L-G-C	6.50	10.00	4.00	0.80	●	●	●	●
NPMT 080408L-G-C	8.00	10.00	4.00	0.80	●	●	●	●
NPMT 090408L-G-C	9.50	10.00	4.00	0.80	●	●	●	●
NPMT 120408L-G-C	12.50	10.00	4.00	0.80	●	●	●	●
NPMT 050308L-HF-C	5.50	8.00	3.00	0.80		●		●
NPMT 060408L-HF-C	6.50	10.00	4.00	0.80		●		●
NPMT 080408L-HF-C	8.00	10.00	4.00	0.80		●		●
NPMT 090408L-HF-C	9.50	10.00	4.00	0.80		●		●
NPMT 120408L-HF-C	12.50	10.00	4.00	0.80		●		●

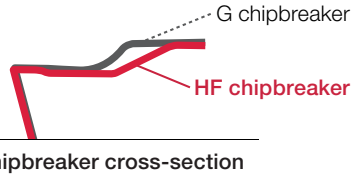
For tools, see pages: DDD-EF-FB (202) • DSD-EF-FB (201) • DSD-IF-FB (201)

	NPMT & NPHT		
	IC908	IC520	IC806
P	●●●	○	○○
M	○○	○	●●●
K	●●●	○	○○
N	●●●		○○
S	○○	○	●●●
H	○○		●●●

••• First priority

Chipbreaker comparison

HF - Provides drilling stability at high feed rates



Chipbreaker cross-section

Chipbreaker type:
G - General
HF – High feed

Insert Size

Corner Radius Size

NP#T ## ## ## #-##-# IC###

Insert type:
M – pressed (central & intermediate)
H – grounded (peripheral)

Thickness

L - Left
R – Right

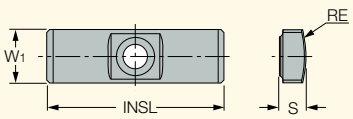
Insert position:
P - peripheral
I - Intermediate
C - center

Grade

FINEBEAM

GPS

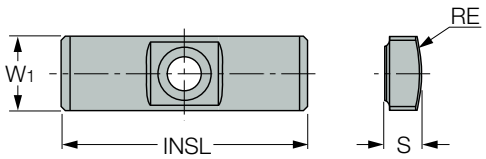
Deep Drilling Solid Carbide Guide Pads

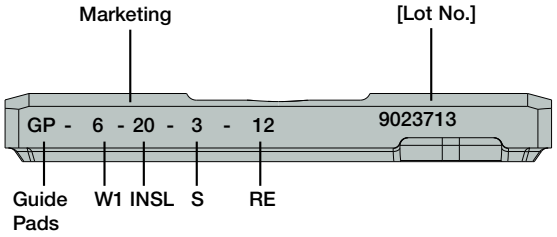


Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC928	IC950	IC908
GPS-04-16-055-DC	4.0	16.00	2.00	5.50	•		•
GPS-05-18-060-DC	5.0	18.00	2.50	6.00	•		•
GPS-05-18-075-DC	5.0	18.00	2.50	7.50	•		•
GPS-06-20-075-DC	6.0	20.00	3.00	7.50			•
GPS-06-20-075	6.0	20.00	3.00	7.50		•	
GPS-06-20-085-DC	6.0	20.00	3.00	8.50	•		•
GPS-06-20-085	6.0	20.00	3.00	8.50		•	
GPS-06-20-100-DC	6.0	20.00	3.00	10.00	•		•
GPS-06-20-100	6.0	20.00	3.00	10.00		•	
GPS-06-20-120-DC	6.0	20.00	3.00	12.00	•		•
GPS-06-20-120	6.0	20.00	3.00	12.00		•	
GPS-07-20-120-DC	7.0	20.00	3.50	12.00	•		•
GPS-07-20-120	7.0	20.00	3.50	12.00		•	
GPS-08-25-155-DC	8.0	25.00	4.50	15.50	•		•
GPS-08-25-155	8.0	25.00	4.50	15.50		•	
GPS-10-30-200-DC	10.0	30.00	4.50	20.00	•		•
GPS-10-30-200	10.0	30.00	4.50	20.00		•	
GPS-10-35-200-DC	10.0	35.00	6.00	20.00	•		•
GPS-10-35-200	10.0	35.00	6.00	20.00		•	
GPS-12-35-250-DC	12.0	35.00	5.50	25.00	•		•
GPS-12-35-250	12.0	35.00	5.50	25.00		•	
GPS-14-40-250-DC	14.0	40.00	7.50	25.00	•		•
GPS-14-40-250	14.0	40.00	7.50	25.00		•	
GPS-18-40-300-DC	18.0	40.00	9.00	30.00	•		•

• DC- Double Chamfer

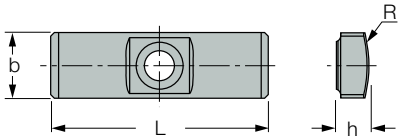
Universal Marking for Deep Drilling Tools





Guide Pad Grade Recommendation

	Oil Coolant			Water Based Coolant		
Priority	1	2	3	1	2	3
ISO-P	IC950	IC908	IC928	IC928	IC908	-
ISO-K	IC950	IC908	IC928	IC928	IC908	-
ISO-M	IC928	IC908	IC950	IC928	IC908	-
ISO-S	IC928	IC908	IC950	IC928	IC908	-

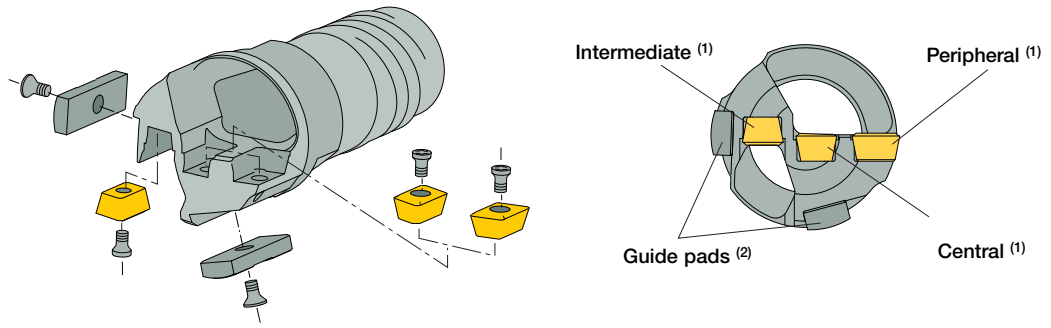


	Tool Diameter		Dimensions (mm)				Solid Carbide
	Min	Max	W1	INSL	RE	h	Description
FINEBEAM	25.00	29.99	6	20	12	3	GPS-06-20-120
	30.00	39.00	7	20	12	3.5	GPS-07-20-120
	39.01	45.00	8	25	15.5	4.5	GPS-08-25-155
	45.01	57.00	10	30	20	4.5	GPS-10-30-200
	57.01	89.00	12	35	25	5.5	GPS-12-35-250

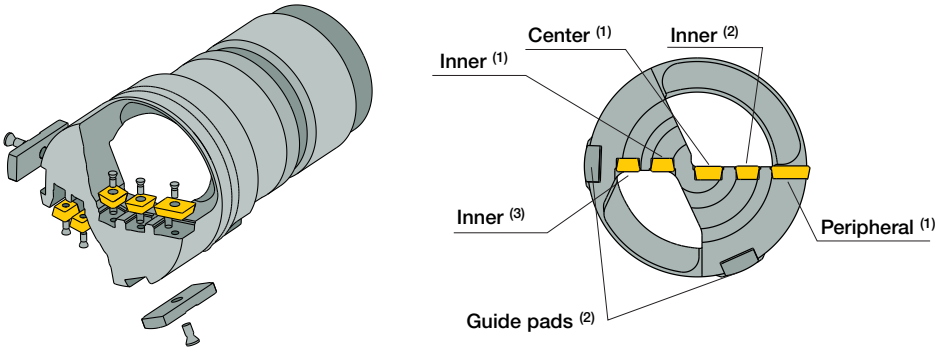
FINEBEAM

DSD-EF-FB / DDD-EF-FB / DSD-IF-FB

Spare Parts List



Drill Diameter	Insert									Guide Pad		
	Peripheral Insert	Screw	Key	Intermediate Insert	Screw	Key	Central Insert	Screw	Key		Screw	Key
25.00 - 28.00	NPHT 060308R-G-P	SR11201753-2	T-7/5	NPMT 050304R-G-I	SR11201753-2	T-7/5	NPMT 050308L-G-C	SR11201753-2	T-7/5	GPS-06	SR11201753-1	T-7/5
	NPHT 060308R-HF-P	SR11201753-2	T-7/5	NPMT 050304R-HF-I	SR11201753-2	T-7/5	NPMT 050308L-HF-C	SR11201753-2	T-7/5	GPS-06	SR11201753-1	T-7/5
28.01 - 29.99	NPHT 060308R-G-P	SR11201753-2	T-7/5	NPMT 050304R-G-I	SR11201753-2	T-7/5	NPMT 060408L-G-C	SR 14-560-HG	T-8/5	GPS-06	SR11201753-1	T-7/5
	NPHT 060308R-HF-P	SR11201753-2	T-7/5	NPMT 050304R-HF-I	SR11201753-2	T-7/5	NPMT 060408L-HF-C	SR 14-560-HG	T-8/5	GPS-06	SR11201753-1	T-7/5
30.00 - 35.00	NPHT 070408R-G-P	SR 14-560-HG	T-8/5	NPMT 060404R-G-I	SR 14-560-HG	T-8/5	NPMT 060408L-G-C	SR 14-560-HG	T-8/5	GPS-07	SR11201753-4	T-9/5
	NPHT 070408R-HF-P	SR 14-560-HG	T-8/5	NPMT 060404R-HF-I	SR 14-560-HG	T-8/5	NPMT 060408L-HF-C	SR 14-560-HG	T-8/5	GPS-07	SR11201753-4	T-9/5
35.01 - 38.00	NPHT 070408R-G-P	SR 14-560-HG	T-8/5	NPMT 060404R-G-I	SR 14-560-HG	T-8/5	NPMT 080408L-G-C	SR 14-560-HG	T-8/5	GPS-07	SR11201753-4	T-9/5
	NPHT 070408R-HF-P	SR 14-560-HG	T-8/5	NPMT 060404R-HF-I	SR 14-560-HG	T-8/5	NPMT 080408L-HF-C	SR 14-560-HG	T-8/5	GPS-07	SR11201753-4	T-9/5
38.01 - 39.00	NPHT 090408R-G-P	SR 14-560-HG	T-8/5	NPMT 060404R-G-I	SR 14-560-HG	T-8/5	NPMT 080408L-G-C	SR 14-560-HG	T-8/5	GPS-07	SR11201753-4	T-9/5
	NPHT 090408R-HF-P	SR 14-560-HG	T-8/5	NPMT 060404R-HF-I	SR 14-560-HG	T-8/5	NPMT 080408L-HF-C	SR 14-560-HG	T-8/5	GPS-07	SR11201753-4	T-9/5
39.01 - 41.00	NPHT 090408R-G-P	SR 14-560-HG	T-8/5	NPMT 060404R-G-I	SR 14-560-HG	T-8/5	NPMT 080408L-G-C	SR 14-560-HG	T-8/5	GPS-08	SR11201753-4	T-9/5
	NPHT 090408R-HF-P	SR 14-560-HG	T-8/5	NPMT 060404R-HF-I	SR 14-560-HG	T-8/5	NPMT 080408L-HF-C	SR 14-560-HG	T-8/5	GPS-08	SR11201753-4	T-9/5
41.01 - 44.00	NPHT 090408R-G-P	SR 14-560-HG	T-8/5	NPMT 080404R-G-I	SR 14-560-HG	T-8/5	NPMT 080408L-G-C	SR 14-560-HG	T-8/5	GPS-08	SR11201753-4	T-9/5
	NPHT 090408R-HF-P	SR 14-560-HG	T-8/5	NPMT 080404R-HF-I	SR 14-560-HG	T-8/5	NPMT 080408L-HF-C	SR 14-560-HG	T-8/5	GPS-08	SR11201753-4	T-9/5
44.01 - 45.00	NPHT 090408R-G-P	SR 14-560-HG	T-8/5	NPMT 080404R-G-I	SR 14-560-HG	T-8/5	NPMT 090408L-G-C	SR 14-560-HG	T-8/5	GPS-08	SR11201753-4	T-9/5
	NPHT 090408R-HF-P	SR 14-560-HG	T-8/5	NPMT 080404R-HF-I	SR 14-560-HG	T-8/5	NPMT 090408L-HF-C	SR 14-560-HG	T-8/5	GPS-08	SR11201753-4	T-9/5
45.01 - 47.00	NPHT 090408R-G-P	SR 14-560-HG	T-8/5	NPMT 080404R-G-I	SR 14-560-HG	T-8/5	NPMT 090408L-G-C	SR 14-560-HG	T-8/5	GPS-10	SR11201753-6	T-15/5
	NPHT 090408R-HF-P	SR 14-560-HG	T-8/5	NPMT 080404R-HF-I	SR 14-560-HG	T-8/5	NPMT 090408L-HF-C	SR 14-560-HG	T-8/5	GPS-10	SR11201753-6	T-15/5
47.01 - 51.00	NPHT 110408R-G-P	SR 14-560-HG	T-8/5	NPMT 080404R-G-I	SR 14-560-HG	T-8/5	NPMT 090408L-G-C	SR 14-560-HG	T-8/5	GPS-10	SR11201753-6	T-15/5
	NPHT 110408R-HF-P	SR 14-560-HG	T-8/5	NPMT 080404R-HF-I	SR 14-560-HG	T-8/5	NPMT 090408L-HF-C	SR 14-560-HG	T-8/5	GPS-10	SR11201753-6	T-15/5
51.01 - 54.00	NPHT 110408R-G-P	SR 14-560-HG	T-8/5	NPMT 090404R-G-I	SR 14-560-HG	T-8/5	NPMT 090408L-G-C	SR 14-560-HG	T-8/5	GPS-10	SR11201753-6	T-15/5
	NPHT 110408R-HF-P	SR 14-560-HG	T-8/5	NPMT 090404R-HF-I	SR 14-560-HG	T-8/5	NPMT 090408L-HF-C	SR 14-560-HG	T-8/5	GPS-10	SR11201753-6	T-15/5
54.01 - 57.00	NPHT 110408R-G-P	SR 14-560-HG	T-8/5	NPMT 090404R-G-I	SR 14-560-HG	T-8/5	NPMT 120408L-G-C	SR 14-560-HG	T-8/5	GPS-10	SR11201753-6	T-15/5
	NPHT 110408R-HF-P	SR 14-560-HG	T-8/5	NPMT 090404R-HF-I	SR 14-560-HG	T-8/5	NPMT 120408L-HF-C	SR 14-560-HG	T-8/5	GPS-10	SR11201753-6	T-15/5
57.01 - 60.00	NPHT 110408R-G-P	SR 14-560-HG	T-8/5	NPMT 090404R-G-I	SR 14-560-HG	T-8/5	NPMT 120408L-G-C	SR 14-560-HG	T-8/5	GPS-12	SR11201753-6	T-15/5
	NPHT 110408R-HF-P	SR 14-560-HG	T-8/5	NPMT 090404R-HF-I	SR 14-560-HG	T-8/5	NPMT 120408L-HF-C	SR 14-560-HG	T-8/5	GPS-12	SR11201753-6	T-15/5
60.01 - 64.00	NPHT 130408R-G-P	SR 14-560-HG	T-8/5	NPMT 090404R-G-I	SR 14-560-HG	T-8/5	NPMT 120408L-G-C	SR 14-560-HG	T-8/5	GPS-12	SR11201753-6	T-15/5
	NPHT 130408R-HF-P	SR 14-560-HG	T-8/5	NPMT 090404R-HF-I	SR 14-560-HG	T-8/5	NPMT 120408L-HF-C	SR 14-560-HG	T-8/5	GPS-12	SR11201753-6	T-15/5
64.01 - 65.00	NPHT 130408R-G-P	SR 14-560-HG	T-8/5	NPMT 120404R-G-I	SR 14-560-HG	T-8/5	NPMT 120408L-G-C	SR 14-560-HG	T-8/5	GPS-12	SR11201753-6	T-15/5
	NPHT 130408R-HF-P	SR 14-560-HG	T-8/5	NPMT 120404R-HF-I	SR 14-560-HG	T-8/5	NPMT 120408L-HF-C	SR 14-560-HG	T-8/5	GPS-12	SR11201753-6	T-15/5



Tool Dia		Insert						Guide Pad		Wrench	
Min	Max	Center	Inner 1	Inner 2	Inner 3	Peripheral	Screw X 5 pcs	GPS X 2 pcs	Screw X 2 pcs	Insert	Pad
65.01	71.00	NPMT09....L-**-C	NPMT08....R-**-I	NPMT08....R-**-I	NPMT06....R-**-I	NPHT11....R-**-P	SR 14-560-HG	GPS12	SR 14-571/S	T-8/5	T-15/5
70.01	83.00				NPMT08....R-**-I	NPHT13....R-**-P					
83.01	90.00	NPMT12....L-**-C	NPMT08....R-**-I	NPMT08....R-**-I	NPMT08....R-**-I	NPHT13....R-**-P					

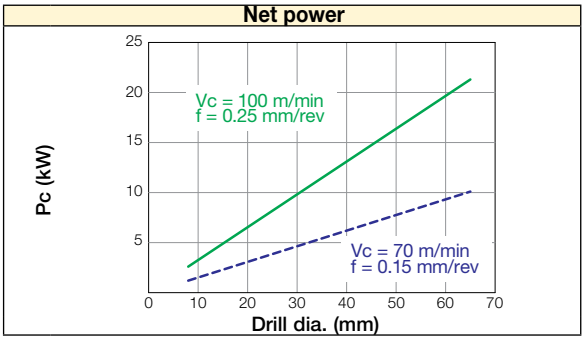
Machining Recommendations for FINEBEAM Drills

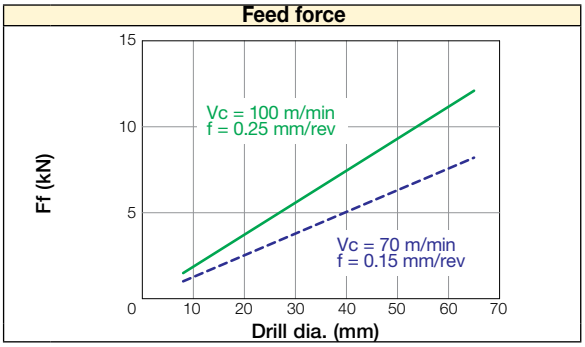
ISO	Material		Condition	Tensile Strength [N/mm²]	Material Group No.(1)	Hardness (HB)	Chipbreaker	Cutting speed V_c (m/min)	Feed : f (mm/rev) Drill dia. (mm) 25.00 - 43.00	Feed : f (mm/rev) Drill dia. (mm) 43.01 - 89.00
P	Non-alloy steel and cast steel, free cutting steel	< 0.25 %C	Annealed	420	1	125	HF	70 - 130	0.11 - 0.41	0.14-0.45
							G	70-130	0.10-0.30	0.12-0.35
		>= 0.25 %C	Annealed	650	2	190	HF	70-130	0.11-0.41	0.14-0.45
							G	70-130	0.10-0.30	0.12-0.35
		< 0.55 %C	Quenched and tempered	850	3	250	HF	70-130	0.11-0.41	0.14-0.45
							G	70-130	0.10-0.30	0.12-0.35
		>= 0.55 %C	Annealed	750	4	220	HF	70-130	0.11-0.41	0.14-0.45
							G	70-130	0.10-0.30	0.12-0.35
			Quenched and tempered	1000	5	300	HF	70-130	0.11-0.41	0.14-0.45
							G	70-130	0.10-0.30	0.12-0.35
	Low alloy and cast steel (less than 5% of alloying elements)		Annealed	600	6	200	HF	70-120	0.11-0.41	0.20-0.45
							G	70-120	0.10-0.30	0.12-0.35
			Quenched and tempered	930	7	275	HF	55-110	0.11-0.41	0.20-0.45
							G	60-120	0.10-0.30	0.12-0.35
				1000	8	300	HF	55-110	0.11-0.41	0.20-0.45
							G	60-120	0.10-0.30	0.12-0.35
				1200	9	350	HF	55-110	0.11-0.41	0.20-0.45
							G	60-120	0.10-0.30	0.12-0.35
	High alloyed steel, cast steel and tool steel		Annealed	680	10	200	HF	55-110	0.11-0.38	0.20-0.40
							G	70-130	0.10-0.30	0.12-0.35
			Quenched and tempered	1100	11	325	HF	55-110	0.11-0.38	0.20-0.40
							G	70-130	0.10-0.30	0.12-0.35
	Stainless steel and cast steel		Ferritic/martensitic	680	12	200	HF	40-110	0.11-0.41	0.20-0.45
							G	70-130	0.10-0.30	0.12-0.35
			Martensitic	820	13	240	HF	40-110	0.11-0.41	0.20-0.45
							G	70-130	0.10-0.30	0.12-0.35
M	Stainless steel and cast steel		Austenitic, duplex	600	14	180	HF	40-110	0.11-0.41	0.20-0.45
							G	70-130	0.10-0.30	0.12-0.35
K	Grey cast iron (GG)		Ferritic/pearlitic		15	180	HF	50-110	0.11-0.38	0.24-0.41
							G	50-110	0.10-0.25	0.12-0.35
			Pearlitic/martensitic		16	260	HF	50-110	0.11-0.38	0.24-0.41
							G	50-110	0.10-0.25	0.12-0.35
	Nodular cast iron (GGG)		Ferritic		17	160	HF	50-110	0.11-0.38	0.24-0.41
							G	50-110	0.10-0.25	0.12-0.35
			Pearlitic		18	250	HF	50-110	0.11-0.38	0.24-0.41
							G	50-110	0.10-0.25	0.12-0.35
	Malleable cast iron		Ferritic		19	130	HF	50-110	0.11-0.38	0.24-0.41
							G	50-110	0.10-0.25	0.12-0.35
			Pearlitic		20	230	HF	50-110	0.11-0.38	0.24-0.41
							G	50-110	0.10-0.25	0.12-0.35
N	Aluminum-wrought alloys		Not hardenable		21	60	HF	65-150	0.09-0.33	0.24-0.35
							G	65-130	0.10-0.25	0.12-0.35
			Hardenable		22	100	HF	65-150	0.09-0.33	0.24-0.35
							G	65-130	0.08-0.23	0.12-0.27
	Aluminum-cast alloys	≤ 12% Si	Not hardenable		23	75	HF	65-150	0.09-0.33	0.24-0.35
							G	65-130	0.08-0.23	0.12-0.27
			Hardenable		24	90	HF	65-150	0.09-0.33	0.24-0.35
							G	65-130	0.08-0.23	0.12-0.27
		>12% Si	High temperature		25	130	HF	65-150	0.09-0.33	0.24-0.35
							G	65-130	0.08-0.23	0.12-0.27
	Copper alloys	>1% Pb	Free cutting		26	110	HF	65-150	0.09-0.33	0.24-0.35
							G	65-130	0.08-0.23	0.12-0.27
			Brass		27	90	HF	65-150	0.09-0.33	0.24-0.35
							G	65-130	0.08-0.23	0.12-0.27
			Electrolitic copper		28	100	HF	65-150	0.09-0.33	0.24-0.35
							G	65-130	0.08-0.23	0.12-0.27
S	High temp. alloys	Fe base	Annealed		31	200	HF	20-55	0.09-0.30	0.20-0.33
							G	20-50	0.08-0.23	0.12-0.27
			Hardened		32	280	HF	20-55	0.09-0.30	0.20-0.33
							G	20-50	0.08-0.23	0.12-0.27
		Ni / Co base	Annealed		33	250	HF	20-55	0.09-0.30	0.20-0.33
							G	20-50	0.08-0.23	0.12-0.27
			Hardened		34	350	HF	20-55	0.09-0.30	0.20-0.33
							G	20-50	0.08-0.23	0.12-0.27
			Cast		35	320	HF	20-55	0.09-0.30	0.20-0.33
							G	20-50	0.08-0.23	0.12-0.27
	Titanium alloys		Pure	400	36		HF	30-60	0.09-0.30	0.20-0.33
							G	30-60	0.08-0.23	0.12-0.27
			Alpha+beta alloys hardened	1050	37		HF	30-60	0.09-0.30	0.20-0.33
							G	30-60	0.08-0.23	0.12-0.27
H	Hardened steel	≥ 40HRC	Hardened		38		HF	30-60	0.09-0.30	0.20-0.33
							G	30-60	0.08-0.23	0.12-0.27

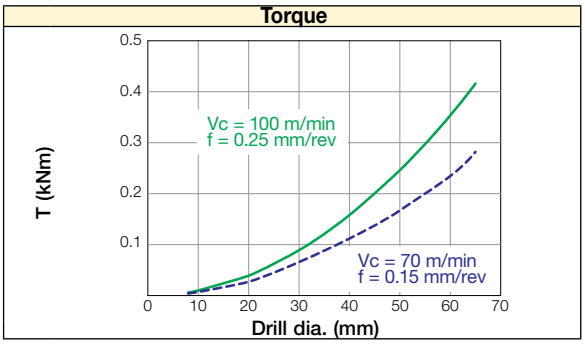
(1) For material groups see pages 495-524

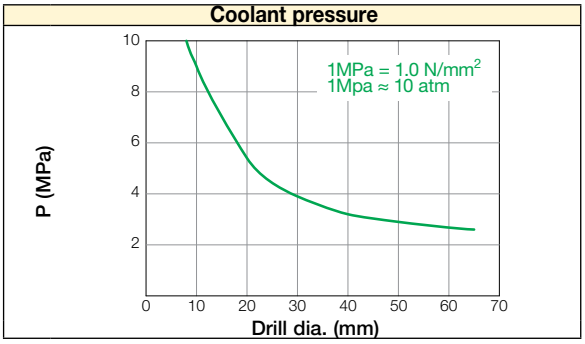
Technical Guide

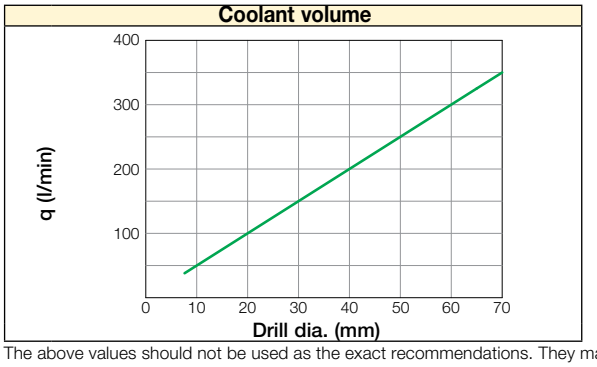
STS - Setting guidelines for cutting loads, fluid pressure and flow rate during STS operation



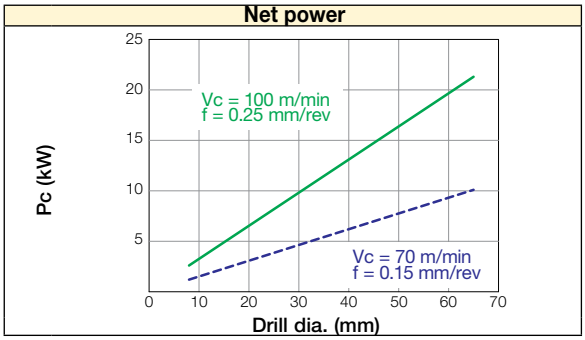


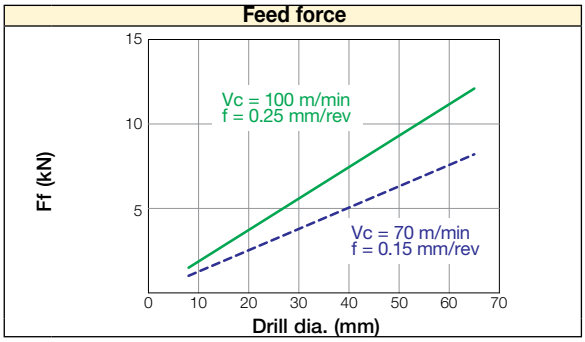


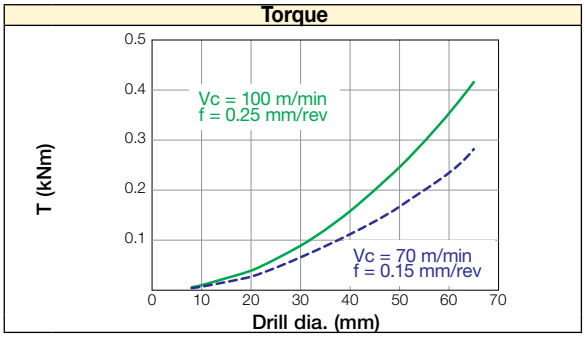


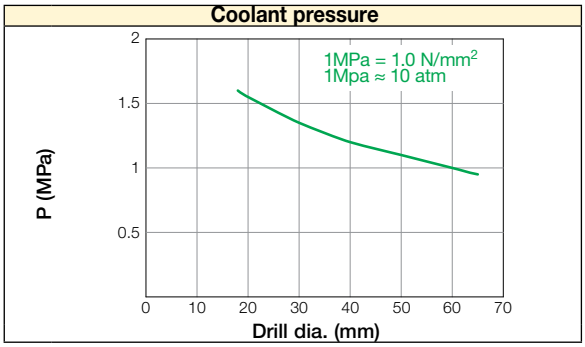


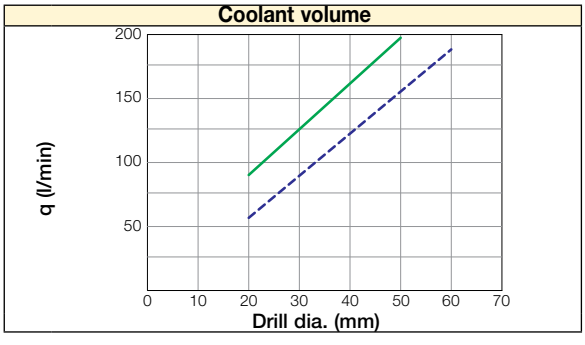
DTS - Setting guidelines for cutting loads, fluid pressure and flow rate during DTS operation









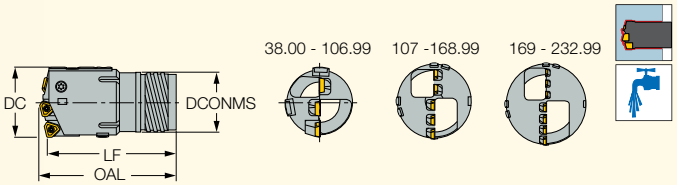


The above values should not be used as the exact recommendations. They may need modification depending on the machining conditions, materials, etc.

ISCARDEEPDRILL

DSD-EC

Deep Single Tube Drills with External 4-Start Thread Connection and Cartridges (38-292 dia.)



Designation	DCN(1)	DCX(2)	OAL	LF	DCONMS	Ts(3)
DSD-EC 38.00-39.60	38.00	39.60	90.00	85.00	30.00	TS-I11
DSD-EC 39.61-43.00	39.61	43.00	91.00	85.00	33.00	TS-I12
DSD-EC 43.01-47.00	43.01	47.00	101.00	95.00	36.00	TS-I13
DSD-EC 47.01-51.70	47.01	51.70	102.00	95.00	39.00	TS-I14
DSD-EC 51.71-56.20	51.71	56.20	107.00	100.00	43.00	TS-I15
DSD-EC 56.21-60.60	56.21	60.60	118.00	110.00	47.00	TS-I16
DSD-EC 60.61-64.99	60.61	64.99	119.00	110.00	51.00	TS-I17
DSD-EC 65.00-66.99	65.00	66.99	159.00	150.00	52.00	TS-I18
DSD-EC 67.00-72.99	67.00	72.99	159.00	150.00	58.00	TS-I19
DSD-EC 73.00-79.99	73.00	79.99	160.00	150.00	63.00	TS-I20
DSD-EC 80.00-86.99	80.00	86.99	191.00	180.00	70.00	TS-I21
DSD-EC 87.00-99.99	87.00	99.99	193.00	180.00	77.00	TS-I22
DSD-EC 100.00-106.99	100.00	106.99	193.00	180.00	89.00	TS-I23
DSD-EC 107.00-111.99	107.00	111.99	197.00	180.00	89.00	TS-I23
DSD-EC 112.00-123.99	112.00	123.99	221.00	205.00	101.00	TS-I24
DSD-EC 124.00-135.99	124.00	135.99	222.00	205.00	113.00	TS-I25
DSD-EC 136.00-147.99	136.00	147.99	223.00	205.00	125.00	TS-I26
DSD-EC 148.00-159.99	148.00	159.99	245.00	225.00	137.00	TS-I27
DSD-EC 160.00-168.99	160.00	168.99	246.00	225.00	149.00	TS-I28
DSD-EC 169.00-171.99	169.00	171.99	246.00	230.00	149.00	TS-I28
DSD-EC 172.00-183.99	172.00	183.99	247.00	230.00	161.00	TS-I29
DSD-EC 184.00-195.99	184.00	195.99	267.00	250.00	173.00	TS-I30
DSD-EC 196.00-207.99	196.00	207.99	270.00	250.00	185.00	TS-I31
DSD-EC 208.00-219.99	208.00	219.99	271.00	250.00	197.00	TS-I32
DSD-EC 220.00-231.99	220.00	231.99	293.00	270.00	208.00	TS-I33
DSD-EC 233.00-243.99	233.00	243.99	294.00	265.00	220.00	TS-I34
DSD-EC 244.00-255.99	244.00	255.99	294.00	265.00	232.00	TS-I35
DSD-EC 256.00-267.99	256.00	267.99	322.00	290.00	244.00	TS-I36
DSD-EC 268.00-279.99	268.00	279.99	323.00	290.00	256.00	TS-I37
DSD-EC 280.00-291.99	280.00	291.99	325.00	290.00	268.00	TS-I38

- Important: The specified drilling range using the original outer cartridge and pad may be enlarged by using optional outer cartridges and pads as specified on page 221
- For quotation form and user guide, see pages 279-280, 216-218, 222-226 • For spare parts, see pages 212-213 • Ordering example: DSD-EC 67.30

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Tube designation

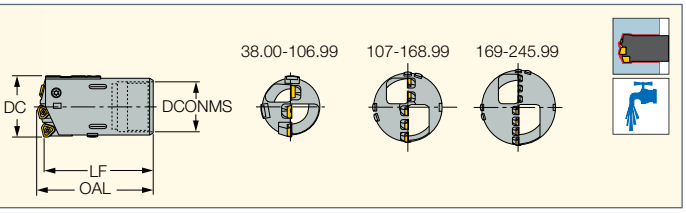
For inserts, see pages: NPMX 0803 RB/RG (214) • TPMX (214)

For holders, see pages: TS-I** (264)

ISCARDEEPDRILL

DSD-IC

Deep Single Tube Drills with Internal Single-Start Thread Connection and Cartridges (38-294 dia.)



Designation	DCN(1)	DCX(2)	OAL	LF	DCONMS	Ts(3)
DSD-IC 38.00-39.99	38.00	39.99	85.00	80.00	30.00	TS-O15
DSD-IC 40.00-43.99	40.00	43.99	86.00	80.00	33.00	TS-O16
DSD-IC 44.00-46.99	44.00	46.99	96.00	90.00	37.00	TS-O17
DSD-IC 47.00-51.99	47.00	51.99	97.00	90.00	41.00	TS-O18
DSD-IC 52.00-56.99	52.00	56.99	107.00	100.00	44.00	TS-O19
DSD-IC 57.00-60.99	57.00	60.99	118.00	110.00	49.00	TS-O20
DSD-IC 61.00-67.99	61.00	67.99	119.00	110.00	53.00	TS-O21
DSD-IC 68.00-74.99	68.00	74.99	129.00	120.00	59.00	TS-O22
DSD-IC 75.00-80.99	75.00	80.99	161.00	150.00	65.00	TS-O23
DSD-IC 81.00-90.99	81.00	90.99	162.00	150.00	71.00	TS-O24
DSD-IC 91.00-98.99	91.00	98.99	162.00	150.00	79.00	TS-O25
DSD-IC 99.00-106.99	99.00	106.99	163.00	150.00	90.00	TS-O26
DSD-IC 107.00-110.99	107.00	110.99	164.00	150.00	90.00	TS-O26
DSD-IC 111.00-122.99	111.00	122.99	165.00	150.00	102.00	TS-O27
DSD-IC 123.00-134.99	123.00	134.99	167.00	150.00	114.00	TS-O28
DSD-IC 135.00-148.99	135.00	148.99	168.00	150.00	126.00	TS-O29
DSD-IC 149.00-161.99	149.00	161.99	170.00	150.00	139.00	TS-O30
DSD-IC 162.00-168.99	162.00	168.99	211.00	190.00	151.00	TS-O31
DSD-IC 169.00-173.99	169.00	173.99	211.00	190.00	151.00	TS-O31
DSD-IC 174.00-185.99	174.00	185.99	213.00	190.00	163.00	TS-O32
DSD-IC 186.00-197.99	186.00	197.99	212.00	190.00	175.00	TS-O33
DSD-IC 198.00-209.99	198.00	209.99	215.00	190.00	187.00	TS-O34
DSD-IC 210.00-221.99	210.00	221.99	217.00	190.00	199.00	TS-O35
DSD-IC 222.00-233.99	222.00	233.99	218.00	190.00	211.00	TS-O36
DSD-IC 246.00-257.99	246.00	257.99	221.00	190.00	235.00	TS-O38
DSD-IC 258.00-269.99	258.00	269.99	242.00	210.00	245.00	TS-O39
DSD-IC 270.00-281.99	270.00	281.99	244.00	210.00	259.00	TS-O40
DSD-IC 282.00-293.99	282.00	293.99	245.00	210.00	271.00	TS-O41

- Important: The specified drilling range using the original outer cartridge and pad may be enlarged by using optional outer cartridges and pads as specified on page 221
- For spare parts and insert information, see pages 212-213 • For user guide and quotation form, see pages 279-280, 216-218, 222-226
- Ordering example: DSD-IC 67.30

(1) Cutting diameter minimum
(2) Cutting diameter maximum
(3) Tube designation

For inserts, see pages: NPMX 0803 RB/RG (214) • TPMX (214)
For holders, see pages: TS-O** (265)

Universal Marking for Deep Drilling Tools

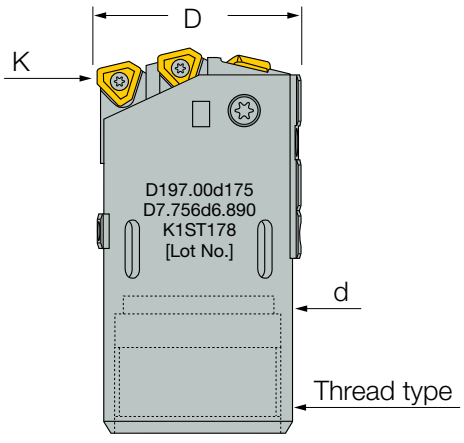
D- **Tool diameter**
Metric- D197.00
Inch- D7.756

d- Pilot diameter
Metric- d175
Inch- d6.890

Tool style
K- Solid drill cartridge style

Thread type
4ST- Four-start thread single tube
1ST- Single-start thread single tube
4DT- Four-start thread double tube

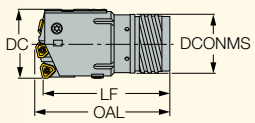
178- Tube diameter

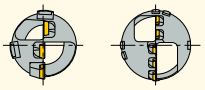


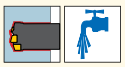
ISCARDEEPDRILL

DDD-EC

Deep Double Tube Drills with External 4-Start Thread Connection and Cartridges (38-184 dia.)







Designation	DCN(1)	DCX(2)	OAL	LF	DCONMS	Ts(3)	Tsi(4)
DDD-EC 38.00-39.60	38.00	39.60	90.00	85.00	33.00	TDO-I8	TDI-N8
DDD-EC 39.61-43.00	39.61	43.00	91.00	85.00	36.00	TDO-I9	TDI-N9
DDD-EC 43.01-47.00	43.01	47.00	101.00	95.00	39.00	TDO-I10	TDI-N10
DDD-EC 47.01-51.70	47.01	51.70	102.00	100.00	43.00	TDO-I11	TDI-N11
DDD-EC 51.71-56.20	51.71	56.20	107.00	100.00	47.00	TDO-I12	TDI-N12
DDD-EC 56.21-65.00	56.21	65.00	119.00	110.00	51.00	TDO-I13	TDI-N13
DDD-EC 65.00-66.99	65.00	66.99	159.00	150.00	52.00	TDO-I14	TDI-N14
DDD-EC 67.00-72.99	67.00	72.99	159.00	150.00	58.00	TDO-I15	TDI-N15
DDD-EC 73.00-79.99	73.00	79.99	160.00	150.00	63.00	TDO-I16	TDI-N16
DDD-EC 80.00-86.99	80.00	86.99	191.00	180.00	70.00	TDO-I17	TDI-N17
DDD-EC 87.00-99.99	87.00	99.99	193.00	180.00	77.00	TDO-I18	TDI-N18
DDD-EC 100.00-106.99	100.00	106.99	193.00	180.00	89.00	TDO-I19	TDI-N19
DDD-EC 107.00-111.99	107.00	111.99	197.00	180.00	89.00	TDO-I19	TDI-N19
DDD-EC 112.00-123.99	112.00	123.99	221.00	205.00	101.00	TDO-I20	TDI-N20
DDD-EC 124.00-135.99	124.00	135.99	222.00	205.00	113.00	TDO-I21	TDI-N21
DDD-EC 136.00-147.99	136.00	147.99	223.00	205.00	125.00	TDO-I22	TDI-N22
DDD-EC 148.00-159.99	148.00	159.99	245.00	225.00	137.00	TDO-I23	TDI-N23
DDD-EC 160.00-168.99	160.00	168.99	246.00	225.00	149.00	TDO-I24	TDI-N24
DDD-EC 169.00-171.99	169.00	171.99	246.00	225.00	149.00	TDO-I24	TDI-N24
DDD-EC 172.00-183.99	172.00	183.99	247.00	225.00	161.00	TDO-I25	TDI-N25

- Important: The specified drilling range using the original outer cartridge and pad may be enlarged by using optional outer cartridges and pads as specified on page 221
- For spare parts and insert information, see pages 212-213 • For user guide and quotation form see pages 279-280, 216-218, 222-226
- Ordering example: DDD-EC 148.00

(1) Cutting diameter minimum
(2) Cutting diameter maximum
(3) Outer tube designation
(4) Inner tube designation

For inserts, see pages: NPMX 0803 RB/RG (214) • TPMX (214)
For holders, see pages: TDO-I (D18.41-65.00) (266) • TDO-I (D65.00-171.99) (267)

Universal Marking for Deep Drilling Tools

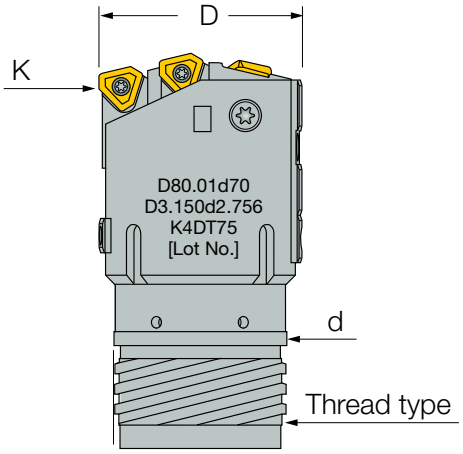
D- **Tool diameter**
Metric- D80.0
Inch- D3.150

d- Pilot diameter
Metric- d70
Inch- d2.756

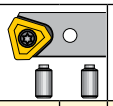
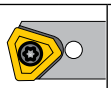
Tool style
K- Cartridge style solid drill

Thread type
4ST- Four-start thread single tube
1ST- Single-start thread single tube
4DT- Four-start thread double tube

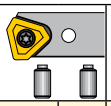
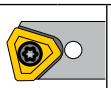
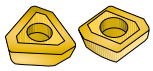
75- Tube diameter



Spare Parts

DSD-EC / DDD-EC / DSD-IC														
Diameter	**Peripheral**	**Qty.**	**Inner/ Central**	**Qty.**	**Guide Pad**	**Qty.**	**Guide Pad Protectors**	**Qty.**	**Sub Guide Pad**	**Qty.**	**Peripheral Insert**	**Qty.**	**Inner/ Central Insert**	**Qty.**
38.00-39.99	CAOD-080	1	CAID-080	1	GPS-08-25-155	2	GPP-06	2	SGP-02	1	NPMX 08**R..	1	NPMX 08**R..	1
			CAID-080	1									NPMX 08**R..	1
40.00-44.99	CAOD-0845	1	CAID-080	1	GPS-08-25-155	2	GPP-06	2	SGP-02	1	TPMX 14**R..	1	NPMX 08**R..	1
			CAID-080	1									NPMX 08**R..	1
45.00-47.99	CAOD-0845	1	CAID-080	1	GPS-10-35-200	2	GPP-07	2	SGP-02	1	TPMX 14**R..	1	NPMX 08**R..	1
			CAID-0845	1									TPMX 14**R..	1
48.00-51.99	CAOD-0845	1	CAID-0845	1	GPS-10-35-200	2	GPP-07	2	SGP-02	1	TPMX 14**R..	1	TPMX 14**R..	1
			CAID-0845	1									TPMX 14**R.	1
52.00-54.99	CAOD-103	1	CAID-0845	1	GPS-10-35-200	2	GPP-07	2	SGP-02	1	TPMX 17**R..	1	TPMX 14**R..	1
			CAID-0845	1									TPMX 14**R..	1
55.00-57.99	CAOD-103	1	CAID-0845	1	GPS-10-35-200	2	GPP-07	2	SGP-02	1	TPMX 17**R..	1	TPMX 14**R..	1
			CAID-103	1									TPMX 17**R..	1
58.00-59.99	CAOD-103	1	CAID-103	1	GPS-10-35-200	2	GPP-07	2	SGP-02	1	TPMX 17**R..	1	TPMX 17**R..	1
			CAID-103	1									TPMX 17**R..	1
60.00-63.99	CAOD-103	1	CAID-103	1	GPS-14-40-250	2	GPP-08	2	SGP-02	1	TPMX 17**R..	1	TPMX 17**R..	1
			CAID-103	1									TPMX 17**R..	1
64.00-67.99	CAOD-142	1	CAID-103	1	GPS-14-40-250	2	GPP-08	2	SGP-03	1	TPMX 24**R..	1	TPMX 17**R..	1
			CAID-103	1									TPMX 17**R..	1
68.00-77.99	CAOD-103	1	CAID-142	1	GPS-14-40-250	2	GPP-08	2	SGP-03	1	TPMX 17**R..	1	TPMX 24**R..	1
			CAID-142	1									TPMX 24**R..	1
78.00-84.99	CAOD-142	1	CAID-142	1	GPS-14-40-250	2	GPP-08	2	SGP-03	1	TPMX 24**R..	1	TPMX 24**R..	1
			CAID-142	1									TPMX 24**R..	1
85.00-91.99	CAOD-170	1	CAID-142	1	GPS-14-40-250	2	GPP-08	2	SGP-03	1	TPMX 28**R..	1	TPMX 24**R..	1
			CAID-142	1									TPMX 24**R..	1
92.00-98.99	CAOD-142	1	CAID-170	1	GPS-14-40-250	2	GPP-08	2	SGP-03	1	TPMX 24**R..	1	TPMX 28**R..	1
			CAID-170	1									TPMX 28**R..	1
99.00-106.99	CAOD-170	1	CAID-170	1	GPS-18-40-300	2	GPP-09	2	SGP-04	1	TPMX 28**R..	1	TPMX 28**R..	1
			CAID-170	1									TPMX 28**R..	1
107.00-117.99	CAOD-142	1	CAID-103	3	GPS-18-40-300	2	GPP-09	2	SGP-04	1	TPMX 24**R..	1	TPMX 17**R..	3
			CAID-142	1									TPMX 24**R..	1
118.00-135.99	CAOD-142	1	CAID-142	3	GPS-18-40-300	2	GPP-09	2	SGP-04	1	TPMX 24**R..	1	TPMX 24**R..	3
			CAID-142	1									TPMX 24**R..	1
136.00-144.99	CAOD-142	1	CAID-142	3	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 24**R..	1	TPMX 24**R..	3
			CAID-170	1									TPMX 28**R..	1
145.00-150.99	CAOD-142	1	CAID-142	2	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 24**R..	1	TPMX 24**R..	2
			CAID-170	1									TPMX 28**R..	1
			CAID-170	1									TPMX 28**R..	1
151.00-156.99	CAOD-170	1	CAID-142	2	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	2
			CAID-170	1									TPMX 28**R..	1
			CAID-170	1									TPMX 28**R..	1
157.00-162.99	CAOD-170	1	CAID-142	1	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	1
			CAID-170	2									TPMX 28**R..	2
			CAID-170	1									TPMX 28**R..	1
163.00-168.99	CAOD-170	1	CAID-170	3	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 28**R..	3
			CAID-170	1									TPMX 28**R..	1
169.00-188.99	CAOD-142	1	CAID-142	5	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 24**R..	1	TPMX 24**R..	5
			CAID-142	1									TPMX 24**R..	1
189.00-196.99	CAOD-142	1	CAID-142	5	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 24**R..	1	TPMX 24**R..	5
			CAID-170	1									TPMX 28**R..	1
197.00-202.99	CAOD-142	1	CAID-142	4	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 24**R..	1	TPMX 24**R..	4
			CAID-170	1									TPMX 28**R..	1
			CAID-170	1									TPMX 28**R..	1
203.00-208.99	CAOD-142	1	CAID-142	3	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 24**R..	1	TPMX 24**R..	3
			CAID-170	2									TPMX 28**R..	2
			CAID-170	1									TPMX 28**R..	1
209.00-214.99	CAOD-170	1	CAID-142	3	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	3
			CAID-170	2									TPMX 28**R..	2
			CAID-170	1									TPMX 28**R..	1

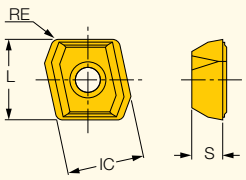
Spare Parts

DSD-EC / DDD-EC / DSD-IC														
Diameter	Peripheral	Qty.	Inner/ Central	Qty.	Guide Pad	Qty.	Guide Pad Protectors	Qty.	Sub Guide Pad	Qty.	Peripheral Insert	Qty.	Inner/ Central Insert	Qty.
215.00-220.99	CAOD-170	1	CAID-142	2	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	2
			CAID-170	3									TPMX 28**R..	3
			CAID-170	1									TPMX 28**R..	1
221.00-226.99	CAOD-170	1	CAID-142	1	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	1
			CAID-170	4									TPMX 28**R..	4
			CAID-170	1									TPMX 28**R..	1
227.00-232.99	CAOD-170	1	CAID-170	5	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 28**R..	5
			CAID-170	1									TPMX 28**R..	1
233.00-247.99	CAOD-142	1	CAID-142	7	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 24**R..	1	TPMX 24**R..	7
			CAID-170	1									TPMX 28**R..	1
248.00-253.99	CAOD-170	1	CAID-142	7	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	7
			CAID-170	1									TPMX 28**R..	1
254.00-258.99	CAOD-170	1	CAID-142	6	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	6
			CAID-170	1									TPMX 28**R..	1
			CAID-170	1									TPMX 28**R..	1
259.00-264.99	CAOD-170	1	CAID-142	5	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	5
			CAID-170	2									TPMX 28**R..	2
			CAID-170	1									TPMX 28**R..	1
265.00-271.99	CAOD-170	1	CAID-142	4	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	4
			CAID-170	3									TPMX 28**R..	3
			CAID-170	1									TPMX 28**R..	1
272.00-275.99	CAOD-170	1	CAID-142	3	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	3
			CAID-170	4									TPMX 28**R..	4
			CAID-170	1									TPMX 28**R..	1
276.00-284.99	CAOD-170	1	CAID-142	2	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	2
			CAID-170	5									TPMX 28**R..	5
			CAID-170	1									TPMX 28**R..	1
285.00-289.99	CAOD-170	1	CAID-142	1	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 24**R..	1
			CAID-170	6									TPMX 28**R..	6
			CAID-170	1									TPMX 28**R..	1
290.00-293.99	CAOD-170	1	CAID-170	7	GPS-18-40-300	4	GPP-09	4	SGP-04	1	TPMX 28**R..	1	TPMX 28**R..	7
			CAID-170	1									TPMX 28**R..	1

ISCARDEEPDRILL

NPMX 0803 RB/RG

Inserts for Drilling Heads
DSD-EC / DDD-EC / DSD-IC

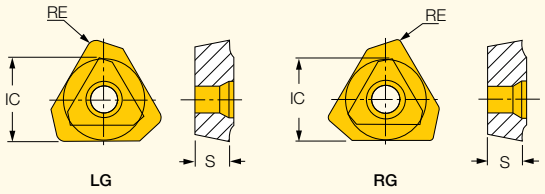


Designation	Dimensions IC	S	RE	L	Tough ↔ Hard IC9025	IC908	IC520
NPMX 080304R-B	8.00	3.18	0.40	8.36		●	●
NPMX 080308R-G	8.00	3.18	0.80	8.36	●		●

ISCARDEEPDRILL

TPMX

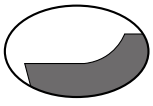
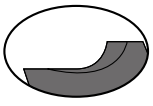
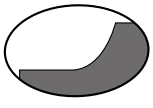
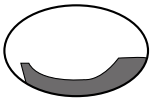
Inserts for Drilling Heads
DSD-EC / DDD-EC /
DSD-IC / DSC-EC / DSC-IC



Designation	Dimensions IC	S	RE	Tough ↔ Hard IC920	IC5500	IC9025	IC508	IC908	IC520	IC806
TPMX 140304R-B	8.45	3.50	0.40	●		●		●	●	●
TPMX 140308R-DT	8.45	3.50	0.80			●		●		
TPMX 140308R-G	8.45	3.50	0.80		●	●	●	●	●	●
TPMX 140308R-B	8.45	3.50	0.80							●
TPMX 170404R-B	10.30	4.00	0.40	●		●		●	●	●
TPMX 170408R-B	10.30	4.00	0.80							●
TPMX 170408R-BG	10.30	4.00	0.80					●	●	●
TPMX 170408R-DT	10.30	4.00	0.80			●		●	●	
TPMX 170408R-G	10.30	4.00	0.80		●		●	●	●	●
TPMX 240504R-B	14.20	5.50	0.40	●		●		●	●	●
TPMX 240512R-BG	14.20	5.50	1.20			●		●	●	●
TPMX 240512R-DT	14.20	5.50	1.20			●		●	●	
TPMX 240512R-G	14.20	5.50	1.20		●		●	●	●	●
TPMX 240512R-B	14.20	5.50	1.20							●
TPMX 280708R-B	17.00	7.50	0.80	●		●		●		●
TPMX 280716R-BG	17.00	7.50	1.60					●	●	●
TPMX 280716R-DT	17.00	7.50	1.60					●	●	
TPMX 280716R-G	17.00	7.50	1.60		●		●	●	●	●
TPMX 280716R-B	17.00	7.50	1.60							●

For tools, see pages: DDC-EC (249) • DSTR-EC (255) • DSTR-IC (258)

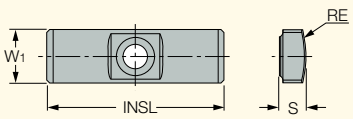
Chipbreaker Selection

G			B		
	Versatile			Good chip control for heat-resistant alloy	
BG			DT		
	Chip control for difficult-to-cut steel			To reduce machine load	

ISCARDEEPDRILL

GPS

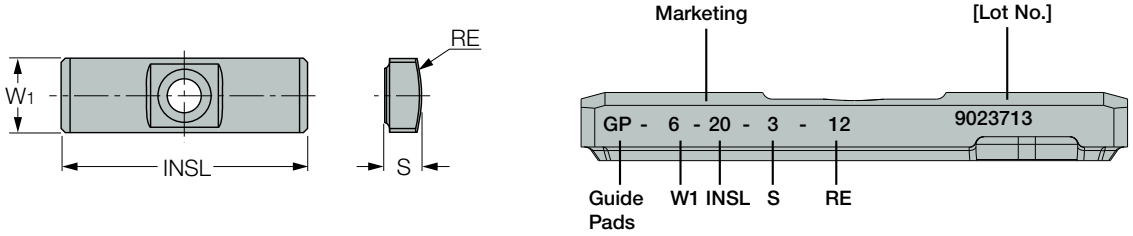
Deep Drilling Solid
Carbide Guide Pads



Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC928	IC950	IC908
GPS-04-16-055-DC	4.0	16.00	2.00	5.50	•		•
GPS-05-18-060-DC	5.0	18.00	2.50	6.00	•		•
GPS-05-18-075-DC	5.0	18.00	2.50	7.50	•		•
GPS-06-20-075-DC	6.0	20.00	3.00	7.50			•
GPS-06-20-075	6.0	20.00	3.00	7.50		•	
GPS-06-20-085-DC	6.0	20.00	3.00	8.50	•		•
GPS-06-20-085	6.0	20.00	3.00	8.50		•	
GPS-06-20-100-DC	6.0	20.00	3.00	10.00	•		•
GPS-06-20-100	6.0	20.00	3.00	10.00		•	
GPS-06-20-120-DC	6.0	20.00	3.00	12.00	•		•
GPS-06-20-120	6.0	20.00	3.00	12.00		•	
GPS-07-20-120-DC	7.0	20.00	3.50	12.00	•		•
GPS-07-20-120	7.0	20.00	3.50	12.00		•	
GPS-08-25-155-DC	8.0	25.00	4.50	15.50	•		•
GPS-08-25-155	8.0	25.00	4.50	15.50		•	
GPS-10-30-200-DC	10.0	30.00	4.50	20.00	•		•
GPS-10-30-200	10.0	30.00	4.50	20.00		•	
GPS-10-35-200-DC	10.0	35.00	6.00	20.00	•		•
GPS-10-35-200	10.0	35.00	6.00	20.00		•	
GPS-12-35-250-DC	12.0	35.00	5.50	25.00	•		•
GPS-12-35-250	12.0	35.00	5.50	25.00		•	
GPS-14-40-250-DC	14.0	40.00	7.50	25.00	•		•
GPS-14-40-250	14.0	40.00	7.50	25.00		•	
GPS-18-40-300-DC	18.0	40.00	9.00	30.00	•		•

• DC- Double Chamfer

Universal Marking for Deep Drilling Tools



Guide Pad Grade Recommendation

	Oil Coolant			Water Based Coolant		
Priority	1	2	3	1	2	3
ISO-P	IC950	IC908	IC928	IC928	IC908	-
ISO-K	IC950	IC908	IC928	IC928	IC908	-
ISO-M	IC928	IC908	IC950	IC928	IC908	-
ISO-S	IC928	IC908	IC950	IC928	IC908	-

Chip Form General Information

Chip form in deep hole drilling

Chip form plays a key role in STS (Single tube system) and DTS (Double tube system) while large-volume and high-pressure coolant do so as well. Because chips are removed through the tube with coolant, proper chip formation is essential for smooth and steady evacuation.

Chip formation

Chip formation is affected by multiple factors, such as workpiece material, chipbreaker geometry, cutting speed, feed, type of coolant, and coolant temperature. Suitable chip formation depends on cutting operation but is controllable by changing the cutting conditions.

How to decide the chip form

Generally the chip length should be 3 - 4 times its width, but tends to be longer with difficult-to-cut materials. In this case, chip evacuation can be improved by making the chips thinner, which is normally done by reducing the feed rate.

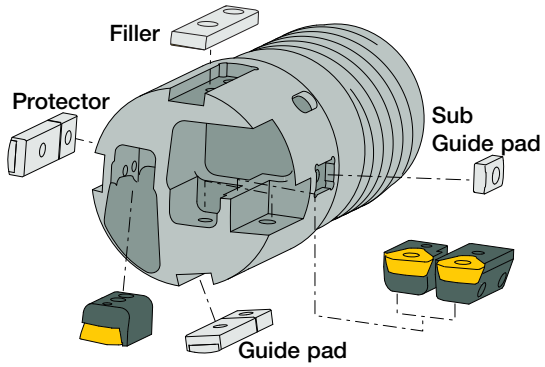
The graph below shows chip formation for different cutting speeds and feeds. Short chips are created by reducing the cutting speed or increasing the feed.

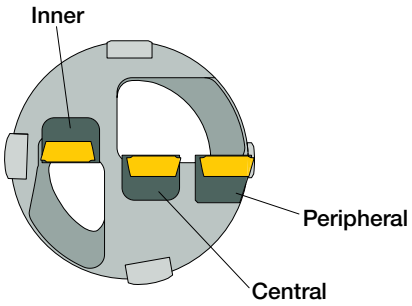
Table 1

		Central	Intermediate	Peripheral
Cutting speed: V_c (m/min)	110			
	90			
	70			
	50			
Condition		0.10	0.15	0.20
		Feed: f (mm/rev)		

From left to right in each box the order is central, intermediate and peripheral chip.

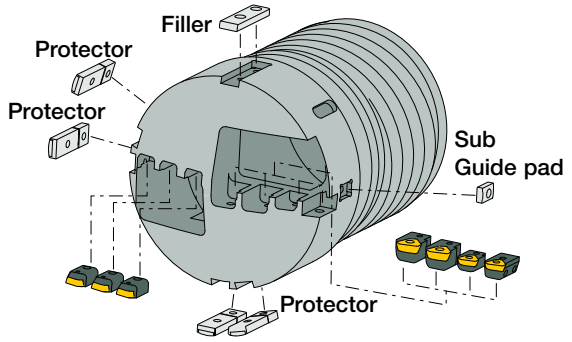
Ø38.00-106.99 mm

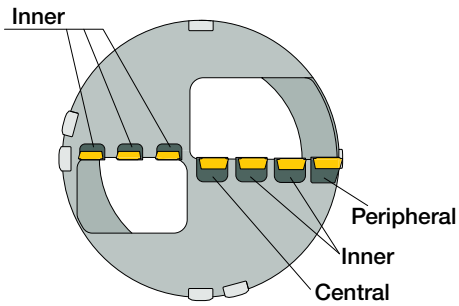




Part positions may vary depending on the drill size.

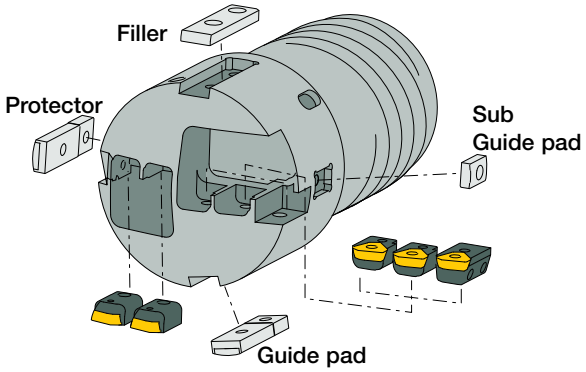
Ø169.00-232.99 mm

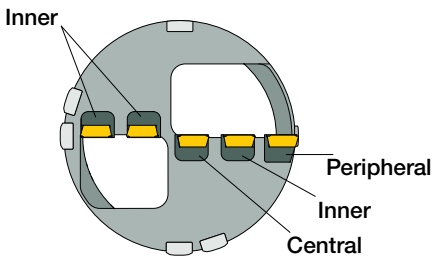




Part positions may vary depending on the drill size.

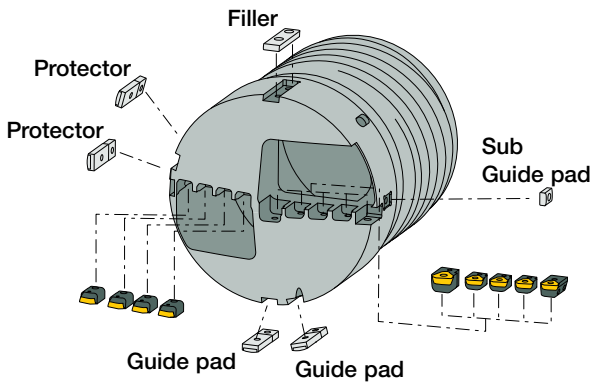
Ø107.00-168.99 mm

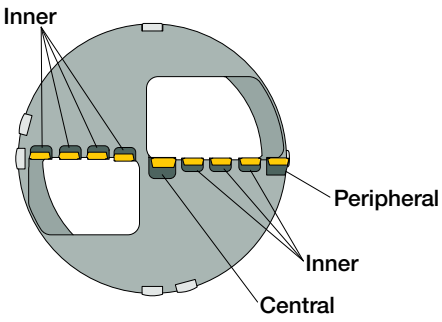




Part positions may vary depending on the drill size.

Ø233.00-291.99 mm





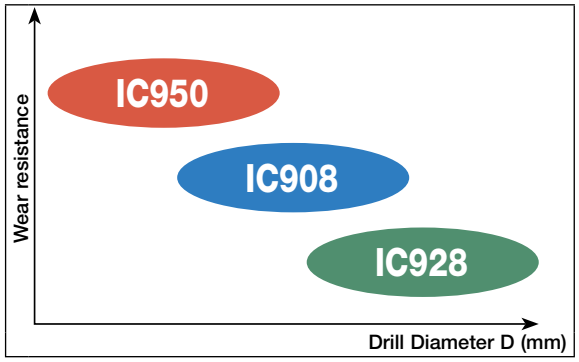
Part positions may vary depending on the drill size.

*For more information regarding the filler please see page 218

Guide pads

Guide pads are subject to wear, like inserts.

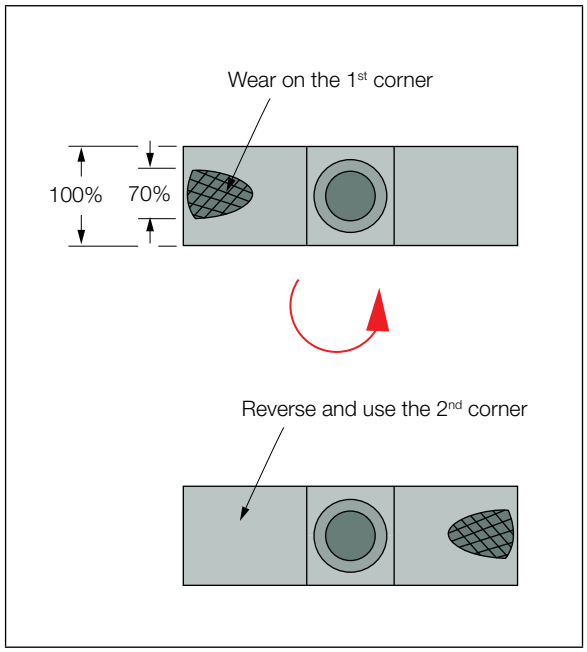
- Each guide pad can be used on two sides. When the first corner wears out 70% of the width, reverse the guide pad to use the second corner.
- Replace with a new guide pad when the second corner wears out.



For higher wear resistance
- High wear-resistant grade

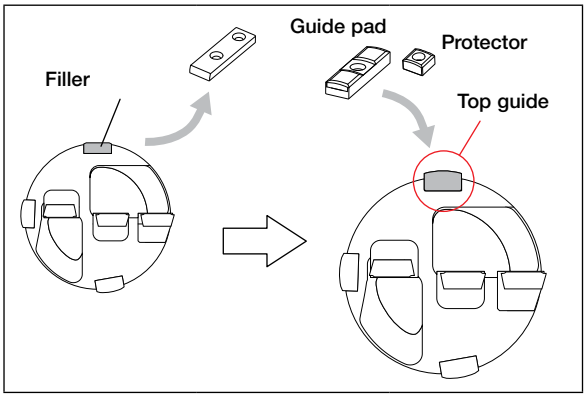
First recommendation
- Suitable for various workpiece materials
- Long tool life due to unique substrate and coating

For higher fracture resistance
- High fracture-resistant grade



Please replace the filler with the top guide pad when:

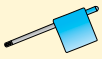
- High hole accuracy is required
- L/D (hole length-to-diameter) ratio is greater than 50:1
- Drilling a workpiece which has a tail stock hole
- The DOC required is greater than the range of the peripheral insert for counterboring. *See chart below.



*Maximum DOC of peripheral insert

Cartridge	DOC (mm)	Guide pad
CAOD-0845	6.4	GPS-08.../GPS-10...
CAOD-103	7.2	GPS-10.../GPS-14...
CAOD-142	10.4	GPS-14.../GPS-18...
CAOD-170	12.0	GPS-18...

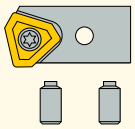
For diameter less than 92 mm, the drill head is semi-standard using the top guide pad.
Please contact your dealer for further information.

Guide Pad		
	Screw	Key
		
GPS-05	SR 34-508 M2.2X0.45	T-7/5
GPS-06	SR 11201753-1	T-7/5
GPS-07	SR 11201753-4	T-9/5
GPS-08	SR 11201753-4	T-9/5
GPS-10	SR 11201753-8	T-15/5
GPS-12	SR 11201753-8	T-15/5
GPS-14	SR 11201752-2	T-15/5
GPS-18	SR 11201756-7S	T-15/5

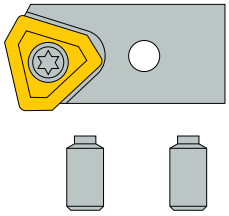
ISCARDEEPDRILL

CAOD

Drilling Head Peripheral Cartridge



Universal Marking for Deep Drilling Tools



CA - P - DR - 0800 - R

- CA – Peripheral Cartridge
- P
- DR – DR : Drilling, CB : Counter Bore
- 0800 – IC
- R – L/R HAND

Spare Parts

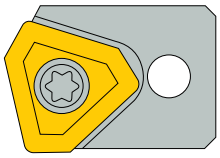
Designation	Adjustment Screw	Key	Locking Screw	Key	Insert	Insert Clamping Screw
CAOD-080	SR 11201755-4	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-0845	SR 11201755-6	HW 2.0	SR 11201756-10	HW 2.5	TPMX 1403..R-G	SR 11201753-3
CAOD-085	SR 11201755-7	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-103	SR 11201755-8	HW 2.5	SR 11201756-12	HW 3.0	TPMX 1704..R-G	SR 11201753-7
CAOD-142	SR 11201755-9	HW 2.5	SR 11201756-15	HW 4.0	TPMX 2405..R-G	SR 11201753-9
CAOD-170	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 2807..R-G	SR 11201753-10

ISCARDEEPDRILL

CAID

Drilling Head Inner Cartridge

Universal Marking for Deep Drilling Tools



CA - I - 0845 - R

- CA – Internal Cartridge
- I
- 0845 – IC
- R – L/R HAND

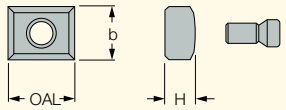
Spare Parts

Designation	Locking Screw	Key	Insert	Insert Clamping Screw	Key
CAID-080	SR 11201753-5	T-9/51	NPMX 0803..R-G	SR 11201753-2	T-7/51
CAID-0845	SR 11201753-6	T-15/51	TPMX 1403..R-G	SR 11201753-3	T-8/51
CAID-085	SR 11201753-5	T-9/51	NPMX 0803..R-G	SR 11201753-2	T-7/51
CAID-103	SR 11201752-1	T-15/51	TPMX 1704..R-G	SR 11201753-7	T-9/51
CAID-142	SR 11201756-7	HW 3.0	TPMX 2405..R-G	SR 11201753-9	T-15/51
CAID-170	SR 11201756-7	HW 3.0	TPMX 2807..R-G	SR 11201753-10	T-20/51

ISCARDEEPDRILL

SGP

Drilling Head Sub-Guide Pads



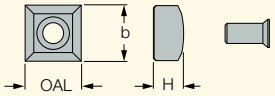
Designation	OAL	b	H
SGP-01	10.00	6.0	3.0
SGP-02	10.00	8.0	4.5
SGP-03	10.00	10.0	5.0
SGP-04	20.00	14.0	7.0

- Select an outer cartridge and pad for the required enlarged diameter.

ISCARDEEPDRILL

GPP

Drilling Head Guide Pad Protectors



Designation	OAL	b	H
GPP-04	8.00	8.0	4.4
GPP-05	8.00	8.0	3.5
GPP-06	8.00	8.0	4.5
GPP-07	10.00	10.0	6.0
GPP-08	14.00	14.0	7.5
GPP-09	18.00	18.0	9.0

- Select an outer cartridge and pad for the required enlarged diameter.

Recomended claming torque

Insert Screw	
	(N·m)
SR 11201753-2	1
SR 11201753-3	1.3
SR 11201753-7	2.3
SR 11201753-9	3.5
SR 11201753-7	5

Cartridge Screw	
	(N·m)
SR 11201752-1	3.5
SR 11201753-5	2.3
SR 11201753-5	3.5
SR 11201756-7	3
SR 11201756-10	2.2
SR 11201756-11	2.2
SR 11201756-12	3
SR 11201756-15	5

Guide Pad Screw	
	(N·m)
SR 14-571/5	3.5
SR 34-506-C	2.3
LS1206SSS	3

(+) Plus Parts for Diameter Enlargement.

By exchanging only the peripheral cartridge and guide pads, the original head diameter can be increased up to 5 mm.
(Standard plus parts = 1 mm, 2 mm , 3 mm , 4 mm , 5 mm)

+ Plus						
	+1	+2	+3	+4	+5	
	0.039″	0.079″	0.118″	0.157″	0.197″	

Plus Cartidge - CAOD

Original	+1 mm	+2 mm	+3 mm	+4 mm	+5 mm
CAOD-080	CAOD-080+1	CAOD-080+2	-	-	-
CAOD-0845	CAOD-0845+1	CAOD-0845+2	CAOD-0845+3	-	-
CAOD-103	CAOD-103+1	CAOD-103+2	CAOD-103+3	CAOD-103+4	-
CAOD-142	CAOD-142+1	CAOD-142+2	CAOD-142+3	CAOD-142+4	CAOD-142+5
CAOD-170	CAOD-170+1	CAOD-170+2	CAOD-170+3	CAOD-170+4	CAOD-170+5

Plus Cartidge - CAORC

Original Cartridge	+1 mm	+2 mm	+3 mm	+4 mm	+5 mm
CAORC-0845	CAORC-0845+1	CAORC-0845+2	CAORC-0845+3	-	-
CAORC-103	CAORC-103+1	CAORC-103+2	CAORC-103+3	CAORC-103+4	-
CAORC-142	CAORC-142+1	CAORC-142+2	CAORC-142+3	CAORC-142+4	CAORC-142+5
CAORC-170	CAORC-170+1	CAORC-170+2	CAORC-170+3	CAORC-170+4	CAORC-170+5

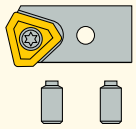
Plus Guide Pad

Original Pad	+1 mm	+2 mm	+3 mm	+4 mm	+5 mm
GPS-08-25-155	GPB-08-25-155+1	GPB-08-25-155+2	GPB-08-25-155+3	-	-
GPS-10-35-200	GPB-10-35-200+1	GPB-10-35-200+2	GPB-10-35-200+3	GPB-10-35-200+4	-
GPS-14-40-250	GPB-14-40-250+1	GPB-14-40-250+2	GPB-14-40-250+3	GPB-14-40-250+4	GPB-14-40-250+5
GPS-18-40-300	GPB-18-40-300+1	GPB-18-40-300+2	GPB-18-40-300+3	GPB-18-40-300+4	GPB-18-40-300+5

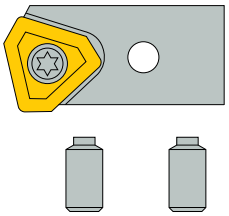
ISCARDEEPDRILL

CAOD

Drilling Head Peripheral Cartridge



Universal Marking for Deep Drilling Tools

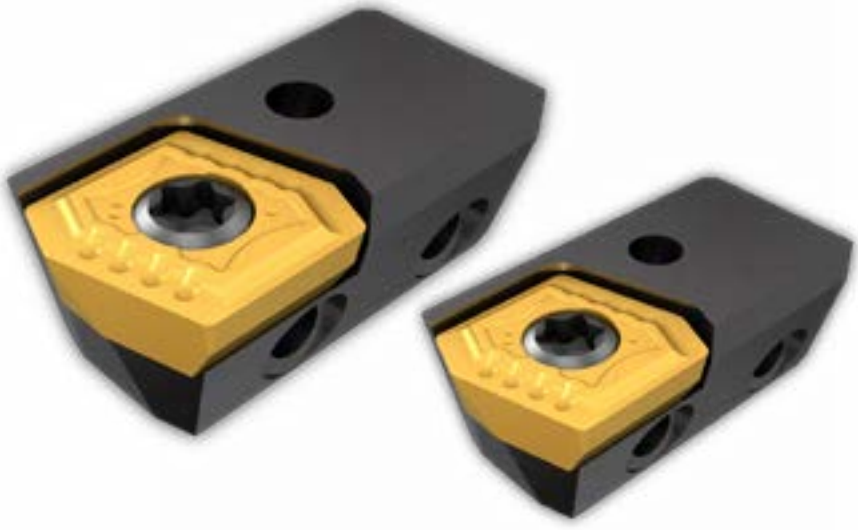


CA - P - DR - 0800 - R

- **CA - P**: Peripheral Cartridge
- **DR**: DR : Drilling, CB : Counter Bore
- **0800**: IC
- **R**: L/R HAND

Spare Parts

Designation	Adjustment Screw	Key	Locking Screw	Key	Insert	Insert Clamping Screw
CAOD-080+1	SR 11201755-4	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-080+2	SR 11201755-4	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-085+1	SR 11201755-7	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-085+2	SR 11201755-7	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-085+3	SR 11201755-7	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-103+1	SR 11201755-8	HW 2.5	SR 11201756-12	HW 3.0	TPMX 1704..R-G	SR 11201753-7
CAOD-103+2	SR 11201755-8	HW 2.5	SR 11201756-12	HW 3.0	TPMX 1704..R-G	SR 11201753-7
CAOD-103+3	SR 11201755-8	HW 2.5	SR 11201756-12	HW 3.0	TPMX 1704..R-G	SR 11201753-7
CAOD-103+4	SR 11201755-8	HW 2.5	SR 11201756-12	HW 3.0	TPMX 1704..R-G	SR 11201753-7
CAOD-142+1	SR 11201755-9	HW 2.5	SR 11201756-15	HW 4.0	TPMX 2405..R-G	SR 11201753-9
CAOD-142+2	SR 11201755-9	HW 2.5	SR 11201756-15	HW 4.0	TPMX 2405..R-G	SR 11201753-9
CAOD-142+3	SR 11201755-9	HW 2.5	SR 11201756-15	HW 4.0	TPMX 2405..R-G	SR 11201753-9
CAOD-142+4	SR 11201755-9	HW 2.5	SR 11201756-15	HW 4.0	TPMX 2405..R-G	SR 11201753-9
CAOD-142+5	SR 11201755-9	HW 2.5	SR 11201756-15	HW 4.0	TPMX 2405..R-G	SR 11201753-9
CAOD-170+1	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 2807..R-G	SR 11201753-10
CAOD-170+2	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 2807..R-G	SR 11201753-10
CAOD-170+3	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 2807..R-G	SR 11201753-10
CAOD-170+4	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 2807..R-G	SR 11201753-10
CAOD-170+5	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 2807..R-G	SR 11201753-10



Machining Recommendations

ISO	Material		Condition	Tensile Strength [N/mm²]	Material Group No.(1)	Hardness HB	Chipbreaker		
								Troubleshooting	
							First Choice	Fracture	Wear
P	Non-alloy steel and cast steel, free cutting steel	< 0.25 %C	Annealed	420	1	125	G IC908	BG IC806	B IC9025
		>= 0.25 %C	Annealed	650	2	190			
		< 0.55 %C	Quenched and tempered	850	3	250			
		>= 0.55 %C	Annealed	750	4	220			
			Quenched and tempered	1000	5	300			
	Low alloy and cast steel (less than 5% of alloying elements)		Annealed	600	6	200	G IC908	BG IC806	B IC9025
			Quenched and tempered	930	7	275			
				1000	8	300			
				1200	9	350			
	High alloyed steel, cast steel and tool steel		Annealed	680	10	200	G IC908	BG IC806	B IC9025
			Quenched and tempered	1100	11	325			
	Stainless steel and cast steel		Ferritic/martensitic	680	12	200	G IC908	BG IC806	B IC9025
			Martensitic	820	13	240			
M	Stainless steel and cast steel		Austenitic, duplex	600	14	180	G IC806	B IC908	B IC9025
K	Grey cast iron (GG)		Ferritic/pearlitic		15	180	G IC908	G IC806	B IC9025
			Pearlitic/martensitic		16	260			
	Nodular cast iron (GGG)		Ferritic		17	160			
			Pearlitic		18	250			
	Malleable cast iron		Ferritic		19	130			
			Pearlitic		20	230			
N	Aluminum-wrought alloys		Not hardenable		21	60	G IC908	G IC806	B IC9025
			Hardenable		22	100			
	Aluminum-cast alloys	<=12% Si	Not hardenable		23	75			
			Hardenable		24	90			
		>12% Si	High temperature		25	130			
	Copper alloys	>1% Pb	Free cutting		26	110			
			Brass		27	90			
			Electrolitic copper		28	100			
	Non-metallic		Duroplastics, fiber plastics		29				
			Hard rubber		30				
S	High temp. alloys	Fe based	Annealed		31	200	B IC806	B IC908	B IC9025
			Hardened		32	280			
		Ni or Co based	Annealed		33	250			
			Hardened		34	350			
			Cast		35	320			
	Titanium alloys		Pure	400	36				
			Alpha+beta alloys hardened	1050	37				
H	Hardened steel		Hardened 55 HRC		38		B IC806	B IC908	B IC908
			Hardened 60 HRC		39				
	Chilled cast iron		Cast		40	400			
	Cast iron		Hardened 55 HRC		41				

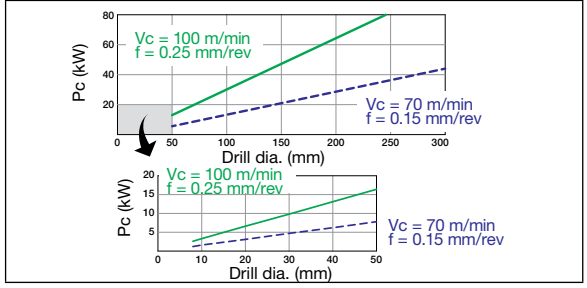
(1) For material groups see pages 495-524

Adjustable Solid Drill Heads DSD-EC, DDD-EC, DSD-IC					
Dia. Range	**38.00-39.99**	**40.00-51.99**	**52.00-63.99**	**64.00-84.99**	**85.00-293.00**
V_c (m/min)	**Feed Rate f (mm/rev)**				
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-100	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-100	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
50-100	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
50-100	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-110	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-110	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-110	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
80-140	0.20-0.30	0.20-0.30	0.24-0.32	0.24-0.32	0.25-0.40
80-140	0.20-0.30	0.20-0.30	0.24-0.32	0.24-0.32	0.25-0.40
80-140	0.20-0.30	0.20-0.30	0.24-0.32	0.24-0.32	0.25-0.40
80-140	0.20-0.30	0.20-0.30	0.24-0.32	0.24-0.32	0.25-0.40
80-140	0.20-0.30	0.20-0.30	0.24-0.32	0.24-0.32	0.25-0.40
80-140	0.20-0.30	0.20-0.30	0.24-0.32	0.24-0.32	0.25-0.40
100-200	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
100-200	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
100-200	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
100-200	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
100-200	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
100-200	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
100-200	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
100-200	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
60-130	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
60-130	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
20-65	0.06-0.13	0.08-0.18	0.13-0.23	0.13-0.23	0.18-0.28
20-65	0.06-0.13	0.08-0.18	0.13-0.23	0.13-0.23	0.18-0.28
20-65	0.06-0.13	0.08-0.18	0.13-0.23	0.13-0.23	0.18-0.28
30-100	0.06-0.13	0.08-0.18	0.13-0.23	0.13-0.23	0.18-0.28
30-100	0.06-0.13	0.08-0.18	0.13-0.23	0.13-0.23	0.18-0.28
30-60	0.06-0.13	0.08-0.18	0.13-0.23	0.13-0.23	0.18-0.28
30-60	0.06-0.13	0.08-0.18	0.13-0.23	0.13-0.23	0.18-0.28
30-80	0.06-0.13	0.08-0.18	0.13-0.23	0.13-0.23	0.15-0.28
30-80	0.06-0.13	0.08-0.18	0.13-0.23	0.13-0.23	0.15-0.28
30-80	0.06-0.13	0.08-0.18	0.13-0.23	0.13-0.23	0.15-0.28
30-80	0.06-0.13	0.08-0.18	0.13-0.23	0.13-0.23	0.15-0.28

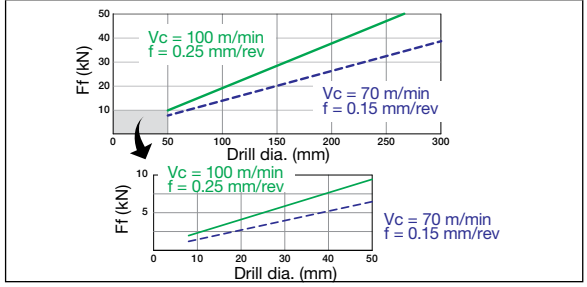
Technical Guide

Setting guidelines for cutting loads, fluid pressure and flow rate during STS operation

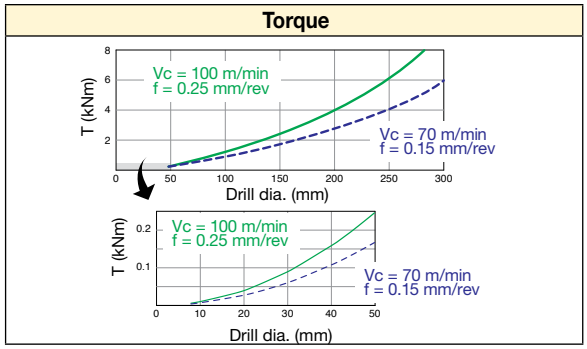
Net power



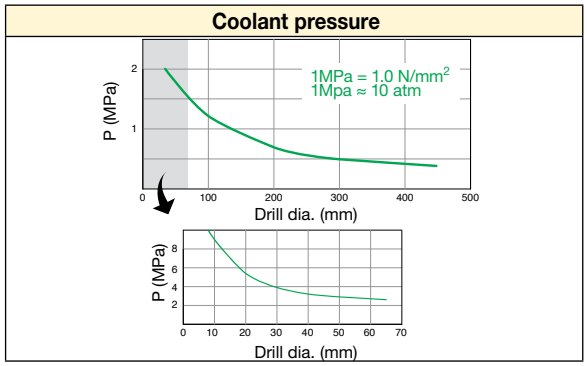
Feed force



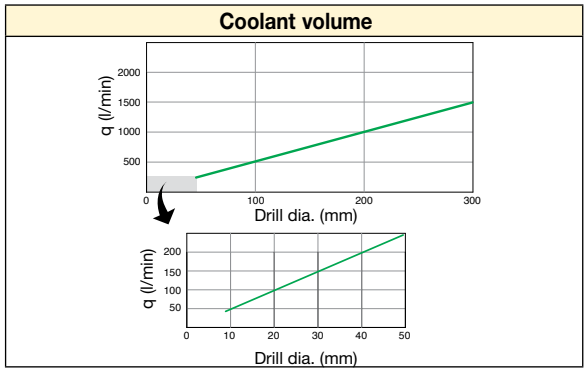
Torque



Coolant pressure

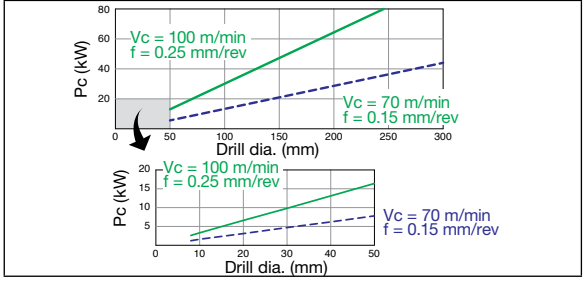


Coolant volume

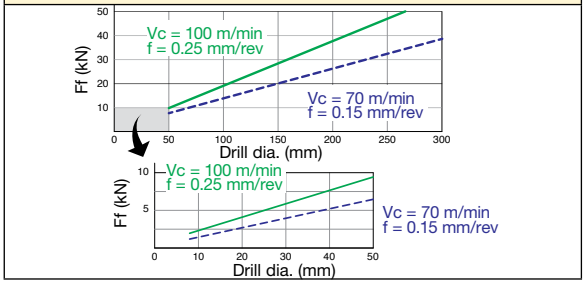


Setting guidelines for cutting loads, fluid pressure and flow rate during DTS operation

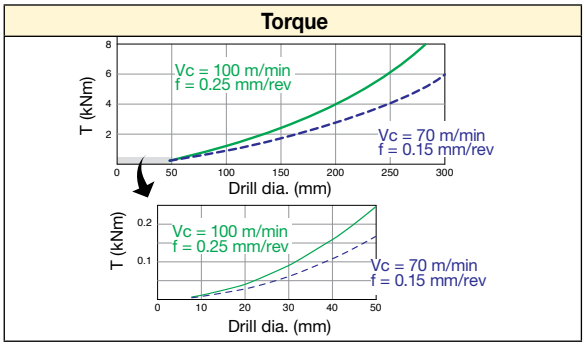
Net power



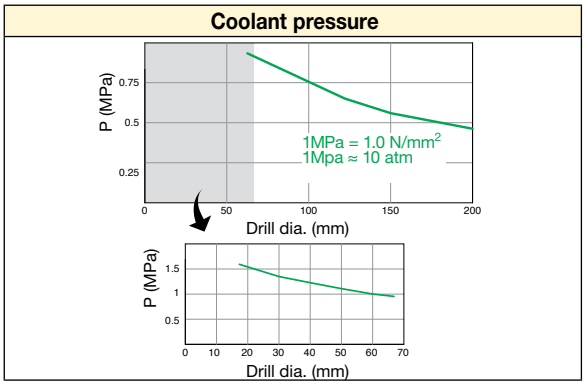
Feed force



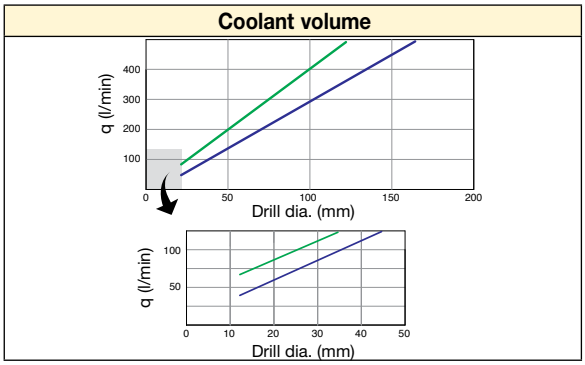
Torque



Coolant pressure



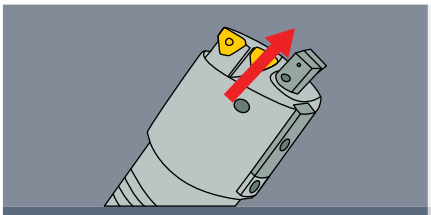
Coolant volume



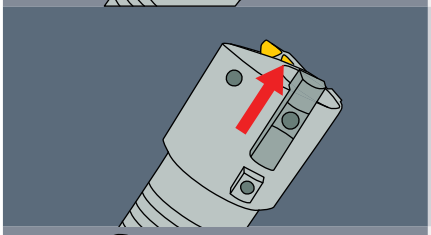
Technical Information - Cartridge Style Drill Head Diameter Settings

The drill head diameter is set and inspected with a master insert in our final inspection. However, the inserts in the market have a tolerance fluctuation so each time you index the insert, the diameter must be adjusted as per the following method.

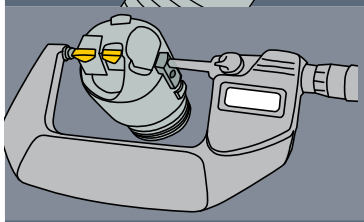
Note: When a corner change is made on the insert, it must be adjusted to the correct size or damage can be caused to the head body or workpiece material.



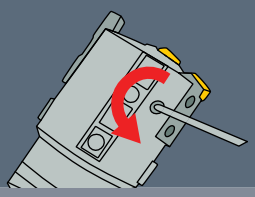
1. Remove the inner cartridge to avoid interference with the guide screw.



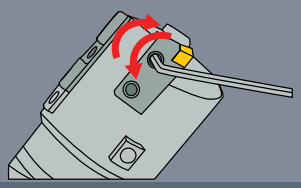
2. The dimensional guide pad must be slid forward to measure the diameter.
   2.1 Loosen the lock screw and slide the guide pad forward.
   2.2 Re-tighten the lock screw at the measuring position.



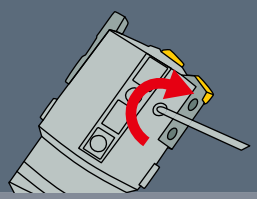
3. Measure the diameter with a micrometer. We recommend setting the tool diameter at h8 tolerance to the cutting diameter. If the diameter is incorrect, go to step 4 below. If it's correct, go to step 5 below.



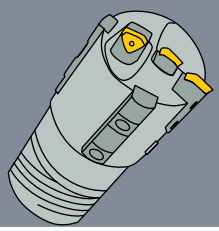
4. Adjust the outer cartridge
   4.1 First loosen the lock screw of the outer cartridge and then tighten it slightly.



4.2 Proceed to adjust the diameter, using the 2 adjustment screws and measure with a micrometer.



4.3 When set to the size, re-tighten the lock screw.
4.4 Recheck the diameter with a micrometer. If it is still out of tolerance, repeat the procedure from steps 1-4.
Note: Please make sure to tighten the lock screw firmly before use. If loose, the cartridge may move and cause serious problems during machining.



5. Slide the dimensional guide pad back to the original position and tighten the lock screw.
6. Replace the inner cartridge and tighten the lock screw.
   Note: Please check that all lock screws are firmly tightened, as they may come loose if vibration occurs during drilling.

Brazed Drilling Head

Single tube system – external thread:

DSD-E0 - Deep Single Tube Drills with External Single Thread Connection and a Brazed Single Tip (8-14.8 dia.)

DSD-E1 - Deep Single Tube Drills with External 2 and 4 Start Thread Connections and a Single Brazed Tip (12.6-20 dia.)

DSD-E2/E3 - Deep Single Tube Drills with External 2 and 4 Start Thread Connections and 2 or 3 Brazed Tips (12.6-65 dia.)

Double tube system:

DDD-E3 - Deep Double Tube Drills with External 4 Start Thread Connection and Brazed Tips (18.4-65 dia.)

Grade of Brazed Heads

D	S	D	-	E	3	25.28	DT	-	PZXT

D	Deep drilling / Counter boring
I	Inch - Deep drilling / Counter boring
S	Special - Deep drilling / Counter boring

Drill Diameter

Chipbreaker
Brazed drill

S	Single Tube
D	Double Tube

D	Drill
C	Counterbore with Through Hole
T	Counterbore w/o Through Hole
TR	Trepanning

E	External Thread
I	Internal Thread

A	Adjustable Insert
C	Cartridge
F	Fast Feed
0	Brazed, 1 tip, 1 thread start (MBU type)
1	Brazed, 1 tip (UTE type)
2	Brazed, 2 tip (BTU type)
3	Brazed, 3 tip (BTU, ETU type)

Grade
Brazed drill

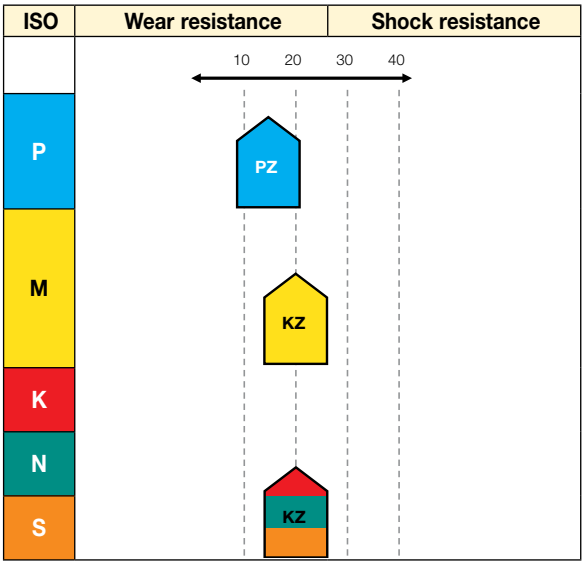
FB	Fixed pocket (FNBM Type)
FT	Fixed pocket (FNTR Type)

Grade of Brazed Heads

DSD-E0

DSD-E0 (MBU style) STS

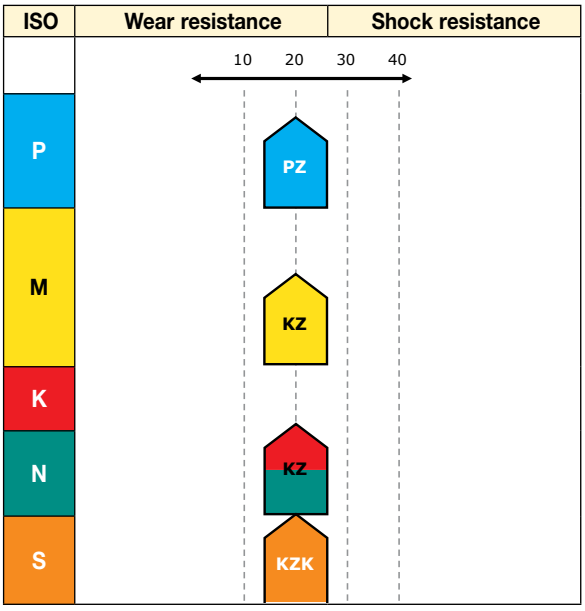
Ø8 -14.79 mm (Ø.315– .582″)



DSD-E1

DSD-E1 (UTE style) STS

Ø12.60 ~ 20.00 mm (Ø.496″ ~ .787″)



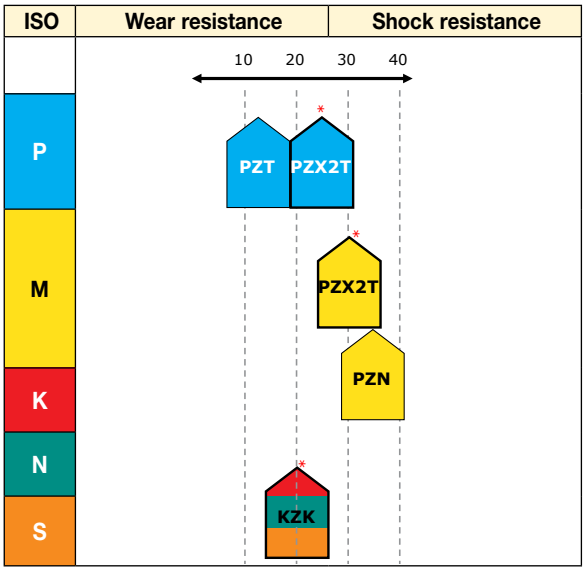
DSD-E2

DSD-E2 (BTU 2tip style) STS

Ø12.60 ~ 20.00 mm (Ø.496″ ~ .787″)

DSD-E3

DSD-E3 (BTU style) STS	DDD-E3 (ETU style) STS
	
Ø15.60 ~ 65.00mm (Ø.615″ ~ 2.559″)	Ø18.40 ~ 65.00mm (Ø.725″ ~ 2.559″)



* indicates the first recommendation

Tool Grades

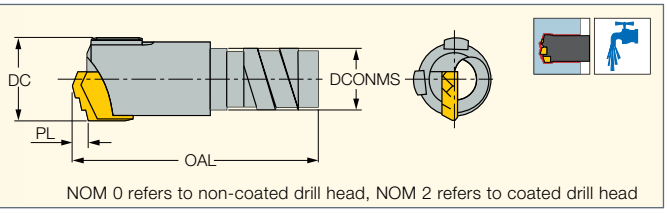
Application	Grade	Coating		Features	Brazed Drill Heads			
		Main composition	Thickness / µm		DSD-E0	DSD-E1	DSD-E2/E3	DDD-E3
								
1122		TiAlCr	2.5	• High wear resistance • Suitable for steel, cast iron, and difficult-to-cut material	✓	✓	✓	✓
P	P10 - P30							
K	K15 - K25							
N	N15 - N25							
S	S15 - S25							
H	H15 - H25							
1132		TiAlCr	2.5	• Good balance between wear and chipping resistance • Suitable for steel and stainless steel under general cutting conditions			✓	✓
P	P20 - P30							
M	M25 - M35							
2122		TiAlCr	2.5	• High fracture resistance • Suitable for stainless steel			✓	✓
M	M30 - M40							
3112		TiAlCr	2.5	• Good balance between wear and fracture resistance	✓	✓		
M	M15 - M25							
K	K10 - K20							
N	N15 - N25							
S	S15 - S25							
H	H15 - H25							
3132		TiAlCr	2.5	• First choice for heat-resistant alloy under general cutting conditions		✓	✓	✓
K	K15 - K25							
N	N10 - N20							
S	S15 - S25							
H	H15 - H25							

Note: Being brazed tools, the grade codes represent the grade combination of the brazed carbide tip and guide pad grades.
They do not represent the individual grade of carbide tips or guide pads.

ISCARDEEPDRILL

DSD-E0

Deep Single Tube Drills with External Single Thread Connection and a Brazed Single Tip (8-14.8 dia.)



NOM 0 refers to non-coated drill head, NOM 2 refers to coated drill head

Designation	DCN(1)	DCX(2)	OAL	DCONMS	PL	Ts(3)
DSD-E0 8.00-8.99 NOM 0	8.00	8.99	35.00	6.00	2.00	TS001
DSD-E0 8.00-8.99 NOM 2	8.00	8.99	35.00	6.00	2.00	TS001
DSD-E0 9.00-9.99 NOM 0	9.00	9.99	35.00	7.20	2.00	TS002
DSD-E0 9.00-9.99 NOM 2	9.00	9.99	35.00	7.20	2.00	TS002
DSD-E0 10.00-10.99 NOM 0	10.00	10.99	35.20	7.60	2.20	TS003
DSD-E0 10.00-10.99 NOM 2	10.00	10.99	35.20	7.60	2.20	TS003
DSD-E0 11.00-11.99 NOM 0	11.00	11.99	35.20	8.60	2.20	TS004
DSD-E0 11.00-11.99 NOM 2	11.00	11.99	35.20	8.60	2.20	TS004
DSD-E0 12.00-13.49 NOM 0	12.00	13.49	35.30	9.10	2.30	TS005
DSD-E0 12.00-13.49 NOM 2	12.00	13.49	35.30	9.10	2.30	TS005
DSD-E0 13.50-14.79 NOM 0	13.50	14.79	35.40	10.80	2.40	TS006
DSD-E0 13.50-14.79 NOM 2	13.50	14.79	35.40	10.80	2.40	TS006

- The drill tip is supplied in a grade that is suitable to machine the material group indicated in the drill head designation: P-Steel, M-Stainless Steel, K-Cast Iron.
- For user guide and quotation form, see pages 268-269, 274-280 • Ordering example: DSD-E0 11.30 DT-PO

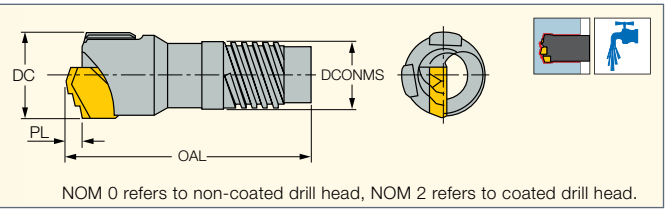
(1) Cutting diameter minimum
(2) Cutting diameter maximum
(3) Tube designation

For holders, see pages: TS*** (263)

ISCARDEEPDRILL

DSD-E1

Deep Single Tube Drills with External 2 and 4 Start Thread Connections and a Single Brazed Tip (12.6-20 dia.)



NOM 0 refers to non-coated drill head, NOM 2 refers to coated drill head.

Designation	DCN(1)	DCX(2)	OAL	DCONMS	PL	Threads(3)	Ts(4)
DSD-E1 12.60-13.60 NOM 0	12.60	13.60	42.50	9.60	2.30	2	TS-I01
DSD-E1 12.60-13.60 NOM 2	12.60	13.60	42.50	9.60	2.30	2	TS-I01
DSD-E1 13.61-14.60 NOM 0	13.61	14.60	42.70	10.60	2.40	2	TS-I02
DSD-E1 13.61-14.60 NOM 2	13.61	14.60	42.70	10.60	2.40	2	TS-I02
DSD-E1 14.61-15.59 NOM 0	14.61	15.59	42.70	11.60	3.00	2	TS-I03
DSD-E1 14.61-15.59 NOM 2	14.61	15.59	42.70	11.60	3.00	2	TS-I03
DSD-E1 15.60-16.70 NOM 0	15.60	16.70	42.70	11.60	2.40	4	TS-I0
DSD-E1 15.60-16.70 NOM 2	15.60	16.70	42.70	11.60	2.40	4	TS-I0
DSD-E1 16.71-17.70 NOM 0	16.71	17.70	43.20	13.60	3.00	4	TS-I1
DSD-E1 16.71-17.70 NOM 2	16.71	17.70	43.20	13.60	3.00	4	TS-I1
DSD-E1 17.71-18.90 NOM 0	17.71	18.90	43.60	14.50	3.30	4	TS-I2
DSD-E1 17.71-18.90 NOM 2	17.71	18.90	43.60	14.50	3.30	4	TS-I2
DSD-E1 18.91-20.00 NOM 0	18.91	20.00	43.60	15.50	3.30	4	TS-I3
DSD-E1 18.91-20.00 NOM 2	18.91	20.00	43.60	15.50	3.30	4	TS-I3

- The drill tip is supplied in a grade that is suitable to machine the material group indicated in the drill head designation: P-Steel, M-Stainless Steel, K-Cast Iron.
- For user guide and quotation form, see pages 268-269, 274-280 • Ordering example: DSD-E1 14.50 DT-PO

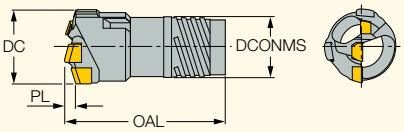
(1) Cutting diameter minimum
(2) Cutting diameter maximum
(3) No. of thread starts
(4) Tube designation

For holders, see pages: TS-I** (264)

ISCARDEEPDRILL

DSD-E2/E3

Deep Single Tube Drills with External 2 and 4 Start Thread Connections and 2 or 3 Brazed Tips (12.6-65 dia.)



NOM 0 refers to non-coated drill head, NOM 2 refers to coated drill head.

Designation	DCN[1]	DCX[2]	OAL	DCONMS	PL	Threads[3]	Ts[4]
DSD-E2 12.60-13.10 NOM 0	12.60	13.10	43.00	9.60	1.10	2	TS-I01
DSD-E2 12.60-13.10 NOM 2	12.60	13.10	43.00	9.60	1.10	2	TS-I01
DSD-E2 13.11-13.60 NOM 0	13.11	13.60	43.00	9.60	1.10	2	TS-I01
DSD-E2 13.11-13.60 NOM 2	13.11	13.60	43.00	9.60	1.10	2	TS-I01
DSD-E2 13.61-14.10 NOM 0	13.61	14.10	43.00	10.60	1.20	2	TS-I02
DSD-E2 13.61-14.10 NOM 2	13.61	14.10	43.00	10.60	1.20	2	TS-I02
DSD-E2 14.11-14.60 NOM 0	14.11	14.60	43.00	10.60	1.20	2	TS-I02
DSD-E2 14.11-14.60 NOM 2	14.11	14.60	43.00	10.60	1.20	2	TS-I02
DSD-E2 14.61-15.10 NOM 0	14.61	15.10	43.00	11.60	1.30	2	TS-I03
DSD-E2 14.61-15.10 NOM 2	14.61	15.10	43.00	11.60	1.30	2	TS-I03
DSD-E2 15.11-15.59 NOM 0	15.11	15.59	43.00	11.60	1.30	2	TS-I03
DSD-E2 15.11-15.59 NOM 2	15.11	15.59	43.00	11.60	1.30	2	TS-I03
DSD-E3 15.60-16.20 NOM 0	15.60	16.20	43.00	12.60	2.70	4	TS-I0
DSD-E3 15.60-16.20 NOM 2	15.60	16.20	43.00	12.60	2.70	4	TS-I0
DSD-E3 16.21-16.70 NOM 0	16.21	16.70	43.00	12.60	2.70	4	TS-I0
DSD-E3 16.21-16.70 NOM 2	16.21	16.70	43.00	12.60	2.70	4	TS-I0
DSD-E3 16.71-17.20 NOM 0	16.71	17.20	43.00	13.60	2.70	4	TS-I1
DSD-E3 16.71-17.20 NOM 2	16.71	17.20	43.00	13.60	2.70	4	TS-I1
DSD-E3 17.21-17.70 NOM 0	17.21	17.70	43.00	13.60	2.70	4	TS-I1
DSD-E3 17.21-17.70 NOM 2	17.21	17.70	43.00	13.60	2.70	4	TS-I1
DSD-E3 17.71-18.40 NOM 0	17.71	18.40	47.00	14.50	2.80	4	TS-I2
DSD-E3 17.71-18.40 NOM 2	17.71	18.40	47.00	14.50	2.80	4	TS-I2
DSD-E3 18.41-18.90 NOM 0	18.41	18.90	47.00	14.50	2.90	4	TS-I2
DSD-E3 18.41-18.90 NOM 2	18.41	18.90	47.00	14.50	2.90	4	TS-I2
DSD-E3 18.91-20.00 NOM 0	18.91	20.00	47.00	15.50	2.90	4	TS-I3
DSD-E3 18.91-20.00 NOM 2	18.91	20.00	47.00	15.50	2.90	4	TS-I3
DSD-E3 20.01-21.80 NOM 0	20.01	21.80	52.50	16.00	3.20	4	TS-I4
DSD-E3 20.01-21.80 NOM 2	20.01	21.80	52.50	16.00	3.20	4	TS-I4
DSD-E3 21.81-24.10 NOM 0	21.81	24.10	56.00	18.00	3.20	4	TS-I5
DSD-E3 21.81-24.10 NOM 2	21.81	24.10	56.00	18.00	3.20	4	TS-I5
DSD-E3 24.11-26.40 NOM 0	24.11	26.40	57.50	19.50	3.50	4	TS-I6
DSD-E3 24.11-26.40 NOM 2	24.11	26.40	57.50	19.50	3.50	4	TS-I6
DSD-E3 26.41-28.70 NOM 0	26.41	28.70	57.50	21.00	3.70	4	TS-I7
DSD-E3 26.41-28.70 NOM 2	26.41	28.70	57.50	21.00	3.70	4	TS-I7
DSD-E3 28.71-31.00 NOM 0	28.71	31.00	63.50	23.50	4.00	4	TS-I8
DSD-E3 28.71-31.00 NOM 2	28.71	31.00	63.50	23.50	4.00	4	TS-I8
DSD-E3 31.01-33.30 NOM 0	31.01	33.30	63.50	25.50	4.30	4	TS-I9
DSD-E3 31.01-33.30 NOM 2	31.01	33.30	63.50	25.50	4.30	4	TS-I9
DSD-E3 33.31-36.20 NOM 0	33.31	36.20	63.50	28.00	4.50	4	TS-I10
DSD-E3 33.31-36.20 NOM 2	33.31	36.20	63.50	28.00	4.50	4	TS-I10
DSD-E3 36.21-39.60 NOM 0	36.21	39.60	73.50	30.00	4.80	4	TS-I11
DSD-E3 36.21-39.60 NOM 2	36.21	39.60	73.50	30.00	4.80	4	TS-I11
DSD-E3 39.61-43.00 NOM 0	39.61	43.00	73.50	33.00	5.60	4	TS-I12
DSD-E3 39.61-43.00 NOM 2	39.61	43.00	73.50	33.00	5.60	4	TS-I12
DSD-E3 43.01-47.00 NOM 0	43.01	47.00	75.00	36.00	5.40	4	TS-I13
DSD-E3 43.01-47.00 NOM 2	43.01	47.00	75.00	36.00	5.40	4	TS-I13
DSD-E3 47.01-51.70 NOM 0	47.01	51.70	75.00	39.00	6.10	4	TS-I14
DSD-E3 47.01-51.70 NOM 2	47.01	51.70	75.00	39.00	6.10	4	TS-I14
DSD-E3 51.71-56.20 NOM 0	51.71	56.20	82.00	43.00	6.50	4	TS-I15
DSD-E3 51.71-56.20 NOM 2	51.71	56.20	82.00	43.00	6.50	4	TS-I15
DSD-E3 56.21-60.60 NOM 0	56.21	60.60	84.00	47.00	6.60	4	TS-I16
DSD-E3 56.21-60.60 NOM 2	56.21	60.60	84.00	47.00	6.60	4	TS-I16
DSD-E3 60.61-65.00 NOM 0	60.61	65.00	84.00	47.00	7.00	4	TS-I17
DSD-E3 60.61-65.00 NOM 2	60.61	65.00	84.00	47.00	7.00	4	TS-I17

• The drill tip is supplied in a grade that is suitable to machine the material group indicated in the drill head designation: ISO P, K, M, N materials • For user guide and quotation form, see pages 268-269, 274-280 • Ordering example: DSD-E3 43.30 DT-PO

[1] Cutting diameter minimum

[2] Cutting diameter maximum

[3] Number of thread starts

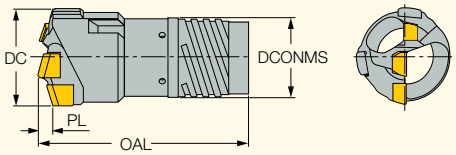
[4] Tube designation

For holders, see pages: TS-I** (264)

ISCARDEEPDRILL

DDD-E3

Deep Double Tube Drills with External 4 Start Thread Connection and Brazed Tips (18.4-65 dia.)



NOM 0 refers to non-coated drill head, NOM 2 refers to coated drill head.

Designation	DCN(1)	DCX(2)	OAL	DCONMS	PL	Ts(3)	Tsi(4)
DDD-E3 18.41-20.00 NOM 0	18.41	20.00	50.00	16.00	2.90	TDO-I0	TDI-N0
DDD-E3 18.41-20.00 NOM 2	18.41	20.00	50.00	16.00	2.90	TDO-I0	TDI-N0
DDD-E3 20.01-21.80 NOM 0	20.01	21.80	56.00	18.00	3.20	TDO-I1	TDI-N1
DDD-E3 20.01-21.80 NOM 2	20.01	21.80	56.00	18.00	3.20	TDO-I1	TDI-N1
DDD-E3 21.81-24.10 NOM 0	21.81	24.10	56.00	19.50	3.20	TDO-I2	TDI-N2
DDD-E3 21.81-24.10 NOM 2	21.81	24.10	56.00	19.50	3.20	TDO-I2	TDI-N2
DDD-E3 24.11-26.40 NOM 0	24.11	26.40	57.50	21.00	3.50	TDO-I3	TDI-N3
DDD-E3 24.11-26.40 NOM 2	24.11	26.40	57.50	21.00	3.50	TDO-I3	TDI-N3
DDD-E3 26.41-28.70 NOM 0	26.41	28.70	60.50	23.50	3.70	TDO-I4	TDI-N4
DDD-E3 26.41-28.70 NOM 2	26.41	28.70	60.50	23.50	3.70	TDO-I4	TDI-N4
DDD-E3 28.71-31.00 NOM 0	28.71	31.00	63.50	25.50	4.00	TDO-I5	TDI-N5
DDD-E3 28.71-31.00 NOM 2	28.71	31.00	63.50	25.50	4.00	TDO-I5	TDI-N5
DDD-E3 31.01-33.30 NOM 0	31.01	33.30	63.50	28.00	4.10	TDO-I6	TDI-N6
DDD-E3 31.01-33.30 NOM 2	31.01	33.30	63.50	28.00	4.10	TDO-I6	TDI-N6
DDD-E3 33.31-36.20 NOM 0	33.31	36.20	70.50	30.00	4.50	TDO-I7	TDI-N7
DDD-E3 33.31-36.20 NOM 2	33.31	36.20	70.50	30.00	4.50	TDO-I7	TDI-N7
DDD-E3 36.21-39.60 NOM 0	36.21	39.60	73.50	33.00	4.80	TDO-I8	TDI-N8
DDD-E3 36.21-39.60 NOM 2	36.21	39.60	73.50	33.00	4.80	TDO-I8	TDI-N8
DDD-E3 39.61-43.00 NOM 0	39.61	43.00	73.50	36.00	5.30	TDO-I9	TDI-N9
DDD-E3 39.61-43.00 NOM 2	39.61	43.00	73.50	36.00	5.30	TDO-I9	TDI-N9
DDD-E3 43.01-47.00 NOM 0	43.01	47.00	75.00	39.00	5.50	TDO-I10	TDI-N10
DDD-E3 43.01-47.00 NOM 2	43.01	47.00	75.00	39.00	5.50	TDO-I10	TDI-N10
DDD-E3 47.01-51.70 NOM 0	47.01	51.70	79.00	43.00	6.10	TDO-I11	TDI-N11
DDD-E3 47.01-51.70 NOM 2	47.01	51.70	79.00	43.00	6.10	TDO-I11	TDI-N11
DDD-E3 51.71-56.20 NOM 0	51.71	56.20	82.00	47.00	6.50	TDO-I12	TDI-N12
DDD-E3 51.71-56.20 NOM 2	51.71	56.20	82.00	47.00	6.50	TDO-I12	TDI-N12
DDD-E3 56.21-65.00 NOM 0	56.21	65.00	84.00	51.00	6.60	TDO-I13	TDI-N13
DDD-E3 56.21-65.00 NOM 2	56.21	65.00	84.00	51.00	6.60	TDO-I13	TDI-N13

• The drill tip is supplied in a grade that is suitable to machine the material group indicated in the drill head designation: ISO P, K, M, N materials • NOM 0 refers to non-coated drill head, NOM 2 refers to coated drill head. • Ordering example: DDD-E3 47.10 OT-P0 • For quotation form and user guide, see pages 268-269, 274-280

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Outer tube designation

(4) Inner tube designation

For holders, see pages: TDO-I (D18.41-65.00) (266)

Universal Marking for Deep Drilling Tools

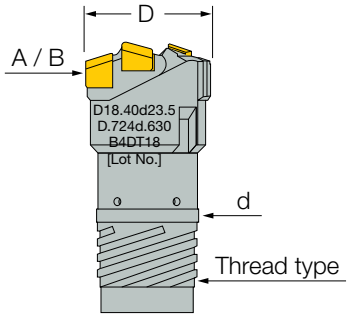
D- **Tool diameter**
Metric- D18.40
Inch- D.724

d- Pilot diameter
Metric- d23.5
Inch- d.630

Tool style
A- Single cutting edge
B- Multiple cutting edges

Thread type
1ST- Single-start thread single tube
2ST- Two-start thread single tube
4ST- Four-start thread single tube
4DT- Four-start thread double tube

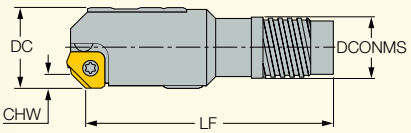
18- Tube diameter



ISCARDEEPDRILL

DSC-EA

Deep Single Tube Counterbore with Through Hole, External 4 Start Thread and Adjustable Diameter (25-40 dia.)



Designation	DCN(1)	DCX(2)	CHW	LF	DCONMS	Ts(3)
DSC-EA 25.00-26.40	25.00	26.40	3.5	70.00	19.50	TS-I6
DSC-EA 26.41-28.70	26.41	28.70	3.5	70.00	21.00	TS-I7
DSC-EA 28.71-31.00	28.71	31.00	3.5	75.00	23.50	TS-I8
DSC-EA 31.01-33.30	31.01	33.30	3.5	75.00	25.50	TS-I9
DSC-EA 33.31-36.20	33.31	36.20	3.5	75.00	28.00	TS-I10
DSC-EA 36.21-39.60	36.21	39.60	3.5	90.00	30.00	TS-I11
DSC-EA 39.61-39.99	39.61	39.99	3.5	90.00	33.00	TS-I12

• For user guide and quotation form, see pages 272-280 • Ordering example: DSC-EA 33.20

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Tube designation

For inserts, see pages: XPMT-45 (234) • XPMT-UB (234)

For holders, see pages: TS-I** (264)

DSC-EA

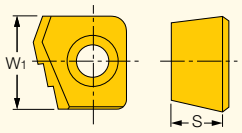
Diameter	Insert	Insert Clamping Screw	QTY	Guide Pads	QTY	SCREW	QTY	Key
25.00-29.99	XPMT 16002-45	SR 11201754-4	1 PCS	GPS-06-20-120	2 PCS	SR 34-508	2 PCS	T-7/5
30.00-37.99	XPMT 16002-45	SR 11201754-4	1 PCS	GPS-07-20-120	3 PCS	SR11201753-4	3 PCS	T-9/5
38.00-39.99	XPMT 16002-45	SR 11201754-4	1 PCS	GPS-08-25-155	3 PCS	SR 34-506-C	3 PCS	T-9/5

Diameter	Guide Pad Protectors	QTY	Screw	QTY	Key	Sub Guide Pad	QTY	Screw	QTY	Key
25.00-29.99	GPP-04	2 PCS	SR11201753-4	2 PCS	T-9/5	SGP-02	1 PCS	SR11201753-1	1 PCS	T-7/5
30.00-37.99	GPP-05	3 PCS	SR11201753-4	3 PCS	T-9/5	SGP-02	1 PCS	SR11201753-1	1 PCS	T-7/5
38.00-39.99	GPP-06	3 PCS	SR11201753-4	3 PCS	T-9/5	SGP-02	1 PCS	SR11201753-4	1 PCS	T-9/5

ISCARDEEPDRILL

XPMT-UB

Inserts for DSD/DSC
Drilling / Boring Heads



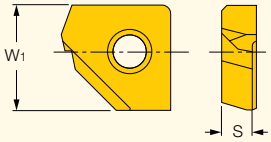
Designation	Dimensions W1	S	Tough ↔ Hard IC908	IC520M
XPMT 16002UB	9.50	2.80	●	
XPMT 18003UB	11.00	3.05	●	
XPMT21003UB	13.00	3.55		●
XPMT 25003UB	14.50	3.40	●	

For tools, see pages: DDC-EA (246) • DSC-EA (233) • DSC-IA (240)

ISCARDEEPDRILL

XPMT-45

Inserts for DSC Boring Heads



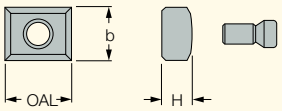
Designation	Dimensions W1	S	IC950
XPMT 16002-45	9.50	2.80	●

For tools, see pages: DDC-EA (246) • DSC-IA (240)

ISCARDEEPDRILL

SGP

Boring Head Sub-Guide Pads



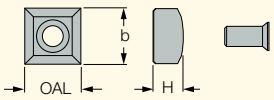
Designation	OAL	b	H
SGP-01	10.00	6.0	3.0
SGP-02	10.00	8.0	4.5
SGP-03	10.00	10.0	5.0
SGP-04	20.00	14.0	7.0

• Select an outer cartridge and pad for the required enlarged diameter.

ISCARDEEPDRILL

GPP

Boring Head Guide
Pad Protectors



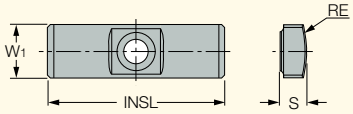
Designation	OAL	b	H
GPP-04	8.00	8.0	4.4
GPP-05	8.00	8.0	3.5
GPP-06	8.00	8.0	4.5
GPP-07	10.00	10.0	6.0
GPP-08	14.00	14.0	7.5
GPP-09	18.00	18.0	9.0

• Select an outer cartridge and pad for the required enlarged diameter.

ISCARDEEPDRILL

GPS

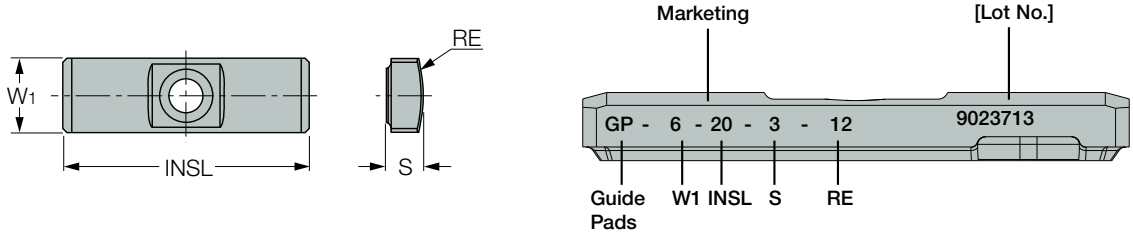
Deep Drilling Solid
Carbide Guide Pads



Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC928	IC950	IC908
GPS-04-16-055-DC	4.0	16.00	2.00	5.50	•		•
GPS-05-18-060-DC	5.0	18.00	2.50	6.00	•		•
GPS-05-18-075-DC	5.0	18.00	2.50	7.50	•		•
GPS-06-20-075-DC	6.0	20.00	3.00	7.50			•
GPS-06-20-075	6.0	20.00	3.00	7.50		•	
GPS-06-20-085-DC	6.0	20.00	3.00	8.50	•		•
GPS-06-20-085	6.0	20.00	3.00	8.50		•	
GPS-06-20-100-DC	6.0	20.00	3.00	10.00	•		•
GPS-06-20-100	6.0	20.00	3.00	10.00		•	
GPS-06-20-120-DC	6.0	20.00	3.00	12.00	•		•
GPS-06-20-120	6.0	20.00	3.00	12.00		•	
GPS-07-20-120-DC	7.0	20.00	3.50	12.00	•		•
GPS-07-20-120	7.0	20.00	3.50	12.00		•	
GPS-08-25-155-DC	8.0	25.00	4.50	15.50	•		•
GPS-08-25-155	8.0	25.00	4.50	15.50		•	
GPS-10-30-200-DC	10.0	30.00	4.50	20.00	•		•
GPS-10-30-200	10.0	30.00	4.50	20.00		•	
GPS-10-35-200-DC	10.0	35.00	6.00	20.00	•		•
GPS-10-35-200	10.0	35.00	6.00	20.00		•	
GPS-12-35-250-DC	12.0	35.00	5.50	25.00	•		•
GPS-12-35-250	12.0	35.00	5.50	25.00		•	
GPS-14-40-250-DC	14.0	40.00	7.50	25.00	•		•
GPS-14-40-250	14.0	40.00	7.50	25.00		•	
GPS-18-40-300-DC	18.0	40.00	9.00	30.00	•		•

• DC- Double Chamfer

Universal Marking for Deep Drilling Tools



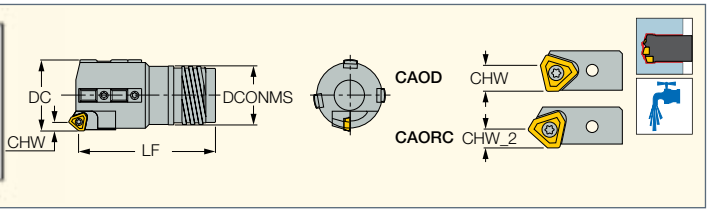
Guide Pad Grade Recommendation

	Oil Coolant			Water Based Coolant		
Priority	1	2	3	1	2	3
ISO-P	IC950	IC908	IC928	IC928	IC908	-
ISO-K	IC950	IC908	IC928	IC928	IC908	-
ISO-M	IC928	IC908	IC950	IC928	IC908	-
ISO-S	IC928	IC908	IC950	IC928	IC908	-

ISCARDEEPDRILL

DSC-EC

Deep Single Tube Counterbore with Through Hole, External 4 Start Thread Connection and a Cartridge (40-292 dia.)



Designation	DCN(1)	DCX(2)	CHW	CHW_2	LF	DCONMS	Ts(3)
DSC-EC 40.00-43.00	40.00	43.00	6.4	4.0	90.00	33.00	TS-I12
DSC-EC 43.01-47.00	43.01	47.00	6.4	4.0	95.00	36.00	TS-I13
DSC-EC 47.01-51.70	47.01	51.70	6.4	4.0	100.00	39.00	TS-I14
DSC-EC 51.71-56.20	51.71	56.20	6.4	4.0	100.00	43.00	TS-I15
DSC-EC 56.21-60.60	56.21	60.60	7.2	4.8	105.00	47.00	TS-I16
DSC-EC 60.61-65.00	60.61	65.00	7.2	4.8	110.00	51.00	TS-I17
DSC-EC 65.00-66.99	65.00	66.99	7.2	4.8	150.00	52.00	TS-I18
DSC-EC 67.00-72.99	67.00	72.99	10.4	6.4	150.00	58.00	TS-I19
DSC-EC 73.00-79.99	73.00	79.99	10.4	6.4	150.00	63.00	TS-I20
DSC-EC 80.00-86.99	80.00	86.99	10.4	6.4	180.00	70.00	TS-I21
DSC-EC 87.00-99.99	87.00	99.99	10.4	6.4	180.00	77.00	TS-I22
DSC-EC 100.00-111.99	100.00	111.99	10.4	6.4	180.00	89.00	TS-I23
DSC-EC 112.00-123.99	112.00	123.99	10.4	6.4	205.00	101.00	TS-I24
DSC-EC 124.00-135.99	124.00	135.99	10.4	6.4	205.00	113.00	TS-I25
DSC-EC 136.00-147.99	136.00	147.99	10.4	6.4	205.00	125.00	TS-I26
DSC-EC 148.00-159.99	148.00	159.99	10.4	6.4	225.00	137.00	TS-I27
DSC-EC 160.00-171.99	160.00	171.99	10.4	6.4	225.00	149.00	TS-I28
DSC-EC 172.00-183.99	172.00	183.99	10.4	6.4	225.00	161.00	TS-I29
DSC-EC 184.00-195.99	184.00	195.99	10.4	6.4	245.00	173.00	TS-I30
DSC-EC 196.00-207.99	196.00	207.99	10.4	6.4	245.00	185.00	TS-I31
DSC-EC 208.00-219.99	208.00	219.99	10.4	6.4	245.00	197.00	TS-I32
DSC-EC 220.00-231.99	220.00	231.99	10.4	6.4	265.00	208.00	TS-I33
DSC-EC 232.00-243.99	232.00	243.99	10.4	6.4	265.00	220.00	TS-I34
DSC-EC 244.00-255.99	244.00	255.99	10.4	6.4	265.00	232.00	TS-I35
DSC-EC 256.00-267.99	256.00	267.99	10.4	6.4	290.00	244.00	TS-I36
DSC-EC 268.00-279.99	268.00	279.99	10.4	6.4	290.00	256.00	TS-I37
DSC-EC 280.00-291.99	280.00	291.99	10.4	6.4	290.00	268.00	TS-I38

• CAOD - Rough boring cartridge (for large D.O.C.), supplied with the cartridge, unless ordered differently • CAORC - Precision boring cartridge • For quotation form and user guide, see pages 272-280 • Ordering example: DSC-EC 87.30

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Tube designation

For inserts, see pages: TPMX (214)

For holders, see pages: TS-I** (264)

DSC-EC

Diameter	Boring Head Central Cartridge	Central Cartridge Insert	Boring Head Peripheral Cartridge	Peripheral Cartridge Insert	Guide Pads	Sub Guide Pad	Guide Pad Protectors
40.00-45.99	CAORC-0845	TPMX 1403LG	CAOD-0845	TPMX 1403RG	GPS-08-25-155	SGP-02	GPP-06
46.00-51.99	CAORC-0845	TPMX 1403LG	CAOD-0845	TPMX 1403RG	GPS-10-35-200	SGP-02	GPP-07
52.00-56.99	CAORC-103	TPMX 1704LG	CAOD-103	TPMX 1704RG	GPS-10-35-200	SGP-02	GPP-07
57.00-59.99	CAORC-103	TPMX 1704LG	CAOD-103	TPMX 1704RG	GPS-10-35-200	SGP-02	GPP-07
60.00-66.99	CAORC-103	TPMX 1704LG	CAOD-103	TPMX 1704RG	GPS-14-40-250	SGP-03	GPP-08
67.00-80.99	CAORC-142	TPMX 2405LG	CAOD-142	TPMX 2405RG	GPS-14-40-250	SGP-03	GPP-08
81.00-90.99	CAORC-142	TPMX 2405LG	CAOD-142	TPMX 2405RG	GPS-14-40-250	SGP-03	GPP-08
91.00-99.99	CAORC-142	TPMX 2405LG	CAOD-142	TPMX 2405RG	GPS-14-40-250	SGP-03	GPP-08
100.00-291.99	CAORC-142	TPMX 2405LG	CAOD-142	TPMX 2405RG	GPS-18-40-300	SGP-04	GPP-09

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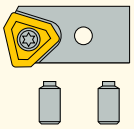
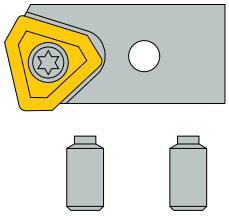
CAOD

Drilling / Boring head
Peripheral Cartridge



Universal Marking for Deep Drilling Tools



CA - P - DR - 0800 - R

- CA: Peripheral Cartridge
- P: —
- DR: DR : Drilling / CB : Counter Bore
- 0800: IC
- R: L/R HAND

Spare Parts

Designation	Adjustment Screw	Key	Locking Screw	Key	Insert	Insert Clamping Screw
CAOD-080	SR 11201755-4	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-0845	SR 11201755-6	HW 2.0	SR 11201756-10	HW 2.5	TPMX 1403..R-G	SR 11201753-3
CAOD-085	SR 11201755-7	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-103	SR 11201755-8	HW 2.5	SR 11201756-12	HW 3.0	TPMX 1704..R-G	SR 11201753-7
CAOD-142	SR 11201755-9	HW 2.5	SR 11201756-15	HW 4.0	TPMX 2405..R-G	SR 11201753-9
CAOD-170	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 2807..R-G	SR 11201753-10

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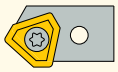
CAORC

Boring Head Central Cartridge



Spare Parts

Designation	Adjustment Screw	Key	Locking Screw	Key	Insert	Insert Clamping Screw
CAORC-0845	SR 11201755-6	HW 2.0	SR 11201756-10	HW 2.5	TPMX 140308L-G	SR 11201753-3
CAORC-103	SR 11201755-10	HW 2.5	SR 11201756-12	HW 3.0	TPMX 170408L-G	SR 11201753-7
CAORC-142	SR 11201755-11	HW 2.5	SR 11201756-15	HW 4.0	TPMX 240512L-G	SR 11201753-9
CAORC-170	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 280716L-G	SR 11201753-10

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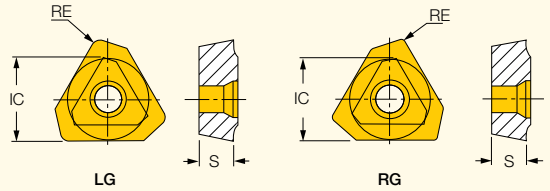
TPMX

Inserts for Drilling / Boring Heads DSD-EC / DDD-EC / DSD-IC / DSC-EC / DSC-IC



Designation	Dimensions IC	S	RE	Tough ↔ Hard IC920	IC5500	IC9025	IC508	IC908	IC520	IC806
TPMX 140304R-B	8.45	3.50	0.40	●		●		●	●	●
TPMX 140308R-DT	8.45	3.50	0.80			●		●		
TPMX 140308R-G	8.45	3.50	0.80		●	●	●	●	●	●
TPMX 140308R-B	8.45	3.50	0.80							●
TPMX 170404R-B	10.30	4.00	0.40	●		●		●	●	●
TPMX 170408R-B	10.30	4.00	0.80							●
TPMX 170408R-BG	10.30	4.00	0.80					●	●	●
TPMX 170408R-DT	10.30	4.00	0.80			●		●	●	
TPMX 170408R-G	10.30	4.00	0.80		●		●	●	●	●
TPMX 240504R-B	14.20	5.50	0.40	●		●		●	●	●
TPMX 240512R-BG	14.20	5.50	1.20			●		●	●	●
TPMX 240512R-DT	14.20	5.50	1.20			●		●	●	
TPMX 240512R-G	14.20	5.50	1.20		●		●	●	●	●
TPMX 240512R-B	14.20	5.50	1.20							●
TPMX 280708R-B	17.00	7.50	0.80	●		●		●		●
TPMX 280716R-BG	17.00	7.50	1.60					●	●	●
TPMX 280716R-DT	17.00	7.50	1.60					●	●	
TPMX 280716R-G	17.00	7.50	1.60		●		●	●	●	●
TPMX 280716R-B	17.00	7.50	1.60							●
TPMX 140308L-G	8.45	3.50	0.80			●		●		
TPMX 170404L-BG	10.30	4.00	0.40					●		
TPMX 170408L-DT	10.30	4.00	0.80					●		
TPMX 170408L-G	10.30	4.00	0.80			●		●	●	
TPMX 240504L-BG	14.20	5.50	0.40					●		
TPMX 240512L-DT	14.20	5.50	1.20					●		
TPMX 240512L-G	14.20	5.50	1.20			●		●	●	
TPMX 280708L-BG	17.00	7.50	0.80					●		
TPMX 280716L-G	17.00	7.50	1.60			●		●	●	

For tools, see pages: DDC-EC (249) • DSTR-EC (255) • DSTR-IC (258)

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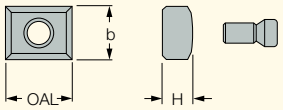
SGP

Boring Head Sub-Guide Pads



Designation	OAL	b	H
SGP-01	10.00	6.0	3.0
SGP-02	10.00	8.0	4.5
SGP-03	10.00	10.0	5.0
SGP-04	20.00	14.0	7.0

• Select an outer cartridge and pad for the required enlarged diameter.

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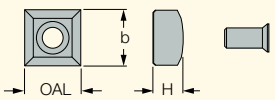
GPP

Boring Head Guide Pad Protectors



Designation	OAL	b	H
GPP-04	8.00	8.0	4.4
GPP-05	8.00	8.0	3.5
GPP-06	8.00	8.0	4.5
GPP-07	10.00	10.0	6.0
GPP-08	14.00	14.0	7.5
GPP-09	18.00	18.0	9.0

• Select an outer cartridge and pad for the required enlarged diameter.

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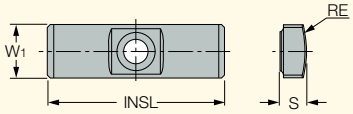
GPS

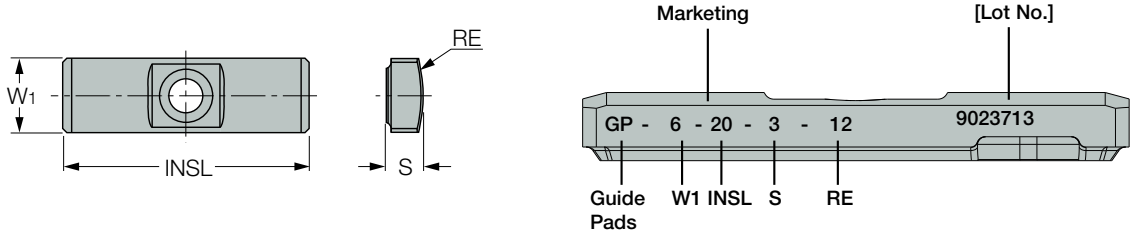
Deep Drilling Solid
Carbide Guide Pads



Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC928	IC950	IC908
GPS-04-16-055-DC	4.0	16.00	2.00	5.50	•		•
GPS-05-18-060-DC	5.0	18.00	2.50	6.00	•		•
GPS-05-18-075-DC	5.0	18.00	2.50	7.50	•		•
GPS-06-20-075-DC	6.0	20.00	3.00	7.50			•
GPS-06-20-075	6.0	20.00	3.00	7.50		•	
GPS-06-20-085-DC	6.0	20.00	3.00	8.50	•		•
GPS-06-20-085	6.0	20.00	3.00	8.50		•	
GPS-06-20-100-DC	6.0	20.00	3.00	10.00	•		•
GPS-06-20-100	6.0	20.00	3.00	10.00		•	
GPS-06-20-120-DC	6.0	20.00	3.00	12.00	•		•
GPS-06-20-120	6.0	20.00	3.00	12.00		•	
GPS-07-20-120-DC	7.0	20.00	3.50	12.00	•		•
GPS-07-20-120	7.0	20.00	3.50	12.00		•	
GPS-08-25-155-DC	8.0	25.00	4.50	15.50	•		•
GPS-08-25-155	8.0	25.00	4.50	15.50		•	
GPS-10-30-200-DC	10.0	30.00	4.50	20.00	•		•
GPS-10-30-200	10.0	30.00	4.50	20.00		•	
GPS-10-35-200-DC	10.0	35.00	6.00	20.00	•		•
GPS-10-35-200	10.0	35.00	6.00	20.00		•	
GPS-12-35-250-DC	12.0	35.00	5.50	25.00	•		•
GPS-12-35-250	12.0	35.00	5.50	25.00		•	
GPS-14-40-250-DC	14.0	40.00	7.50	25.00	•		•
GPS-14-40-250	14.0	40.00	7.50	25.00		•	
GPS-18-40-300-DC	18.0	40.00	9.00	30.00	•		•

• DC- Double Chamfer

Universal Marking for Deep Drilling Tools



Guide Pad Grade Recommendation

	Oil Coolant			Water Based Coolant		
Priority	1	2	3	1	2	3
ISO-P	IC950	IC908	IC928	IC928	IC908	-
ISO-K	IC950	IC908	IC928	IC928	IC908	-
ISO-M	IC928	IC908	IC950	IC928	IC908	-
ISO-S	IC928	IC908	IC950	IC928	IC908	-

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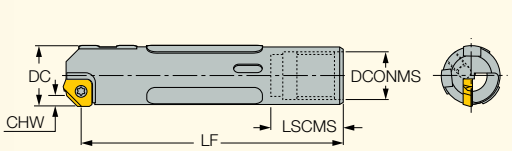
DSC-IA

Deep Single Tube Counterbore with a Through Hole, Internal Single-Start Thread and Adjustable Diameter (25-40 dia.)



Designation	DCN(1)	DCX(2)	CHW	LF	LSCMS	DCONMS	Ts(3)
DSC-IA 25.00-26.99	25.00	26.99	2.8	110.00	25.00	20.00	TS-O10
DSC-IA 27.00-29.99	27.00	29.99	2.8	110.00	25.00	22.00	TS-O11
DSC-IA 30.00-31.99	30.00	31.99	2.8	110.00	25.00	24.00	TS-O12
DSC-IA 32.00-33.99	32.00	33.99	2.8	110.00	25.00	26.00	TS-O13
DSC-IA 34.00-36.99	34.00	36.99	2.8	135.00	40.00	27.00	TS-O14
DSC-IA 37.00-39.99	37.00	39.99	2.8	135.00	40.00	30.00	TS-O15

• For user guide and quotation form, see pages 272-280 • Ordering example: DSC-IA 30.35

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Tube designation

For inserts, see pages: XPMT-45 (234) • XPMT-UB (234)

For holders, see pages: TS-O** (265)

Universal Marking for Deep Drilling Tools

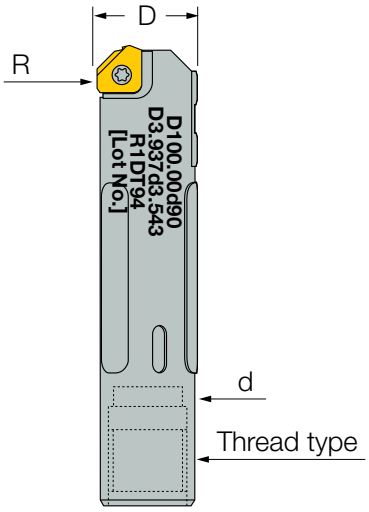
D- **Tool diameter**
Metric- D100.00
Inch- D3.937

d- Pilot diameter
Metric- d90
Inch- d3.543

Tool style
R- Cartridge style counter boring

Thread type
4ST- Four-start thread single tube
1ST- Single-start thread single tube
4DT- Four-start thread double tube

94- Tube diameter



DSC-IA

Diameter	Guide Pads (3 pcs)	Resin Guide Pads (3 pcs)	Close Tolerance Insert	Insert Clamping Screw
25.00-27.99	GPS-06-20-120	RGP01	XPMT 16002-45	SR 11201754-4
28.00-29.99	GPS-06-20-120	RGP02	XPMT 16002-45	SR 11201754-4
30.00-37.99	GPS-07-20-120	RGP02	XPMT 16002-45	SR 11201754-4
38.00-39.99	GPS-08-25-155	RGP03	XPMT 16002-45	SR 11201754-4

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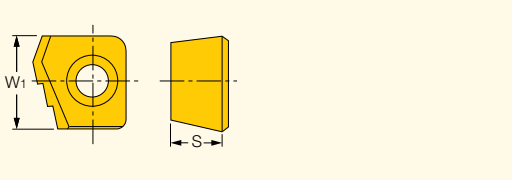
XPMT-UB

Inserts for DSD/DSC Drilling / Boring Heads



Designation	Dimensions W1	Dimensions S	Tough ↔ Hard IC908	Tough ↔ Hard IC520M
XPMT 16002UB	9.50	2.80	•	
XPMT 18003UB	11.00	3.05	•	
XPMT21003UB	13.00	3.55		•
XPMT 25003UB	14.50	3.40	•	

For tools, see pages: DDC-EA (246) • DSC-EA (233) • DSC-IA (240)

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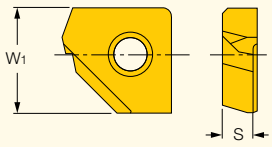
XPMT-45

Inserts for DSC Boring Heads



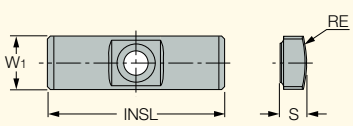
Designation	Dimensions W1	Dimensions S	IC950
XPMT 16002-45	9.50	2.80	●

For tools, see pages: DDC-EA (246) • DSC-IA (240)

ISCARDEEPDRILL

GPS

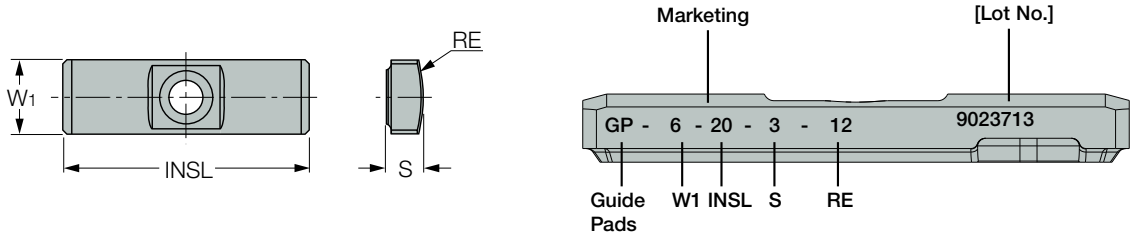
Deep Drilling Solid Carbide Guide Pads



Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC928	IC950	IC908
GPS-04-16-055-DC	4.0	16.00	2.00	5.50	●		●
GPS-05-18-060-DC	5.0	18.00	2.50	6.00	●		●
GPS-05-18-075-DC	5.0	18.00	2.50	7.50	●		●
GPS-06-20-075-DC	6.0	20.00	3.00	7.50			●
GPS-06-20-075	6.0	20.00	3.00	7.50		●	
GPS-06-20-085-DC	6.0	20.00	3.00	8.50	●		●
GPS-06-20-085	6.0	20.00	3.00	8.50		●	
GPS-06-20-100-DC	6.0	20.00	3.00	10.00	●		●
GPS-06-20-100	6.0	20.00	3.00	10.00		●	
GPS-06-20-120-DC	6.0	20.00	3.00	12.00	●		●
GPS-06-20-120	6.0	20.00	3.00	12.00		●	
GPS-07-20-120-DC	7.0	20.00	3.50	12.00	●		●
GPS-07-20-120	7.0	20.00	3.50	12.00		●	
GPS-08-25-155-DC	8.0	25.00	4.50	15.50	●		●
GPS-08-25-155	8.0	25.00	4.50	15.50		●	
GPS-10-30-200-DC	10.0	30.00	4.50	20.00	●		●
GPS-10-30-200	10.0	30.00	4.50	20.00		●	
GPS-10-35-200-DC	10.0	35.00	6.00	20.00	●		●
GPS-10-35-200	10.0	35.00	6.00	20.00		●	
GPS-12-35-250-DC	12.0	35.00	5.50	25.00	●		●
GPS-12-35-250	12.0	35.00	5.50	25.00		●	
GPS-14-40-250-DC	14.0	40.00	7.50	25.00	●		●
GPS-14-40-250	14.0	40.00	7.50	25.00		●	
GPS-18-40-300-DC	18.0	40.00	9.00	30.00	●		●

• DC- Double Chamfer

Universal Marking for Deep Drilling Tools



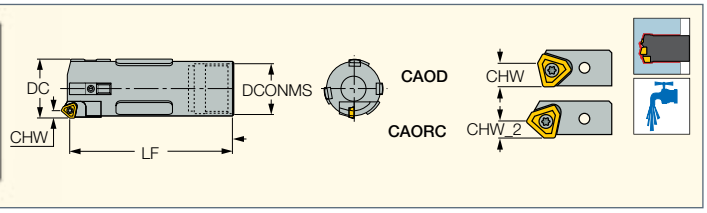
Guide Pad Grade Recommendation

	Oil Coolant			Water Based Coolant		
Priority	1	2	3	1	2	3
ISO-P	IC950	IC908	IC928	IC928	IC908	-
ISO-K	IC950	IC908	IC928	IC928	IC908	-
ISO-M	IC928	IC908	IC950	IC928	IC908	-
ISO-S	IC928	IC908	IC950	IC928	IC908	-

ISCARDEEPDRILL

DSC-IC

Deep Single Tube Counterbore with a Through Hole, Internal Single Start Thread and a Cartridge (40-294 dia.)



Designation	DCN[1]	DCX[2]	CHW	CHW_2	LF	DCONMS	Ts[3]
DSC-IC 40.00-43.99	40.00	43.99	6.4	4.0	135.00	33.00	TS-O16
DSC-IC 44.00-46.99	44.00	46.99	6.4	4.0	135.00	37.00	TS-O17
DSC-IC 47.00-51.99	47.00	51.99	6.4	4.0	145.00	41.00	TS-O18
DSC-IC 52.00-56.99	52.00	56.99	7.2	4.8	145.00	44.00	TS-O19
DSC-IC 57.00-60.99	57.00	60.99	7.2	4.8	170.00	49.00	TS-O20
DSC-IC 61.00-67.99	61.00	67.99	7.2	4.8	170.00	53.00	TS-O21
DSC-IC 68.00-74.99	68.00	74.99	10.4	6.4	170.00	59.00	TS-O22
DSC-IC 75.00-80.99	75.00	80.99	10.4	6.4	205.00	65.00	TS-O23
DSC-IC 81.00-90.99	81.00	90.99	10.4	6.4	205.00	71.00	TS-024
DSC-IC 91.00-98.99	91.00	98.99	10.4	6.4	215.00	79.00	TS-O25
DSC-IC 99.00-110.99	99.00	110.99	10.4	6.4	225.00	90.00	TS-O26
DSC-IC 111.00-122.99	111.00	122.99	10.4	6.4	235.00	102.00	TS-O27
DSC-IC 123.00-134.99	123.00	134.99	10.4	6.4	265.00	104.00	TS-O28
DSC-IC 135.00-148.99	135.00	148.99	10.4	6.4	265.00	126.00	TS-O29
DSC-IC 149.00-161.99	149.00	161.99	10.4	6.4	265.00	139.00	TS-O30
DSC-IC 162.00-173.99	162.00	173.99	10.4	6.4	285.00	151.00	TS-O31
DSC-IC 186.00-197.99	186.00	197.99	10.4	6.4	310.00	175.00	TS-O33
DSC-IC 198.00-209.99	198.00	209.99	10.4	6.4	310.00	187.00	TS-O34
DSC-IC 210.00-221.99	210.00	221.99	10.4	6.4	320.00	199.00	TS-O35
DSC-IC 222.00-233.99	222.00	233.99	10.4	6.4	325.00	211.00	TS-O36
DSC-IC 234.00-245.99	234.00	245.99	10.4	6.4	325.00	223.00	TS-O37
DSC-IC 246.00-257.99	246.00	257.99	10.4	6.4	325.00	235.00	TS-O38
DSC-IC 258.00-269.99	258.00	269.99	10.4	6.4	360.00	245.00	TS-O39
DSC-IC 282.00-293.99	282.00	293.99	10.4	6.4	360.00	271.00	TS-O41

• CAOD - Rough boring cartridge (for large D.O.C.) supplied with the cartridge, unless ordered differently • CAORC - Precision boring cartridge • For user guide and quotation form, see pages 272-280 • Ordering example: DSC-IC 91.10

[1] Cutting diameter minimum

[2] Cutting diameter maximum

[3] Tube designation

For inserts, see pages: TPMX (214)

For holders, see pages: TS-O** (265)

Universal Marking for Deep Drilling Tools

D- **Tool diameter**

Metric- D100.00

Inch- D3.937

d- Pilot diameter

Metric- d90

Inch- d3.543

Tool style

R- Cartridge style counter boring

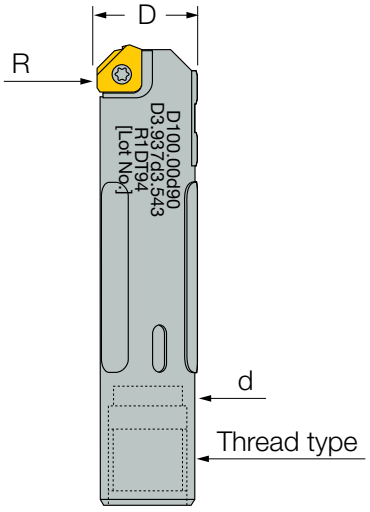
Thread type

4ST- Four-start thread single tube

1ST- Single-start thread single tube

4DT- Four-start thread double tube

94- Tube diameter



DSC-IC

Diameter	Close Tolerance Cartridge	Normal Tolerance Cartridge	Guide Pads (3 pcs)	Resin Guide Pads (3 pcs)	Close Tolerance Insert	Normal Tolerance Insert
40.00-45.99	CAORC-0845	CAOD-0845	GPS-08-25-155	RGP03	TPMX 1403LG	TPMX 1403RG
46.00-51.99	CAORC-0845	CAOD-0845	GPS-10-35-200	RGP03	TPMX 1403LG	TPMX 1403RG
52.00-56.99	CAORC-103	CAOD-103	GPS-10-35-200	RGP03	TPMX 1704LG	TPMX 1704RG
57.00-59.99	CAORC-103	CAOD-103	GPS-10-35-200	RGP03	TPMX 1704LG	TPMX 1704RG
60.00-66.99	CAORC-103	CAOD-103	GPS-14-40-250	RGP04	TPMX 1704LG	TPMX 1704RG
67.00-80.99	CAORC-142	CAOD-142	GPS-14-40-250	RGP04	TPMX 2405LG	TPMX 2405RG
81.00-90.99	CAORC-142	CAOD-142	GPS-14-40-250	RGP05	TPMX 2405LG	TPMX 2405RG
91.00-99.99	CAORC-142	CAOD-142	GPS-14-40-250	RGP06	TPMX 2405LG	TPMX 2405RG
100.00-122.99	CAORC-142	CAOD-142	GPS-18-40-300	RGP06	TPMX 2405LG	TPMX 2405RG

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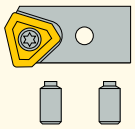
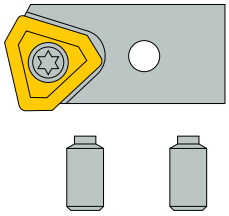
CAOD

Drilling Head Peripheral Cartridge



Universal Marking for Deep Drilling Tools



CA - P - DR - 0800 - R

- CA: Peripheral Cartridge
- P: DR : Drilling / CB : Counter Bore
- DR: IC
- 0800: IC
- R: L/R HAND

Spare Parts

Designation	Adjustment Screw	Key	Locking Screw	Key	Insert	Insert Clamping Screw
CAOD-080	SR 11201755-4	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-0845	SR 11201755-6	HW 2.0	SR 11201756-10	HW 2.5	TPMX 1403..R-G	SR 11201753-3
CAOD-085	SR 11201755-7	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-103	SR 11201755-8	HW 2.5	SR 11201756-12	HW 3.0	TPMX 1704..R-G	SR 11201753-7
CAOD-142	SR 11201755-9	HW 2.5	SR 11201756-15	HW 4.0	TPMX 2405..R-G	SR 11201753-9
CAOD-170	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 2807..R-G	SR 11201753-10

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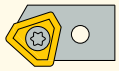
CAORC

Boring Head Central Cartridge



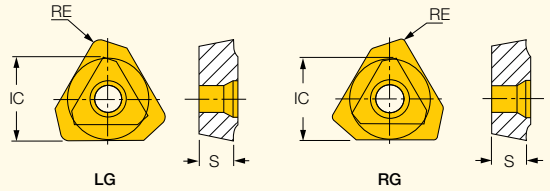
Spare Parts

Designation	Adjustment Screw	Key	Locking Screw	Key	Insert	Insert Clamping Screw
CAORC-0845	SR 11201755-6	HW 2.0	SR 11201756-10	HW 2.5	TPMX 140308L-G	SR 11201753-3
CAORC-103	SR 11201755-10	HW 2.5	SR 11201756-12	HW 3.0	TPMX 170408L-G	SR 11201753-7
CAORC-142	SR 11201755-11	HW 2.5	SR 11201756-15	HW 4.0	TPMX 240512L-G	SR 11201753-9
CAORC-170	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 280716L-G	SR 11201753-10

ISCARDEEPDRILL

TPMX

Inserts for Drilling Heads
DSD-EC / DDD-EC / DSD-IC / DSC-EC / DSC-IC



Designation	Dimensions IC	S	RE	Tough ↔ Hard IC920	IC5500	IC9025	IC508	IC908	IC520	IC806
TPMX 140304R-B	8.45	3.50	0.40	●		●		●	●	●
TPMX 140308R-DT	8.45	3.50	0.80			●		●		
TPMX 140308R-G	8.45	3.50	0.80		●	●	●	●	●	●
TPMX 140308R-B	8.45	3.50	0.80							●
TPMX 170404R-B	10.30	4.00	0.40	●		●		●	●	●
TPMX 170408R-B	10.30	4.00	0.80							●
TPMX 170408R-BG	10.30	4.00	0.80					●	●	●
TPMX 170408R-DT	10.30	4.00	0.80			●		●	●	
TPMX 170408R-G	10.30	4.00	0.80		●		●	●	●	●
TPMX 240504R-B	14.20	5.50	0.40	●		●		●	●	●
TPMX 240512R-BG	14.20	5.50	1.20			●		●	●	●
TPMX 240512R-DT	14.20	5.50	1.20			●		●	●	
TPMX 240512R-G	14.20	5.50	1.20		●		●	●	●	●
TPMX 240512R-B	14.20	5.50	1.20							●
TPMX 280708R-B	17.00	7.50	0.80	●		●		●		●
TPMX 280716R-BG	17.00	7.50	1.60					●	●	●
TPMX 280716R-DT	17.00	7.50	1.60					●	●	
TPMX 280716R-G	17.00	7.50	1.60		●		●	●	●	●
TPMX 280716R-B	17.00	7.50	1.60							●
TPMX 140308L-G	8.45	3.50	0.80			●		●		
TPMX 170404L-BG	10.30	4.00	0.40					●		
TPMX 170408L-DT	10.30	4.00	0.80					●		
TPMX 170408L-G	10.30	4.00	0.80			●		●	●	
TPMX 240504L-BG	14.20	5.50	0.40					●		
TPMX 240512L-DT	14.20	5.50	1.20					●		
TPMX 240512L-G	14.20	5.50	1.20			●		●	●	
TPMX 280708L-BG	17.00	7.50	0.80					●		
TPMX 280716L-G	17.00	7.50	1.60			●		●	●	

For tools, see pages: DDC-EC (249) • DSTR-EC (255) • DSTR-IC (258)

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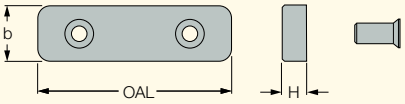
RGP

Boring Head Enlargement
Resin Pads



Designation	OAL	b	H
RGP01	40.00	10.0	4.0
RGP02	45.00	12.0	5.0
RGP03	50.00	15.0	5.8
RGP04	70.00	20.0	7.5
RGP05	80.00	30.0	12.5
RGP06	100.00	35.0	15.5

• Select an outer cartridge and pad for the required enlarged diameter.

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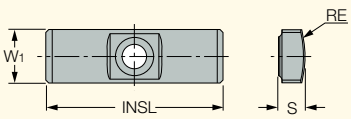
GPS

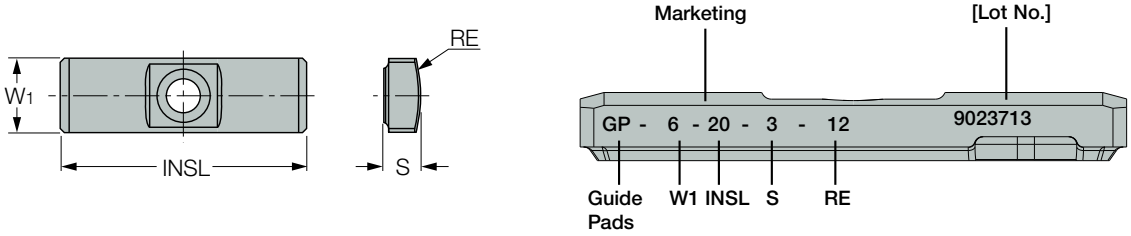
Deep Drilling Solid
Carbide Guide Pads



Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC928	IC950	IC908
GPS-04-16-055-DC	4.0	16.00	2.00	5.50	•		•
GPS-05-18-060-DC	5.0	18.00	2.50	6.00	•		•
GPS-05-18-075-DC	5.0	18.00	2.50	7.50	•		•
GPS-06-20-075-DC	6.0	20.00	3.00	7.50			•
GPS-06-20-075	6.0	20.00	3.00	7.50		•	
GPS-06-20-085-DC	6.0	20.00	3.00	8.50	•		•
GPS-06-20-085	6.0	20.00	3.00	8.50		•	
GPS-06-20-100-DC	6.0	20.00	3.00	10.00	•		•
GPS-06-20-100	6.0	20.00	3.00	10.00		•	
GPS-06-20-120-DC	6.0	20.00	3.00	12.00	•		•
GPS-06-20-120	6.0	20.00	3.00	12.00		•	
GPS-07-20-120-DC	7.0	20.00	3.50	12.00	•		•
GPS-07-20-120	7.0	20.00	3.50	12.00		•	
GPS-08-25-155-DC	8.0	25.00	4.50	15.50	•		•
GPS-08-25-155	8.0	25.00	4.50	15.50		•	
GPS-10-30-200-DC	10.0	30.00	4.50	20.00	•		•
GPS-10-30-200	10.0	30.00	4.50	20.00		•	
GPS-10-35-200-DC	10.0	35.00	6.00	20.00	•		•
GPS-10-35-200	10.0	35.00	6.00	20.00		•	
GPS-12-35-250-DC	12.0	35.00	5.50	25.00	•		•
GPS-12-35-250	12.0	35.00	5.50	25.00		•	
GPS-14-40-250-DC	14.0	40.00	7.50	25.00	•		•
GPS-14-40-250	14.0	40.00	7.50	25.00		•	
GPS-18-40-300-DC	18.0	40.00	9.00	30.00	•		•

• DC- Double Chamfer

Universal Marking for Deep Drilling Tools



Guide Pad Grade Recommendation

	Oil Coolant			Water Based Coolant		
Priority	1	2	3	1	2	3
ISO-P	IC950	IC908	IC928	IC928	IC908	-
ISO-K	IC950	IC908	IC928	IC928	IC908	-
ISO-M	IC928	IC908	IC950	IC928	IC908	-
ISO-S	IC928	IC908	IC950	IC928	IC908	-

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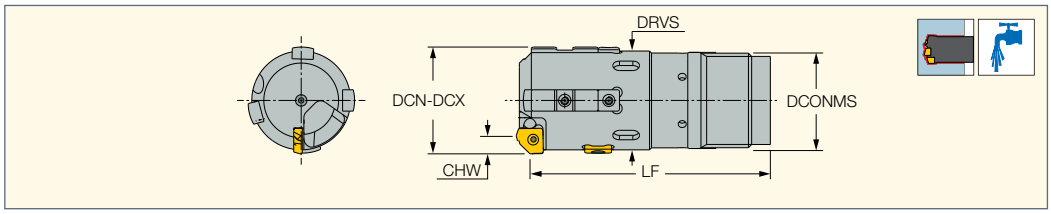
DDC-EA

Double Tube Counterboring Drills with Outer 4-Start Thread, Cartridges and Adjustable Diameter (25-40mm dia.)



Designation	DCN(1)	DCX(2)	CHW	DRVS(3)	LF	DCONMS
DDC-EA 25.00-26.40	25.00	26.40	2.80	24.0	72.50	21.00
DDC-EA 26.41-28.70	26.41	28.70	2.80	26.0	72.50	23.50
DDC-EA 28.71-31.00	28.71	31.00	2.80	28.0	75.50	25.50
DDC-EA 31.01-33.30	31.01	33.30	2.80	31.0	75.50	28.00
DDC-EA 33.31-36.20	33.31	36.20	2.80	34.0	75.50	30.00
DDC-EA 36.21-39.60	36.21	39.60	2.80	37.0	90.50	33.00
DDC-EA 39.61-39.99	39.61	39.99	2.80	37.0	90.50	36.00

• For user guide and quotation form, see pages 272-280 • Ordering example: DDC-EA 30.55

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Torque key size

For inserts, see pages: XPMT-45 (234) • XPMT-UB (234)

For holders, see pages: TDO-I (D18.41-65.00) (266)

DDC-EA

Diameter	Insert	Insert Clamping Screw	Qty	Guide Pads	Qty	Screw	Qty	Key
25.00-29.99	XPMT 16002-45	SR 11201754-4	1	GPS-06-20-120	2	SR 34-508	2	T-7/5
30.00-37.99	XPMT 16002-45	SR 11201754-4	1	GPS-07-20-120	3	SR11201753-4	3	T-9/5
38.00-39.99	XPMT 16002-45	SR 11201754-4	1	GPS-08-25-155	3	SR 34-506-C	3	T-9/5

DDC-EA (continued)

Diameter	Guide Pad Protectors	Qty	Screw	Qty	Key	Sub Guide Pad	Qty	Screw	Qty	Key
25.00-29.99	GPP-04	2	SR11201753-4	2	T-9/5	SGP-02	1	SR11201753-1	1	T-7/5
30.00-37.99	GPP-05	3	SR11201753-4	3	T-9/5	SGP-02	1	SR11201753-1	1	T-7/5
38.00-39.99	GPP-06	3	SR11201753-4	3	T-9/5	SGP-02	1	SR11201753-4	1	T-9/5

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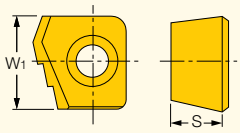
XPMT-UB

Inserts for DSD/DSC
Drilling / Boring Heads



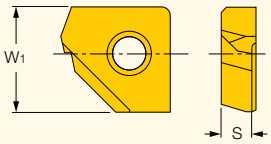
Designation	Dimensions W1	Dimensions S	Tough ↔ Hard IC908	IC520M
XPMT 16002UB	9.50	2.80	●	
XPMT 18003UB	11.00	3.05	●	
XPMT21003UB	13.00	3.55		●
XPMT 25003UB	14.50	3.40	●	

For tools, see pages: DDC-EA (246) • DSC-EA (233) • DSC-IA (240)

ISCARDEEPDRILL

XPMT-45

Inserts for DSC Boring Heads



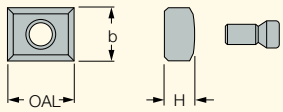
Designation	Dimensions W1	Dimensions S	IC950
XPMT 16002-45	9.50	2.80	●

For tools, see pages: DDC-EA (246) • DSC-IA (240)

ISCARDEEPDRILL

SGP

Boring Head Sub-Guide Pads



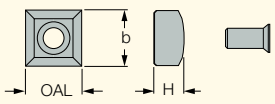
Designation	OAL	b	H
SGP-01	10.00	6.0	3.0
SGP-02	10.00	8.0	4.5
SGP-03	10.00	10.0	5.0
SGP-04	20.00	14.0	7.0

• Select an outer cartridge and pad for the required enlarged diameter.

ISCARDEEPDRILL

GPP

Boring Head Guide
Pad Protectors



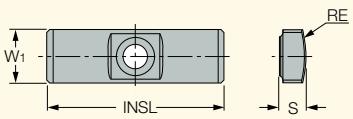
Designation	OAL	b	H
GPP-04	8.00	8.0	4.4
GPP-05	8.00	8.0	3.5
GPP-06	8.00	8.0	4.5
GPP-07	10.00	10.0	6.0
GPP-08	14.00	14.0	7.5
GPP-09	18.00	18.0	9.0

• Select an outer cartridge and pad for the required enlarged diameter.

ISCARDEEPDRILL

GPS

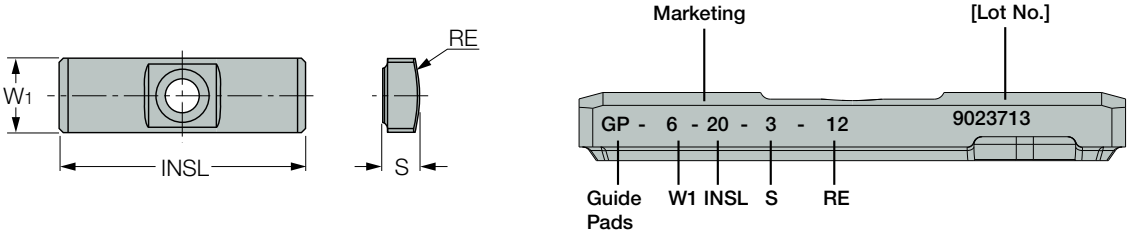
Deep Drilling Solid Carbide Guide Pads



Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC928	IC950	IC908
GPS-04-16-055-DC	4.0	16.00	2.00	5.50	•		•
GPS-05-18-060-DC	5.0	18.00	2.50	6.00	•		•
GPS-05-18-075-DC	5.0	18.00	2.50	7.50	•		•
GPS-06-20-075-DC	6.0	20.00	3.00	7.50			•
GPS-06-20-075	6.0	20.00	3.00	7.50		•	
GPS-06-20-085-DC	6.0	20.00	3.00	8.50	•		•
GPS-06-20-085	6.0	20.00	3.00	8.50		•	
GPS-06-20-100-DC	6.0	20.00	3.00	10.00	•		•
GPS-06-20-100	6.0	20.00	3.00	10.00		•	
GPS-06-20-120-DC	6.0	20.00	3.00	12.00	•		•
GPS-06-20-120	6.0	20.00	3.00	12.00		•	
GPS-07-20-120-DC	7.0	20.00	3.50	12.00	•		•
GPS-07-20-120	7.0	20.00	3.50	12.00		•	
GPS-08-25-155-DC	8.0	25.00	4.50	15.50	•		•
GPS-08-25-155	8.0	25.00	4.50	15.50		•	
GPS-10-30-200-DC	10.0	30.00	4.50	20.00	•		•
GPS-10-30-200	10.0	30.00	4.50	20.00		•	
GPS-10-35-200-DC	10.0	35.00	6.00	20.00	•		•
GPS-10-35-200	10.0	35.00	6.00	20.00		•	
GPS-12-35-250-DC	12.0	35.00	5.50	25.00	•		•
GPS-12-35-250	12.0	35.00	5.50	25.00		•	
GPS-14-40-250-DC	14.0	40.00	7.50	25.00	•		•
GPS-14-40-250	14.0	40.00	7.50	25.00		•	
GPS-18-40-300-DC	18.0	40.00	9.00	30.00	•		•

• DC- Double Chamfer

Universal Marking for Deep Drilling Tools



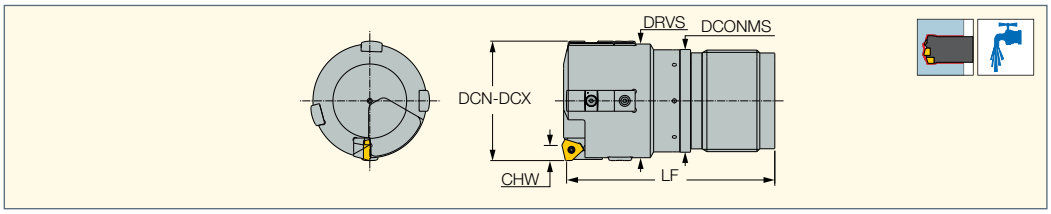
Guide Pad Grade Recommendation

	Oil Coolant			Water Based Coolant		
Priority	1	2	3	1	2	3
ISO-P	IC950	IC908	IC928	IC928	IC908	-
ISO-K	IC950	IC908	IC928	IC928	IC908	-
ISO-M	IC928	IC908	IC950	IC928	IC908	-
ISO-S	IC928	IC908	IC950	IC928	IC908	-

ISCARDEEPDRILL

DDC-EC

Double Tube Counterboring Drills with Outer 4-Start Thread, Cartridges and Adjustable Diameter (40-184mm dia.)



Designation	DCN[1]	DCX[2]	CHW	DRVS[3]	LF	DCONMS	APMX	APMX_2
DDC-EC 40.00-43.00	40.00	43.00	6.40	40.0	91.00	36.00	6.40	4.00
DDC-EC 43.01-47.00	43.01	47.00	6.40	43.0	95.00	39.00	6.40	4.00
DDC-EC 47.01-51.70	47.01	51.70	6.40	48.0	100.00	43.00	6.40	4.00
DDC-EC 51.71-56.20	51.71	51.99	6.40	53.0	100.00	47.00	6.40	4.00
DDC-EC 56.21-65.00	56.21	65.00	7.20	61.0	110.00	51.00	7.20	4.80
DDC-EC 65.00-66.99	65.00	66.99	7.20	63.0	150.00	52.00	7.20	4.80
DDC-EC 67.00-72.99	67.00	72.99	10.40	69.0	150.00	58.00	10.40	6.40
DDC-EC 73.00-79.99	73.00	79.99	10.40	76.0	150.00	63.00	10.40	6.40
DDC-EC 80.00-86.99	80.00	86.99	10.40	83.0	180.00	70.00	10.40	6.40
DDC-EC 87.00-99.99	87.00	99.99	10.40	96.0	180.00	77.00	10.40	6.40
DDC-EC 100.00-111.99	100.00	111.99	10.40	107.0	180.00	89.00	10.40	6.40
DDC-EC 112.00-123.99	112.00	123.99	10.40	119.0	205.00	101.00	10.40	6.40
DDC-EC 124.00-135.99	124.00	135.99	10.40	131.0	205.00	113.00	10.40	6.40
DDC-EC 136.00-147.99	136.00	147.99	10.40	143.0	205.00	125.00	10.40	6.40
DDC-EC 148.00-159.99	148.00	159.99	10.40	155.0	225.00	137.00	10.40	6.40
DDC-EC 160.00-171.99	160.00	171.99	10.40	167.0	225.00	149.00	10.40	6.40
DDC-EC 172.00-183.99	172.00	183.99	10.40	179.0	225.00	161.00	10.40	6.40

• For user guide and quotation form, see pages 272-280 • Ordering example: DDC-EC 130.35

[1] Cutting diameter minimum

[2] Cutting diameter maximum

[3] Torque key size

For inserts, see pages: TPMX (214)

For holders, see pages: TDO-I (D18.41-65.00) (266) • TDO-I (D65.00-171.99) (267)

DDC-EC

Diameter	Boring Head Central Cartridge	Central Cartridge Insert	Boring Head Peripheral Cartridge	Peripheral Cartridge Insert	Guide Pads	Sub Guide Pad	Guide Pad Protectors
40.00-45.99	CAORC-0845	TPMX 1403LG	CAOD-0845	TPMX 1403RG	GPS-08-25-155	SGP-02	GPP-06
46.00-51.99	CAORC-0845	TPMX 1403LG	CAOD-0845	TPMX 1403RG	GPS-10-35-200	SGP-02	GPP-07
52.00-56.99	CAORC-103	TPMX 1704LG	CAOD-103	TPMX 1704RG	GPS-10-35-200	SGP-02	GPP-07
57.00-59.99	CAORC-103	TPMX 1704LG	CAOD-103	TPMX 1704RG	GPS-10-35-200	SGP-02	GPP-07
60.00-66.99	CAORC-103	TPMX 1704LG	CAOD-103	TPMX 1704RG	GPS-14-40-250	SGP-03	GPP-08
67.00-80.99	CAORC-142	TPMX 2405LG	CAOD-142	TPMX 2405RG	GPS-14-40-250	SGP-03	GPP-08
81.00-90.99	CAORC-142	TPMX 2405LG	CAOD-142	TPMX 2405RG	GPS-14-40-250	SGP-03	GPP-08
91.00-99.99	CAORC-142	TPMX 2405LG	CAOD-142	TPMX 2405RG	GPS-14-40-250	SGP-03	GPP-08
100.00-183.99	CAORC-142	TPMX 2405LG	CAOD-142	TPMX 2405RG	GPS-18-40-300	SGP-04	GPP-09

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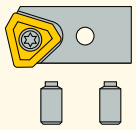
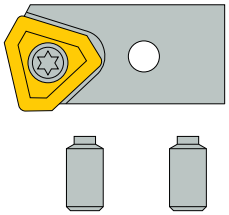
CAOD

Drilling Head Peripheral Cartridge



Universal Marking for Deep Drilling Tools



CA - P - DR - 0800 - R

- CA – Peripheral Cartridge
- P – DR : Drilling / CB : Counter Bore
- DR – IC
- 0800 – IC
- R – L/R HAND

Spare Parts

Designation	Adjustment Screw	Key	Locking Screw	Key	Insert	Insert Clamping Screw
CAOD-080	SR 11201755-4	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-0845	SR 11201755-6	HW 2.0	SR 11201756-10	HW 2.5	TPMX 1403..R-G	SR 11201753-3
CAOD-085	SR 11201755-7	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-103	SR 11201755-8	HW 2.5	SR 11201756-12	HW 3.0	TPMX 1704..R-G	SR 11201753-7
CAOD-142	SR 11201755-9	HW 2.5	SR 11201756-15	HW 4.0	TPMX 2405..R-G	SR 11201753-9
CAOD-170	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 2807..R-G	SR 11201753-10

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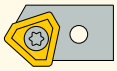
CAORC

Boring Head Central Cartridge



Spare Parts

Designation	Adjustment Screw	Key	Locking Screw	Key	Insert	Insert Clamping Screw
CAORC-0845	SR 11201755-6	HW 2.0	SR 11201756-10	HW 2.5	TPMX 140308L-G	SR 11201753-3
CAORC-103	SR 11201755-10	HW 2.5	SR 11201756-12	HW 3.0	TPMX 170408L-G	SR 11201753-7
CAORC-142	SR 11201755-11	HW 2.5	SR 11201756-15	HW 4.0	TPMX 240512L-G	SR 11201753-9
CAORC-170	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 280716L-G	SR 11201753-10

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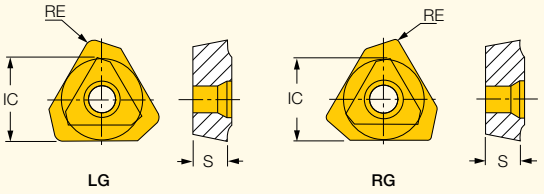
TPMX

Inserts for Drilling Heads
DSD-EC / DDD-EC /
DSD-IC / DSC-EC / DSC-IC



Designation	Dimensions IC	S	RE	Tough ↔ Hard IC920	IC5500	IC9025	IC508	IC908	IC520	IC806
TPMX 140304R-B	8.45	3.50	0.40	●		●		●	●	●
TPMX 140308R-DT	8.45	3.50	0.80			●		●		
TPMX 140308R-G	8.45	3.50	0.80		●	●	●	●	●	●
TPMX 140308R-B	8.45	3.50	0.80							●
TPMX 170404R-B	10.30	4.00	0.40	●		●		●	●	●
TPMX 170408R-B	10.30	4.00	0.80							●
TPMX 170408R-BG	10.30	4.00	0.80					●	●	●
TPMX 170408R-DT	10.30	4.00	0.80			●		●	●	
TPMX 170408R-G	10.30	4.00	0.80		●		●	●	●	●
TPMX 240504R-B	14.20	5.50	0.40	●		●		●	●	●
TPMX 240512R-BG	14.20	5.50	1.20			●		●	●	●
TPMX 240512R-DT	14.20	5.50	1.20			●		●	●	
TPMX 240512R-G	14.20	5.50	1.20		●		●	●	●	●
TPMX 240512R-B	14.20	5.50	1.20							●
TPMX 280708R-B	17.00	7.50	0.80	●		●		●		●
TPMX 280716R-BG	17.00	7.50	1.60					●	●	●
TPMX 280716R-DT	17.00	7.50	1.60					●	●	
TPMX 280716R-G	17.00	7.50	1.60		●		●	●	●	●
TPMX 280716R-B	17.00	7.50	1.60							●
TPMX 140308L-G	8.45	3.50	0.80			●		●		
TPMX 170404L-BG	10.30	4.00	0.40					●		
TPMX 170408L-DT	10.30	4.00	0.80					●		
TPMX 170408L-G	10.30	4.00	0.80			●		●	●	
TPMX 240504L-BG	14.20	5.50	0.40					●		
TPMX 240512L-DT	14.20	5.50	1.20					●		
TPMX 240512L-G	14.20	5.50	1.20			●		●	●	
TPMX 280708L-BG	17.00	7.50	0.80					●		
TPMX 280716L-G	17.00	7.50	1.60			●		●	●	

For tools, see pages: DDC-EC (249) • DSTR-EC (255) • DSTR-IC (258)

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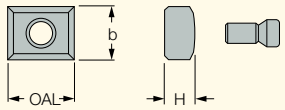
SGP

Boring Head Sub-Guide Pads



Designation	OAL	b	H
SGP-01	10.00	6.0	3.0
SGP-02	10.00	8.0	4.5
SGP-03	10.00	10.0	5.0
SGP-04	20.00	14.0	7.0

- Select an outer cartridge and pad for the required enlarged diameter.

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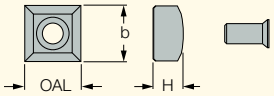
GPP

Boring Head Guide Pad Protectors



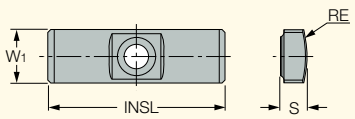
Designation	OAL	b	H
GPP-04	8.00	8.0	4.4
GPP-05	8.00	8.0	3.5
GPP-06	8.00	8.0	4.5
GPP-07	10.00	10.0	6.0
GPP-08	14.00	14.0	7.5
GPP-09	18.00	18.0	9.0

- Select an outer cartridge and pad for the required enlarged diameter.

ISCARDEEPDRILL

GPS

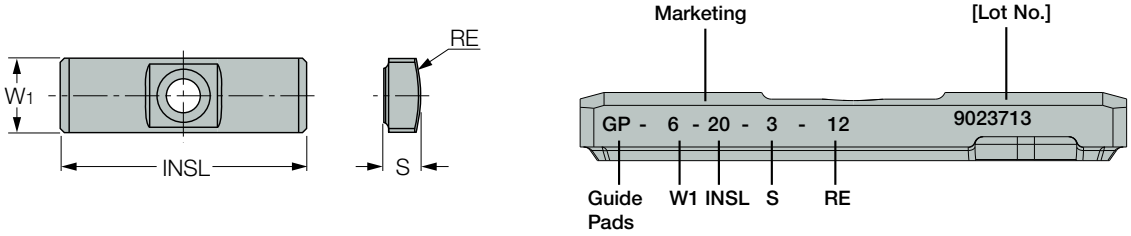
Deep Drilling Solid
Carbide Guide Pads



Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC928	IC950	IC908
GPS-04-16-055-DC	4.0	16.00	2.00	5.50	•		•
GPS-05-18-060-DC	5.0	18.00	2.50	6.00	•		•
GPS-05-18-075-DC	5.0	18.00	2.50	7.50	•		•
GPS-06-20-075-DC	6.0	20.00	3.00	7.50			•
GPS-06-20-075	6.0	20.00	3.00	7.50		•	
GPS-06-20-085-DC	6.0	20.00	3.00	8.50	•		•
GPS-06-20-085	6.0	20.00	3.00	8.50		•	
GPS-06-20-100-DC	6.0	20.00	3.00	10.00	•		•
GPS-06-20-100	6.0	20.00	3.00	10.00		•	
GPS-06-20-120-DC	6.0	20.00	3.00	12.00	•		•
GPS-06-20-120	6.0	20.00	3.00	12.00		•	
GPS-07-20-120-DC	7.0	20.00	3.50	12.00	•		•
GPS-07-20-120	7.0	20.00	3.50	12.00		•	
GPS-08-25-155-DC	8.0	25.00	4.50	15.50	•		•
GPS-08-25-155	8.0	25.00	4.50	15.50		•	
GPS-10-30-200-DC	10.0	30.00	4.50	20.00	•		•
GPS-10-30-200	10.0	30.00	4.50	20.00		•	
GPS-10-35-200-DC	10.0	35.00	6.00	20.00	•		•
GPS-10-35-200	10.0	35.00	6.00	20.00		•	
GPS-12-35-250-DC	12.0	35.00	5.50	25.00	•		•
GPS-12-35-250	12.0	35.00	5.50	25.00		•	
GPS-14-40-250-DC	14.0	40.00	7.50	25.00	•		•
GPS-14-40-250	14.0	40.00	7.50	25.00		•	
GPS-18-40-300-DC	18.0	40.00	9.00	30.00	•		•

• DC- Double Chamfer

Universal Marking for Deep Drilling Tools



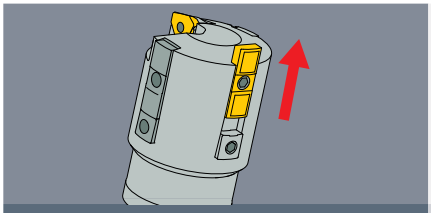
Guide Pad Grade Recommendation

	Oil Coolant			Water Based Coolant		
Priority	1	2	3	1	2	3
ISO-P	IC950	IC908	IC928	IC928	IC908	-
ISO-K	IC950	IC908	IC928	IC928	IC908	-
ISO-M	IC928	IC908	IC950	IC928	IC908	-
ISO-S	IC928	IC908	IC950	IC928	IC908	-

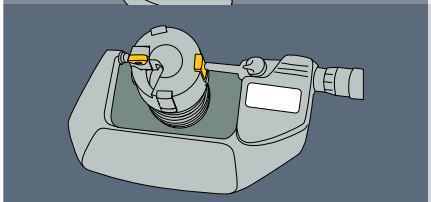
Technical Information - Cartridge Style Counter Boring Head Diameter Settings

The drill head diameter is set and inspected with a master insert in our final inspection. However, the inserts in the market have a tolerance fluctuation so each time you change or index the insert, the diameter must be adjusted as per the following method.

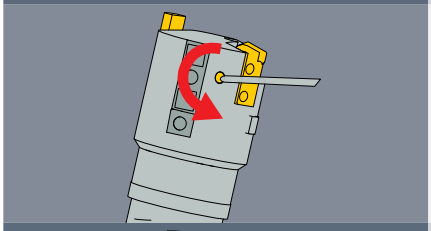
Note: When a corner change is made on the insert, it must be adjusted to the correct size or damage can be caused to the head body or work piece material.



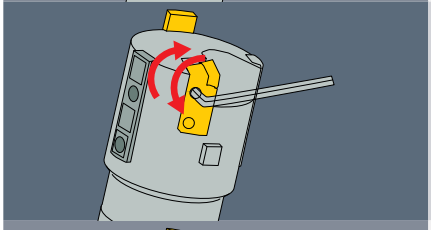
1. The dimensional guide pad must be slid forward to measure the diameter.
   1.1 Loosen the lock screw and slide the guide pad forward.
   1.2 Retighten the lock screw at the measuring position.



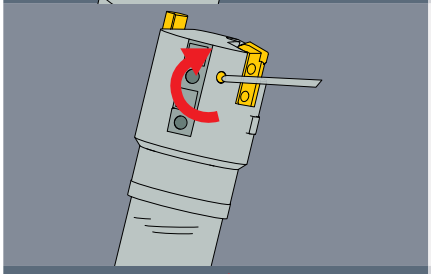
2. Measure the diameter with a micrometer. We recommend setting the tool diameter at h8 tolerance to the cutting diameter.
   Note: If the diameter is incorrect, go to **step 3**. If it's correct, go to **step 4**



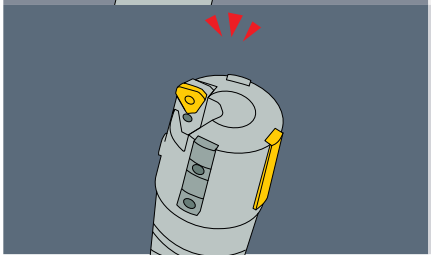
3. Adjust the outer cartridge
   3.1 First loosen the lock screw of the outer cartridge and then tighten it slightly.



3.2 Proceed to adjust the diameter, using the 2 adjustment screws and measure with a micrometer.



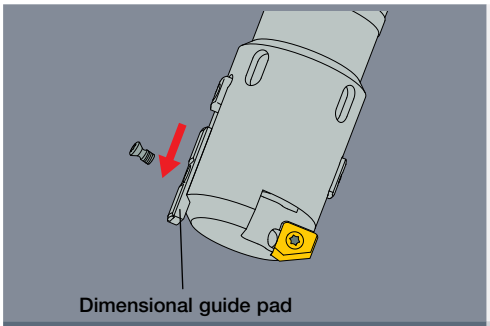
3.3 When set to the size, re-tighten the lock screw.
3.4 Recheck the diameter with a micrometer. If it is still out of tolerance, repeat the procedure from step 3.1.
Note: Please make sure to tighten the lock screw firmly before using. If loose, the cartridge may move and cause serious problems during machining.



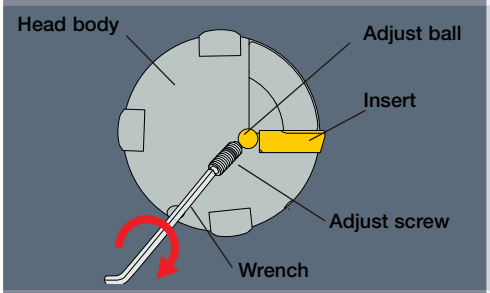
4. Slide the dimensional guide pad back to the original position and tighten the lock screw.
   Please check all the lock screws are firmly tightened as they may come loose if vibration occurs during drilling.

Technical Information - Adjustable Counter Boring Head Diameter Settings

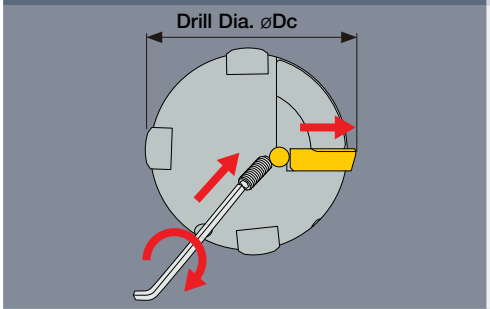
Drill diameter is adjusted with an adjust ball for diameter ø25 - ø39.99 mm with the following method.



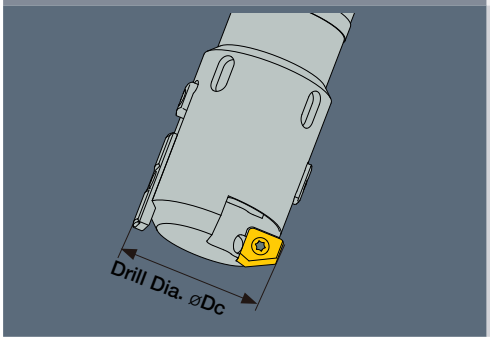
1. Slide the dimensional guide pad forward and then re-tighten the lock screw at the measuring position.



2. Tighten the adjust screw.



3. As the adjust screw moves forward, insert moves in a peripheral direction.



4. Measure the diameter with a micrometer. If the diameter is larger than expected, loosen the adjust screw and insert screw, then re-tighten the insert screw. Repeat the procedure from step 2.

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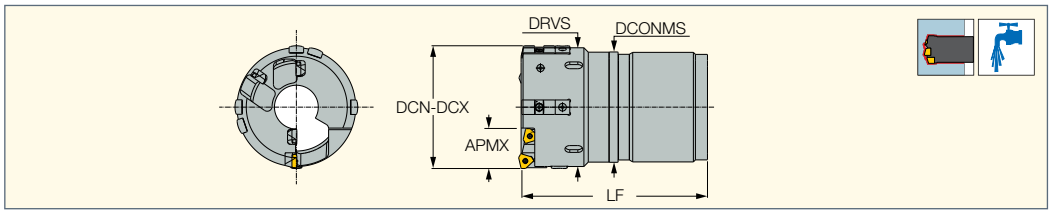
DSTR-EC

Single Tube Trepanning Drills with Outer 4-Start Thread, Cartridges, and Adjustable Diameter (100-328mm dia.)



Designation	DCN(1)	DCX(2)	APMX	DRVS(3)	LF	DCONMS
DSTR-EC 100.00-111.99	100.00	111.99	38.00	107.0	174.00	89.00
DSTR-EC 112.00-123.99	112.00	123.99	38.00	119.0	204.00	101.00
DSTR-EC 124.00-135.99	124.00	135.99	49.50	131.0	204.00	113.00
DSTR-EC 136.00-147.99	136.00	147.99	49.50	143.0	204.00	125.00
DSTR-EC 148.00-159.99	148.00	159.99	49.50	155.0	229.00	137.00
DSTR-EC 160.00-171.99	160.00	171.99	49.50	167.0	229.00	149.00
DSTR-EC 172.00-183.99	172.00	183.99	49.50	179.0	229.00	161.00
DSTR-EC 184.00-195.99	184.00	195.99	49.50	191.0	249.00	173.00
DSTR-EC 196.00-207.99	196.00	207.99	56.50	203.0	249.00	185.00
DSTR-EC 208.00-219.99	208.00	219.99	56.50	215.0	249.00	197.00
DSTR-EC 220.00-231.99	220.00	231.99	56.50	227.0	284.00	208.00
DSTR-EC 232.00-243.99	232.00	243.99	56.50	239.0	284.00	220.00
DSTR-EC 244.00-255.99	244.00	255.99	56.50	251.0	284.00	232.00
DSTR-EC 256.00-267.99	256.00	267.99	56.50	263.0	304.00	244.00
DSTR-EC 268.00-279.99	268.00	279.99	56.50	275.0	304.00	256.00
DSTR-EC 280.00-291.99	280.00	291.99	56.50	287.0	304.00	268.00
DSTR-EC 292.00-303.99	292.00	303.99	56.50	299.0	324.00	280.00
DSTR-EC 304.00-315.99	304.00	315.99	56.50	311.0	324.00	292.00
DSTR-EC 316.00-328.99	316.00	328.00	56.50	323.0	324.00	304.00

• For user guide and quotation form, see pages 272-280 • Ordering example: DSTR-EC 120.55

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Torque key size

For inserts, see pages: TPMX (214)

For holders, see pages: TS-I** (264)

Diameter	Peripheral Cartridge	Qty.	Peripheral Insert	Qty.	Inner/Central Cartridge	Qty.	Inner/ Central Insert	Qty.	Guide Pad	Qty.	Guide Pad Protectors	Qty.	Sub Guide Pad	Qty.
DSTR-EC 100.00-111.99	CAOD-103	1	TPMX 1704RG	1	CAID-103L	3	TPMX 1704RG	3	GPB-18-40-300	3	GPP-09	3	SGP-04	1
DSTR-EC 112.00-123.99	CAOD-103	1	TPMX 1704RG	1	CAID-103L	3	TPMX 1704RG	3	GPB-18-40-300	3	GPP-09	3	SGP-04	1
DSTR-EC 124.00-135.99	CAOD-142	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	3	GPP-09	3	SGP-04	1
DSTR-EC 136.00-147.99	CAOD-142	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	5	GPP-09	5	SGP-04	1
DSTR-EC 148.00-159.99	CAOD-142	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	5	GPP-09	5	SGP-04	1
DSTR-EC 160.00-171.99	CAOD-142	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	5	GPP-09	5	SGP-04	1
DSTR-EC 172.00-183.99	CAOD-142	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	5	GPP-09	5	SGP-04	1
DSTR-EC 184.00-195.99	CAOD-142	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	5	GPP-09	5	SGP-04	1
DSTR-EC 196.00-207.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	5	GPP-09	5	SGP-04	1
DSTR-EC 208.00-219.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-EC 220.00-231.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-EC 232.00-243.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-EC 244.00-255.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-EC 256.00-267.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-EC 268.00-279.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-EC 280.00-291.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-EC 292.00-303.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-EC 304.00-315.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-EC 316.00-328.00	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1

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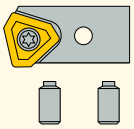
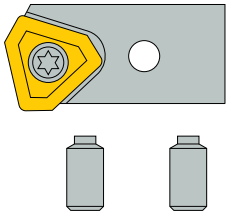
CAOD

Boring Head Peripheral Cartridge



Universal Marking for Deep Drilling Tools



CA - P - DR - 0800 - R

- CA: Peripheral Cartridge
- P: DR : Drilling / CB : Counter Bore
- DR: IC
- 0800: IC
- R: L/R HAND

Spare Parts

Designation	Adjustment Screw	Key	Locking Screw	Key	Insert	Insert Clamping Screw
CAOD-080	SR 11201755-4	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-0845	SR 11201755-6	HW 2.0	SR 11201756-10	HW 2.5	TPMX 1403..R-G	SR 11201753-3
CAOD-085	SR 11201755-7	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-103	SR 11201755-8	HW 2.5	SR 11201756-12	HW 3.0	TPMX 1704..R-G	SR 11201753-7
CAOD-142	SR 11201755-9	HW 2.5	SR 11201756-15	HW 4.0	TPMX 2405..R-G	SR 11201753-9
CAOD-170	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 2807..R-G	SR 11201753-10

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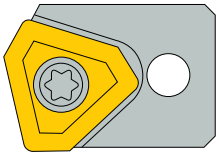
CAID

Drilling Head Inner Cartridge

Universal Marking for Deep Drilling Tools



CA - I - 0845 - R

- CA: Internal Cartridge
- I: IC
- 0845: IC
- R: L/R HAND

Spare Parts

Designation	Locking Screw	Key	Insert	Insert Clamping Screw	Key
CAID-080	SR 11201753-5	T-9/51	NPMX 0803..R-G	SR 11201753-2	T-7/51
CAID-0845	SR 11201753-6	T-15/51	TPMX 1403..R-G	SR 11201753-3	T-8/51
CAID-085	SR 11201753-5	T-9/51	NPMX 0803..R-G	SR 11201753-2	T-7/51
CAID-103	SR 11201752-1	T-15/51	TPMX 1704..R-G	SR 11201753-7	T-9/51
CAID-142	SR 11201756-7	HW 3.0	TPMX 2405..R-G	SR 11201753-9	T-15/51
CAID-170	SR 11201756-7	HW 3.0	TPMX 2807..R-G	SR 11201753-10	T-20/51

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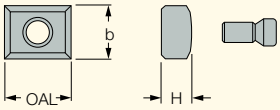
SGP

Drilling Head Sub-Guide Pads



Designation	OAL	b	H
SGP-01	10.00	6.0	3.0
SGP-02	10.00	8.0	4.5
SGP-03	10.00	10.0	5.0
SGP-04	20.00	14.0	7.0

- Select an outer cartridge and pad for the required enlarged diameter.

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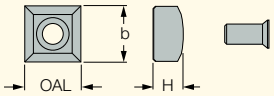
GPP

Drilling Head Guide Pad Protectors



Designation	OAL	b	H
GPP-04	8.00	8.0	4.4
GPP-05	8.00	8.0	3.5
GPP-06	8.00	8.0	4.5
GPP-07	10.00	10.0	6.0
GPP-08	14.00	14.0	7.5
GPP-09	18.00	18.0	9.0

- Select an outer cartridge and pad for the required enlarged diameter.

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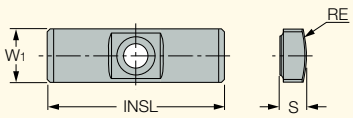
GPS

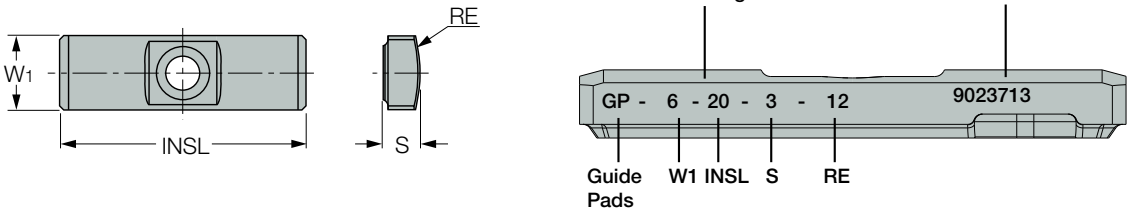
Deep Drilling Solid Carbide Guide Pads



Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC928	IC950	IC908
GPS-04-16-055-DC	4.0	16.00	2.00	5.50	●		●
GPS-05-18-060-DC	5.0	18.00	2.50	6.00	●		●
GPS-05-18-075-DC	5.0	18.00	2.50	7.50	●		●
GPS-06-20-075-DC	6.0	20.00	3.00	7.50			●
GPS-06-20-075	6.0	20.00	3.00	7.50		●	
GPS-06-20-085-DC	6.0	20.00	3.00	8.50	●		●
GPS-06-20-085	6.0	20.00	3.00	8.50		●	
GPS-06-20-100-DC	6.0	20.00	3.00	10.00	●		●
GPS-06-20-100	6.0	20.00	3.00	10.00		●	
GPS-06-20-120-DC	6.0	20.00	3.00	12.00	●		●
GPS-06-20-120	6.0	20.00	3.00	12.00		●	
GPS-07-20-120-DC	7.0	20.00	3.50	12.00	●		●
GPS-07-20-120	7.0	20.00	3.50	12.00		●	
GPS-08-25-155-DC	8.0	25.00	4.50	15.50	●		●
GPS-08-25-155	8.0	25.00	4.50	15.50		●	
GPS-10-30-200-DC	10.0	30.00	4.50	20.00	●		●
GPS-10-30-200	10.0	30.00	4.50	20.00		●	
GPS-10-35-200-DC	10.0	35.00	6.00	20.00	●		●
GPS-10-35-200	10.0	35.00	6.00	20.00		●	
GPS-12-35-250-DC	12.0	35.00	5.50	25.00	●		●
GPS-12-35-250	12.0	35.00	5.50	25.00		●	
GPS-14-40-250-DC	14.0	40.00	7.50	25.00	●		●
GPS-14-40-250	14.0	40.00	7.50	25.00		●	
GPS-18-40-300-DC	18.0	40.00	9.00	30.00	●		●

- DC- Double Chamfer

Universal Marking for Deep Drilling Tools



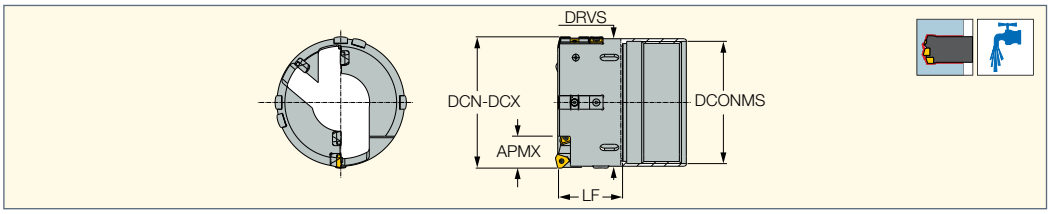
Guide Pad Grade Recommendation

	Oil Coolant			Water Based Coolant		
Priority	1	2	3	1	2	3
ISO-P	IC950	IC908	IC928	IC928	IC908	-
ISO-K	IC950	IC908	IC928	IC928	IC908	-
ISO-M	IC928	IC908	IC950	IC928	IC908	-
ISO-S	IC928	IC908	IC950	IC928	IC908	-

ISCARDEEPDRILL

DSTR-IC

Single Tube Trepanning Drills with Inner Single Start Thread, Cartridges and Adjustable Diameter (100-306mm dia.)



Designation	DCN(1)	DCX(2)	APMX	DRVS(3)	LF	DCONMS
DSTR-IC 100.00-110.99	100.00	110.99	38.00	106.0	139.00	90.00
DSTR-IC 111.00-122.99	111.00	122.99	38.00	118.0	149.00	102.00
DSTR-IC 123.00-123.99	123.00	123.99	38.00	119.0	149.00	114.00
DSTR-IC 124.00-134.99	124.00	134.99	49.50	130.0	149.00	114.00
DSTR-IC 135.00-148.99	135.00	148.99	49.50	144.0	149.00	126.00
DSTR-IC 149.00-161.99	149.00	161.99	49.50	157.0	149.00	139.00
DSTR-IC 162.00-173.99	162.00	173.99	49.50	169.0	169.00	151.00
DSTR-IC 174.00-185.99	174.00	185.99	49.50	181.0	169.00	163.00
DSTR-IC 186.00-195.99	186.00	195.99	49.50	191.0	169.00	175.00
DSTR-IC 196.00-197.99	196.00	197.99	56.50	193.0	169.00	175.00
DSTR-IC 198.00-209.99	198.00	209.99	56.50	205.0	169.00	187.00
DSTR-IC 210.00-221.99	210.00	221.99	56.50	217.0	189.00	199.00
DSTR-IC 222.00-233.99	222.00	233.99	56.50	229.0	189.00	211.00
DSTR-IC 234.00-245.99	234.00	245.99	56.50	241.0	189.00	223.00
DSTR-IC 246.00-257.99	246.00	257.99	56.50	253.0	189.00	235.00
DSTR-IC 258.00-266.99	258.00	266.99	56.50	262.0	209.00	245.00
DSTR-IC 267.00-281.99	267.00	281.99	56.50	277.0	209.00	259.00
DSTR-IC 282.00-293.99	282.00	293.99	56.50	289.0	209.00	271.00
DSTR-IC 294.00-305.99	294.00	305.99	56.50	301.0	209.00	283.00

• For user guide and quotation form, see pages 272-280 • Ordering example: DSTR-IC 120.55

(1) Cutting diameter minimum

(2) Cutting diameter maximum

(3) Torque key size

For inserts, see pages: TPMX (214)

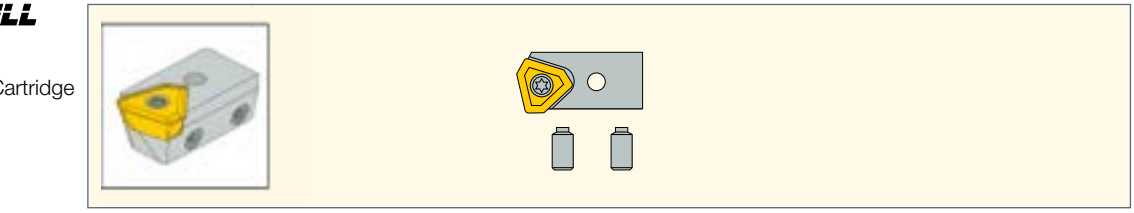
For holders, see pages: TS-O** (265)

Diameter	Peripheral Cartridge	Qty.	Peripheral Insert	Qty.	Inner/ Central Cartridge	Qty.	Inner/ Central Insert	Qty.	Guide Pad	Qty.	Guide Pad Protectors	Qty.	Sub Guide Pad	Qty.
DSTR-IC 100.00-110.99	CAOD-103	1	TPMX 1704RG	1	CAID-103L	3	TPMX 1704RG	3	GPB-18-40-300	3	GPP-09	3	SGP-04	1
DSTR-IC 111.00-122.99	CAOD-103	1	TPMX 1704RG	1	CAID-103L	3	TPMX 1704RG	3	GPB-18-40-300	3	GPP-09	3	SGP-04	1
DSTR-IC 123.00-123.99	CAOD-142	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	3	GPP-09	3	SGP-04	1
DSTR-IC 124.00-134.99	CAOD-142	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	3	GPP-09	3	SGP-04	1
DSTR-IC 135.00-148.99	CAOD-142	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	5	GPP-09	5	SGP-04	1
DSTR-IC 149.00-161.99	CAOD-142	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	5	GPP-09	5	SGP-04	1
DSTR-IC 162.00-173.99	CAOD-142	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	5	GPP-09	5	SGP-04	1
DSTR-IC 174.00-185.99	CAOD-170	1	TPMX 2405RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	5	GPP-09	5	SGP-04	1
DSTR-IC 186.00-195.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-18-40-300	5	GPP-09	5	SGP-04	1
DSTR-IC 196.00-197.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	5	GPP-10	5	SGP-04	1
DSTR-IC 198.00-209.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	5	GPP-10	5	SGP-04	1
DSTR-IC 210.00-221.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-IC 222.00-233.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-IC 234.00-245.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-IC 246.00-257.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-IC 258.00-266.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-IC 267.00-281.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-IC 282.00-293.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1
DSTR-IC 294.00-305.99	CAOD-170	1	TPMX 2807RG	1	CAID-142L	3	TPMX 2405RG	3	GPB-22-50-750	3	GPP-10	3	SGP-04	1

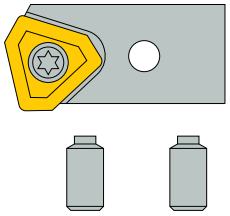
ISCARDEEPDRILL

CAOD

Drilling Head Peripheral Cartridge



Universal Marking for Deep Drilling Tools



CA - P - DR - 0800 - R

- CA: Peripheral Cartridge
- P
- DR: DR : Drilling, CB : Counter Bore
- 0800: IC
- R: L/R HAND

Spare Parts

Designation	Adjustment Screw	Key	Locking Screw	Key	Insert	Insert Clamping Screw
CAOD-080	SR 11201755-4	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-0845	SR 11201755-6	HW 2.0	SR 11201756-10	HW 2.5	TPMX 1403..R-G	SR 11201753-3
CAOD-085	SR 11201755-7	HW 1.5	SR 11201756-11	HW 2.0	NPMX 0803..R-G	SR 11201753-2
CAOD-103	SR 11201755-8	HW 2.5	SR 11201756-12	HW 3.0	TPMX 1704..R-G	SR 11201753-7
CAOD-142	SR 11201755-9	HW 2.5	SR 11201756-15	HW 4.0	TPMX 2405..R-G	SR 11201753-9
CAOD-170	SR 11201755-11	HW 3.0	SR 11201756-15	HW 4.0	TPMX 2807..R-G	SR 11201753-10

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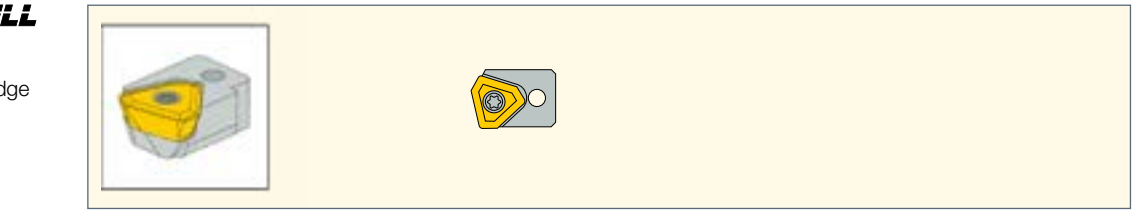
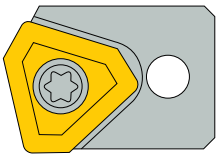
CAID

Drilling Head Inner Cartridge



Universal Marking for Deep Drilling Tools



CA - I - 0845 - R

- CA: Internal Cartridge
- I
- 0845: IC
- R: L/R HAND

Spare Parts

Designation	Locking Screw	Key	Insert	Insert Clamping Screw	Key
CAID-080	SR 11201753-5	T-9/51	NPMX 0803..R-G	SR 11201753-2	T-7/51
CAID-0845	SR 11201753-6	T-15/51	TPMX 1403..R-G	SR 11201753-3	T-8/51
CAID-085	SR 11201753-5	T-9/51	NPMX 0803..R-G	SR 11201753-2	T-7/51
CAID-103	SR 11201752-1	T-15/51	TPMX 1704..R-G	SR 11201753-7	T-9/51
CAID-142	SR 11201756-7	HW 3.0	TPMX 2405..R-G	SR 11201753-9	T-15/51
CAID-170	SR 11201756-7	HW 3.0	TPMX 2807..R-G	SR 11201753-10	T-20/51

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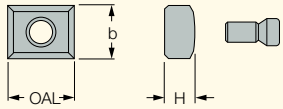
SGP

Drilling Head Sub-Guide Pads



Designation	OAL	b	H
SGP-01	10.00	6.0	3.0
SGP-02	10.00	8.0	4.5
SGP-03	10.00	10.0	5.0
SGP-04	20.00	14.0	7.0

- Select an outer cartridge and pad for the required enlarged diameter.

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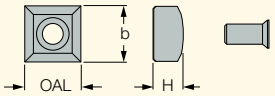
GPP

Drilling Head Guide Pad Protectors



Designation	OAL	b	H
GPP-04	8.00	8.0	4.4
GPP-05	8.00	8.0	3.5
GPP-06	8.00	8.0	4.5
GPP-07	10.00	10.0	6.0
GPP-08	14.00	14.0	7.5
GPP-09	18.00	18.0	9.0

- Select an outer cartridge and pad for the required enlarged diameter.

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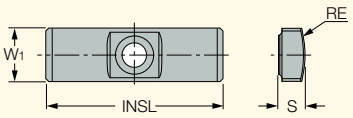
GPS

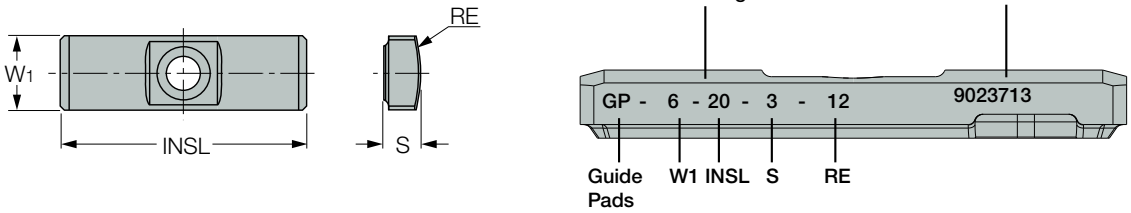
Deep Drilling Solid Carbide Guide Pads



Designation	Dimensions W1	INSL	S	RE	Tough ↔ Hard IC928	IC950	IC908
GPS-04-16-055-DC	4.0	16.00	2.00	5.50	●		●
GPS-05-18-060-DC	5.0	18.00	2.50	6.00	●		●
GPS-05-18-075-DC	5.0	18.00	2.50	7.50	●		●
GPS-06-20-075-DC	6.0	20.00	3.00	7.50			●
GPS-06-20-075	6.0	20.00	3.00	7.50		●	
GPS-06-20-085-DC	6.0	20.00	3.00	8.50	●		●
GPS-06-20-085	6.0	20.00	3.00	8.50		●	
GPS-06-20-100-DC	6.0	20.00	3.00	10.00	●		●
GPS-06-20-100	6.0	20.00	3.00	10.00		●	
GPS-06-20-120-DC	6.0	20.00	3.00	12.00	●		●
GPS-06-20-120	6.0	20.00	3.00	12.00		●	
GPS-07-20-120-DC	7.0	20.00	3.50	12.00	●		●
GPS-07-20-120	7.0	20.00	3.50	12.00		●	
GPS-08-25-155-DC	8.0	25.00	4.50	15.50	●		●
GPS-08-25-155	8.0	25.00	4.50	15.50		●	
GPS-10-30-200-DC	10.0	30.00	4.50	20.00	●		●
GPS-10-30-200	10.0	30.00	4.50	20.00		●	
GPS-10-35-200-DC	10.0	35.00	6.00	20.00	●		●
GPS-10-35-200	10.0	35.00	6.00	20.00		●	
GPS-12-35-250-DC	12.0	35.00	5.50	25.00	●		●
GPS-12-35-250	12.0	35.00	5.50	25.00		●	
GPS-14-40-250-DC	14.0	40.00	7.50	25.00	●		●
GPS-14-40-250	14.0	40.00	7.50	25.00		●	
GPS-18-40-300-DC	18.0	40.00	9.00	30.00	●		●

- DC- Double Chamfer

Universal Marking for Deep Drilling Tools

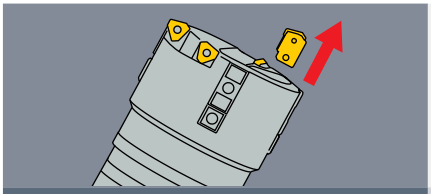


Guide Pad Grade Recommendation

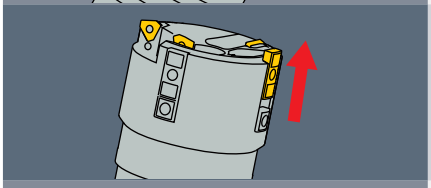
	Oil Coolant			Water Based Coolant		
Priority	1	2	3	1	2	3
ISO-P	IC950	IC908	IC928	IC928	IC908	-
ISO-K	IC950	IC908	IC928	IC928	IC908	-
ISO-M	IC928	IC908	IC950	IC928	IC908	-
ISO-S	IC928	IC908	IC950	IC928	IC908	-

Technical Information - Cartridge Style Trepanning Head Diameter Settings

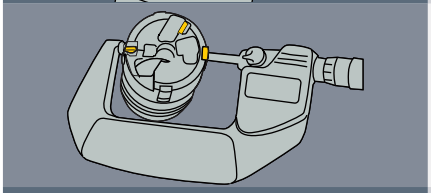
The Drill Head diameter is set and inspected with a master insert in our final inspection. However, the inserts in the market have a tolerance fluctuation so each time you change or index the insert, the diameter must be adjusted as per the following method.



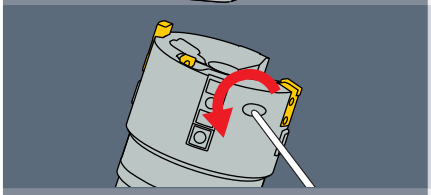
1. When a corner change is made on the insert, it must be adjusted to the correct size or damage can be caused to the head body or work piece material.



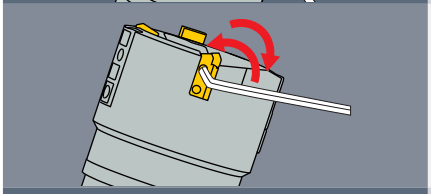
2. The dimensional guide pad must be slid forward to measure the diameter.
   2.1 Loosen the lock screw and slide the guide pad forward.
   2.2 Re-tighten the lock screw at the measuring position.



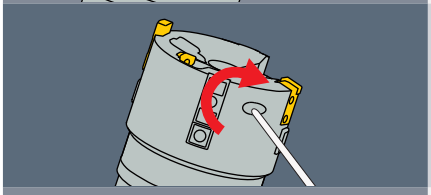
3. Measure the diameter with a micrometer.
   We recommend setting the tool diameter at h8 tolerance to the cutting diameter.
   If the diameter is incorrect, go to step 4
   If it's correct, go to step 5



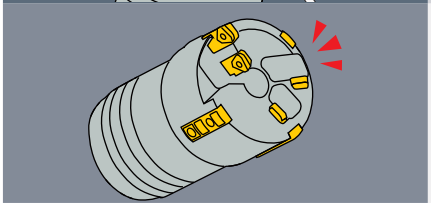
4. Adjust the peripheral cartridge
   4.1 First loosen the lock screw of the peripheral cartridge and then tighten it slightly.



4.2 Proceed to adjust the diameter, using the 2 adjust screws and measure with a micrometer.



4.3 When set to the size, retighten the lock screw.
4.4 Recheck the diameter with a micrometer. If it is still out of tolerance, repeat the procedure from step 4-1.
Please make sure to tighten the lock screw firmly before using. If loose, the cartridge may move and cause serious problems during machining.



5. Slide the dimensional guide pad back to the original position and tighten the lock screw.
6. Replace the inner cartridge and tighten the lock screw.
Please check that all the lock screws are firmly tightened as they may come loose if vibration occurs during drilling.

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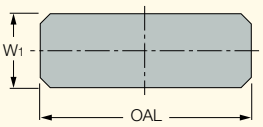
SHIM GPS

Shims for GPS Pads



Designation	W1	OAL
SHIMSET-GP04	4.00	15.90
SHIMSET-GP05	5.00	18.00
SHIMSET-GP06	6.00	20.00

• 5 shim set contains 5 shims in thicknesses of 0.01mm, 0.02mm, 0.03mm, 0.04 mm and 0.05mm respectively • Adjusting shims are sold by set only, and are not to be sold separately

Shim Combinations for Various Diameters

Diameter Adjustmemts (mm)	Shim (s) for Measuring Guide Pad	Shim (s) for Supporting Guide Pad	Number of Shim Sets Needed
+0.01	0.01	0.01	2
+0.02	0.02	0.02	2
+0.03	0.03	0.01+0.02	1
+0.04	0.04	0.01+0.03	1
+0.05	0.05	0.02+0.03	1
+0.06	0.01+0.05	0.02+0.04	1
+0.07	0.02+0.05	0.03+0.04	1
+0.08	0.03+0.05	0.04+0.04	2
+0.09	0.04+0.05	0.04+0.05	2
+0.10	0.05+0.05	0.04+0.04+0.02	2

Assembly Instructions

STEP 1

Measure the DTD drill diameter between the measuring guide pad and the insert cutting edge. If a pre setter is not available, use a micrometer or caliper. For a precise drill diameter measurement, it is recommended to test drill a hole and measure the hole diameter.

STEP 2

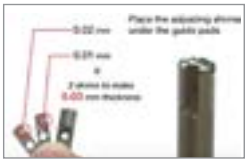
Select the shim combinations according to the chart above to obtain the required hole diameter. Take into consideration that the actual diameter of the drilled hole tends to be slightly larger (usually +20 µm to +30 µm) than the drill's nominal diameter — i.e. add 20 µm-30 µm to the measured drill diameter in Step 1 before the final drill diameter.

STEP 3

Remove the guide pads.

STEP 4

Install the adjusting shims underneath the guide pads, respectively. Put the guide pads back on the tool.

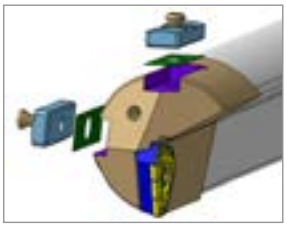


STEP 5

Measure the drill diameter again to confirm that the required diameter is obtained on the DTD.

STEP 6

Drill a hole to confirm that the required hole diameter is achieved.



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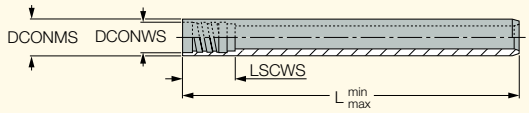
TS***

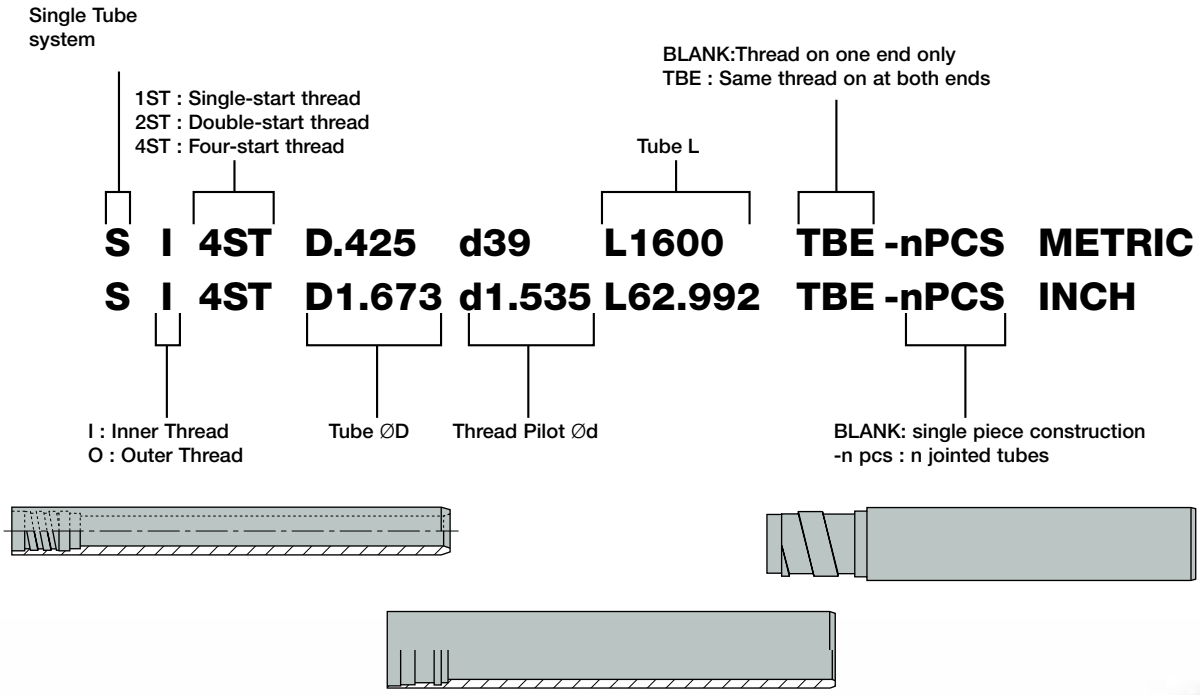
Drill Tubes - STS System - Inner Single-Start Thread Connection



Designation	d Range	DCONMS	DCONWS	LSCWS	L min	L max
TS001 L=(0-2950)MM	8.00-8.99	7.10	6.00	16.00	0.0	1749.0
TS002 L=(0-2950)MM	9.00-9.99	8.30	7.20	16.00	0.0	1749.0
TS003 L=(0-2950)MM	10.00-10.99	9.00	7.60	16.00	0.0	1749.0
TS004 L=(0-2950)MM	11.00-11.99	10.00	8.60	16.00	0.0	1749.0
TS005 L=(0-2950)MM	12.00-13.49	11.00	9.10	16.00	0.0	1749.0
TS006 L=(0-2950)MM	13.50-14.79	12.00	10.80	16.00	0.0	1749.0

• Indicate overall length (L) when ordering. • Ordering example: TS004-L1500

Universal Marking for Deep Drilling Tools



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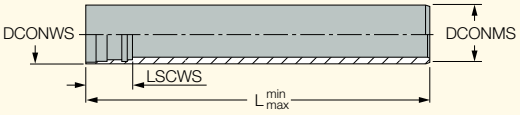
TS-I**

Drill Tubes - STS System - Inner 4-Start Thread Connection

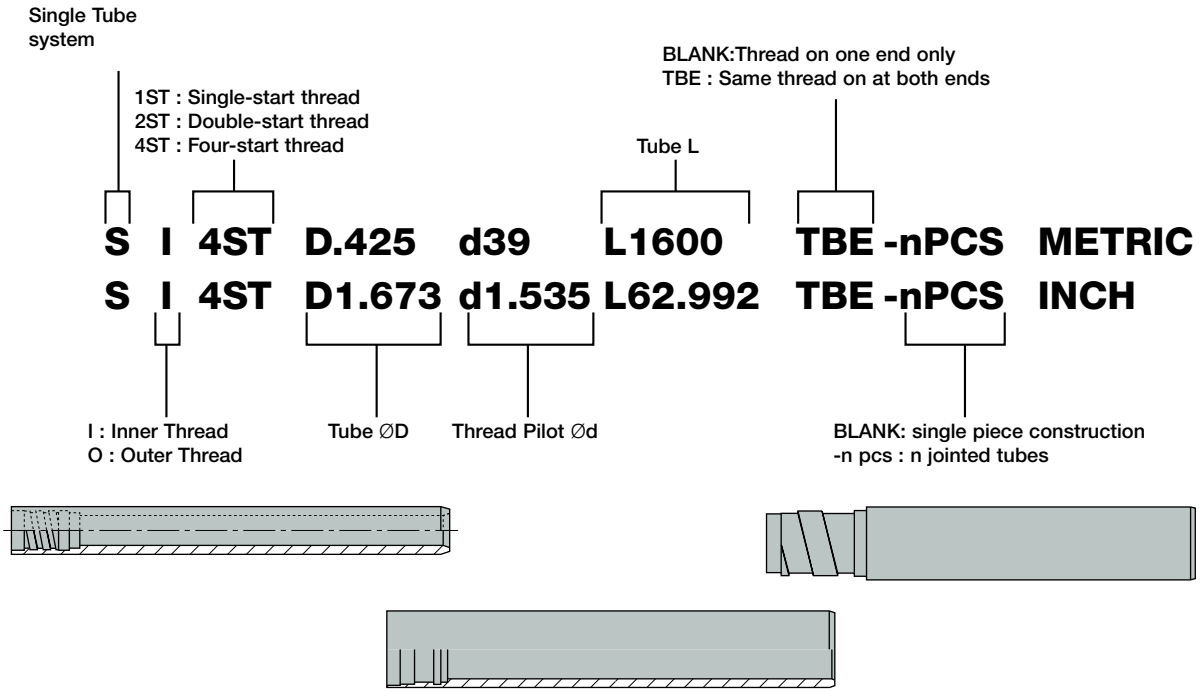


Designation	d Range	DCONMS	DCONWS	LSCWS	L min	L max
TS-I01 L=(0-3350)MM	12.60-13.60	11.00	9.60	22.00	0.0	1749.0
TS-I02 L=(0-3350)MM	13.61-14.60	12.00	10.60	22.00	0.0	1749.0
TS-I03 L=(0-3350)MM	14.61-15.59	13.00	11.60	22.00	0.0	1749.0
TS-I0 L=(0-3700)MM	15.60-16.70	14.00	12.60	21.00	0.0	1749.0
TS-I1 L=(0-3700)MM	16.71-17.70	15.00	13.60	21.00	0.0	1749.0
TS-I2 L=(0-3700)MM	17.71-18.90	16.00	14.50	22.00	0.0	1749.0
TS-I3 L=(0-3700)MM	18.91-20.00	17.00	15.50	22.00	0.0	1749.0
TS-I4 L=(0-3700)MM	20.01-21.80	18.00	16.00	27.50	0.0	1749.0
TS-I5 L=(0-3700)MM	21.81-24.10	20.00	18.00	30.00	0.0	1749.0
TS-I6 L=(0-3700)MM	24.11-26.40	22.00	19.50	30.00	0.0	1749.0
TS-I7 L=(0-3700)MM	26.41-28.70	24.00	21.00	30.00	0.0	1749.0
TS-I8 L=(0-3700)MM	28.71-31.00	26.00	23.50	33.00	0.0	1749.0
TS-I9 L=(0-3700)MM	31.01-33.30	28.00	25.50	33.00	0.0	1749.0
TS-I10 L=(0-3700)MM	33.31-36.20	30.00	28.00	33.00	0.0	1749.0
TS-I11 L=(037009)MM	36.21-39.60	33.00	30.00	40.00	0.0	1749.0
TS-I12 L=(0-3700)MM	39.61-43.00	36.00	33.00	40.00	0.0	1749.0
TS-I13 L=(037009)MM	43.01-47.00	39.00	36.00	40.00	0.0	1749.0
TS-I14 L=(0-3700)MM	47.01-51.70	43.00	39.00	40.00	0.0	1749.0
TS-I15 L=(0-3700)MM	51.71-56.20	47.00	43.00	44.00	0.0	1749.0
TS-I16 L=(0-3700)MM	56.21-60.60	51.00	47.00	44.00	0.0	1749.0
TS-I17 L=(0-3700)MM	60.61-64.99	56.00	51.00	44.00	0.0	1749.0
TS-I18 L=(0-3700)MM	65.00-66.99	56.00	52.00	75.00	0.0	1749.0
TS-I19 L=(0-2950)MM	67.00-72.99	62.00	58.00	75.00	0.0	1749.0
TS-I20 L=(0-3700)MM	73.00-79.99	68.00	63.00	75.00	0.0	1749.0
TS-I21 L=(0-3700)MM	80.00-86.99	75.00	70.00	97.00	0.0	1749.0
TS-I22 L=(0-3700)MM	87.00-99.99	82.00	77.00	97.00	0.0	1749.0
TS-I23 L=(0-3700)MM	100.00-111.99	94.00	89.00	97.00	0.0	1749.0
TS-I24 L=(0-3700)MM	112.00-123.99	106.00	101.00	118.00	0.0	1749.0
TS-I25 L=(0-3700)MM	124.00-135.99	118.00	113.00	118.00	0.0	1749.0
TS-I26 L=(0-3700)MM	136.00-147.99	130.00	125.00	118.00	0.0	1749.0
TS-I27 L=(0-3700)MM	148.00-159.99	142.00	137.00	139.00	0.0	1749.0
TS-I28 L=(0-3700)MM	160.00-171.99	154.00	149.00	139.00	0.0	1749.0
TS-I29 L=(0-3700)MM	172.00-183.99	166.00	161.00	139.00	0.0	1749.0
TS-I30 L=(0-3700)MM	184.00-195.99	178.00	173.00	144.00	0.0	1749.0
TS-I31 L=(0-3700)MM	196.00-207.99	190.00	185.00	144.00	0.0	1749.0
TS-I32 L=(0-3700)MM	208.00-219.99	202.00	197.00	144.00	0.0	1749.0
TS-I33 L=(0-3700)MM	220.00-231.99	214.00	208.00	164.00	0.0	1749.0
TS-I34 L=(0-3700)MM	232.00-243.99	226.00	220.00	164.00	0.0	1749.0

• Indicate overall length (L) when ordering. • Ordering example: TS-I12-L2000

For tools, see pages: DSD-EF-FB (201) • DSD-EF-FT (192) • DSTR-EC (255)

Universal Marking for Deep Drilling Tools



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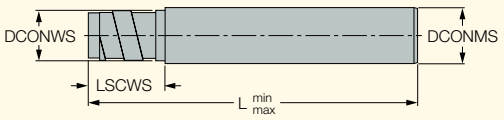
TS-O**

Drill Tubes - STS System - Outer Single-Start Thread Connection

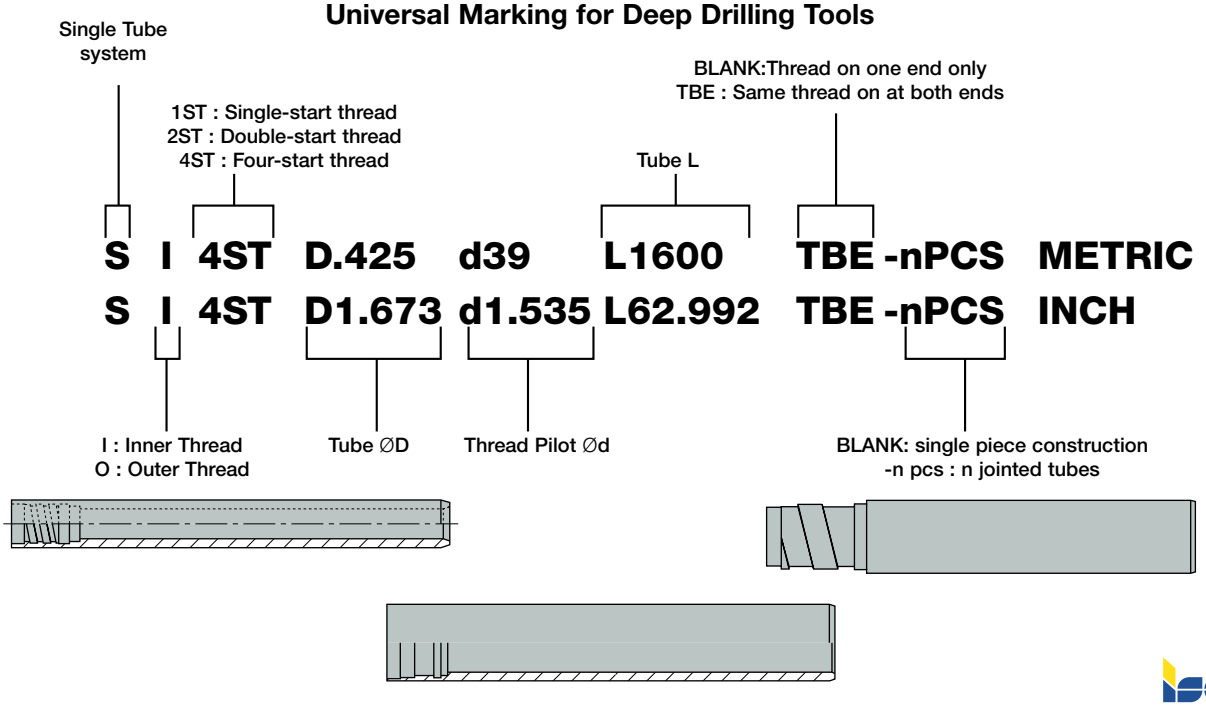


Designation	d Range	DCONMS	DCONWS	LSCWS	L min	L max
TS-00 L=(0-3350)MM	14.50-15.00	12.00	11.50	23.00	0.0	3350.0
TS-00 L=(661-1100)DEL	14.50-15.00	12.00	11.50	23.00	661.0	1100.0
TS-01 L=(0-3350)MM	15.01-15.50	12.00	11.80	23.00	0.0	3350.0
TS-01 L=(661-1100)DEL	15.01-15.50	12.00	11.80	23.00	661.0	1100.0
TS-02 L=(0-3350)MM	15.51-16.00	13.00	12.40	23.00	0.0	3350.0
TS-02 L=(661-1100)DEL	15.51-16.00	13.00	12.40	23.00	661.0	1100.0
TS-03 L=(0-3700)MM	16.01-16.50	13.00	12.70	23.00	0.0	3700.0
TS-04 L=(0-3700)MM	16.51-17.25	14.00	13.40	23.00	0.0	3700.0
TS-05 L=(0-3700)MM	17.26-18.00	14.00	13.70	23.00	0.0	3700.0
TS-06 L=(0-3700)MM	18.01-19.00	15.00	14.40	23.00	0.0	3700.0
TS-07 L=(0-3700)MM	19.01-19.99	16.50	15.40	23.00	0.0	3700.0
TS-08 L=(0-3700)MM	20.00-21.99	18.00	16.50	26.00	0.0	3700.0
TS-09 L=(0-3700)MM	22.00-24.99	20.00	19.00	26.00	0.0	3700.0
TS-010 L=(0-3700)MM	25.00-26.99	22.00	20.00	26.00	0.0	3700.0
TS-011 L=(0-1749)MM	27.00-29.99	24.00	22.00	26.00	0.0	1749.0
TS-011 L=(1750-2600)MM	27.00-29.99	24.00	22.00	26.00	1750.0	2600.0
TS-012 L=(0-3700)MM	30.00-31.99	26.00	24.00	26.00	0.0	3700.0
TS-013 L=(0-3700)MM	32.00-33.99	30.00	27.00	26.00	0.0	3700.0
TS-014 L=(0-3700)MM	34.00-36.99	30.00	27.00	41.00	0.0	3700.0
TS-015 L=(0-3700)MM	37.00-39.99	33.00	30.00	41.00	0.0	3700.0
TS-016 L=(0-3700)MM	40.00-43.99	36.00	33.00	41.00	0.0	3700.0
TS-017 L=(0-3700)MM	44.00-46.99	39.00	37.00	41.00	0.0	3700.0
TS-018 L=(0-3700)MM	47.00-51.99	43.00	41.00	41.00	0.0	3700.0
TS-019 L=(0-3700)MM	52.00-56.99	47.00	44.00	41.00	0.0	3700.0
TS-020 L=(0-3700)MM	57.00-60.99	51.00	49.00	41.00	0.0	3700.0
TS-021 L=(0-3700)MM	61.00-67.99	56.00	53.00	41.00	0.0	3700.0
TS-022 L=(0-2950)MM	68.00-74.99	62.00	59.00	41.00	0.0	2950.0
TS-023 L=(0-3700)MM	75.00-80.99	68.00	65.00	71.00	0.0	3700.0
TS-024 L=(0-3700)MM	81.00-90.99	75.00	71.00	71.00	0.0	3700.0
TS-025 L=(0-3700)MM	91.00-98.99	82.00	79.00	71.00	0.0	3700.0
TS-026 L=(0-3700)MM	99.00-110.99	94.00	90.00	71.00	0.0	3700.0
TS-027 L=(0-3700)MM	111.00-122.99	106.00	102.00	71.00	0.0	3700.0
TS-028 L=(0-3700)MM	123.00-134.99	118.00	114.00	71.00	0.0	3700.0
TS-029 L=(0-3700)MM	135.00-148.99	130.00	126.00	71.00	0.0	3700.0
TS-030 L=(0-3700)MM	149.00-161.99	142.00	139.00	71.00	0.0	3700.0
TS-031 L=(0-3700)MM	162.00-173.99	154.00	151.00	86.00	0.0	3700.0
TS-032 L=(0-3700)MM	174.00-185.99	166.00	163.00	86.00	0.0	3700.0
TS-033 L=(0-3700)MM	186.00-197.99	178.00	175.00	86.00	0.0	3700.0
TS-034 L=(0-3700)MM	198.00-209.99	190.00	187.00	86.00	0.0	3700.0
TS-035 L=(0-3700)MM	210.00-221.99	202.00	199.00	86.00	0.0	3700.0
TS-036 L=(0-3700)MM	222.00-233.99	214.00	211.00	86.00	0.0	3700.0
TS-037 L=(0-3700)MM	234.00-245.99	226.00	223.00	86.00	0.0	3700.0

• Indicate overall length (L) when ordering. • Ordering example: TS-036-L1100

For tools, see pages: DSD-IF-FB (201) • DSD-IF-FT (192) • DSTR-IC (258)

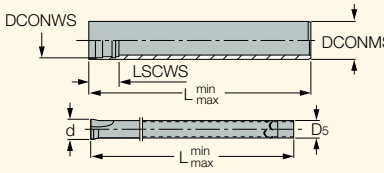
Universal Marking for Deep Drilling Tools



ISCARDEEPDRILL

TDO-I (D18.41-65.00)

Double Tube Drill System
with 4-Start Thread
Connection Outer Tubes

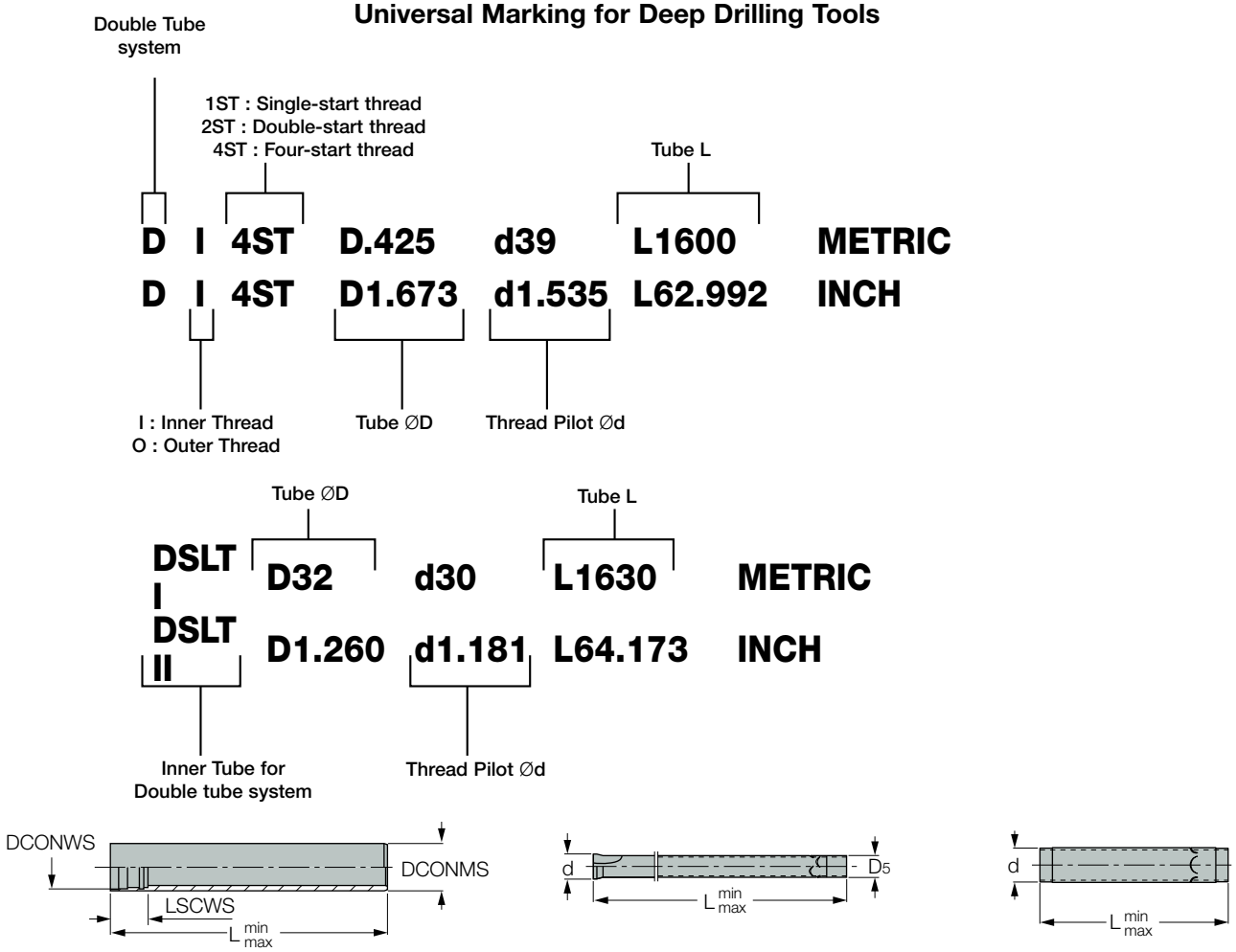


Designation	d Range	DCONMS	DCONWS	LSCWS	Int Tube	d	D5	L min	L max
TDO-I0 L=(0-3700)MM	18.41-20.00	18.00	16.00	27.50	TDI-N0	12.00	10.00	0.0	630.0
TDO-I1 L=(0-3700)MM	20.01-21.80	19.50	18.00	30.00	TDI-N1	14.00	12.00	0.0	630.0
TDO-I2 L=(0-3700)MM	21.81-24.10	21.50	19.50	30.00	TDI-N2	15.00	13.00	0.0	630.0
TDO-I3 L=(0-3700)MM	24.11-26.40	23.50	21.00	30.00	TDI-N3	16.00	14.00	0.0	630.0
TDO-I4 L=(0-3700)MM	26.41-28.70	26.00	23.50	33.00	TDI-N4	18.00	16.00	0.0	630.0
TDO-I5 L=(0-3700)MM	28.71-31.00	28.00	25.50	33.00	TDI-N5	20.00	18.00	0.0	630.0
TDO-I6 L=(0-3700)MM	31.01-33.30	30.50	28.00	33.00	TDI-N6	22.00	20.00	0.0	630.0
TDO-I7 L=(0-3700)MM	33.31-36.20	33.00	30.00	40.00	TDI-N7	24.00	22.00	0.0	630.0
TDO-I8 L=(0-3700)MM	36.21-39.60	35.50	33.00	40.00	TDI-N8	26.00	24.00	0.0	630.0
TDO-I9 L=(0-3700)MM	39.61-43.00	39.00	36.00	40.00	TDI-N9	29.00	27.00	0.0	630.0
TDO-I10 L=(0-3700)MM	43.01-47.00	42.50	39.00	40.00	TDI-N10	32.00	30.00	0.0	630.0
TDO-I11 L=(0-3700)MM	47.01-51.70	46.50	43.00	44.00	TDI-N11	35.00	32.00	0.0	630.0
TDO-I12 L=(0-3700)MM	51.71-56.20	51.00	47.00	44.00	TDI-N12	39.00	36.00	0.0	630.0
TDO-I13 L=(0-3700)MM	56.21-65.00	55.50	51.00	44.00	TDI-N13	43.00	40.00	0.0	630.0

• Please indicate overall length (L) when ordering • Ordering example: TDO-I13-L1100 • For 18.41-65.00 diameter range, the inner tube should be 30 mm longer than the outer tube

For tools, see pages: DDC-EA (246) • DDC-EC (249)

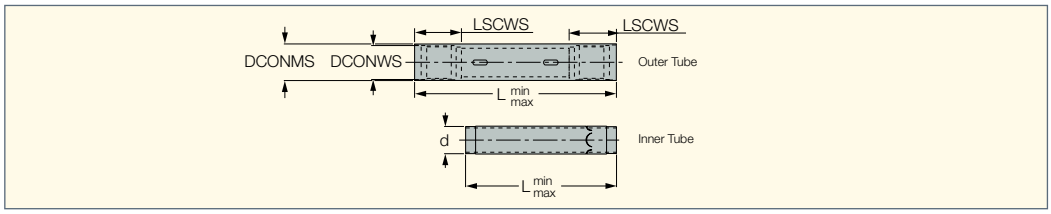
Universal Marking for Deep Drilling Tools



ISCARDEEPDRILL

TDO-I (D65.00-171.99)

Double Tube Drill System
with 4-Start Thread
Connection Outer Tubes



Designation	d Range	DCONMS	DCONWS	LSCWS	Int Tube	d	L min	L max
TDO-I14 L=(0-3700)MM	65.00-66.99	56.00	52.00	75.00	TDI-N14	40.00	0.0	660.0
TDO-I15 L=(0-2950)MM	67.00-72.99	62.00	58.00	75.00	TDI-N15	44.00	0.0	660.0
TDO-I16 L=(0-3700)MM	73.00-79.99	68.00	63.00	75.00	TDI-N16	48.00	0.0	630.0
TDO-I17 L=(0-3700)MM	80.00-86.99	75.00	70.00	97.00	TDI-N17	54.00	0.0	630.0
TDO-I18 L=(0-3700)MM	87.00-99.99	82.00	77.00	97.00	TDI-N18	60.00	0.0	630.0
TDO-I19 L=(0-3700)MM	100.00-111.99	94.00	89.00	97.00	TDI-N19	70.00	0.0	630.0
TDO-I20 L=(0-3700)MM	112.00-123.99	106.00	101.00	118.00	TDI-N20	80.00	0.0	630.0
TDO-I21 L=(0-630)MM	124.00-135.99	118.00	113.00	118.00	TDI-N21	80.00	0.0	630.0
TDO-I21 L=(631-1070)MM	124.00-135.99	118.00	113.00	118.00	TDI-N21	80.00	631.0	1070.0
TDO-I22 L=(0-630)MM	136.00-147.99	130.00	125.00	118.00	TDI-N22	90.00	0.0	630.0
TDO-I22 L=(631-1070)MM	136.00-147.99	130.00	125.00	118.00	TDI-N22	90.00	631.0	1070.0
TDO-I23 L=(0-630)MM	148.00-159.99	142.00	137.00	139.00	TDI-N23	100.00	0.0	630.0
TDO-I23 L=(631-1070)MM	148.00-159.99	142.00	137.00	139.00	TDI-N23	100.00	631.0	1070.0
TDO-I24 L=(0-630)MM	160.00-171.99	154.00	149.00	139.00	TDI-N24	120.00	0.0	630.0
TDO-I24 L=(631-1070)MM	160.00-171.99	154.00	149.00	139.00	TDI-N24	120.00	631.0	1070.0

• Indicate overall length (L) when ordering • Ordering example: TDO-I18-L1150 • For 65.00-123.99 diameter range, the inner tube should be 190 mm longer than the outer tube. • For 124.00-183.99 diameter range, the inner tube should be 220 mm longer than the outer tube.

For tools, see pages: DDC-EC (249) • DDD-EC (211)

Universal Marking for Deep Drilling Tools

Double Tube system

1ST : Single-start thread
2ST : Double-start thread
4ST : Four-start thread

Tube L

D	I	4ST	D.425	d39	L1600	METRIC
D	I	4ST	D1.673	d1.535	L62.992	INCH

I : Inner Thread
O : Outer Thread

Tube ØD

Thread Pilot Ød

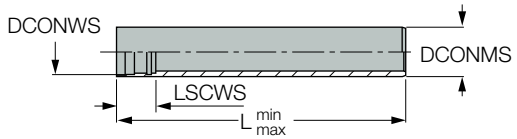
Tube ØD

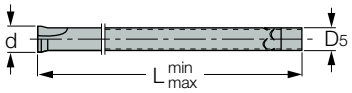
Tube L

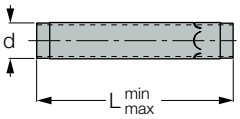
DSLT I	D32	d30	L1630	METRIC
DSLT II	D1.260	d1.181	L64.173	INCH

Inner Tube for Double tube system

Thread Pilot Ød







Recommended Machining Conditions

ISO	Material		Condition	Tensile Strength [N/mm²]	Hardness HB	Material Group No.(1)
P	Non-alloy steel and cast steel, free cutting steel	< 0.25 %C	Annealed	420	125	1
		>= 0.25 %C	Annealed	650	190	2
		< 0.55 %C	Quenched and tempered	850	250	3
		>= 0.55 %C	Annealed	750	220	4
			Quenched and tempered	1000	300	5
	Low alloy and cast steel (less than 5% of alloying elements)		Annealed	600	200	6
			Quenched and tempered	930	275	7
				1000	300	8
				1200	350	9
	High alloyed steel, cast steel and tool steel		Annealed	680	200	10
			Quenched and tempered	1100	325	11
	Stainless steel and cast steel		Ferritic/martensitic	680	200	12
			Martensitic	820	240	13
M	Stainless steel and cast steel		Austenitic, duplex	600	180	14
K	Grey cast iron (GG)		Ferritic/pearlitic		180	15
			Pearlitic/martensitic		260	16
	Nodular cast iron (GGG)		Ferritic		160	17
			Pearlitic		250	18
	Malleable cast iron		Ferritic		130	19
			Pearlitic		230	20
N	Aluminum-wrought alloys		Not hardenable		60	21
			Hardenable		100	22
	Aluminum-cast alloys	<=12% Si	Not hardenable		75	23
			Hardenable		90	24
		>12% Si	High temperature		130	25
	Copper alloys	>1% Pb	Free cutting		110	26
			Brass		90	27
			Electrolitic copper		100	28
	Non-metallic		Duroplastics, fiber plastics			29
			Hard rubber			30
S	High temp. alloys	Fe based	Annealed		200	31
			Hardened		280	32
		Ni or Co based	Annealed		250	33
			Hardened		350	34
			Cast		320	35
	Titanium alloys		Pure	400		36
			Alpha+beta alloys hardened	1050		37
H	Hardened steel		Hardened		55 HRC	38
			Hardened		60 HRC	39
	Chilled cast iron		Cast		400	40
	Cast iron		Hardened		55 HRC	41

(1) Based on ISO 513 and VDI 3323 standards

Ground Brazed Solid Drill Heads DSD-E0, DSD-E1, DSD-E3, DDD-E3, DSD-I1						Adjustable Solid Drill Heads DSD-IA, DSD-EA		
Dia. Range	**8.00-20.00**	**15.60-20.00**	**20.01-31.00**	**31.01-43.00**	**43.01-65.00**	**Dia. Range**	**16.01-21.99**	**22.00-28.50**
V_c (m/min)	**Feed Rate f (mm/rev)**					**V_c (m/min)**	**Feed Rate f (mm/rev)**	
70-120	0.05-0.13	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3	60-120	0.08-0.13	0.1-0.15
70-120	0.05-0.13	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3	60-120	0.08-0.13	0.1-0.15
40-70	0.05-0.13	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3	60-120	0.08-0.13	0.1-0.15
70-120	0.05-0.13	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3	60-120	0.08-0.13	0.1-0.15
55-100	0.05-0.1	0.08-0.12	0.1-0.15	0.13-0.17	0.15-0.28	50-100	0.08-0.11	0.1-0.13
70-100	0.05-0.13	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3	50-100	0.08-0.11	0.1-0.15
55-100	0.05-0.1	0.08-0.12	0.1-0.15	0.13-0.17	0.15-0.28	50-100	0.08-0.11	0.1-0.13
55-100	0.05-0.1	0.08-0.12	0.1-0.15	0.13-0.17	0.15-0.28	50-100	0.08-0.11	0.1-0.13
55-100	0.05-0.1	0.08-0.12	0.1-0.15	0.13-0.17	0.15-0.28	50-100	0.08-0.11	0.1-0.13
50-85	0.05-0.13	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3	60-120	0.08-0.13	0.1-0.15
55-100	0.05-0.1	0.08-0.12	0.1-0.15	0.13-0.17	0.15-0.28	50-100	0.08-0.11	0.1-0.13
60-100	0.05-0.13	0.08-0.15	0.1-0.28	0.13-0.3	0.16-0.35	40-80	0.08-0.13	0.1-0.15
60-100	0.05-0.13	0.08-0.15	0.1-0.28	0.13-0.3	0.16-0.35	40-80	0.08-0.13	0.1-0.15
60-100	0.05-0.12	0.05-0.12	0.08-0.25	0.1-0.28	0.15-0.33	30-60	0.05-0.11	0.08-0.14
80-100	0.05-0.13	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3	70-100	0.08-0.13	0.1-0.15
80-100	0.05-0.13	0.08-0.15	0.1-0.17	0.13-0.2	0.16-0.3	70-100	0.08-0.13	0.1-0.15
60-100	0.05-0.13	0.06-0.13	0.08-0.18	0.1-0.2	0.15-0.25	50-90	0.06-0.12	0.08-0.16
60-100	0.05-0.13	0.06-0.13	0.08-0.18	0.1-0.2	0.15-0.25	50-80	0.06-0.12	0.08-0.16
50-100	0.05-0.13	0.06-0.13	0.08-0.18	0.1-0.2	0.15-0.25	50-90	0.06-0.12	0.08-0.16
50-100	0.05-0.13	0.06-0.13	0.08-0.18	0.1-0.2	0.15-0.25	50-90	0.06-0.12	0.08-0.16
65-130	0.05-0.13	0.08-0.15	0.1-0.2	0.15-0.25	0.16-0.3	60-120	0.08-0.13	0.1-0.18
65-100	0.05-0.13	0.08-0.15	0.1-0.2	0.15-0.25	0.16-0.3	60-90	0.08-0.13	0.1-0.18
65-130	0.05-0.13	0.08-0.15	0.1-0.2	0.15-0.25	0.16-0.3	60-120	0.08-0.13	0.1-0.18
65-130	0.05-0.13	0.08-0.15	0.1-0.2	0.15-0.25	0.16-0.3	60-120	0.08-0.13	0.1-0.18
65-130	0.05-0.13	0.08-0.15	0.1-0.2	0.15-0.25	0.16-0.3	60-120	0.08-0.13	0.1-0.18
65-130	0.05-0.13	0.08-0.15	0.1-0.2	0.15-0.25	0.16-0.3	60-120	0.08-0.13	0.1-0.18
65-130	0.05-0.13	0.08-0.15	0.1-0.2	0.15-0.25	0.16-0.3	60-120	0.08-0.13	0.1-0.18
65-130	0.05-0.13	0.08-0.15	0.1-0.2	0.15-0.25	0.16-0.3	60-120	0.08-0.13	0.1-0.18
10-50	0.05-0.12	0.06-0.12	0.08-0.15	0.12-0.18	0.15-0.25	20-50	0.06-0.11	0.08-0.14
10-50	0.05-0.12	0.06-0.12	0.08-0.15	0.12-0.18	0.15-0.25	20-50	0.06-0.11	0.08-0.14
10-50	0.05-0.12	0.06-0.12	0.08-0.15	0.12-0.18	0.15-0.25	20-50	0.06-0.11	0.08-0.14
10-50	0.05-0.12	0.06-0.12	0.08-0.15	0.12-0.18	0.15-0.25	20-50	0.06-0.11	0.08-0.14
10-50	0.05-0.12	0.06-0.12	0.08-0.15	0.12-0.18	0.15-0.25	20-50	0.06-0.11	0.08-0.14
30-50	0.05-0.1	0.05-0.1	0.08-0.12	0.1-0.15	0.12-02	20-50	0.05-0.09	0.08-0.11
30-50	0.05-0.1	0.05-0.1	0.08-0.12	0.1-0.15	0.12-0.2	20-50	0.05-0.09	0.08-0.11

Recommended Machining Conditions

ISO	Material		Condition	Tensile Strength [N/mm²]	Hardness HB	Material Group No.(1)
P	Non-alloy steel and cast steel, free cutting steel	< 0.25 %C	Annealed	420	125	1
		>= 0.25 %C	Annealed	650	190	2
		< 0.55 %C	Quenched and tempered	850	250	3
		>= 0.55 %C	Annealed	750	220	4
			Quenched and tempered	1000	300	5
	Low alloy and cast steel (less than 5% of alloying elements)		Annealed	600	200	6
			Quenched and tempered	930	275	7
				1000	300	8
				1200	350	9
	High alloyed steel, cast steel and tool steel		Annealed	680	200	10
			Quenched and tempered	1100	325	11
	Stainless steel and cast steel		Ferritic/martensitic	680	200	12
			Martensitic	820	240	13
M	Stainless steel and cast steel		Austenitic, duplex	600	180	14
K	Grey cast iron (GG)		Ferritic/pearlitic		180	15
			Pearlitic/martensitic		260	16
	Nodular cast iron (GGG)		Ferritic		160	17
			Pearlitic		250	18
	Malleable cast iron		Ferritic		130	19
			Pearlitic		230	20
N	Aluminum-wrought alloys		Not hardenable		60	21
			Hardenable		100	22
	Aluminum-cast alloys	<=12% Si	Not hardenable		75	23
			Hardenable		90	24
		>12% Si	High temperature		130	25
	Copper alloys	>1% Pb	Free cutting		110	26
			Brass		90	27
			Electrolitic copper		100	28
	Non-metallic		Duroplastics, fiber plastics			29
			Hard rubber			30
S	High temp. alloys	Fe based	Annealed		200	31
			Hardened		280	32
		Ni or Co based	Annealed		250	33
			Hardened		350	34
			Cast		320	35
	Titanium alloys		Pure	400		36
			Alpha+beta alloys hardened	1050		37
H	Hardened steel		Hardened		55 HRC	38
			Hardened		60 HRC	39
	Chilled cast iron		Cast		400	40
	Cast iron		Hardened		55 HRC	41

(1) Based on ISO 513 and VDI 3323 standards

Adjustable Solid Drill Heads DSD-EC, DDD-EC, DSD-IC					
Dia. Range	**38.00-39.99**	**40.00-51.99**	**52.00-63.99**	**64.00-84.99**	**85.00-**
V_c (m/min)	**Feed Rate f (mm/rev)**				
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-100	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-100	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
50-100	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
50-100	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-120	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-110	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-110	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-110	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
60-100	0.08-0.13	0.1-0.15	0.13-0.18	0.15-0.2	0.18-0.23
60-100	0.08-0.13	0.1-0.15	0.13-0.18	0.15-0.2	0.18-0.23
60-100	0.08-0.13	0.1-0.15	0.13-0.18	0.15-0.2	0.18-0.23
60-100	0.08-0.13	0.1-0.15	0.13-0.18	0.15-0.2	0.18-0.23
60-100	0.08-0.13	0.1-0.15	0.13-0.18	0.15-0.2	0.18-0.23
60-100	0.08-0.13	0.1-0.15	0.13-0.18	0.15-0.2	0.18-0.23
60-130	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
60-130	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
60-130	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
60-130	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
60-130	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
60-130	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
60-130	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
60-130	0.08-0.2	0.1-0.25	0.13-0.28	0.15-0.3	0.18-0.33
20-65	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
20-65	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
20-65	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
20-65	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
20-65	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
30-100	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3
30-100	0.08-0.15	0.1-0.2	0.13-0.23	0.15-0.25	0.18-0.3

Recommended Machining Conditions

ISO	Material		Condition	Tensile Strength [N/mm²]	Hardness HB	Material Group No.(1)
P	Non-alloy steel and cast steel, free cutting steel	< 0.25 %C	Annealed	420	125	1
		>= 0.25 %C	Annealed	650	190	2
		< 0.55 %C	Quenched and tempered	850	250	3
		>= 0.55 %C	Annealed	750	220	4
			Quenched and tempered	1000	300	5
	Low alloy and cast steel (less than 5% of alloying elements)		Annealed	600	200	6
			Quenched and tempered	930	275	7
				1000	300	8
				1200	350	9
	High alloyed steel, cast steel and tool steel		Annealed	680	200	10
			Quenched and tempered	1100	325	11
	Stainless steel and cast steel		Ferritic/martensitic	680	200	12
			Martensitic	820	240	13
M	Stainless steel and cast steel		Austenitic, duplex	600	180	14
K	Grey cast iron (GG)		Ferritic/pearlitic		180	15
			Pearlitic/martensitic		260	16
	Nodular cast iron (GGG)		Ferritic		160	17
			Pearlitic		250	18
	Malleable cast iron		Ferritic		130	19
			Pearlitic		230	20
N	Aluminum-wrought alloys		Not hardenable		60	21
			Hardenable		100	22
	Aluminum-cast alloys	<=12% Si	Not hardenable		75	23
			Hardenable		90	24
		>12% Si	High temperature		130	25
	Copper alloys	>1% Pb	Free cutting		110	26
			Brass		90	27
			Electrolitic copper		100	28
	Non-metallic		Duroplastics, fiber plastics			29
			Hard rubber			30
S	High temp. alloys	Fe based	Annealed		200	31
			Hardened		280	32
		Ni or Co based	Annealed		250	33
			Hardened		350	34
			Cast		320	35
	Titanium alloys		Pure	400		36
			Alpha+beta alloys hardened	1050		37
H	Hardened steel		Hardened		55 HRC	38
			Hardened		60 HRC	39
	Chilled cast iron		Cast		400	40
	Cast iron		Hardened		55 HRC	41

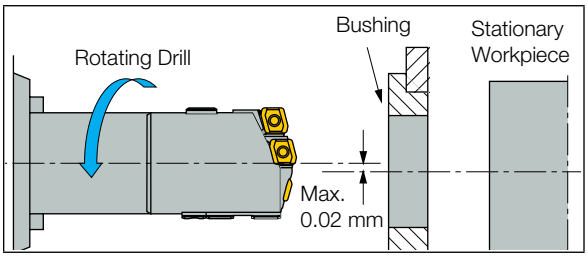
(1) Based on ISO 513 and VDI 3323 standards

Adjustable Counterboring Heads DSC-EA, DSC-EC, DSC-I1, DST-I1, DSC-IA, DSC-IC, DDC-EA, DDT-E1				Trepanning Heads		Ground Brazed Counterboring Heads DSC-E1, DST-E1, DSC-I1, DST-I1, DDC-E1		
Width of Cut (mm)	1-3	3-8	8-23	Dia. Range	120-400	Width of Cut (mm)	1-3	3-5
V_c (m/min)	Feed Rate f (mm/rev)			V_c (m/min)	Feed Rate f (mm/rev)	V_c (m/min)	Feed Rate f (mm/rev)	
60-140	0.1-0.3	0.15-0.3	0.1-0.3	80-100	0.12-0.3	60-140	0.1-0.3	0.15-0.3
60-120	0.1-0.3	0.15-0.3	0.1-0.3	80-100	0.12-0.3	60-120	0.1-0.3	0.15-0.3
60-120	0.1-0.3	0.15-0.3	0.1-0.3	80-100	0.12-0.3	60-120	0.1-0.3	0.15-0.3
50-100	0.1-0.3	0.15-0.3	0.1-0.3	80-100	0.12-0.3	50-100	0.1-0.3	0.15-0.3
50-100	0.1-0.3	0.15-0.3	0.1-0.3	80-100	0.12-0.3	50-100	0.1-0.3	0.15-0.3
60-130	0.1-0.3	0.15-0.3	0.1-0.3	70-100	0.12-0.3	60-130	0.1-0.3	0.15-0.3
60-120	0.1-0.3	0.15-0.3	0.1-0.3	70-100	0.12-0.3	60-120	0.1-0.3	0.15-0.3
60-100	0.1-0.3	0.15-0.3	0.1-0.3	60-100	0.12-0.3	60-100	0.1-0.3	0.15-0.3
60-100	0.1-0.3	0.15-0.3	0.1-0.3	60-100	0.12-0.3	60-100	0.1-0.3	0.15-0.3
50-100	0.1-0.3	0.15-0.3	0.1-0.3	70-100	0.12-0.3	50-100	0.1-0.3	0.15-0.3
60-100	0.1-0.3	0.15-0.3	0.1-0.3	60-100	0.12-0.3	60-100	0.1-0.3	0.15-0.3
60-100	0.1-0.3	0.15-0.3	0.1-0.3	50-90	0.12-0.3	60-100	0.1-0.3	0.15-0.3
60-100	0.1-0.3	0.15-0.3	0.1-0.3	50-90	0.12-0.3	60-100	0.1-0.3	0.15-0.3
60-100	0.1-0.3	0.15-0.3	0.1-0.3	50-90	0.12-0.3	60-100	0.1-0.3	0.15-0.3
60-120	0.1-0.3	0.15-0.3	0.1-0.3	80-100	0.12-0.3	60-120	0.1-0.3	0.15-0.3
50-120	0.1-0.3	0.15-0.3	0.1-0.3	60-100	0.12-0.3	50-120	0.1-0.3	0.15-0.3
60-120	0.1-0.3	0.15-0.3	0.1-0.3	50-100	0.12-0.3	60-120	0.1-0.3	0.15-0.3
60-120	0.1-0.3	0.15-0.3	0.1-0.3	50-100	0.12-0.3	60-120	0.1-0.3	0.15-0.3
60-120	0.1-0.3	0.15-0.3	0.1-0.3	80-100	0.12-0.3	60-120	0.1-0.3	0.15-0.3
60-120	0.1-0.3	0.15-0.3	0.1-0.3	80-100	0.12-0.3	60-120	0.1-0.3	0.15-0.3
70-200	0.1-0.4	0.15-0.3	0.1-0.3	65-130	0.1-0.3	70-200	0.1-0.4	0.15-0.3
60-200	0.1-0.4	0.1-0.4	0.1-0.4	65-130	0.1-0.3	60-200	0.1-0.4	0.1-0.4
60-200	0.1-0.4	0.1-0.4	0.1-0.4	65-130	0.1-0.3	60-200	0.1-0.4	0.1-0.4
60-200	0.1-0.4	0.1-0.4	0.1-0.4	65-130	0.1-0.3	60-200	0.1-0.4	0.1-0.4
60-200	0.1-0.4	0.1-0.4	0.1-0.4	65-130	0.1-0.3	60-200	0.1-0.4	0.1-0.4
60-200	0.1-0.4	0.1-0.4	0.1-0.4	65-130	0.1-0.3	60-200	0.1-0.4	0.1-0.4
60-200	0.1-0.4	0.1-0.4	0.1-0.4	65-130	0.1-0.3	60-200	0.1-0.4	0.1-0.4
60-200	0.1-0.4	0.1-0.4	0.1-0.4	65-130	0.1-0.3	60-200	0.1-0.4	0.1-0.4
40-80	0.1-0.3	0.15-0.3	0.1-0.3	20-65	0.1-0.2	40-80	0.1-0.3	0.15-0.3
40-80	0.1-0.3	0.15-0.3	0.1-0.3	20-65	0.1-0.2	40-80	0.1-0.3	0.15-0.3
40-80	0.1-0.3	0.15-0.3	0.1-0.3	20-65	0.1-0.2	40-80	0.1-0.3	0.15-0.3
40-80	0.1-0.3	0.15-0.3	0.1-0.3	20-65	0.1-0.2	40-80	0.1-0.3	0.15-0.3
40-80	0.1-0.3	0.15-0.3	0.1-0.3	20-65	0.1-0.2	40-80	0.1-0.3	0.15-0.3
60-100	0.1-0.3	0.15-0.3	0.1-0.3	30-100	0.1-0.2	60-100	0.1-0.3	0.15-0.3
60-100	0.1-0.3	0.15-0.3	0.1-0.3	30-100	0.1-0.2	60-100	0.1-0.3	0.15-0.3

Technical Information - Drill Setup

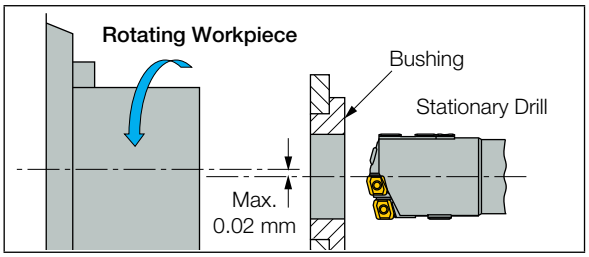
Rotating Drill

- Can be applied on symmetrical and non-symmetrical workpieces
- Drill to bushing center misalignment should not exceed 0.02 mm



Stationary Drill

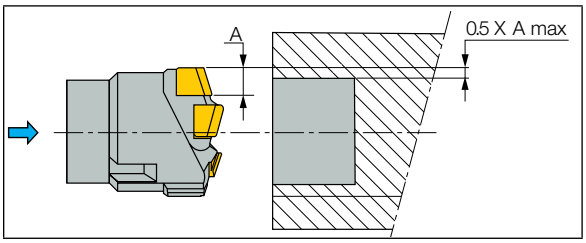
- Applied on symmetrical workpieces
- Improved hole straightness and bushing wear
- Drill to bushing center misalignment should not exceed 0.02 mm

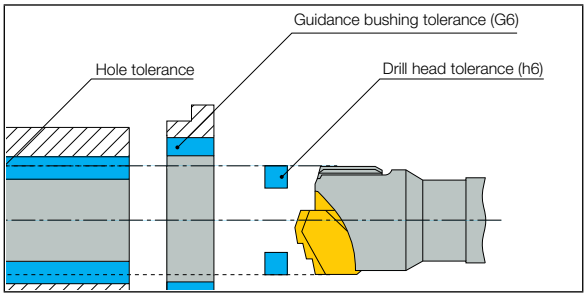


Drill Bushing and Workpiece Tolerance Relative Positioning

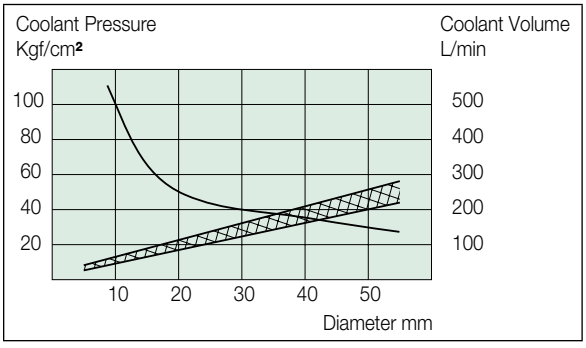
Pre-drilled Hole

A large pre-drilled hole (larger than D-a) ensures precise hole size and center location.

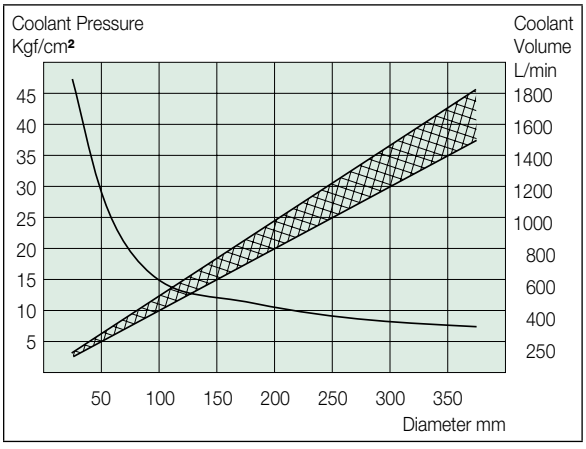




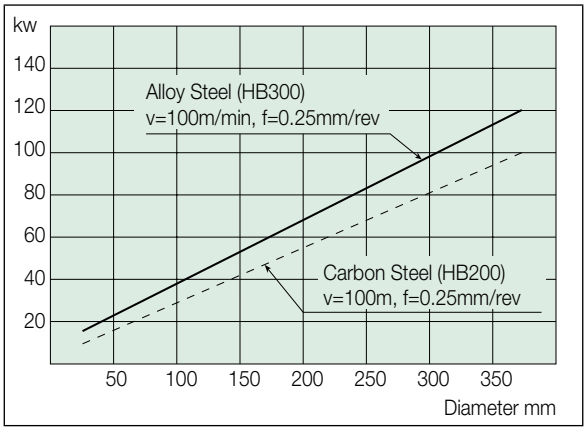
Recommended Coolant Pressure and Volume ≤50 mm



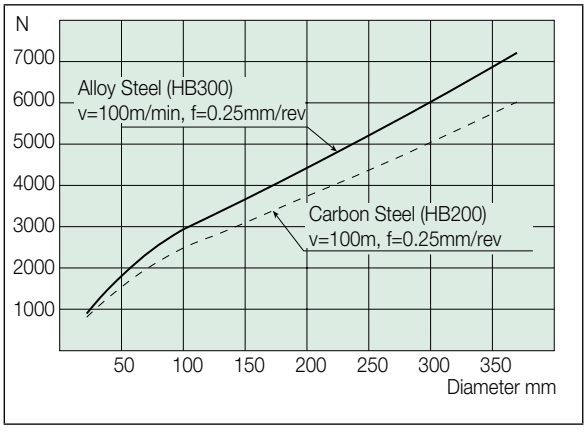
Recommended Coolant Pressure and Volume >50 mm



Machine Power

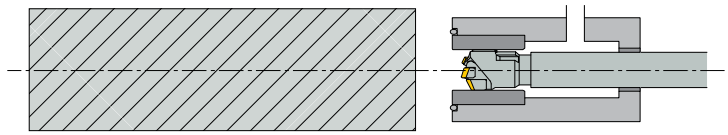


Machine Thrust Force

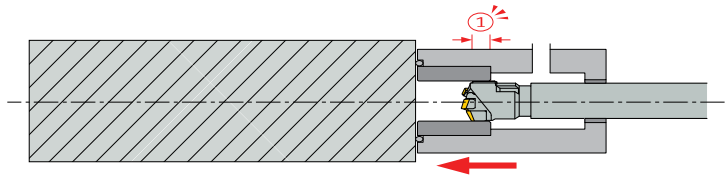


Technical Information - NC Cycle

Use the NC cycle as instructed below to optimize tool performance more safely.

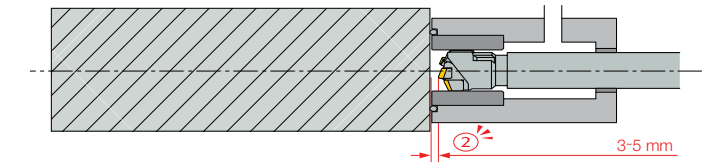


1. Start NC operation cycle



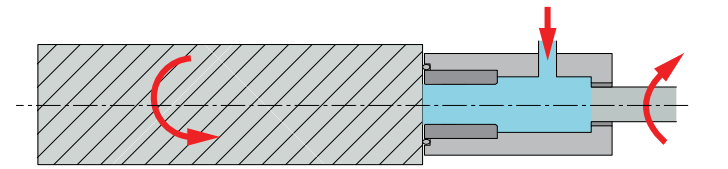
2. Oil pressure head moves until it touches the workpiece

① Set the starting point of the main axis of the tool so that the guide pad remains inside the guide bush when the oil pressure head moves forward.



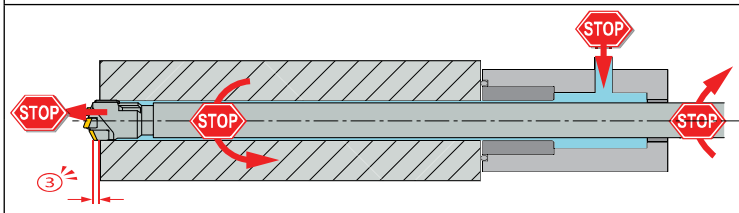
3. Move tool workpiece

② Move the tool 3 to 5 mm from the edge of the workpiece.
If the available NC machine can support this approach, the operation process may start from this point



4. Start cutting

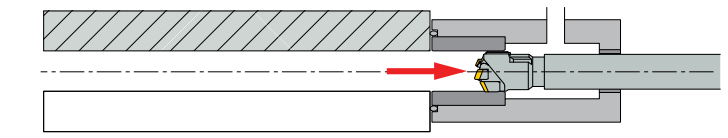
- Start coolant supply
- Start rotating (tool / workpiece / tool & workpiece)
- Start feeding



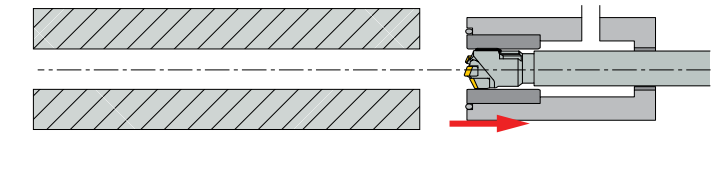
5. Stop cutting

- Stop feeding
- Stop rotating (tool / workpiece tool & workpiece)
- Stop coolant supply

③ Stop rotation when the outer tip is at the edge of the workpiece.



6. Tool main axis back to starting point

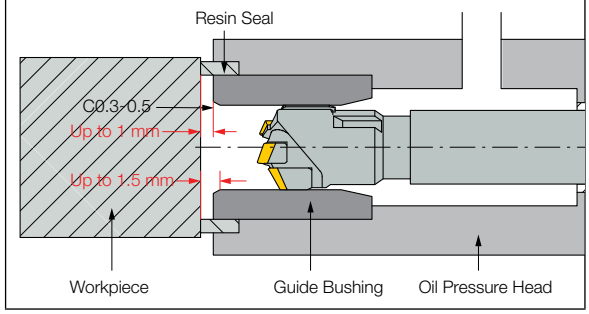


7. Oil pressure head back to starting point

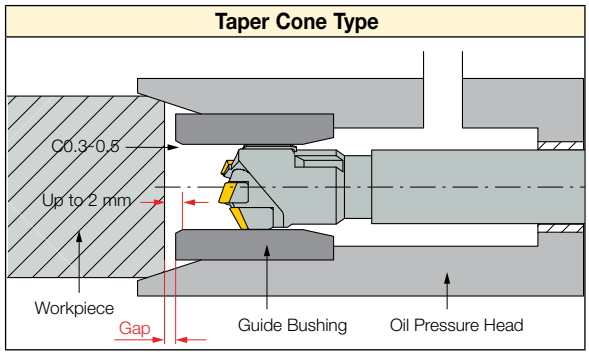
Technical Information - Notes for Guide Bushing Installation

Many of the problems in BTA drilling are caused by incorrect use of the guide bushing.
The shape, type and tolerance greatly affect cutting accuracy and tool life. Please note the following when using one in your application.

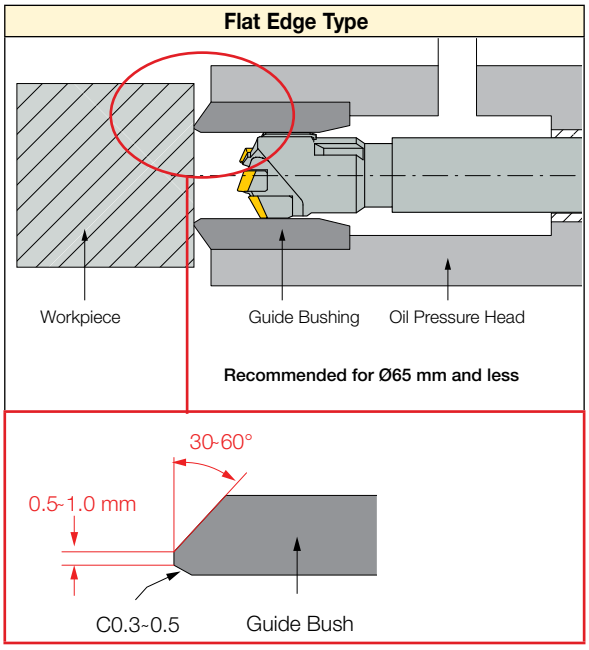
Resin Seal Type



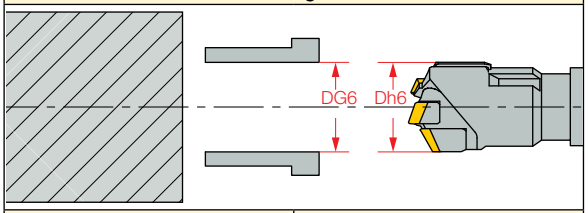
Taper Cone Type



Flat Edge Type



Guide Bushing Tolerance



Tool Diameter D (mm)	G6 Tolerance (mm)
8.00 - 10.00	+0.005 ~ +0.014
10.01 - 18.00	+0.006 ~ +0.017
18.01 - 30.00	+0.007 ~ +0.020
30.01 - 50.00	+0.009 ~ +0.025
50.01 - 80.00	+0.010~ +0.029
80.01 - 120.00	+0.012 ~ +0.034
120.01 - 180.00	+0.014 ~ +0.039
180.01 - 245.99	+0.015 ~ +0.044

Deep Hole Drilling Systems

Problem	Possible Cause	Solution
The drill breaks or insert chips	• Chip evacuation problems • Center misalignment of drill to workpiece	• Check that the coolant passages are clear and that the Venturi slots are not damaged • Check center alignment of drill to workpiece • Check workpiece and drill clamping rigidity
Poor surface finish	• Workpiece or drill clamping rigidity problem • Inadequate coolant oil • Cutting speed too low	• Improve workpiece or drill clamping • Check the coolant oil and replace if necessary • Increase the cutting speed
Excessive leakage of the coolant	• Chips block the fluid passages • The drill was incorrectly assembled, or the Venturi slots of the internal tube are located in the wrong direction	• Clear the chips • Check all connections and the direction of the internal tube
Insufficient coolant flow at the cutting zone, despite correct fluid supply	• Chips block the fluid passages • Worn bushing or sealing device • Venturi slots are too wide (worn) • Internal tube shorter than the external tube	• Clear the chips • Check the bushing and seal and replace if necessary • Replace the internal tube • Replace the internal tube to one with a correct length
Chips jam in the front end of the drill	• Insufficient coolant flow	• Adjust the fluid flow by raising the pressure; check the filter and fluid quality

Connection Adapters

Various kinds of rotating and non-rotating drill connectors are available upon request.

Oil Pressure Heads

Oil pressure heads are available on request.

Special Heads

Special form heads for trepanning or any other special contours can be produced on request.

Coolant

Successful deep hole drilling is achieved by an optimal combination of the tool, the machine and the coolant. Coolant plays an essential role in achieving secure and cost-efficient deep hole drilling operations. Therefore, it is very important to choose the correct type of coolant and use it appropriately.

Coolant

Coolant plays an essential role in lubricating tools, cooling cutting edges, chips and guide pads, as well as evacuating chips when drilling. It also improves tool life, surface finish and cutting accuracy when continuously supplied during the machining process.

1 Lubrication

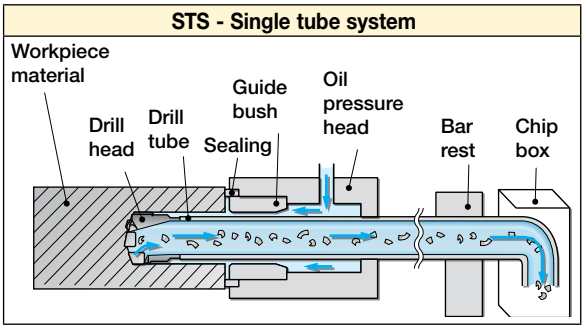
Lubrication of cutting edges and guide pads is necessary in deep hole drilling. For efficient lubrication, it is recommended to use EP (Extreme Pressure) additives which contain sulfur or chlorine.

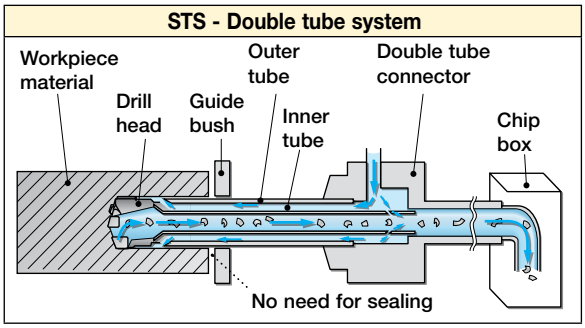
2 Temperature reduction

The ability to cool down the cutting edge and chips depends on such characteristics as thermal conductivity and relative heat. Coolant with good cooling ability increases tool life, but water-soluble coolant is not preferred in deep hole drilling because it reduces effectiveness. If water-soluble coolant is used, the recommended concentration is 10% (dilution rate 1/10) or more.

3 Chip evacuation

Coolant helps push chips through the back end of the boring bar (for STS) or inner tube (for DTS) until the chips are separated from the workpiece in general cutting conditions. The flow and the pressure of coolant are also important in order to control chip evacuation.





Coolant unit

A coolant unit is also important to obtain the best effect from the coolant.

1 Coolant pressure and volume should be fixed and continuous.

An ideal coolant unit should be able to set any valve of coolant pressure and volume and monitor the condition with gauges. A system that can detect trapped chips by a pressure gauge and the screw pumps with an inverter controller are both recommended.

2 Coolant temperature should be maintained.

Coolant is heated by factors, such as:

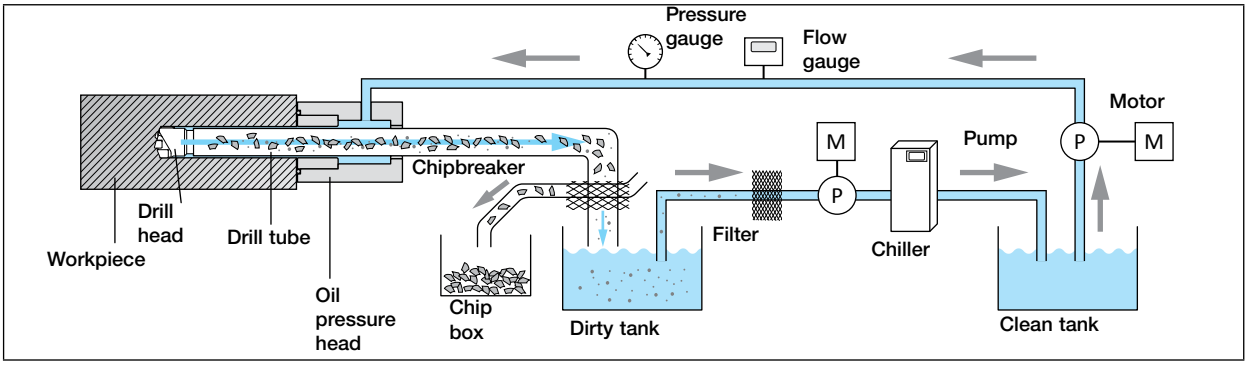
- Cutting edge
- Friction on guide pad
- Contact time of heated chips and coolant
- Pump

Maintaining coolant temperature is important to keeping stable cutting conditions, chip formation and cutting accuracy. The temperature should be lower than 40°C (100°F) for EP additives to provide sufficient lubrication. Therefore, the coolant temperature should be kept between 30 - 40°C (90 - 100°F) throughout the cutting operation.

3 Filtering

Unwanted particles are contained in coolant after the cutting operations, thus filtration is necessary to remove them. The filter size should be selected carefully to catch particles but not EP additives. Filter size depends on the coolant, but around 10 - 20 µm is generally suggested. For iron-based workpieces, a magnetic separator is helpful as it decreases the frequency of filter maintenance.

Flow chart of coolant in deep hole drilling



Requested Information Form for Deep Hole Drill Design

Company name _____ **Telephone no.** _____

Address _____ **Date** _____

Contact person _____ **Customer no.** _____

Workpiece

Product name: _____ Hole diameter: _____

Hole depth: _____ No. of holes: _____ Tolerance (of hole): _____

Surface finish (Rz, Ra...): _____ Deviation (mm/100): _____ Straightness (mm/100): _____

Material

Material (DIN, AISI, JIS...): _____

Hardness (HB, HS, HRC...): _____

Condition: ☐ Quenched ☐ Tempered ☐ Cast ☐ Annealed

☐ Other _____

Machine

Machine supplier name: _____

Machine type/model: ☐ NC lathe ☐ Machining center ☐ Other _____

Rigidity: ☐ Good ☐ Normal ☐ Poor

Spindle power (kW): _____

Tool and/or workpiece rotation (TR/WR):

☐ Tool and workpiece ☐ Rotating workpiece (WR) ☐ Rotating tool (TR)

Type of Coolant

Water based: ☐ Soluble ☐ Emulsion _____%

Oil based: ☐ Coolant Pressure (bar): _____ Coolant Volume (L/min): _____

Tool Drill Head

Drill diameter: _____ (mm/inch)

Thread: ☐ Inner ☐ Outer ☐ Brazed

Indexable: ☐ Adjustable ☐ Direct mount Coating: ☐ Coated ☐ Uncoated

☐ Solid drilling ☐ Counterboring

Pre-drilled hole size: _____ (mm/inch)

Bottom finishing: ☐ Full ball R ☐ Flat bottom R ☐ Corner R ☐ Other _____

Trepanning: ☐ Y ☐ N

Tube outer diameter: _____ (mm/inch) Core size diameter: _____ (mm/inch)

Please fill in and return to your **ISCAR** representative.

Requested Information Form for Deep Hole Drill Design (continued)

Tube

Outside diameter: _____ (mm/inch) Total Length: _____ (mm/inch)

Internal Thread: _____

External Thread: 4 ☐ Starts 2 ☐ Starts 1 ☐ Starts

Tube Thread: 1 ☐ End ☐ Both ends

Inner Tube Length: _____ (mm/inch)

Inner Tube Slit: 1 ☐ End ☐ Both ends

Drilling System & Boring Conditions

☐ Single Tube System: ☐ Blind Hole Drilling ☐ Double Tube System

☐ Cross Hole Drilling: ☐ Through Hole Drilling

Please Sketch Your Drilling Application

General Production Information

Quantity of parts per year: _____

Grade, tool life, etc.: _____

Perfomance expectation: V_c= _____ m/min N= _____ RPM F= _____ mm/min f= _____ mm/rev

Cutting data: _____

Description of present system in use: _____

Please fill in and return to your **ISCAR** representative.

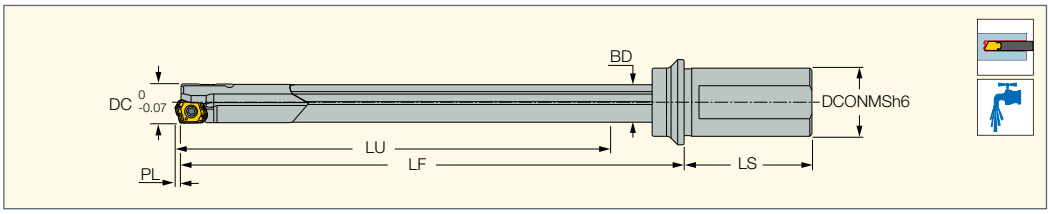
GUNDRILLS

TABLE OF CONTENTS

TRIDEEP DEEP DRILLING

GD-DH (12-13.5)

Gundrills Carrying Indexable Inserts with 2 Chip Splitting Cutting Edges and a Wiper for High Hole Surface Quality



Designation	DC	LF	PL	LU	DCONMS	BD	LS	Insert
GD-DH 12.00-M20-15D-06	12.00	225.00	1.800	196.80	20.00	11.50	50.0	LOGT 06..
GD-DH 12.00-M20-20D-06	12.00	280.00	1.800	251.80	20.00	11.50	50.0	LOGT 06..
GD-DH 12.00-M20-25D-06	12.00	343.00	1.800	314.80	20.00	11.50	50.0	LOGT 06..
GD-DH 12.50-M20-15D-06	12.50	226.00	1.800	196.80	20.00	12.00	50.0	LOGT 06..
GD-DH 12.50-M20-20D-06	12.50	291.00	1.800	261.80	20.00	12.00	50.0	LOGT 06..
GD-DH 12.50-M20-25D-06	12.50	356.00	1.800	326.80	20.00	12.00	50.0	LOGT 06..
GD-DH 13.00-M25-15D-06	13.00	238.00	1.800	204.80	25.00	12.50	56.0	LOGT 06..
GD-DH 13.00-M25-20D-06	13.00	305.00	1.800	271.80	25.00	12.50	56.0	LOGT 06..
GD-DH 13.00-M25-25D-06	13.00	373.00	1.800	339.80	25.00	12.50	56.0	LOGT 06..
GD-DH 13.50-M25-15D-06	13.50	245.00	1.800	211.80	25.00	13.00	56.0	LOGT 06..
GD-DH 13.50-M25-20D-06	13.50	315.00	1.800	281.80	25.00	13.00	56.0	LOGT 06..

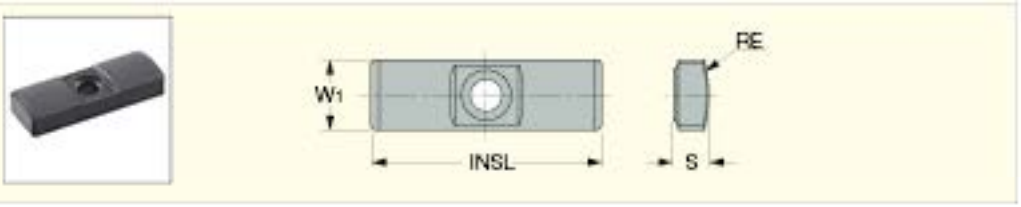
- Note: Gundrills can be supplied with up to 2400 mm length on request. • Inserts and guide pads should be ordered separately (they are not included with the tools).
- For user guide and cutting conditions, see pages 289-292 • Preventative measures: Do NOT operate the deep hole drill at full speed before engaging the guide hole.

Enter the guide hole slowly at a speed of 50 - 100 rpm.

For inserts, see pages: LOGT (288)

GPS

Deep Drilling Solid Carbide Guide Pads

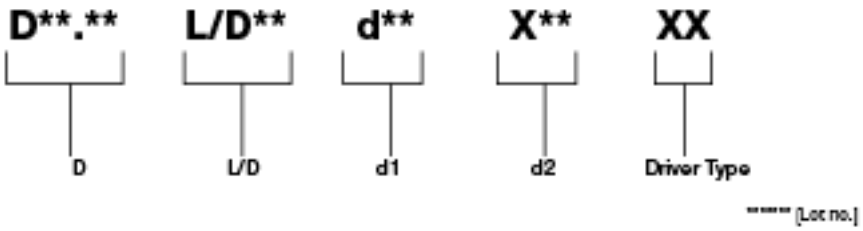


Designation	Dimensions W1	RE	INSL	S	IC908
GPS-04-16-055	4.0	5.50	16.00	2.0	•

Spare Parts

Designation	Guide Pad Screw	Guide Pad Key	N*m
GPS-04-16-055	TS 20043FHS-P M2X0.4	Wrench IP-6/5	0.65

Universal Marking for Deep Drilling Tools

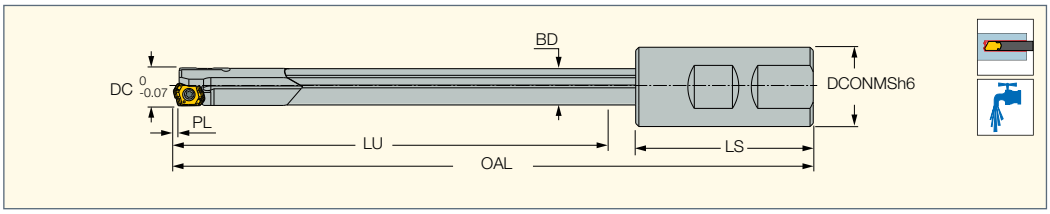


Example:
Metric: D14.00 L/D15 d25X56M
Inch: D0.551 L/D15 d0.984X2.205M
*****

TRIDEEP DEEP DRILLING

GD-DHL

Gundrills Carrying Indexable Inserts with 2 Chip Splitting Cutting Edges and a Wiper for High Hole Surface Quality



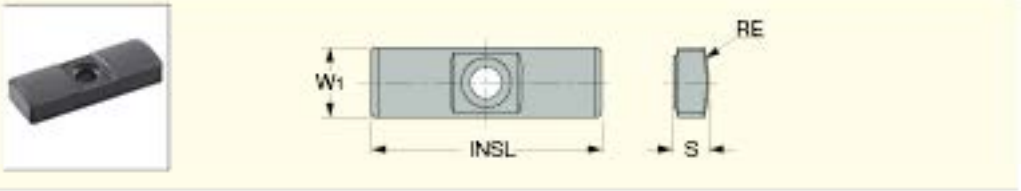
Designation	DC	LU	OAL	DCONMS	BD	PL	LS	Insert
GD-DHL 12.00X800-U03	12.00	713.80	801.80	19.05	11.50	1.80	70.0	LOGT 06..
GD-DHL 12.00X800-22	12.00	733.80	801.80	20.00	11.50	1.80	50.0	LOGT 06..
GD-DHL 12.00X800-34	12.00	733.80	801.80	20.00	11.50	1.80	50.0	LOGT 06..
GD-DHL 12.00X1000-U03	12.00	913.80	1001.80	19.05	11.50	1.80	70.0	LOGT 06..
GD-DHL 12.00X1000-22	12.00	933.80	1001.80	20.00	11.50	1.80	50.0	LOGT 06..
GD-DHL 12.00X1000-34	12.00	933.80	1001.80	20.00	11.50	1.80	50.0	LOGT 06..
GD-DHL 12.00X1650-U03	12.00	1563.80	1651.80	19.05	11.50	1.80	70.0	LOGT 06..
GD-DHL 12.00X1650-22	12.00	1583.80	1651.80	20.00	11.50	1.80	50.0	LOGT 06..
GD-DHL 12.00X1650-34	12.00	1583.80	1651.80	20.00	11.50	1.80	50.0	LOGT 06..
GD-DHL 13.00X800-U04	13.00	711.80	801.80	25.40	12.50	1.80	70.0	LOGT 06..
GD-DHL 13.00X800-23	13.00	725.80	801.80	25.00	12.50	1.80	56.0	LOGT 06..
GD-DHL 13.00X800-35	13.00	725.80	801.80	25.00	12.50	1.80	56.0	LOGT 06..
GD-DHL 13.00X1000-U04	13.00	911.80	1001.80	25.40	12.50	1.80	70.0	LOGT 06..
GD-DHL 13.00X1000-23	13.00	925.80	1001.80	25.00	12.50	1.80	56.0	LOGT 06..
GD-DHL 13.00X1000-35	13.00	925.80	1001.80	25.00	12.50	1.80	56.0	LOGT 06..
GD-DHL 13.00X1650-U04	13.00	1561.80	1651.80	25.40	12.50	1.80	70.0	LOGT 06..
GD-DHL 13.00X1650-23	13.00	1575.80	1651.80	25.00	12.50	1.80	56.0	LOGT 06..
GD-DHL 13.00X1650-35	13.00	1575.80	1651.80	25.00	12.50	1.80	56.0	LOGT 06..

• Note: Gundrills can be supplied with up to 2400 mm length on request. • Inserts and guide pads should be ordered separately (they are not included with the tools).
• For user guide and cutting conditions, see pages 289-292 • Preventative measures: Do NOT operate the deep hole drill at full speed before engaging the guide hole. Enter the guide hole slowly at a speed of 50 - 100 rpm.

For inserts, see pages: LOGT (288)

GPS

Deep Drilling Solid Carbide Guide Pads

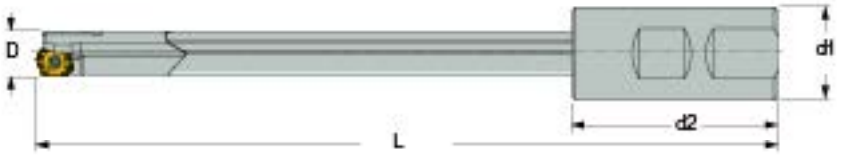


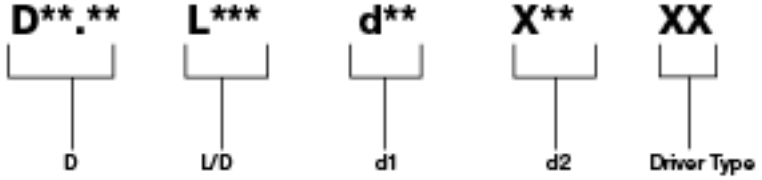
Designation	Dimensions W1	RE	INSL	S	IC908
GPS-04-16-055	4.0	5.50	16.00	2.0	•

Spare Parts

Designation	Guide Pad Screw	Guide Pad Key	N*m
GPS-04-16-055	TS 2004B/H3-P M2X0.4	Wrench IP-6/5	0.55

Universal Marking for Deep Drilling Tools





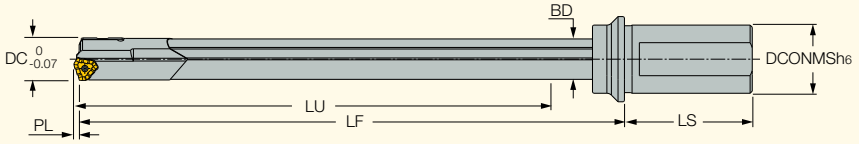
Example:
Metric: D14.00 L1000 d25X56WD
Inch: D0.551 L39.37 d0.984X2.205WD
*****

***** [Lot no.]

TRIDEEP DEEP DRILLING

GD-DH

Gundrills Carrying Triangular Inserts with 3 Chip Splitting Cutting Edges and a Wiper for High Hole Surface Quality



Designation	DC	LU	DCONMS	BD	LF	PL	LS	Insert
GD-DH 14.00-15D-M25-07	14.00	227.00	25.00	13.50	261.0	1.95	56.0	TOGT 07..
GD-DH 14.00-20D-M25-07	14.00	302.00	25.00	13.50	336.0	1.95	56.0	TOGT 07..
GD-DH 14.00-25D-M25-07	14.00	377.00	25.00	13.50	411.0	1.95	56.0	TOGT 07..
GD-DH 14.50-15D-M25-07	14.50	227.00	25.00	14.00	262.0	1.95	56.0	TOGT 07..
GD-DH 14.50-20D-M25-07	14.50	302.00	25.00	14.00	337.0	1.95	56.0	TOGT 07..
GD-DH 14.50-25D-M25-07	14.50	377.00	25.00	14.00	412.0	1.95	56.0	TOGT 07..
GD-DH 15.00-15D-M25-07	15.00	242.00	25.00	14.50	278.0	1.95	56.0	TOGT 07..
GD-DH 15.00-20D-M25-07	15.00	322.00	25.00	14.50	358.0	1.95	56.0	TOGT 07..
GD-DH 15.00-25D-M25-07	15.00	402.00	25.00	14.50	438.0	1.95	56.0	TOGT 07..
GD-DH 16.00-10D-M25-08-N	16.00	172.20	25.00	15.50	209.0	2.20	56.0	TOGT 08..
GD-DH 16.00-15D-M25-08-N	16.00	257.20	25.00	15.50	294.0	2.20	56.0	TOGT 08..
GD-DH 16.00-25D-M25-08-N	16.00	427.20	25.00	15.50	464.0	2.20	56.0	TOGT 08..
GD-DH 16.50-10D-M25-08-N	16.50	172.20	25.00	15.50	209.0	2.20	56.0	TOGT 08..
GD-DH 16.50-15D-M25-08-N	16.50	257.20	25.00	15.50	294.0	2.20	56.0	TOGT 08..
GD-DH 16.50-25D-M25-08-N	16.50	427.20	25.00	15.50	464.0	2.20	56.0	TOGT 08..
GD-DH 17.00-10D-M25-08-N	17.00	182.20	25.00	16.20	220.0	2.20	56.0	TOGT 08..
GD-DH 17.00-15D-M25-08-N	17.00	272.20	25.00	16.20	310.0	2.20	56.0	TOGT 08..
GD-DH 17.00-25D-M25-08-N	17.00	452.20	25.00	16.20	490.0	2.20	56.0	TOGT 08..
GD-DH 17.50-15D-M25-08-N	17.50	272.20	25.00	16.20	310.0	2.20	56.0	TOGT 08..
GD-DH 17.50-25D-M25-08-N	17.50	452.20	25.00	16.20	490.0	2.20	56.0	TOGT 08..
GD-DH 18.00-10D-M25-08-N	18.00	193.00	25.00	16.20	232.0	2.20	56.0	TOGT 08..
GD-DH 18.00-15D-M25-08-N	18.00	288.00	25.00	17.20	327.0	2.20	56.0	TOGT 08..
GD-DH 18.00-25D-M25-08-N	18.00	478.00	25.00	17.20	517.0	2.20	56.0	TOGT 08..
GD-DH 18.50-15D-M25-09	18.50	288.00	25.00	17.20	327.0	3.00	56.0	TOGT 09..
GD-DH 18.50-25D-M25-09	18.50	478.00	25.00	17.20	517.0	3.00	56.0	TOGT 09..
GD-DH 19.00-10D-M25-09	19.00	203.00	25.00	18.20	243.0	3.00	56.0	TOGT 09..
GD-DH 19.00-15D-M25-09	19.00	303.00	25.00	18.20	343.0	3.00	56.0	TOGT 09..
GD-DH 19.00-25D-M25-09	19.00	503.00	25.00	18.20	543.0	3.00	56.0	TOGT 09..
GD-DH 19.50-15D-M25-09	19.50	303.00	25.00	18.20	343.0	3.00	56.0	TOGT 09..
GD-DH 19.50-25D-M25-09	19.50	503.00	25.00	18.20	543.0	3.00	56.0	TOGT 09..
GD-DH 20.00-10D-M32-09	20.00	213.20	32.00	19.00	255.0	3.00	60.0	TOGT 09..
GD-DH 20.00-15D-M32-09	20.00	318.20	32.00	19.00	360.0	3.00	60.0	TOGT 09..
GD-DH 20.00-25D-M32-09	20.00	528.20	32.00	19.00	570.0	3.00	60.0	TOGT 09..
GD-DH 21.00-10D-M32-10	21.00	223.20	32.00	20.00	266.0	3.20	60.0	TOGT 10..
GD-DH 21.00-15D-M32-10	21.00	333.20	32.00	20.00	376.0	3.20	60.0	TOGT 10..
GD-DH 21.00-25D-M32-10	21.00	553.20	32.00	20.00	596.0	3.20	60.0	TOGT 10..
GD-DH 22.00-10D-M32-11	22.00	233.40	32.00	21.00	278.0	3.40	60.0	TOGT 11..
GD-DH 22.00-15D-M32-11	22.00	348.40	32.00	21.00	393.0	3.40	60.0	TOGT 11..
GD-DH 22.00-25D-M32-11	22.00	578.40	32.00	21.00	623.0	3.40	60.0	TOGT 11..
GD-DH 23.00-10D-M32-11	23.00	243.40	32.00	22.00	289.0	3.40	60.0	TOGT 11..
GD-DH 23.00-15D-M32-11	23.00	363.40	32.00	22.00	409.0	3.40	60.0	TOGT 11..
GD-DH 23.00-25D-M32-11	23.00	603.40	32.00	22.00	649.0	3.40	60.0	TOGT 11..
GD-DH 24.00-10D-M32-11	24.00	253.40	32.00	23.00	301.0	3.40	60.0	TOGT 11..
GD-DH 24.00-15D-M32-11	24.00	378.40	32.00	23.00	426.0	3.40	60.0	TOGT 11..
GD-DH 24.00-25D-M32-11	24.00	628.40	32.00	23.00	676.0	3.40	60.0	TOGT 11..
GD-DH 25.00-10D-M32-11	25.00	263.60	32.00	24.00	312.0	3.40	60.0	TOGT 11..
GD-DH 25.00-15D-M32-11	25.00	393.60	32.00	24.00	442.0	3.40	60.0	TOGT 11..
GD-DH 25.00-25D-M32-11	25.00	653.60	32.00	24.00	702.0	3.40	60.0	TOGT 11..
GD-DH 26.00-10D-M40-12	26.00	273.60	40.00	25.00	324.0	3.60	70.0	TOGT 12..
GD-DH 26.00-15D-M40-12	26.00	408.60	40.00	25.00	459.0	3.60	70.0	TOGT 12..
GD-DH 26.00-25D-M40-12	26.00	678.60	40.00	25.00	729.0	3.60	70.0	TOGT 12..
GD-DH 27.00-10D-M40-12	27.00	283.60	40.00	26.00	335.0	3.60	70.0	TOGT 12..
GD-DH 27.00-15D-M40-12	27.00	423.60	40.00	26.00	475.0	3.60	70.0	TOGT 12..
GD-DH 27.00-25D-M40-12	27.00	703.60	40.00	26.00	755.0	3.60	70.0	TOGT 12..
GD-DH 28.00-10D-M40-12	28.00	283.60	40.00	27.00	337.0	3.60	70.0	TOGT 12..
GD-DH 28.00-15D-M40-12	28.00	423.60	40.00	27.00	477.0	3.60	70.0	TOGT 12..
GD-DH 28.00-25D-M40-12	28.00	703.60	40.00	27.00	757.0	3.60	70.0	TOGT 12..
GD-DH 29.00-10D-M40-13	29.00	294.57	40.00	27.00	360.0	4.57	69.0	TOGT 13..
GD-DH 29.00-20D-M40-13	29.00	584.57	40.00	27.00	650.0	4.57	69.0	TOGT 13..
GD-DH 30.00-10D-M40-13	30.00	314.57	40.00	29.00	383.0	4.57	69.0	TOGT 13..

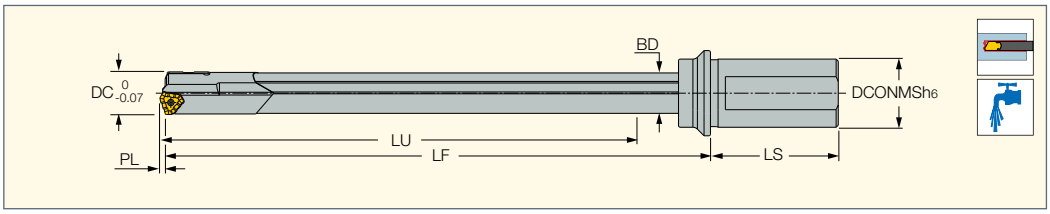
• Note: Gundrills can be supplied with up to 2400 mm length on request. • Inserts and guide pads should be ordered separately (they are not included with the tools).
• For user guide and cutting conditions, see pages 289-292 • Preventative measures: Do NOT operate the deep hole drill at full speed before engaging the guide hole. Enter the guide hole slowly at a speed of 50 - 100 rpm.

For inserts, see pages: TOGT-DT (194) • TOGT-GF (194)

TRIDEEP DEEP DRILLING

GD-DH (continued)

Gundrills Carrying Triangular Inserts with 3 Chip Splitting Cutting Edges and a Wiper for High Hole Surface Quality



Designation	DC	LU	DCONMS	BD	LF	PL	LS	Insert
GD-DH 30.00-20D-M40-13	30.00	624.57	40.00	29.00	693.0	4.57	69.0	TOGT 13..
GD-DH 31.00-10D-M40-13	31.00	314.57	40.00	29.00	383.0	4.57	69.0	TOGT 13..
GD-DH 31.00-20D-M40-13	31.00	624.57	40.00	29.00	693.0	4.57	69.0	TOGT 13..
GD-DH 32.00-10D-M40-13	32.00	324.57	40.00	30.00	395.0	4.57	69.0	TOGT 13..
GD-DH 32.00-20D-M40-13	32.00	644.57	40.00	30.00	715.0	4.57	69.0	TOGT 13..

• Note: Gundrills can be supplied with up to 2400 mm length on request. • Inserts and guide pads should be ordered separately (they are not included with the tools).
• For user guide and cutting conditions, see pages 289-292 • Preventative measures: Do NOT operate the deep hole drill at full speed before engaging the guide hole. Enter the guide hole slowly at a speed of 50 - 100 rpm.

For inserts, see pages: TOGT-DT (194) • TOGT-GF (194)

Universal Marking for Deep Drilling Tools

D.** L/D** d** X** XX**

D L/D d1 d2 Driver Type

***** [Lot no.]

Driver Type

M	Machining	M20,M25,M32,M40 U19.05,U25.4,U31.75 U38.1,FM32,FM40 FU31.75,FU38.1	
WD	Weldon	22,23,24,25,26,99	
WN	Whistle Notch	U03,U04,U05,U06 34,35,36	
F	Flat	FD60C25, FD97C25 C25	
C	Cylindrical	95	

Example:
Metric: D14.00 L/D15 d25X56M
Inch: D0.551 L/D15 d0.984X2.205M
*****

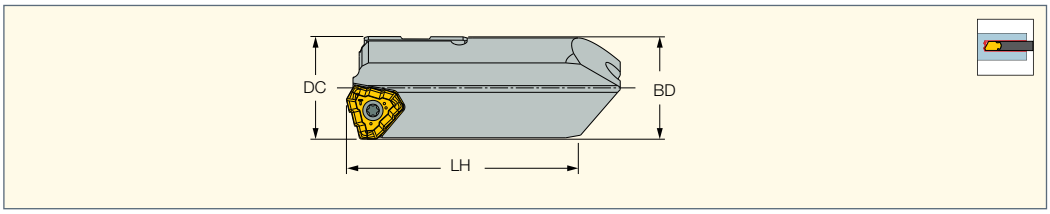
Spare Parts

Diameter Range	Insert	Insert Clamping Screw	Key	N*m	Solid Carbide Guide Pad	Guide Pad Clamping Screw	Key
14.00-15.99	TOGT 070304-DT/GF	SR 14-560/8 M2.5X0.45	T-8	1.2	GPS-06-18-050-DC	SR 34-508 M2.2X0.45	T-7
16.00-18.00	TOGT 080305-DT/GF		T-8	1.2	GPS-06-20-075-DC		
18.01-20.00	TOGT 090305-DT/GF		T-8	1.2	GPS-06-20-085-DC		
20.01-20.99	TOGT 100305-DT/GF	SR 34-506 M3X0.5	T-9	2.0	GPS-06-20-085-DC		
21.00-21.99	TOGT 100305-DT/GF				GPS-06-20-100-DC		
22.00-25.00	TOGT 110405-DT/GF	SR 14-571/8 M3.5X0.6	T-15	4.8	GPS-06-20-100-DC		
25.01-28.00	TOGT 120405-DT/GF	SR 14-506 M4X0.7	T-15	4.8	GPS-06-20-120-DC		
28.01-29.99	TOGT 130405-DT/GF	SR 16-212/L10 M5X0.8	T20/15	10	GPS-06-20-120-DC	SR 34-508 M2.2X0.45	T-7/15
30.00-32.00	TOGT 130405-DT/GF				GPS-07-20-120-DC	CSTB-8L065 M2.2X0.45	T-9/15
32.01-39.01	TOGT 140510-DT/GF				GPS-07-20-120-DC		
39.01-40.00	TOGT 140510-DT/GF				GPS-08-25-155-DC		

TRIDEEP DEEP DRILLING

GDH-MKT

Gundrill Heads Carrying Triangular Inserts with 3 Chip Splitting Cutting Edges and a Wiper for High Hole Surface Quality



Designation	DC	BD	LH
GDH-14.00 MKT	14.00	13.70	51.2
GDH-14.50 MKT	14.50	14.20	51.2
GDH-15.00 MKT	15.00	14.70	51.2
GDH-16.00 MKT	16.00	15.70	51.3
GDH-16.50 MKT	16.50	16.00	51.3
GDH-17.00 MKT	17.00	16.50	51.3
GDH-17.50 MKT	17.50	17.20	51.3
GDH-18.00 MKT	18.00	17.40	51.3
GDH-18.50 MKT	18.50	18.00	52.2
GDH-19.00 MKT	19.00	18.40	52.2
GDH-19.50 MKT	19.50	18.90	52.2
GDH-20.00 MKT	20.00	19.40	52.2
GDH-21.00 MKT	21.00	20.40	52.3
GDH-22.00 MKT	22.00	21.70	52.3
GDH-22.50 MKT	22.50	21.90	52.3
GDH-23.00 MKT	23.00	22.40	52.3
GDH-23.50 MKT	23.50	22.90	52.3
GDH-24.00 MKT	24.00	23.40	52.3
GDH-25.00 MKT	25.00	24.40	52.3
GDH-26.00 MKT	26.00	25.40	52.3
GDH-27.00 MKT	27.00	26.40	52.3
GDH-28.00 MKT	28.00	27.40	52.3

• Inserts and guide pads should be ordered separately (they are not included with the tools). • For user guide and cutting conditions, see pages 289-292

For inserts, see pages: TOGT-DT (194) • TOGT-GF (194)

Spare Parts

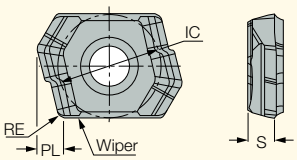


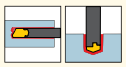

Gundrill Head	Guide Pad Screw		Guide Pad Key	Insert Screw		Insert Key
Description	Description	Qty.	Description	Description	Qty.	Description
GDH-14.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-560/S M2.5X0.45	1	T-8/5
GDH-14.50 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-560/S M2.5X0.45	1	T-8/5
GDH-15.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-560/S M2.5X0.45	1	T-8/5
GDH-16.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-560/S M2.5X0.45	1	T-8/5
GDH-16.50 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-560/S M2.5X0.45	1	T-8/5
GDH-17.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-560/S M2.5X0.45	1	T-8/5
GDH-17.50 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-560/S M2.5X0.45	1	T-8/5
GDH-18.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-560/S M2.5X0.45	1	T-8/5
GDH-18.50 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-560/S M2.5X0.45	1	T-8/5
GDH-19.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-560/S M2.5X0.45	1	T-8/5
GDH-19.50 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-560/S M2.5X0.45	1	T-8/5
GDH-20.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 34-506 M3X0.5	1	T-8/5
GDH-21.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 34-506 M3X0.5	1	T-8/5
GDH-22.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-571/S M3.5X0.6	1	T-10/5
GDH-22.50 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-571/S M3.5X0.6	1	T-10/5
GDH-23.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-571/S M3.5X0.6	1	T-10/5
GDH-23.50 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-571/S M3.5X0.6	1	T-10/5
GDH-24.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-571/S M3.5X0.6	1	T-10/5
GDH-25.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-571/S M3.5X0.6	1	T-10/5
GDH-26.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-506 M4X0.7	1	T-15/5
GDH-27.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-506 M4X0.7	1	T-15/5
GDH-28.00 MKT	SR 34-508 M2.2X0.45	2	T-7/5	SR 14-506 M4X0.7	1	T-15/5

TRIDEEP DEEP DRILLING

LOGT

Deep Drilling Inserts with 2 Chip Splitting Cutting Edges, Positive Rake Chipbreaker and a Wiper





Designation	Dimensions IC	RE	PL	S	IC908
LOGT 060204R-DT	7.00	0.40	1.80	2.00	●

For tools, see pages: GD-DH (12-13.5) (283) • GD-DHL (284)

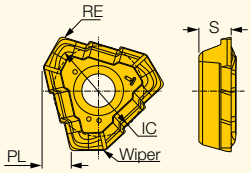
Spare Parts

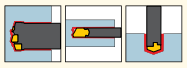
Designation	Insert Screw	Insert key	N*m
LOGT 060204R-DT	SR 10503833L040	T-7F	0.9

TRIDEEP DEEP DRILLING

TOGT-DT

Deep Drilling Inserts with 3 Chip Splitting Cutting Edges, Positive Rake Chipbreaker and a Wiper





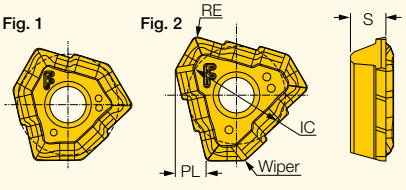
Designation	Dimensions IC	RE	PL	S	Fig.	IC908
TOGT 070304-DT	7.69	0.40	1.95	2.30	1	●
TOGT 080305-DT	8.55	0.50	2.20	2.80	1	●
TOGT 090305-DT	8.32	0.50	3.00	3.00	2	●
TOGT 100305-DT	9.23	0.50	3.20	3.30	2	●
TOGT 110405-DT	10.40	0.50	3.40	3.80	2	●
TOGT 120405-DT	11.59	0.50	3.60	4.30	2	●
TOGT 130408-DT	12.85	0.80	4.57	4.76	2	●
TOGT 140510-DT	16.85	1.00	5.43	5.26	2	●

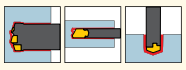
For tools, see pages: DDD-EF-FT (193) • DSD-EF-FT (192) • DSD-IF-FT (192) • GD-DH (285) • GDH-MKT (287)

TRIDEEP DEEP DRILLING

TOGT-GF

Deep Drilling Inserts with 3 Chip Splitting Cutting Edges, Positive Rake Chipbreaker and a Wiper



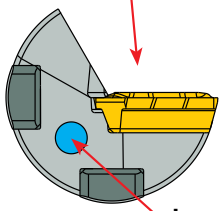


Designation	Dimensions IC	RE	PL	S	Fig.	IC908
TOGT 070304-GF	7.69	0.40	1.95	2.30	1	●
TOGT 080305-GF	8.55	0.50	2.20	2.80	1	●
TOGT 090305-GF	8.32	0.50	3.00	3.00	2	●
TOGT 100305-GF	9.23	0.50	3.20	3.30	2	●
TOGT 110405-GF	10.40	0.50	3.40	3.80	2	●
TOGT 120405-GF	11.59	0.50	3.60	4.30	2	●
TOGT 130408-GF	12.85	0.80	4.57	4.76	2	●

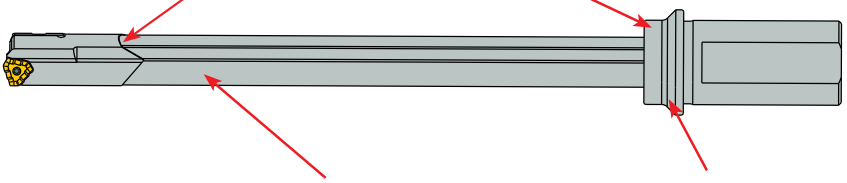
For tools, see pages: DDD-EF-FT (193) • DSD-EF-FT (192) • DSD-IF-FT (192) • GD-DH (285) • GDH-MKT (287)

Wide Flute Angle

- Smooth chip evacuation



Brazed Body



Large Oil Hole

- Efficient lubrication
- Longer life of inserts and guide pads

Steel Body Tool

- Extremely high rigidity
- Simple direct mounting setup

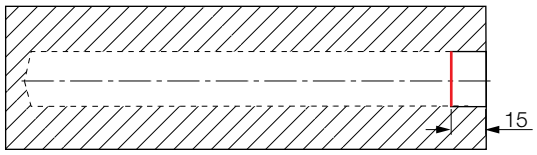
Flange

- Superior rigidity for higher speeds and feeds

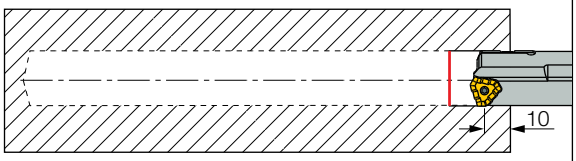
Drilling Process on Machining Centers and Lathe Machines

1 Drill a 15 mm pilot hole D $^{+0.05}_{+0.03}$ flat bottom
2 Set the TRIDEEP drill into the pilot hole (10 mm depth). V_c=5-10 m/min f=0.5-1.0 mm/rev
3 Initial cutting at a 25 mm DOC (80% feed rate), verify activated coolant (V_c=100%).
4 In case of through hole, drill the full hole to a depth of +5 mm.
5 Retract with slow rotation (5-10 m/min).

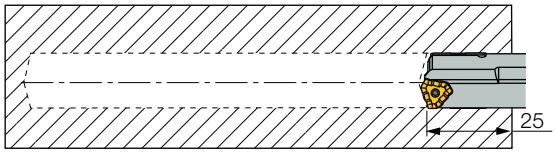
1 Drill a 15 mm pilot hole flat bottom



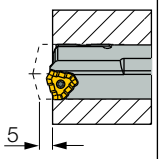
2 Slow rotation and feed while entering to the pre-hole



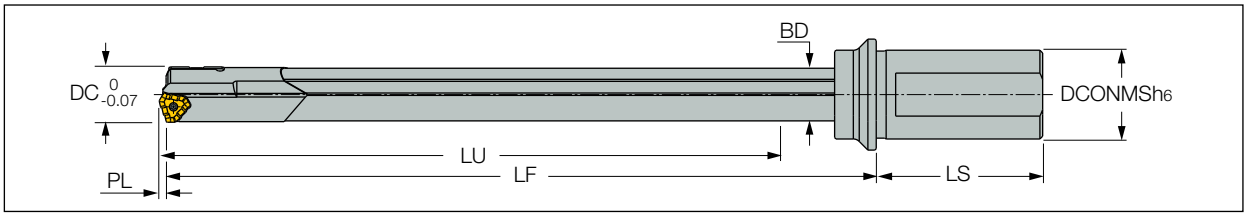
3 Maintain for 2-3 seconds and activate the cooling system



4 Drill +5mm depth through hole



Inquiry Form



1. Tool

Quantity _____

Nominal diameter and tolerance _____

Please fill in dimensions on the sketch.

Driver

For standard drivers please use codes from page 292 _____

☐ Code No.

☐ Special, please attach sketch and specifications.

2. Workpiece

(If possible, attach a drawing)

2.1 Material

Material description
(DIN material number or any other standard):

_____

Hardness and Properties:

_____

2.2 Hole Type

☐ Blind Hole ☐ Drilling into Pre-hole

☐ Angled Entry

☐ Drilling into Solid ☐ Boring ☐ Angled Exit

Drilling Depth _____mm Hole Tolerance _____

2.3 Application:

Workpiece: ☐ Stationary ☐ Rotating

Tool: ☐ Stationary ☐ Rotating

3. Machine

3.1 Technical Data

Machine Type _____

Power _____kW _____

Sketch of drilling application

Note: It may be necessary to change several of the parameters that you indicated, based on our experience with your application.

3.2 Cutting Data:

Cutting Speed V_c _____m/min

Revolutions Nmin _____RPM, Nmax _____RPM

Feed Fmin _____ mm/rev,

Fmax _____ mm/rev

Feed Rate VF _____ mm/min

Coolant:

☐ Oil ☐ Soluble Oil ☐ Other

Coolant Pressure: _____ Bar

Specially Tailored TRIDEEP Code Key

GD - DH ##.##-#####-##

Dia. **Drilling length** **Shank Type**

Machining Recommendations for TRIDEEP Drills

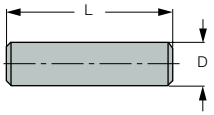
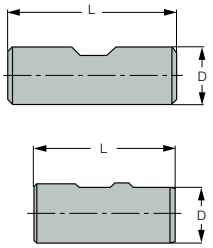
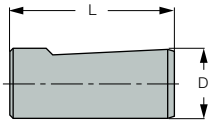
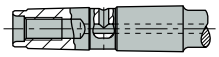
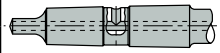
ISO	Material		Condition	Tensile Strength [N/mm²]	Hardness HB	Material Group No.	TOGT V m/min	TOGT Feed per insert size "GF" & "DT" 06	07	08	09	10	11	12	13
								mm/rev							
P	Non-alloy steel and cast steel, free cutting steel	< 0.25 %C	Annealed	420	125	1	80-120	0.04-0.08 0.08-0.14			0.04-0.10 0.08-0.16	0.06-0.10 0.08-0.16	0.06-0.10 0.08-0.16	0.06-0.12 0.08-0.18	
		>= 0.25 %C	Annealed	650	190	2									
		< 0.55 %C	Quenched and tempered	850	250	3									
		>= 0.55 %C	Annealed	750	220	4									
			Quenched and tempered	1000	300	5									
	Low alloy and cast steel (less than 5% of alloying elements)		Annealed	600	200	6						0.04-0.12 0.06-0.20			
			Quenched and tempered	930	275	7									
				1000	300	8									
				1200	350	9									
	High alloyed steel, cast steel and tool steel		Annealed	680	200	10		0.04-0.08 0.08-0.14			0.04-0.10 0.08-0.16	0.06-0.10 0.08-0.16	0.06-0.10 0.08-0.16	0.06-0.12 0.08-0.18	
			Quenched and tempered	1100	325	11									
	Stainless steel and cast steel		Ferritic/ martensitic.	680	200	12									
			Martensitic	820	240	13									
M	Stainless steel and cast steel		Austenitic, duplex	600	180	14	50-100	0.02-0.06 0.04-0.12			0.02-0.06 0.04-0.12	0.02-0.06 0.04-0.12	0.02-0.06 0.04-0.12	0.02-0.06 0.04-0.12	
K	Grey cast iron (GG)		Ferritic/pearlitic		180	15	50-100 80-120	0.03-0.15 0.08-0.25			0.03-0.15 0.08-0.25	0.05-0.18 0.08-0.25	0.05-0.18 0.08-0.30	0.05-0.18 0.08-0.30	
			Pearlitic / martensitic		260	16									
	Cast iron nodular (GGG)		Ferritic		160	17									
			Pearlitic		250	18									
	Malleable cast iron		Ferritic		130	19									
			Pearlitic		230	20									
N	Aluminum-wrought alloys		Not hardenable		60	21	80-160	0.03-0.15 0.08-0.20			0.03-0.15 0.08-0.20	0.03-0.18 0.08-0.20	0.05-0.18 0.08-0.20	0.03-0.18 0.08-0.20	
			Hardenable		100	22									
	Aluminum-cast alloys	<=12% Si	Not hardenable		75	23									
			Hardenable		90	24									
		>12% Si	High temperature		130	25									
	Copper alloys	>1% Pb	Free cutting		110	26									
			Brass		90	27									
			Electrolitic copper		100	28									
	Non metallic		Duroplastics, fiber plastics			29									
			Hard rubber			30									
S	High temp. alloys	Fe based	Annealed		200	31	20-50	0.08-0.14			0.08-0.16	0.08-0.16	0.08-0.16	0.08-0.16	
			Hardened		280	32									
		Ni or Co based	Annealed		250	33									
			Hardened		350	34									
			Cast		320	35									

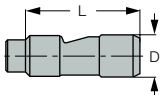
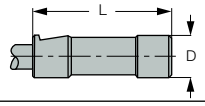
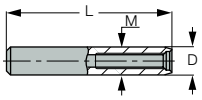
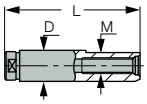
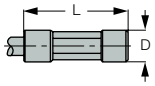
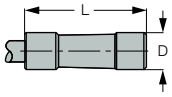
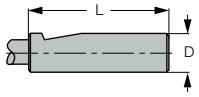
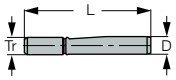
Standard Gundrill Drivers for Machining Centers, Lathes, etc.

Drivers

Drivers are available for dedicated and CNC machines, for any specified diameter and length.
Below are the driver codes and technical data.

Standard Drivers for Gundrill Machines

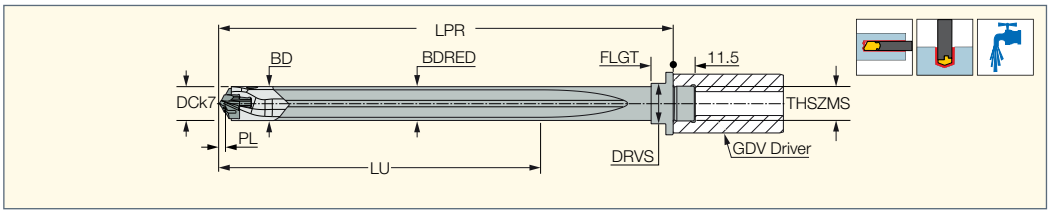
Driver Type	Drawing	øD x L	Driver Code
Cylindrical DIN1835A DIN6535HA		.75x2.03″	95
		20x50	10
		25x56	11
		1.00x2.28″	96
		1.25x2.28″	97
		32x60	12
		40x70	13
Weldon DIN1835B DIN6535HB		.75x2.03″	99
		20x50	22
		25x56	23
		1.00x2.28″	100
		1.25x2.28″	101
		32x60	24
		40x70	25
Whistle Notch DIN1835E		20x50	34
		25x56	35
		32x60	36
		40x70	37
DIN228AK		CM1	45
		CM2	46
		CM3	47
		CM4	48
DIN228BK		CM1	49
		CM2	50
		CM3	51
		CM4	52

Driver Type	Drawing	øD x L	Driver Code
Central Clamping Surface 15°		.750x2.75″	56
		25x70	57
		1.00x2.75″	58
		1.25x2.75″	59
		1.50x2.75″	60
Frontal Clamping Surface 15°		16x50	61
Cylindrical with Thread		25x100 M16x1.5	66
		36x120 M24x1.5	67
VDI Design		25x112 M16x1.5	70
		36x135 M24x1.5	71
Central Clamping Hexagonal		25x70	72
		32x70	73
Central Clamping Tapered		.75x2.75″	76
		20x70	77
Frontal Clamping Surface 2°		1.00x2.75″	80
		1.00x3.94″	81
		1.25x2.75″	82
		1.25x3.94″	83
		1.50x2.75″	84
		1.50x3.94″	85
Trapezoidal Thread		28x126 Tr 28x2	88
		36x162 Tr 36x2	89
Spraymist Driver		25x50	91
		35x60	92

SUMOGUN

MNSNT

Indexable SUMOCHAM Inserts and Modular Shank Gundrills



Designation	DCN[1]	DCX[2]	LU	PL	THSZMS	BD	BDRED	LPR	FLGT	DRVS[3]	SSC[4]	MIID[5]	
MNSNT 100-200-MF16X1	10.00	10.40	200.00	2.720	MF16X1	9.70	9.60	274.00	10.00	16.0	10.0	HCP 100	K DCN 10-13.99
MNSNT 105-200-MF16X1	10.50	10.90	200.00	2.720	MF16X1	10.20	10.10	274.00	10.00	16.0	10.0	HCP 105	K DCN 10-13.99
MNSNT 110-200-MF16X1	11.00	11.40	200.00	2.750	MF16X1	10.70	10.60	275.00	10.00	16.0	11.0	HCP 110	K DCN 10-13.99
MNSNT 115-200-MF16X1	11.50	11.90	200.00	2.750	MF16X1	11.20	11.10	275.00	10.00	16.0	11.0	HCP 115	K DCN 10-13.99
MNSNT 120-200-MF16X1	12.00	12.40	200.00	3.160	MF16X1	11.70	11.60	275.00	10.00	16.0	12.0	HCP 120	K DCN 10-13.99
MNSNT 125-200-MF16X1	12.50	12.90	200.00	3.160	MF16X1	12.20	12.10	275.00	12.00	16.0	12.0	HCP 125	K DCN 10-13.99
MNSNT 130-200-MF16X1	13.00	13.40	200.00	3.510	MF16X1	12.70	12.60	276.00	12.00	16.0	13.0	HCP 130	K DCN 10-13.99
MNSNT 135-200-MF16X1	13.50	13.90	200.00	3.510	MF16X1	13.20	13.10	276.00	12.00	16.0	13.0	HCP 135	K DCN 10-13.99
MNSNT 140-200-MF16X1	14.00	14.40	200.00	3.630	MF16X1	13.70	13.60	276.00	12.00	16.0	14.0	HCP 140	K DCN 14-17.99
MNSNT 145-200-MF16X1	14.50	14.90	200.00	3.630	MF16X1	14.20	14.10	276.00	12.00	16.0	14.0	HCP 145	K DCN 14-17.99
MNSNT 130-250-MF16X1	13.00	13.40	250.00	3.510	MF16X1	12.70	12.60	326.00	12.00	16.0	13.0	HCP 130	K DCN 10-13.99
MNSNT 135-250-MF16X1	13.50	13.90	250.00	3.510	MF16X1	13.20	13.10	326.00	12.00	16.0	13.0	HCP 135	K DCN 10-13.99
MNSNT 140-250-MF16X1	14.00	14.40	250.00	3.630	MF16X1	13.70	13.60	326.00	12.00	16.0	14.0	HCP 140	K DCN 14-17.99
MNSNT 145-250-MF16X1	14.50	14.90	250.00	3.630	MF16X1	14.20	14.10	326.00	12.00	18.0	14.0	HCP 145	K DCN 14-17.99
MNSNT 100-400-MF16X1	10.00	10.40	400.00	2.720	MF16X1	9.70	9.60	474.00	10.00	16.0	10.0	HCP 100	K DCN 10-13.99
MNSNT 105-400-MF16X1	10.50	10.90	400.00	2.720	MF16X1	10.20	10.10	474.00	10.00	16.0	10.0	HCP 105	K DCN 10-13.99
MNSNT 110-400-MF16X1	11.00	11.40	400.00	2.750	MF16X1	10.70	10.60	474.00	10.00	16.0	11.0	HCP 110	K DCN 10-13.99
MNSNT 115-400-MF16X1	11.50	11.90	400.00	2.750	MF16X1	11.20	11.10	474.00	10.00	16.0	11.0	HCP 115	K DCN 10-13.99
MNSNT 120-400-MF16X1	12.00	12.40	400.00	3.160	MF16X1	11.70	11.60	475.00	10.00	16.0	12.0	HCP 120	K DCN 10-13.99
MNSNT 125-400-MF16X1	12.50	12.90	400.00	3.160	MF16X1	12.20	12.10	475.00	12.00	16.0	12.0	HCP 125	K DCN 10-13.99
MNSNT 130-400-MF16X1	13.00	13.40	400.00	3.510	MF16X1	12.70	12.60	476.00	12.00	16.0	13.0	HCP 130	K DCN 10-13.99
MNSNT 135-400-MF16X1	13.50	13.90	400.00	3.510	MF16X1	13.20	13.10	476.00	12.00	16.0	13.0	HCP 135	K DCN 10-13.99
MNSNT 140-400-MF16X1	14.00	14.40	400.00	3.630	MF16X1	13.70	13.60	476.00	12.00	16.0	14.0	HCP 140	K DCN 14-17.99
MNSNT 145-400-MF16X1	14.50	14.90	400.00	3.630	MF16X1	14.20	14.10	476.00	12.00	18.0	14.0	HCP 145	K DCN 14-17.99
MNSNT 150-400-MF16X1	15.00	15.90	400.00	3.880	MF16X1	14.70	14.60	484.00	12.00	18.0	15.0	HCP 150	K DCN 14-17.99
MNSNT 160-400-MF20X1	16.00	16.90	400.00	3.910	MF20X1	15.50	15.40	484.00	12.00	18.0	16.0	HCP 160	K DCN 14-17.99
MNSNT 170-400-MF20X1	17.00	17.90	400.00	4.570	MF20X1	16.50	16.40	485.00	12.00	22.0	17.0	HCP 170	K DCN 14-17.99
MNSNT 180-400-MF20X1	18.00	18.90	400.00	4.660	MF20X1	17.50	17.40	486.00	12.00	22.0	18.0	HCP 180	K DCN 14-17.99
MNSNT 190-400-MF20X1	19.00	19.90	400.00	4.660	MF20X1	18.50	18.40	486.00	12.00	22.0	19.0	HCP 190	K DCN 18-21.99
MNSNT 200-400-MF20X1	20.00	20.90	400.00	4.810	MF20X1	19.50	19.40	487.00	12.00	22.0	20.0	HCP 200	K DCN 18-21.99
MNSNT 210-400-MF20X1	21.00	21.90	400.00	4.940	MF20X1	20.50	20.40	503.00	21.00	28.0	21.0	HCP 210	K DCN 18-21.99
MNSNT 220-400-MF20X1	22.00	22.90	400.00	5.200	MF20X1	21.50	21.40	504.00	21.00	28.0	22.0	HCP 220	K DCN 18-21.99
MNSNT 230-400-MF20X1	23.00	23.90	400.00	5.280	MF20X1	22.50	22.40	504.00	21.00	28.0	23.0	HCP 230	K DCN 22-26.99
MNSNT 240-400-MF20X1	24.00	24.90	400.00	5.630	MF20X1	23.50	23.40	505.00	21.00	28.0	24.0	HCP 240	K DCN 22-26.99
MNSNT 250-400-MF20X1	25.00	25.90	400.00	5.700	MF20X1	24.50	24.40	506.00	21.00	28.0	25.0	HCP 250	K DCN 22-26.99

• For user guide and cutting conditions, see pages 294-297

[1] Do not mount smaller drilling heads than the specified range of the drill body

[2] Cutting diameter maximum

[3] Torque key size

[4] Seat size code

[5] Master insert identification

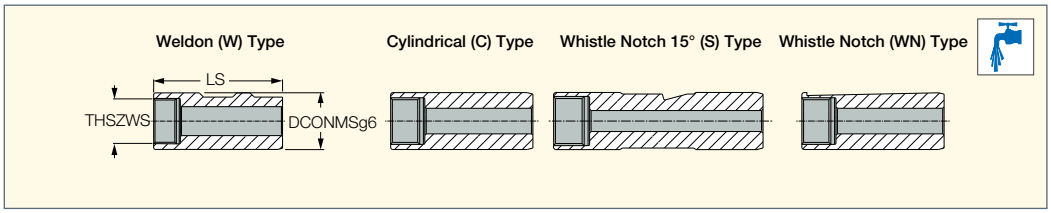
For inserts, see pages: HCP-IQ (47) • ICG (57) • ICK (28) • ICK-2M (32) • ICP (18) • ICP-2M (24) • QCP-2M (43)

For holders, see pages: GDV (294)

SUMOGUN

GDV

Shanks for SUMOGUN Modular Gundrills with Threaded Connection



Designation	THSZWS	DCONMS	Shank[1]	LS
GDV56-MF16X1-I-WN.75"	MF16X1	19.05	S	69.8
GDV99-MF16X1-I-W.75"	MF16X1	19.05	W	69.8
GDV10-MF16X1-M-C20	MF16X1	20.00	C	50.0
GDV22-MF16X1-M-W20	MF16X1	20.00	W	50.0
GDV80-MF16X1-I-WN1.00"	MF16X1	25.40	WN	69.8
GDV11-MF20X1-M-C25	MF20X1	25.00	C	56.0
GDV23-MF20X1-M-W25	MF20X1	25.00	W	56.0
GDV57-MF20X1-M-WN25	MF20X1	25.00	S	70.0
GDV100-MF20X1-I-W1.00"	MF20X1	25.40	W	57.9
GDV58-MF20X1-I-WN1.00"	MF20X1	25.40	S	69.8
GDV101-MF20X1-I-W1.25"	MF20X1	31.75	W	57.9
GDV97-MF20X1-I-C1.25"	MF20X1	31.75	C	57.9
GDV12-MF20X1-M-C32	MF20X1	32.00	C	60.0
GDV24-MF20X1-M-W32	MF20X1	32.00	W	60.0
GDV13-MF20X1-M-C40	MF20X1	40.00	C	70.0
GDV25-MF20X1-M-W40	MF20X1	40.00	W	70.0

[1] W-Weldon, C-Cylindrical, S-Whistle notch 15°, WN-Whistle notch

For tools, see pages: MNSNT (293)

Machining Conditions for MNSNT

ISO	Material		Condition	Tensile Strength [N/mm²]	Hardness HB	Material Group No.	SUMOGUN V (m/min)	SUMOGUN Feed vs. Drill Diameter mm/rev D=10-11.9	D=12-13.9	D=14-15.9	D=16-19.9	D=20-25.9
P	Non-alloy steel and cast steel, free cutting steel	< 0.25 %C	Annealed	420	125	1	80-110-140	0.15	0.18	0.20	0.25	0.25
		>= 0.25 %C	Annealed	650	190	2	80-105-130	0.18	0.21	0.23	0.30	0.30
		< 0.55 %C	Quenched and tempered	850	250	3	80-100-120	0.21	0.24	0.27	0.35	0.35
		>= 0.55 %C	Annealed	750	220	4	70-90-110					
			Quenched and tempered	1000	300	5	50-70-90					
	Low alloy steel and cast steel (less than 5% of alloying elements)		Annealed	600	200	6	80-100-120	0.14	0.16	0.18	0.23	0.25
			Quenched and tempered	930	275	7	70-90-110	0.17	0.20	0.22	0.27	0.30
				1000	300	8	50-70-90	0.21	0.24	0.26	0.31	0.35
				1200	350	9	40-55-70					
	High alloyed steel, cast steel, and tool steel		Annealed	680	200	10	50-70-90	0.12	0.15	0.18	0.20	0.22
			Quenched and tempered	1100	325	11	40-60-80	0.14	0.17	0.20	0.22	0.24
								0.17	0.20	0.23	0.25	0.27
	Stainless steel and cast steel		Ferritic/ martensitic.	680	200	12	40-55-70	0.12	0.14	0.16	0.16	0.18
								0.13	0.15	0.18	0.19	0.21
			Martensitic	820	240	13		0.15	0.17	0.20	0.21	0.24
K	Cast iron nodular (GG)		Ferritic/pearlitic		180	15	90-125-160	0.20	0.25	0.30	0.35	0.35
			Pearlitic/ martensitic		260	16	80-110-140	0.23	0.28	0.33	0.40	0.42
	Grey cast iron (GGG)		Ferritic		160	17	90-135-180	0.27	0.32	0.37	0.45	0.47
			Pearlitic		250	18	80-110-140					
	Malleable cast iron		Ferritic		130	19	90-125-160					
			Pearlitic		230	20	80-110-140					
N	Aluminum-wrought alloys		Not hardenable		60	21	90-155-220	0.25	0.30	0.35	0.40	0.45
			Hardenable		100	22		0.28	0.33	0.38	0.45	0.50
	Aluminum-cast alloys	<=12% Si	Not hardenable		75	23		0.32	0.37	0.42	0.50	0.57
			Hardenable		90	24						
		>12% Si	High temperature		130	25	80-120-160					

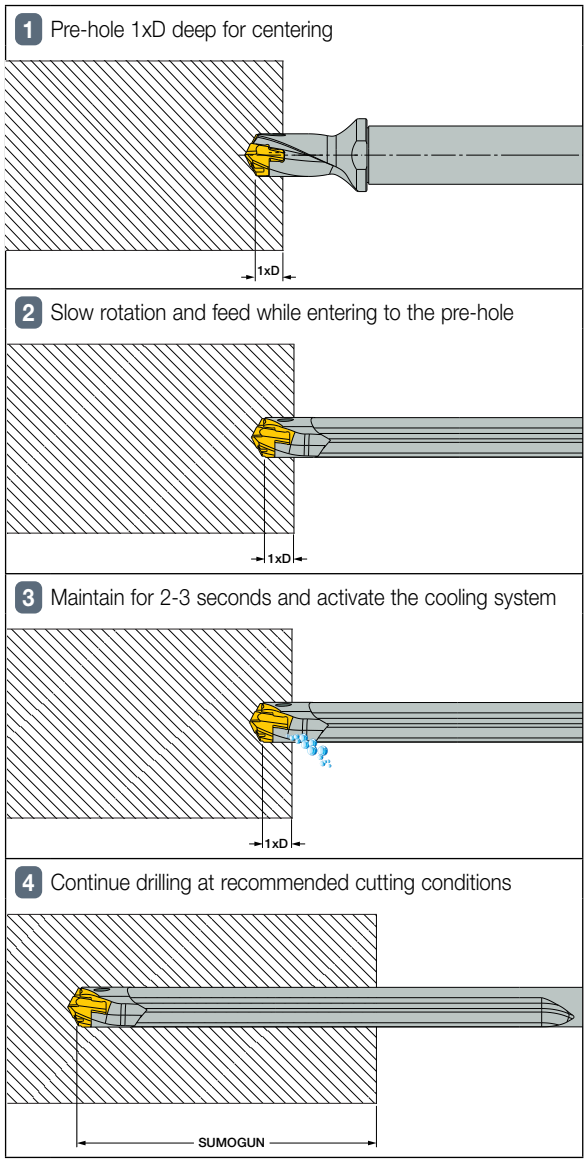
Recommended cutting data

- Mandatory use of emulsion or oil when drilling
- For the 400mm long tools please reduce the cutting speed by 20%.

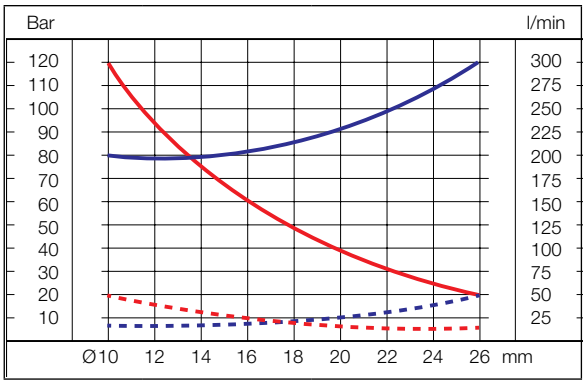
Drill Penetration Instructions on Horizontal Milling and Lathe machines

Note: The following procedure (1-4) is recommended for up to 400 mm hole depths using MNSNT ...-400... drill.

1 Drill a pilot hole 0.5xD deep with a short drill in the same diameter as of the **SUMOGUN** drill.
2 Enter the pre-hole at slow speed, feed and 50 RPM until 1-2 mm before reaching the bottom.
3 Activate the cooling system and increase rotation speed to recommended drilling speed, maintain for 2-3 seconds, then continue at recommended drilling feed. **No pecking is required**. Apply maximum possible coolant flow rate.
4 After having reached the required depth, reduce speed to 50-100 RPM while exiting from the hole.



Pressure and Coolant Flow Rate for SUMOGUN



SUMOGUN Drilling Range — **Drilling Diameter**

Q l/min — P bar

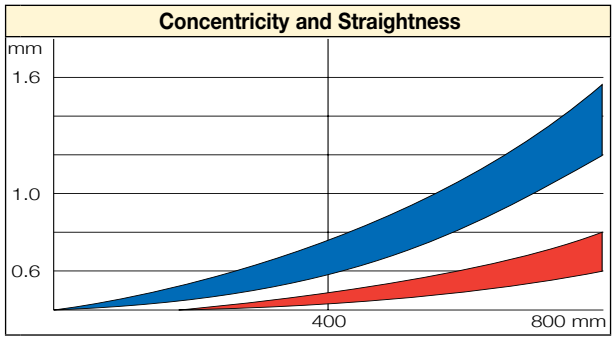
GUNDRILL Machines
Milling and Turning Machines

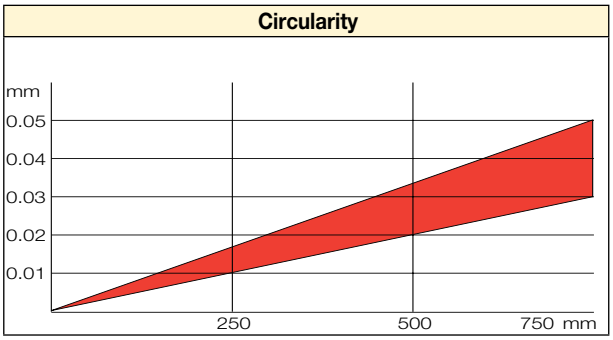
Gundrill Lubrication and Cooling

The best performance is obtained by using oil.
On equipment that uses water-soluble fluids (i.e. machining centers and CNC machines) a concentration between 10% and 15% is recommended.

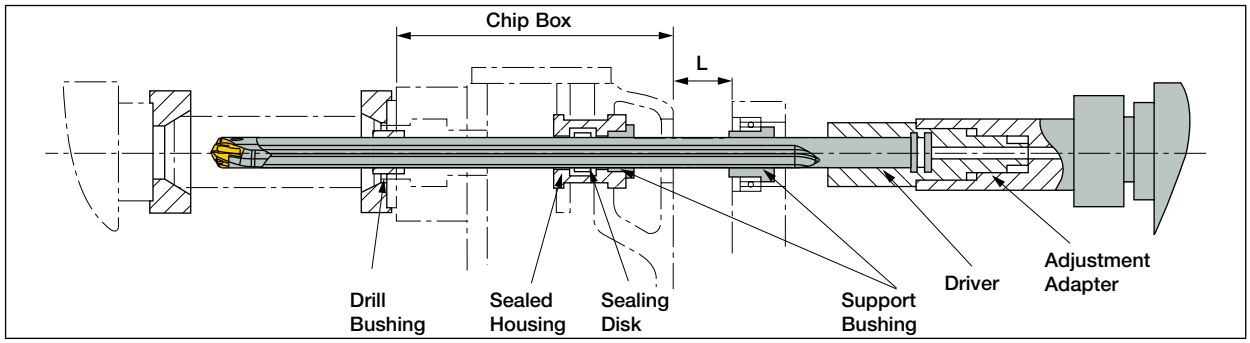
Guidelines for Optimal Gundrill Performance

- Coolant pressure and flow
- It is recommended to use a strong coolant flow for efficient chip flushing and cooling of the cutting edge
- Filtration: It is recommended to use a filter under 20 µm.
- **Note:** Improper filtration may result in interrupted flow of the lubricating oil. This creates a sticky surface on the bearing pads and leads to premature wear of the tool and overloading the coolant pump and spindle seals.
- The coolant temperature should be between 20 and 22º C.
  Note: Above 50º C the viscosity of the coolant is reduced by 50% and becomes ineffective.





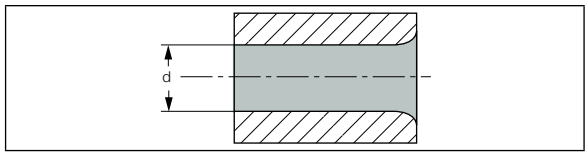
Stationary workpiece – rotating tool
Rotating workpiece – stationary tool



L = 20xD
1- The support bushing should be according to tube diameter (D3) (see below)

Bushing

Based on modified DIN 179 specify the "d" diameter of the drill head. Carbide bushing is delivered only on request.



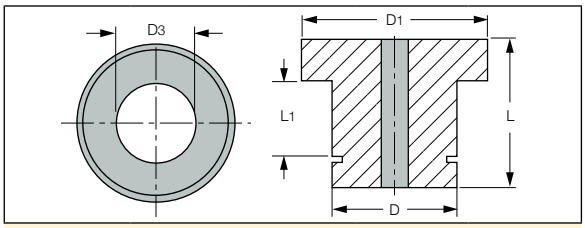
d = Drill diameter +0.02

Guide Bushing

A guide bushing is an essential component for a proper gundrill operation. The function of the guide bushing is to direct the SUMOGUN into the material during penetration. The diameter of the guide bushing should be within 20 microns larger than the diameter of the drill. Dedicated gundrill machines are equipped with a guide bushing system.

Support Bushing

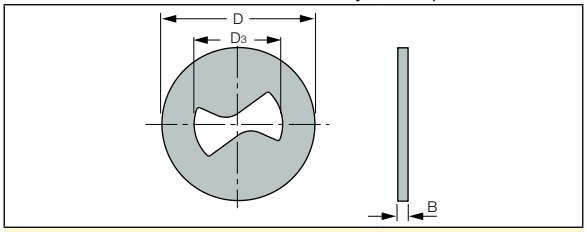
D3 indicate the tube diameter



Support Bushing				
D3	Ext. Ø "D"	Ext. Ø "D1"	Length "L"	Length "L1"
9.6 - 16,399	20	26	20	12
9.6 - 25,999	30	38	26	16
9.6 - 25,999	45	50	26	16

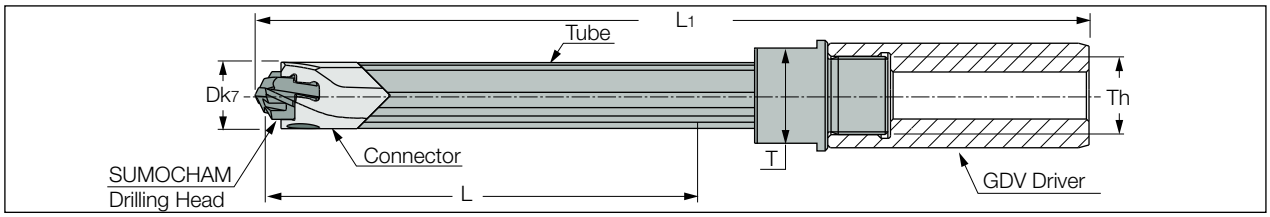
Sealing Disk

Indicate the dimensions needed for your requirements



Sealing Disk		
D3	Ext. Ø "D"	Thick. " B"
9.6 to 15,559	32	4
15,6 to 25,999	40	4

SUMOGUN Inquiry Form



1. Tool

Quantity _____

Nominal diameter and tolerance _____

Please fill in dimensions on the sketch.

Driver

For standard drivers please use designation from page 294

Special Driver

☐ Code No. _____

☐ Special, please attach sketch and specifications.

2. Workpiece

(If possible, please attach a drawing)

2.1 Material

Material description (DIN material number or any other standard):

_____

Hardness and Properties: _____

☐ Short Chips ☐ Long Chips

2.2 Hole Type

☐ Blind Hole ☐ Drilling into Pre-hole

☐ Angled Entry ☐ Drilling into Solid

☐ Boring ☐ Angled Exit

Drilling Depth _____ mm Hole Tolerance _____

2.3 Application:

Workpiece: ☐ Stationary ☐ Rotating

Tool: ☐ Stationary ☐ Rotating

Sketch of drilling application

Note: It may be necessary to change several of the parameters that you indicated, based on our experience with your application.

3. Machine

3.1 Technical Data

Machine Type _____

Power: _____kW

3.2 Cutting Data:

Cutting Speed V_c _____ m/min

Revolutions Nmin _____ RPM, Nmax _____RPM

Feed Fmin _____ mm/rev,

Fmax _____ mm/rev

Feed Rate VF _____ mm/min

Coolant:

☐ Oil ☐ Soluble Oil ☐ Other

Coolant Pressure: _____ Bar

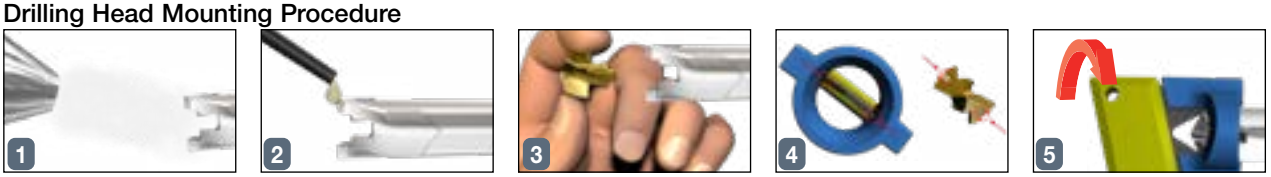
Drill Body Type		Hole Diameter	Length
SNT	Steel body	Ø10.00-25.99	Drilling Depth
CNT	For C.N.C		
GDT	For Gundrill		Total length

Metric Fine Pictch	Dwg. Number
1=M16 1=M20	4 last digits

Tool Type	
Code	Type
No code	Standard shape and size
GP	Guide Pads
SC	Special Connector
PT	P-Tube

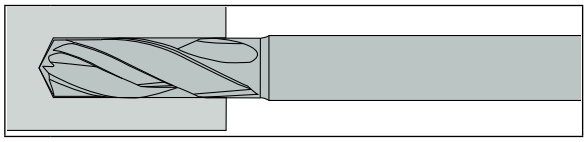
MN	###	-	XXX	-	XXX	-	MF	1	GP	-	XXXX

Drilling Head Mounting Procedure

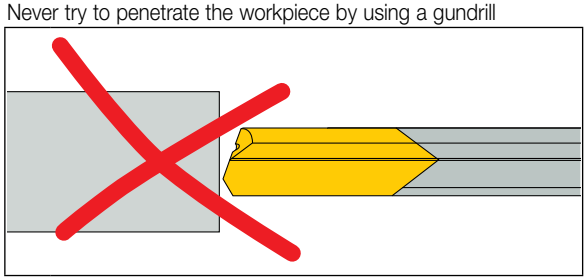


When using a gundrill on a lathe machine, a short solid carbide centering drill should be used prior to the gundrill. Once the gundrill enters the pre-drilled hole, it is self-guided.

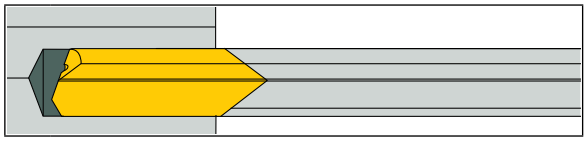
1 Drilling a pre-hole (drill diameter +0.02 mm)



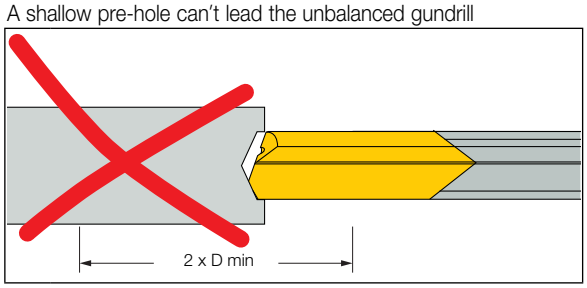
Never try to penetrate the workpiece by using a gundrill



2 Gundrill penetration through the pre-hole

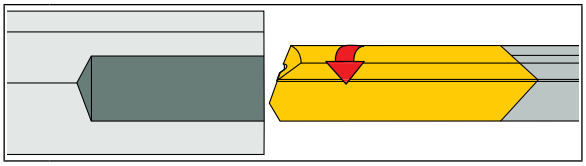


A shallow pre-hole can't lead the unbalanced gundrill

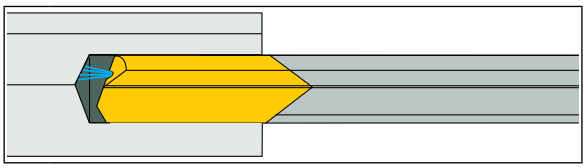


Drill Penetration Instructions

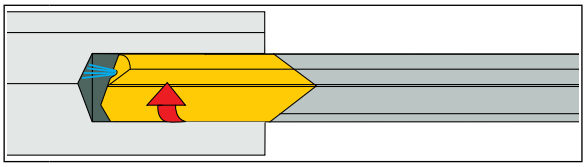
1 Rotate the drill counterclockwise prior to and during hole penetration



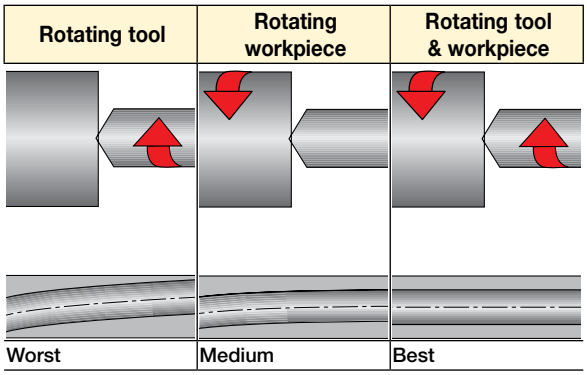
2 Stop the drill rotation and start the coolant



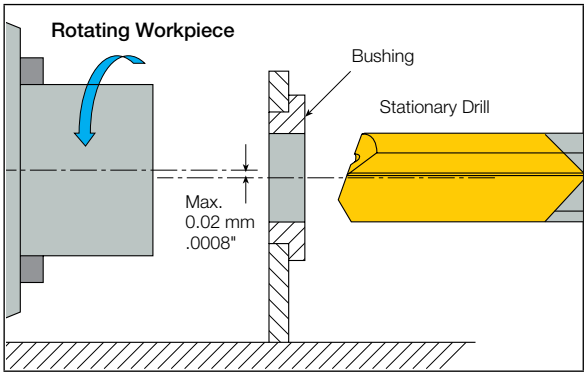
3 Rotate the drill clockwise prior to drilling operation



The influence of a Tool vs. Workpiece rotation



The maximum misalignment between the drill bushing and the workpiece center line should not exceed 0.02 mm (.0008").



Single Flute Gundrill

Iscar's gundrill consists of a single-piece carbide head, a streamlined shank and a driver through which coolant flows to the working end where it is most needed. Chips are evacuated along the V-shaped external flute.

Drilling Head

The carbide head is tapered on its length to reduce friction. The taper angle depends on the type of material to be drilled. For high precision drilling, the taper should be reduced to a minimum.
Note that when the head is resharpened, the diameter of the drill changes, affecting the hole tolerance.

Shank

The cross-section of the shank is V-shaped with coolant holes. It is made of hardened steel that is highly resistant to twisting. This cross-section provides the optimal conditions for twist resistance, coolant flow and chip evacuation.

Driver

The driver ensures the connection between the gundrill and the machine tool, (see page 301 for detailed driver information).

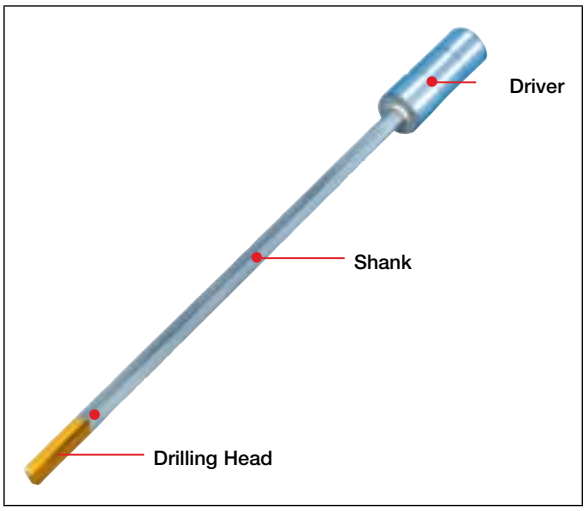
Advantages

- Drilling precision of IT7 to IT9 tolerances can be reached
- Excellent straightness and concentricity
- Maintains high precision hole center alignment
- Surface roughness of R0.4 - R1.6 is easily obtained
- Reboring operations are often unnecessary

Carbide Tipped Gundrill Range

Drill Diameter	Max. Flute Length
2.50 to 3.09	1100
3.10 to 5.99	2500
6.00 to 11.39	3000
11.40 to 40.00	3500

Overall length=flute length+driver length (see page 303)



Iscar's advanced gundrill technology provides superior geometric and dimensional quality for both deep and shallow drilling. The drills are available in the range of 2.5 to 40 mm.

Single Flute Solid Carbide Gundrills

Another type of gundrill is made with an integral tip and shank, made of solid carbide with either a steel or a carbide driver. These drills are designed for conventional machines, machining centers and lathes. This style of gundrill is available from 0.9-16 mm and can be used on various types of materials. It provides superior rigidity and optimal coolant flow rates. As a result of its rigidity, up to 100% higher feed rate can be reached.
When using the small diameter drills, it is crucial to adhere closely to the recommended drilling parameters.

Solid Carbide Gundrill Range

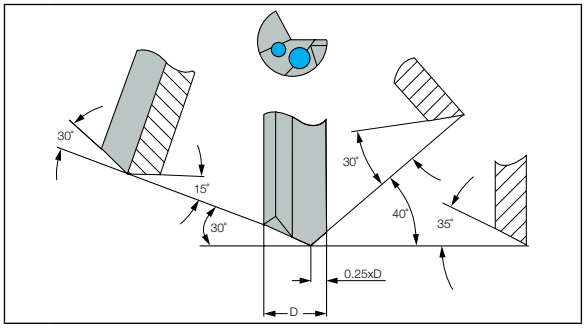
(with or without brazed steel driver)

Drill Diameter	Max. Flute Length
0.9 to 16.00	300 mm

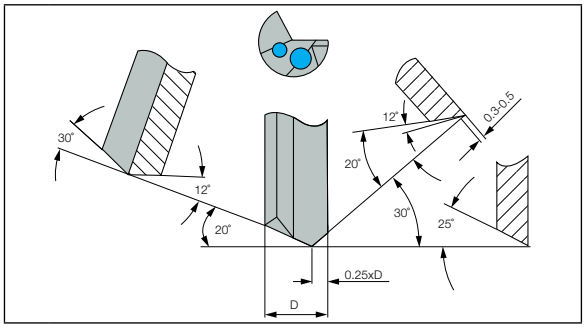
Standard Gundrill Head Sharpening Angles

Subject to the required tolerance, cutting performance and desired chip shape, the following standard sharpening angles are recommended (shown in figures 1 and 2).

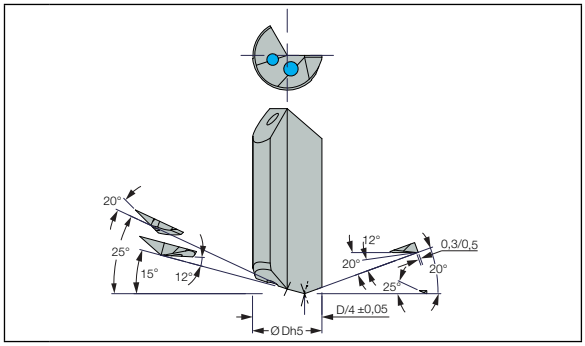
1 Standard sharpening for 0.9 to 4 mm drill diameters



2 Standard sharpening for 4 to 32 mm drill diameters



3 Standard sharpening for 32 to 40 mm drill diameters

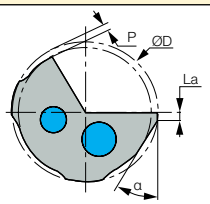


Note: For special or semi-standard gundrills, special geometries will be offered to match the application.

Standard Gundrill Head Profiles

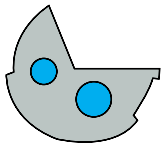
Drilling capacity and finish of the drilled hole are dependent on the geometrical shape of the drill head. Both the profile and the sharpening must be matched to the workpiece material. The profile is defined when the tool is manufactured. Although regrinding may change the cutting geometry, the profile should remain the same.

General Sketch



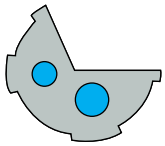
All cross section profile parameters such as: P, La and must be precisely matched to the workpiece material properties.

Profile G (Universal)



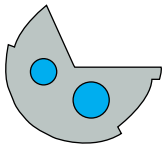
Standard form for most material types, particularly for materials with a tendency to shrink. Recommended for high precision bore tolerance and straightness. Maintains precise exit hole size. Recommended when extra burnishing is required.

Profile A



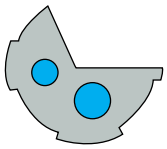
Suitable for cast iron (usually coated) and aluminum alloys. Can be used for cross drilling, angular entry or exit and for interrupted cut. Large coolant gaps between pads.

Profile B



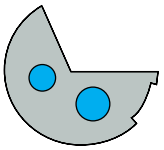
Excellent size control, for high precision hole tolerance. Used for cast iron and aluminum alloys.

Profile C



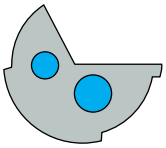
Used for angled entry or exit. Large back taper, for shrinking materials such as types of alloys and stainless steel. Large coolant gaps between pads.

Profile D



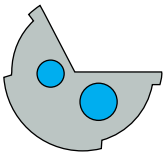
Suitable for cast iron only. Very effective in grey cast iron (usually coated).

Profile E



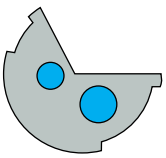
General use, for alloys and stainless steel. This profile eliminates the problem of the tool sticking in the hole after the outer corner dulls. Especially suitable for crankshaft and other forged materials. Recommended for accurate hole straightness.

Profile H



Recommended for all nonferrous and cast iron materials up 5 mm diameter. Sometimes used for wood and plastic with larger back taper.

Profile I

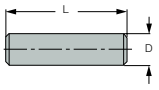
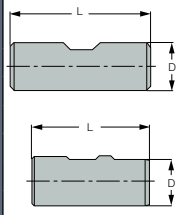
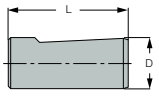
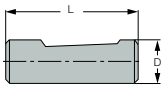


Used for aluminum and brass for best hole finish. For intersecting holes and interrupted cut or when extra outer diameter support and burnishing is required.

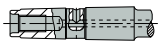
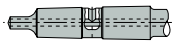
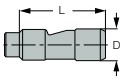
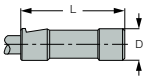
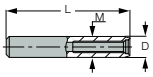
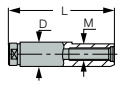
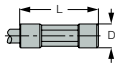
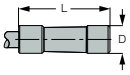
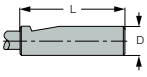
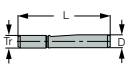
Standard Gundrill Drivers for Machining Centers, Lathes, etc.

Drivers

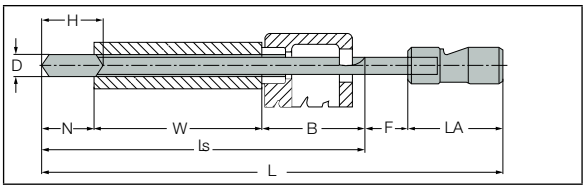
Drivers are available for dedicated and CNC machines for any specified diameter and length.
Below are the driver codes and technical data.

Driver Type	Drawing	DXL	Driver code	BRAZED GUNDRILL F = CYLINDRICAL TUBE: Max. cutting diameter	BRAZED GUNDRILL F = CYLINDRICAL TUBE: Equal or less than max. cutting diameter	BRAZED GUNDRILL F = CYLINDRICAL TUBE: More than max. diameter	SOLID CARBIDE GUNDRILL: F = Straightening extension
Cylindrical DIN1835A DIN6535HA		4x28	N°1	2.749	10	20	18
		5x28	N°2	3.249	10	20	15
		6x36	N°3	4.249	10	20	14
		8x36	N°4	5.749	10	20	14
		10x40	N°5	7.299	10	20	15
		12x45	N°6	8.999	10	20	15
		.50x1.78″	N°94	9.699	10	20	15
		14x45	N°7	10.999	10	20	15
		16x48	N°8	12.399	10	20	15
		18x48	N°9	14.399	10	20	15
		.75x2.03″	N°95	14.899	10	20	15
		20x50	N°10	15.899	10	20	
		25x56	N°11	19.509	10	25	
		1.00x2.28″	N°96	19.509	10	25	
		1.25x2.28″	N°97	25.609	10	25	
		32x60	N°12	25.609	10	25	
		40x70	N°13	32.609	10	25	
		50x80	N°14	40	10	25	
		63x90	N°15	40	10	25	
Weldon DIN1835B DIN6535HB		6x36	N°16	2.749	10	20	15
		8x36	N°17	3.249	10	20	15
		10x40	N°18	7.299	10	20	15
		12x45	N°19	8.999	10	20	15
		.50x1.78″	N°98	9.699	10	20	15
		16x48	N°20	12.399	10	20	15
		18x48	N°21	14.399	10	20	15
		.75x2.03″	N°99	14.899	10	20	15
		20x50	N°22	15.899	10	20	15
		25x56	N°23	19.509	10	25	
		1.00x2.28″	N°100	19.509	10	25	
		1.25x2.28″	N°101	25.609	10	25	
		32x60	N°24	25.609	10	25	
		40x70	N°25	32.609	10	25	
		50x80	N°26	40	10	25	
		63x90	N°27	40	10	25	
Whistle Notch DIN1835E		6x36	N°28	2.749	10	20	
		8x36	N°29	3.249	10	20	
		10x40	N°30	7.299	10	20	15
		12x45	N°31	8.999	10	20	15
		16x48	N°32	12.399	10	20	15
		18x48	N°33	14.399	10	20	15
		20x50	N°34	15.899	10	20	15
		25x56	N°35	19.509	10	25	
		32x60	N°36	25.609	10	25	
		40x70	N°37	32.609	10	25	
Whistle Notch DIN6535HE		6x36	N°38	2.749	10	20	15
		8x36	N°39	3.249	10	20	15
		10x40	N°40	7.299	10	20	15
		12x45	N°41	8.999	10	20	15
		16x48	N°42	12.399	10	20	15
		18x48	N°43	14.399	10	20	15
		20x50	N°44	15.899	10	20	15

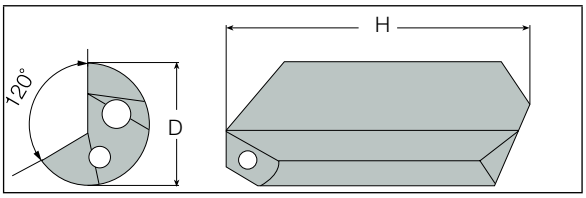
Standard Drivers for Gundrill Machines

Driver Type	Drawing	DXL	Driver code	BRAZED GUNDRILL F = CYLINDRICAL TUBE: Max. cutting diameter	BRAZED GUNDRILL F = CYLINDRICAL TUBE: Equal or less than max. cutting diameter	BRAZED GUNDRILL F = CYLINDRICAL TUBE: More than max. diameter	SOLID CARBIDE GUNDRILL: F = Straightening extension
DIN228AK		CM1	N°45	9.599	10	20	
		CM2	N°46	14.599	10	20	
		CM3	N°47	21.499	10	25	
		CM4	N°48	29.499	10	25	
DIN228BK		CM1	N°49	9.599	10	20	
		CM2	N°50	14.599	10	20	
		CM3	N°51	21.499	10	25	
		CM4	N°52	29.499	10	25	
Central Clamping Surface 15°		6x30	N°53	2.749	10	20	20
		10x40	N°54	7.299	10	20	15
		16x45	N°55	12.399	10	20	
		.750x2.75″	N°56	14.899	10	20	
		25x70	N°57	19.509	10	25	
		1.00x2.75″	N°58	19.509	10	25	
		1.25x2.75″	N°59	25.609	10	25	
		1.50x2.75″	N°60	32.609	10	25	
Frontal Clamping Surface 15°		16x50	N°61	12.399	10	20	
Cylindrical with Thread		10x50 M6X0.5	N°62	7.299	10	20	15
		10x60 M6X0.5	N°63	7.299	10	20	
		.50x1.97″ M6x0.5	N°64	8.999	10	20	15
		16x80 M10X1	N°65	12.399	10	20	15
		25x100 M16x1.5	N°66	19.509	10	25	
		36x120 M24x1.5	N°67	30.609	10	25	
VDI Design		10x68 M6x0.5	N°68	6.749	10	20	
		16x90 M10x1	N°69	10.799	10	20	15
		25x112 M16x1.5	N°70	19.509	10	25	
		36x135 M24x1.5	N°71	30.609	10	25	
Central Clamping Hexagonal		25x70	N°72	19.509	10	25	
		32x70	N°73	25.609	10	25	
Central Clamping Tapered		.50x1.50″	N°74	8.599	10	20	15
		16x70	N°75	12.099	10	20	15
		.75x2.75″	N°76	14.099	10	20	
		20x70	N°77	16.099	10	20	15
Frontal Clamping Surface 2°		.50x1.50″	N°78	9.699	10	20	
		.75x2.75″	N°79	14.899	10	20	
		1.00x2.75″	N°80	19.509	10	25	
		1.00x3.94″	N°81	19.509	10	25	
		1.25x2.75″	N°82	25.609	10	25	
		1.25x3.94″	N°83	25.609	10	25	
		1.50x2.75″	N°84	32.609	10	25	
		1.50x3.94″	N°85	32.609	10	25	
Trapezoidal Thread		16x112 Tr 16x1.5	N°86	13.599	10	20	
		20x126 Tr 20x2	N°87	17.099	10	20	
		28x126 Tr 28x2	N°88	25.599	10	25	
		36x162 Tr 36x2	N°89	32.599	10	25	
Spraymist Driver		16x40	N°90	12.399	10	20	
		25x50	N°91	19.509	10	25	
		35x60	N°92	26.599	10	25	

Standard Gundrill Length Calculations



Standard Gundrill Carbide Head Length



D= Cutting diameter
H= Carbide length
N= Regrinding area = H-D
W= Hole depth
B= Chip evacuation area = For typical gundrill machines, 250 mm
= For machining centers, 2xD (minimum 15 mm)
F= 10 mm.
LA = Driver length
LS = Flute length
L= Overall length

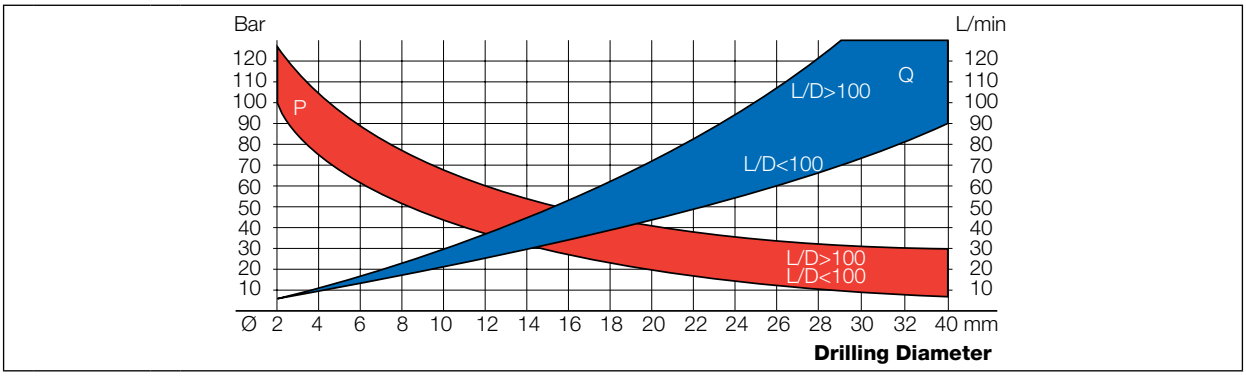
Example
Drilling of a ø10x500 depth hole on a gundrill machine with ø25x70 mm driver code No. 57 (See page 302)
D=10 W=500 LA=70 B=250 (or per experience)
L=N+W+B+F+LA
L=(35-10)+500+250+13+70=858 (OAL)
Ls=N+W+B=770 (flute length)

Ordering Code
For example:
D and Ls are available as standard
STGD-10000-0858-57-IC08

Diameter Range	Head Length
2.50-3.80	20
3.80-4.05	23
4.05-5.05	25
5.05-6.55	30
6.55-11.05	35
11.05-18.35	40
18.35-21.35	45
21.35-23.35	50
23.35-26.35	55
26.35-32.00	65

Note: regrindable length=H-D

Pressure and Coolant Flow Rate for Gundrills



Q l/min P bar

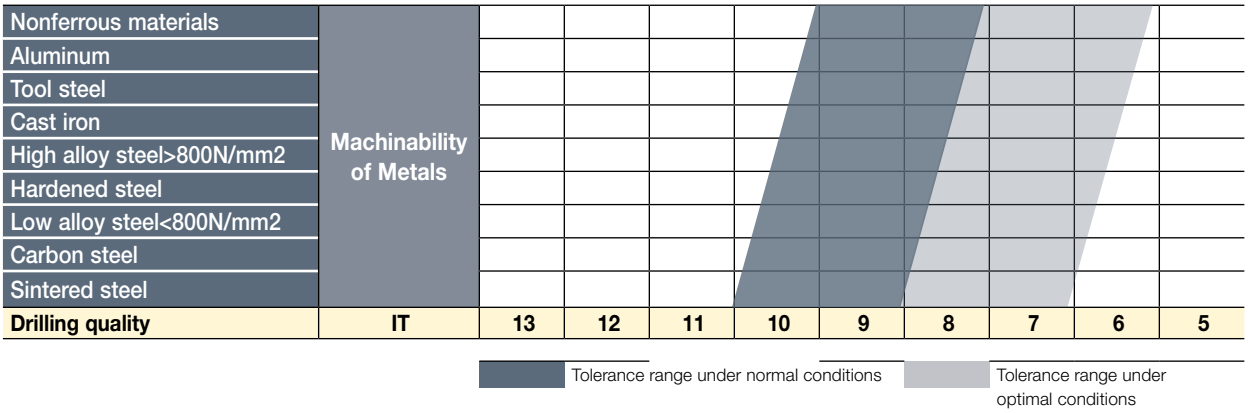
Gundrill Lubrication and Cooling
The best performance is obtained by using oil.
On equipment that uses water-soluble fluids (i.e. machining centers and CNC machines), a concentration between 10% and 15% is recommended.

Guidelines for Optimal Gundrill Performance
- It is recommended to use a strong coolant flow for efficient chip flushing and cooling of the cutting edge
- It is recommended to use a filter under 20 µm
- Note: Improper filtration may result in interrupted flow of lubricating oil. This creates a sticky surface on the bearing pads and leads to premature wear of the tool and overloading the coolant pump and spindle seals
- The coolant temperature should be between 20 and 22° C.
  Note: Above 50° C the viscosity of the coolant is reduced by 50% and becomes ineffective.

Drilling Tolerances Obtainable In Deep Hole Drilling

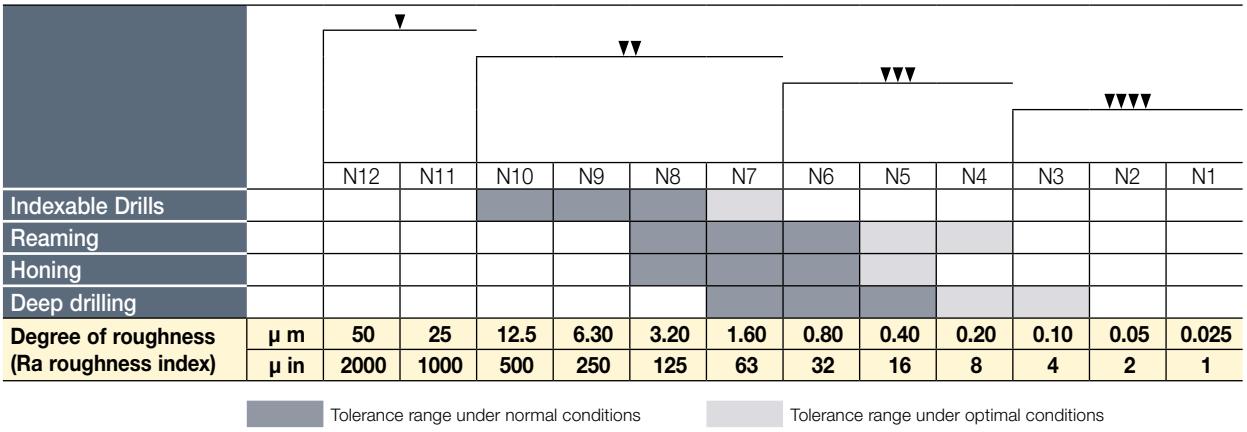
Deep Drilling Tolerances

Gundrill configurations when used under recommended conditions can produce holes with tolerances of IT8-IT9.
When operating under optimal conditions, even better tolerances can be achieved.



Surface Quality

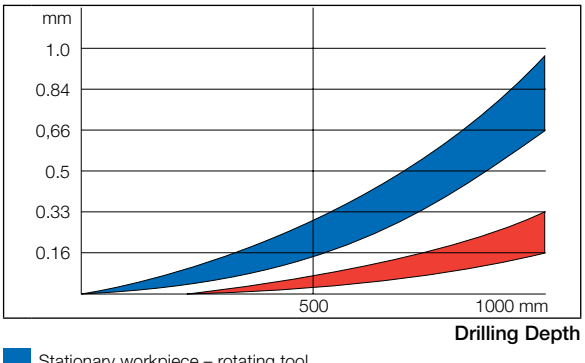
Surface quality of 0.2 Ra can be achieved when using gundrills under recommended conditions.



Concentricity and Straightness

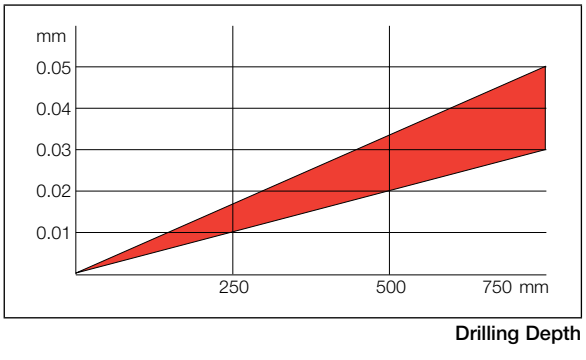
The resulting quality depends on different factors such as:

- Drilling depth and diameter
- Type of machining and cutting parameters
- Quality and uniformity of the workpiece material
- Machine tool conditions
- Gundrill support



Circularity

The geometric quality of bores obtained from deep hole drill bits is clearly higher than that obtained with the use of twist drills. It is possible to obtain precision with deviations of less than 4 µm.



Delivery Schedule Based on Drill Dimensions for Carbide Tipped Gundrills

Single Flute Carbide Tipped Gundrill Designations New Tools

Standard(1) Brazed Drill (Carbide Tipped):

Ordering Example:

STGD	- 05500	- 0500	- 57	- IC08
	Drill Diameter	Overall Length	Offer No. or Drawing No.	Version No. or Drawing

Ø2.5 to Ø20 each 0.1 mm and Ø20 to Ø32 each 1 mm
Standard geometry suitable in any material Standard driver from the table (page 301) 1-2 weeks delivery

Semi-Standard(1) Brazed Drill (Carbide Tipped):

Ordering Example:

GD	- 05520	- 0500	- ER	- IC908(2)
	Drill Diameter	Overall Length	Offer No. or Drawing No.	carbide grade(2)

Diameter out of standard range Standard geometry and/or head profile from page 300 and/or coating Standard driver from the table (page 301) 3-4 weeks delivery

Special(1) Gundrill Carbide Tipped:

Ordering Example:

SPGD	- 05520	- 0500	- 02051	- 01
	Drill Diameter	Overall Length	Offer No. or Drawing No.	Version No.

Any special specification (special geometry, special driver, etc.) 3-4 weeks delivery

Repair (Replacement of the Carbide Tip)

Repair of Standard(1) Drills

Ordering Example:

RSTGD	- 05520	- 0500	- IC08
	Drill Diameter	Overall Length	(The only available carbide grade)

Repair of Semi-Standard(1)

Ordering Example:

RGD	- 05520	- 0500	- GR	- IC508(2)
	Drill Diameter	Overall Length	G=Drill Profile R=Rough (P=Polished)	(carbide grade)(2)

Repair of Special(1) Drills

Ordering Example:

RSPGD	- 05520	- 0500	- 02051	- 01
	Drill Diameter	Overall Length	Offer No. or Drawing No.	Version No. or Drawing

Single Flute Solid Carbide Gundrill Designation New Tools

4-6 weeks delivery for any kind of solid cabide gundrill

Standard(1) Solid Carbide Drills

Ordering Example:

STCGD	- 05500	- 0200	- 05
	Drill Diameter	Overall Length	Driver Type

Semi-Standard(1) Solid Carbide Drills

Ordering Example:

CGD	- 05520	- 0200	- 05	- CPIC08
	Drill Diameter	Overall Length	Driver Type	C=Drill Profile P=Polished (R=Rough) IC08=Carbide Grade(2)

Special(1) Solid Carbide Gundrills

Ordering Example:

SPCGD	- 05520	- 0500	- 02051	- 01
	Drill Diameter	Overall Length	Offer No. or Drawing No.	Version No.

Repair of a solid carbide drill is not possible

Special(1) Two Flute Carbide Tipped Gundrill Designations

Ordering Example:

GD2L	- 05520	- 0500	- 02051	- 01
	Drill Diameter	Overall Length	Offer No. or Drawing No.	Version No.

Standard Geometry Resharpening of Carbide Tipped or Solid Gundrills

(See page 299)
Ordering Example:

STGRIND	- 05520
	Drill Diameter

Special Geometry Resharpening

Ordering Example:

SPGRIND	- 05520	- 0205	- 02051	- 01
	Drill Diameter	Overall Length	Offer No.	Version No.

Standard gundrills: delivery within 1-2 weeks from order (shipment time not included).
Semi-standard gundrills: delivery within 2-4 weeks from order (shipment time not included)
Special gundrills: delivery within 8-10 weeks from order (shipment time not included)
Available carbide grades: IC08 – uncoated grade used as a substrate for the following coated grades: IC908 (TiAlN); IC508 (TiCN+TiN); IC308 (TiCN); IC208 (TiN)

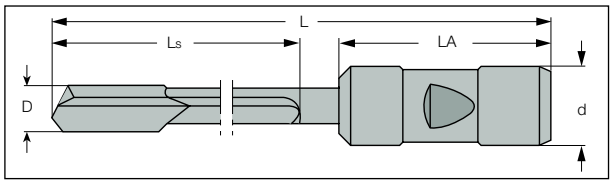
Gundrill Inquiry Form

1. Tool

Quantity _____

Nominal diameter and tolerance _____

Please fill in dimensions on the sketch below.



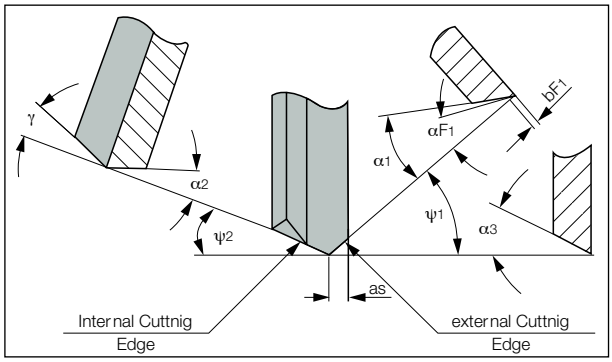
Driver

For standard drivers please use codes from page 301

☐ Code No.

☐ Special, please attach sketch and specifications.

Grind: ☐ special (fill in the dimensions and angles below).



α1= _____ αF1= _____ Ψ1= _____

α2= _____ bF1= _____ Ψ2= _____

α3= _____ as= _____ γ= _____

☐ Standard (see page 299)

Coating:

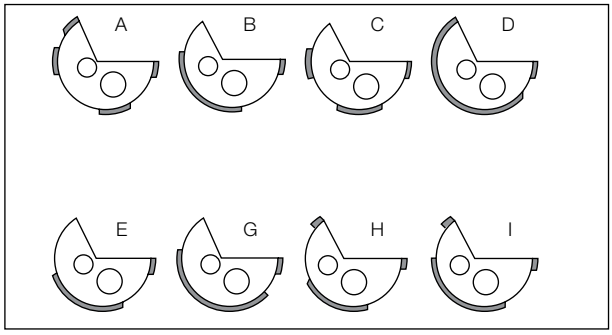
☐ TiN ☐ TiCN ☐ TiN+TiCN ☐ Other

☐ IC208 (TiN) ☐ IC308 (TiCN) ☐ IC508 (TiCN+TiN)

☐ IC908 (TiAlN) ☐ TiAlN

Type:

Please circle the required type. See page 300.



2. Workpiece

(If possible, please attach a drawing)

2.1 Material

Material description (DIN material number or any other standard):

_____

Hardness and Properties:

_____

☐ Short Chips ☐ Long Chips

2.2 Hole Type

☐ Blind Hole ☐ Drilling into Pre-hole

☐ Angled Entry ☐ Drilling into Solid

☐ Boring ☐ Angled Exit

Drilling Depth _____ mm Hole Tolerance _____

2.3 Application:

Workpiece: ☐ Stationary ☐ Rotating

Tool: ☐ Stationary ☐ Rotating

3. Machine

3.1 Technical Data

Machine Type. _____

Power _____ kW

3.2 Cutting Data:

Cutting Speed V_c _____ m/min

Revolutions Nmin _____ RPM, Nmax _____RPM

Feed Fmin _____ mm/rev,

Fmax _____ mm/rev

Feed Rate VF _____ mm/min

Coolant:

☐ Oil ☐ Soluble Oil ☐ Other

Coolant Pressure _____ Bar

Sketch of drilling application

Note: It may be necessary to change several of the parameters that you indicated based on our experience with your application.

Typical Gundrill Applications - Main Drilling Methods

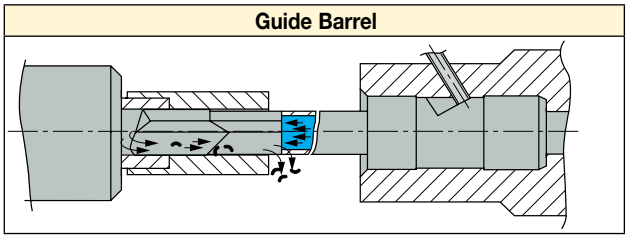


Figure 1

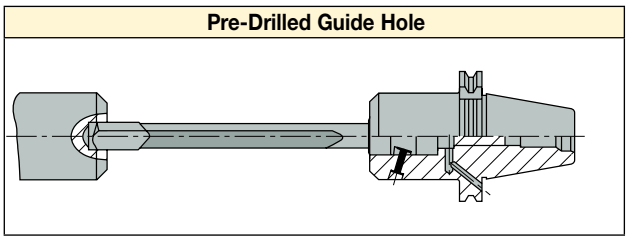


Figure 2

User Guide

The gundrill is not a self-centering tool. Therefore, an external means must be used to guide it to the point of entry into the workpiece. It is recommended that the machine tool be equipped with a means for guiding the gundrill, preferably during the entire drilling process.
An alternative method is a pre-drilled guide hole (figure 2), which is common for machining centers. Once the drill has been fully engaged into this hole, it continues to be self-guided.
The guide pads contribute to the high degree of calibration and provide burnishing of the drilled hole.

Typical Gundrill Applications - Chip Evacuation and Coolant Flow

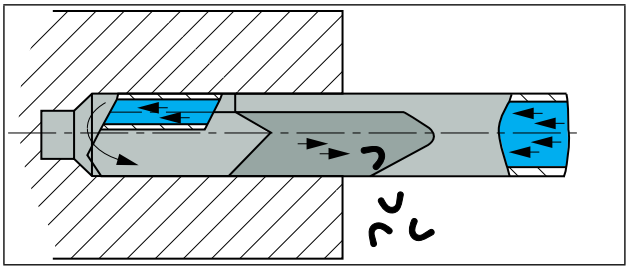


Figure 3

Boring with chip evacuation and coolant flowing opposite the boring direction

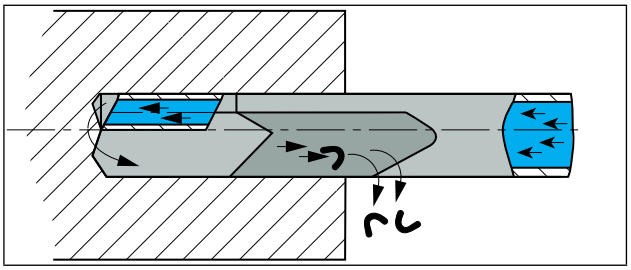


Figure 4

Drilling of solid material with chip evacuation and coolant flow opposite the drilling direction

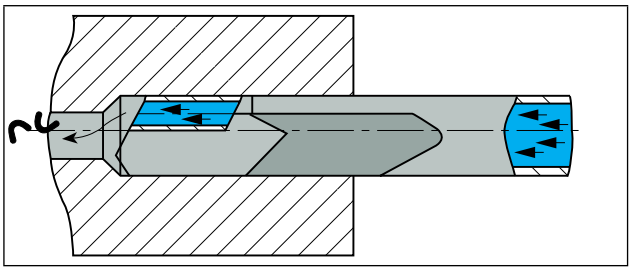


Figure 5

Boring with chip evacuation in the boring direction

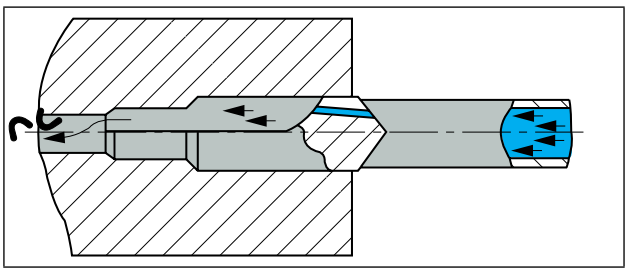
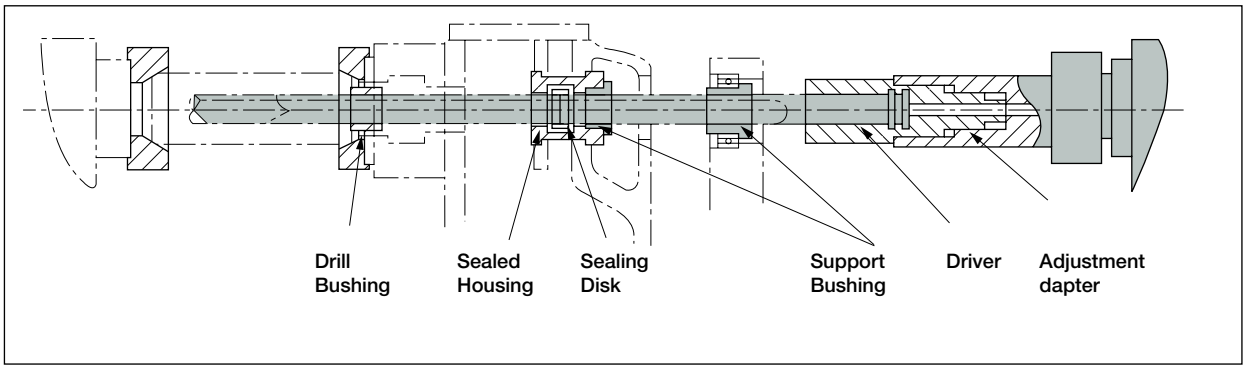


Figure 6

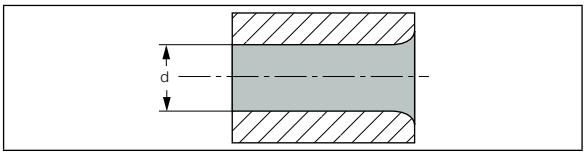
Boring with a staged tool chip evacuation and coolant flow in the boring direction

Deep Hole Machine Accessories



Bushing

Based on modified DIN 179 specify the "d" diameter of the drill. Carbide bushing is delivered only on request.



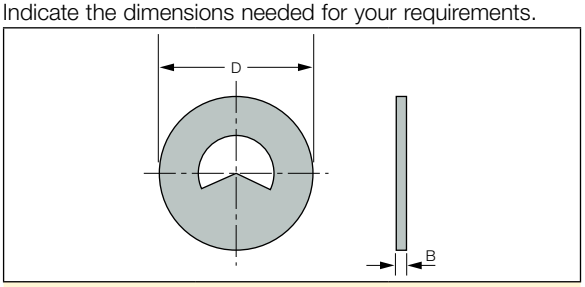
d = Drill diameter +0.02

Guide Bushings

As the gundrill is not a self-centering tool and its radial rigidity is low (due to diameter to length ratio), a guide bushing is an essential component for a proper gundrill operation. The function of the guide bushing is to direct the gundrill into the material during penetration. The diameter of the guide bushing should be within 20 microns larger than the diameter of the drill. Dedicated gundrill machines are equipped with a guide bushing system.

Sealing Disk

Supplied with a single sealing disk or a protection sheet. Indicate the dimensions needed for your requirements.

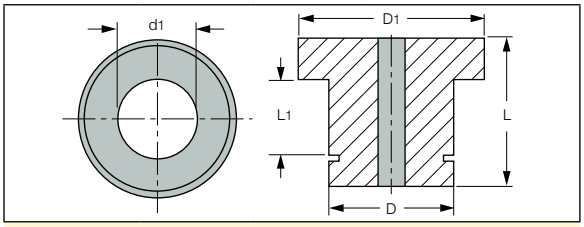


Sealing Disk		
Tool Ø "d"	**Ext. Ø "D"**	**Thick. " B"**
2 to 6	20	3
3,1 to 15,559	32	4
15,6 to 25,999	40	4
26 to 40	90	4

Sealing Disk with Protection		
Tool Ø "d1"	**Ext. Ø "D"**	**Thick. " B"**
2,9 - 5,249	20	7
5,25 - 14,449	32	11
14,45 - 25,999	40	12
26 - 41	90	12

Support Bushing

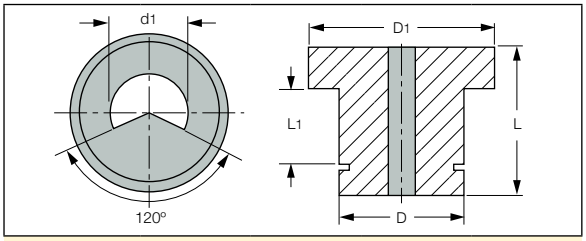
Indicate the "d" diameter of the drill



Support Bushing				
Tool Ø "d1"	**Ext. Ø "D"**	**Ext. Ø "D1"**	**Length "L"**	**Length "L1"**
1,9 - 16,399	20	26	20	12
1,9 - 25,999	30	38	26	16
1,9 - 34	45	50	26	16

Support Bushing with "V" Form

Indicate the "d" diameter of the drill

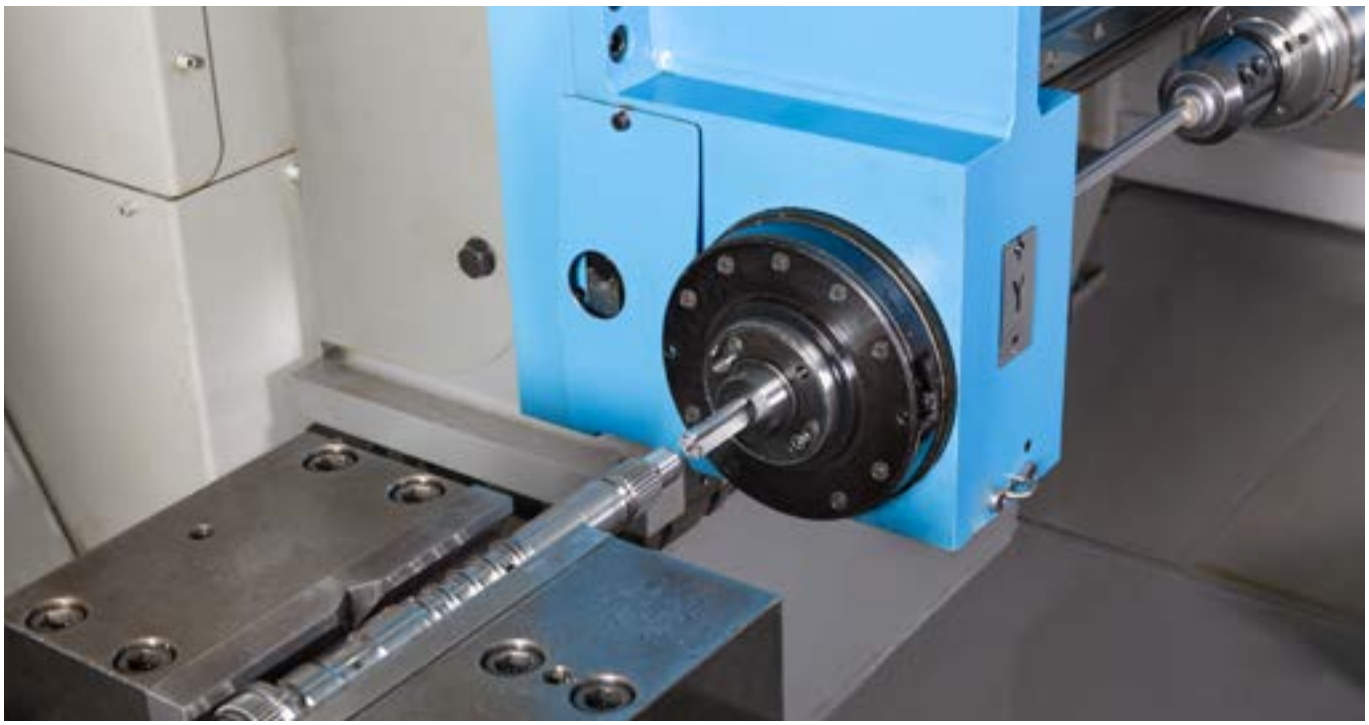


Support Bushing with "V" Form				
Tool Ø "d1"	**Ext. Ø "D"**	**Ext. Ø "D1"**	**Length " L"**	**Length " L1"**
1,9 - 16,399	20	26	20	12
1,9 - 23,799	30	38	26	16

Gundrill Troubleshooting Guide

Hole Problems	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	Incorrect drill profile	Incorrect head angles	Vibrations	Oversized bushing	A gap between bushing and workpiece	Bushing undersize	Loss of coolant pressure	High coolant pressure	Overheating coolant	Insufficent coolant	Head inside angle excessive wear	Head outside angle excessive wear	Too short carbide head	Tool heal drag	Worn supporting pads
	Possible Causes																																	
Oversize	+	+				+							+			+		+		+	+	+	+	+			+		+	+		+	+	
Undersize			+								+									+	+			+	+	+					+	+		
Rough surface finish		+	+	+	+	+			+		+			+		+	+	+		+	+	+		+		+		+	+	+	+	+	
Runout	+				+	+			+	+	+	+	+		+		+	+	+	+	+	+	+	+	+				+	+	+	+	+
Conical entrance						+															+	+	+	+		+								
Curved hole axis	+				+	+				+		+	+		+		+	+	+	+	+	+	+	+			+		+			+	+	

Drill Problems																																		
Breakage	+	+	+		+	+		+		+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+			+			+	+	+
Chipping					+		+			+					+		+		+		+	+										+		
Poor drill life		+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+
Excessive margin wear	+			+				+					+	+			+	+	+	+					+			+				+	+	
Excessive corner wear				+				+		+	+				+	+	+			+	+	+						+			+		+	+
Excessive flank wear		+		+		+		+					+	+				+	+		+			+	+			+				+	+	
Drill heat		+				+		+			+			+					+							+		+	+			+	+	+
Flute bending					+	+		+					+					+		+	+	+			+	+			+	+	+	+	+	+
Damaged wear pad				+				+		+	+		+	+				+	+	+		+			+	+		+	+	+		+	+	+
Built-up edge				+	+	+	+		+	+					+		+			+	+	+				+			+		+	+		
Cratering				+		+			+	+					+		+			+	+	+						+	+			+		+



Gundrill Recommended Machining Conditions

ISO	Material		Condition	Tensile Strength [N/mm²]	Hardness HB	Material Group No.(1)	Cutting Speed v_c m/min	Feed (mm/rev) vs. Drill Diameter (mm)				
								2.0-9.79	9.8-11.69	11.7-13.19	13.2-16.19	16.2-40
P	Non-alloy steel and cast steel, free cutting steel	< 0.25 %C	Annealed	420	125	1	70-110	0.01-0.03	0.03-0.05	0.035-0.06	0.04-0.07	0.02-0.10
		>= 0.25 %C	Annealed	650	190	2	80-110					
		< 0.55 %C	Quenched and tempered	850	250	3	70-100					
		>= 0.55 %C	Annealed	750	220	4	70-110					
			Quenched and tempered	1000	300	5	70-90					
	Low alloy and cast steel (less than 5% of alloying elements)		Annealed	600	200	6	80-110	0.01-0.03	0.03-0.05	0.035-0.06	0.04-0.07	0.02-0.10
			Quenched and tempered	930	275	7	70-110					
				1000	300	8	60-90					
				1200	350	9	50-80					
	High alloyed steel, cast steel and tool steel		Annealed	680	200	10	50-70	0.01-0.03	0.025-0.04	0.03-0.045	0.035-0.05	0.12-0.10
			Quenched and tempered	1100	325	11	40-70	0.01-0.03	0.025-0.04	0.03-0.045	0.035-0.05	0.12-0.10
	Stainless steel and cast steel		Ferritic/ martensitic	680	200	12						
			Martensitic	820	240	13						
M	Stainless steel and cast steel		Austenitic, duplex	600	180	14	40-80	0.01-0.03	0.025-0.04	0.03-0.045	0.035-0.05	0.02-0.10
K	Grey cast iron (GG)		Ferritic/ pearlitic		180	15	70-100	0.01-0.40	0.04-0.1	0.05-0.12	0.06-0.14	0.05-0.20
			Pearlitic/ martensitic		260	16	70-100					
	Nodular cast iron (GGG)		Ferritic		160	17	80-110					
			Pearlitic		250	18	80-110					
	Malleable cast iron		Ferritic		130	19	90-115					
			Pearlitic		230	20	90-115					
N	Aluminum-wrought alloys		Not hardenable		60	21	80-160	0.02-0.04	0.03-0.17	0.03-0.18	0.035-0.19	0.03-0.15
			Hardenable		100	22						
	Aluminum-cast alloys	<=12% Si	Not hardenable		75	23						
			Hardenable		90	24						
		>12% Si	High temperature		130	25	80-120					
	Copper alloys	>1% Pb	Free cutting		110	26	80-180	0.02-0.04	0.02-0.13	0.03-0.16	0.04-0.18	0.03-0.15
			Brass		90	27						
			Electrolitic copper		100	28						
	Non-metallic		Duroplastics, fiber plastics			29						
			Hard rubber			30						
S	High temp. alloys	Fe based	Annealed		200	31	25-60	0.01-0.03	0.025-0.03	0.03-0.035	0.03-0.04	0.02-0.10
			Hardened		280	32						
		Ni or Co based	Annealed		250	33						
			Hardened		350	34						
			Cast		320	35						
	Titanium alloys		Pure	400		36						
			Alpha+beta alloys hardened	1050		37						
H	Hardened steel		Hardened		55 HRC	38	20-50	0.01-0.03	0.025-0.03	0.03-0.035	0.03-0.04	0.02-0.10
			Hardened		60 HRC	39						
	Chilled cast iron		Cast		400	40						
	Cast iron		Hardened		55 HRC	41						

(1) For workpiece materials list, see pages 495-524