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GRADES & CHIP BREAKERS

KORLOY's new grades are designed with optimal substrates for each application and are PVD coated for high temperature, high hardness and oxidation resistance, or CVD coated for high temperature and wear resistance. Additionally, the improved post-coating treatment provides superior surface finishes to ensure the highest levels of quality and productivity.



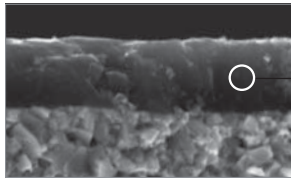
Solid drills grades selection

Grades for Mach Solid Drill (MSD)

PC325U

- Special surface treatment provides improved lubrication and reduced cutting loads
- Stable tool life thanks to increased welding resistance

Features



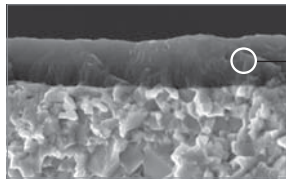
Increased welding resistance in medium to high speed cutting due to highly lubricative coating layers Increased wear resistance in carbon steel machining

Grades for Mach Solid Drill (MSD)

PC325T **new**

- Good wear resistance in HRSA machining at high temperature
- Good surface finish reduces friction resistance and increases chip evacuation

Features



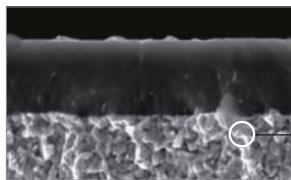
High heat and oxide resistance increase tool life Increased wear. Good surface finish coating layer ensures lubrication and high quality in machining.

Grades for Mach Long Drill (MLD)

PC215G/PC315G

- Improved wear resistance due to the ultrafine substrate
- Reduced friction resistance and smooth chip flow due to improved coating lubrication

Features



Exceptional wear resistance due to the ultrafine substrate

Selection system

Workpiece	Grade	ISO	Application range
P Steel	PC215G	P01	
	PC315G	P10	
	PC325U	P20	PC215G — PC315G — PC325U — PC230F
	PC230F	P30	
M Stainless steel	PC215G	M01	
	PC315G	M10	
	PC205F	M20	PC215G — PC315G — PC325U
	PC325U	M30	
K Cast iron	PC215G	K01	
	PC315G	K10	
	PC205F	K20	PC215G — PC315G — PC325U
	PC325U	K30	
N Nonferrous	ND2100 new	N05	ND2100 new — FG2 — FA1
	FG2	N10	
		N20	
S HRSA	PC325T new	S20	PC325T new
		S30	



Solid drills grades selection

Grade information for each product

Item	Grade	
	Coated	Uncoated
MSD Plus	PC325U	FG2
MSD Plus-S	PC325T	-
MSD Plus CFRP	ND2100	-
MSFD	PC325U	-
MLD Plus	PC215G, PC315G	FG2
VZD	PC230F	-
ESDP	PC325U	FG2
SSD Plus	-	FA1, FG2

The features of PVD coated grades

Workpiece	ISO	Features
PC325U	P20 ~ P35 M20 ~ M30 K20 ~ K35	<ul style="list-style-type: none"> • Universal grade for machining steel, cast iron, stainless steel, etc. • Stable cutting performance with excellent wear/chipping resistance • Increased welding resistance due to lubricative new coating at medium to high speed
PC325T <small>new</small>	M20 ~ M30 S20 ~ S30	<ul style="list-style-type: none"> • Good wear resistance realizes HRSA machining at high temperature • Good wear and chipping resistance ensure stable machinability
PC215G	P15 ~ P30 M15 ~ M25 K15 ~ K30	<ul style="list-style-type: none"> • Universal grade for machining steel, cast iron, etc. • Stable cutting performance with excellent wear/chipping resistance
PC315G	P15 ~ P30 M15 ~ M25 K15 ~ K30	<ul style="list-style-type: none"> • Universal grade for machining steel, cast iron, stainless steel, etc. • Stable cutting performance with excellent wear/chipping resistance • Increased welding resistance due to lubricative new coating at medium to high speed
PC230F	P25 ~ P35	<ul style="list-style-type: none"> • For machining general steel at medium to high speed • Stable cutting performance with excellent wear/chipping resistance
ND2100 <small>new</small>	N03 ~ N08	<ul style="list-style-type: none"> • For machining composite materials • Diamond-coated layers with excellent adhesion
FG2 / FA1	N05 ~ N25	<ul style="list-style-type: none"> • Increased wear/chipping resistance with the use of ultra fine substrate

Features of KORLOY drills

Index	Features
MSD Plus	<ul style="list-style-type: none"> • Increased welding resistance in medium to high speed cutting due to highly lubricative coating layers • Increased wear resistance in carbon steel machining • Reduced friction resistance around corners and flutes
MSD Plus-S	<ul style="list-style-type: none"> • Exclusive for HRSA grooving with good wear resistance at high temperature and chipping resistance. • New coating layer with good surface finish reduces frictional resistance and increases chip evacuation. • Preventing chipping on the cutting edge and fracture of tool ensures high productivity.
MSD Plus CFRP	<ul style="list-style-type: none"> • The best tool for hole making of CFRP workpieces • Excellent wear resistance due to the diamond-coated grade • Reduced burr creation in CFRP machining due to high rake cutting edges
MSFD	<ul style="list-style-type: none"> • High quality hole making capability with 180° point angle • Improved anti-chipping and welding resistance by edge honing and chamfering • Minimized creation of burrs compared to general drills
MLD Plus	<ul style="list-style-type: none"> • Higher rigidity due to straight-edge design • Smooth chip flow due to wider chip pockets and improved surface finish on flutes • Double margin system for stable machinability
ESDP	<ul style="list-style-type: none"> • Lubricative coating layer improves welding resistance at middle to high speed. • Increase wear resistance in machining carbon steel • Increased welding resistance and wear resistance with new PC325U grade applied.
SSD Plus	<ul style="list-style-type: none"> • New shape increases chip control • Surface finish and improved shape realize high quality of machining • Stable tool life increases productivity

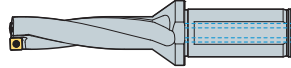
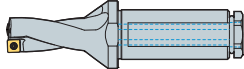

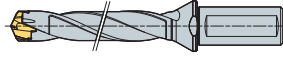




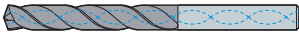









G


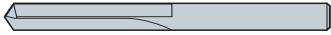




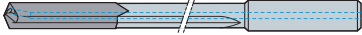






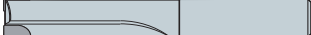


DRILL

Korloy drills provide a total solution for hole making, based on tooling know-how as well as extensive research and development for our tools.



Type	Designation		Shape	Drills dia.	Aspect ratio	Page
Indexable Drills	King Drill	K□D	 Available insert: SP□T, XO□T	Ø12.0~Ø60.5	2D~5D	G12 ~ G20
	King Drill HP	K□D..HP	 Available insert: SP□T, XO□T	Ø12.0~Ø60.5	2D~4D	G22 ~ G24
	King Drill (for large diameter drilling)	K□D	 Available insert: SP□T, XO□T	Ø61.0~Ø100.0	2D~4D	G26
	TPDC ^{new}	TPDC	 Available insert: TPD□□□□CP	Ø12.0~Ø30.9	3D~12D	G32 ~ G33
	TPDB Plus ^{new}	TPDB-P	 Available insert: TPD□□□B	Ø10.0~Ø32.9	3D~12D	G39 ~ G43
	TPDB-H ^{new}	TPDB-H	 Available insert: TPD□□□B-H	Ø14.0~Ø30.4	3D~8D	G48 ~ G50
	Indexable Drills & Drill with center	WPDC	 Available insert: WC□T	Ø25.0~Ø80.0	5D~8D	G55 ~ G56
Solid Drills	Mach Solid Drill Plus ^{new}	MSDP		Ø1.0~Ø20.0	3D~7D	G59 ~ G63
		MSDPH		Ø2.5~Ø20.0	3D~7D	G60 ~ G63
	Mach Solid Drill Plus-S ^{new}	MSDPH-S		Ø3.0~Ø16.0	3D~5D	G66 ~ G69
	Mach Solid Drill Plus CFRP ^{new}	MSDP-C		Ø3.0~Ø12.7	5D	G72
	Mach Solid Flat Drill ^{new}	MSFD		Ø2.5~Ø16.0	2D	G76 ~ G78
		MSFDH		Ø2.5~Ø16.0	3D	G79 ~ G81
	Mach Long Drill Plus ^{new}	MLD□□□□N		Ø3.0~Ø10.0	10D~25D	G84 ~ G86
	Vulcan Drill	VZD		Ø12.6~Ø40.5	-	G89 ~ G90
	ESD Plus ^{new}	ESDP		Ø1.0~Ø20.0	3D~7D	G93 ~ G97



Type	Designation		Shape	Drills dia.	Aspect ratio	Page
Solid Drills	Carbide Drill <small>new</small>	SSDP		Ø1.0~Ø15.0	-	G99 ~ G100
	Burnishing Drill	BDS		Ø4.0~Ø16.0	5D~7D	G101
		BDT		Ø4.2~Ø10.3	2D~4D	G101
	Top solid Drill	TSDM		Ø8.0~Ø25.0	5D~8D	G102
	PCD Drill	PDD		Ø5.0~Ø12.0	5D	G103
	Gun Drill	KGDS		Ø2.0~Ø33.0	50D~100D	G108
		KGDT		Ø6.0~Ø26.5	50D~100D	G109
Reamer	Indexable Reamer	IRT	 Available Insert: RI	Ø10.0~Ø31.0	3D~5D	G114
		IRB	 Available Insert: RI	Ø10.0~Ø31.0	3D~5D	G115
	Chucking/Machine Reamer	SCRS		Ø5.0~Ø20.0	2D~3D	G117
		SCRH		Ø5.0~Ø20.0	2D~3D	G117
		TCRS		Ø7.0~Ø30.0	2D~3D	G118
		TMRS		Ø7.0~Ø30.0	3D~5D	G118
	PCD Reamer	PDR		Ø5.0~Ø20.0	3D~5D	G119
	Cermet Reamer	KCR		Ø6.0~Ø30.0	3D~7D	G120
	Broach Reamer	HBRE		Ø3.0~Ø25.0	3D~7D	G121

Highly efficient hole making for various workpieces including components

MSD Plus **new**

Mach Solid Drill Plus

Code system

MSDP(H) 040 - 5 P - 100L - 5S

Oil hole
None: MSDP
With oil hole: MSDPH

Drill dia. (ØD)
040: Ø4.0
(One decimal place marked)

Standard type
Aspect ratio (L/D)
3D, 5D, 7D

Special type
Flute length
100: 100 mm

Machining area
P: Carbon steel, alloy steel
M: Stainless steel
K: Cast iron
N: Aluminum, copper alloy

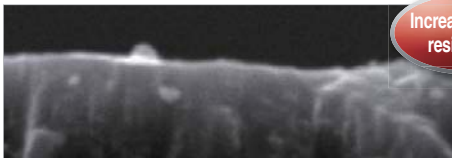
Overall length
100L: 100 mm

Shank dia.
5S: Ø5

Features

New grade (PC325U)

- Lubricative coating layer improves welding resistance at middle to high speed.
- Increase wear resistance in machining carbon steel



PC325U

Increased wear resistance

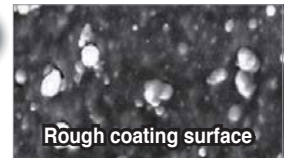
Surface of coating layer

- Increased welding resistance and lower cutting load
- Reduced frictional resistance at cutting edges and on the flute



PC325U

Improved lubrication



Competitor

Chip control

- Workpiece** SCM440
- Cutting conditions** vc (m/min) = 90, fn (mm/rev) = 0.2
ap (mm) = 30, wet
- Tools** MSDPH060-5P (PC325U)



MSD Plus

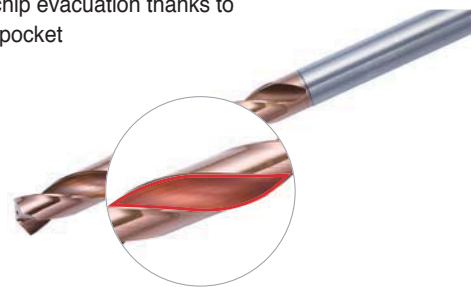
Chip in good shape



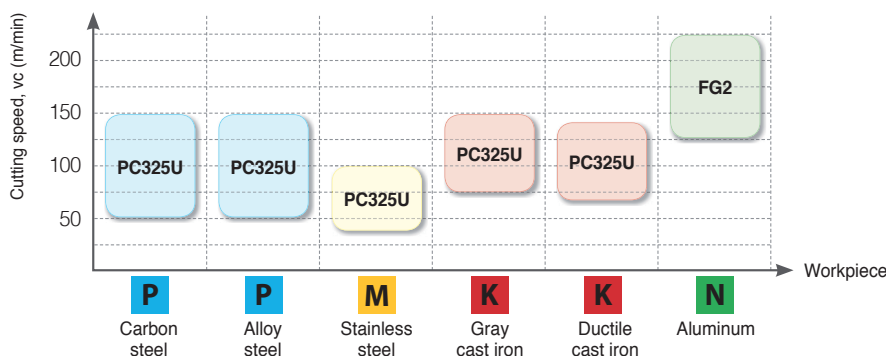
Competitor

Flute shape

- Improved chip evacuation thanks to wider chip pocket

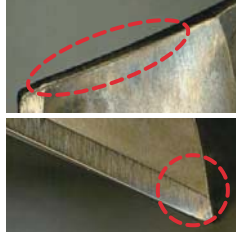


Application area

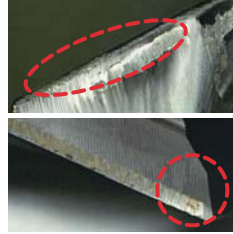


Application examples

- **Use** Part of Automobile
- **Workpiece** SM45C
- **Cutting conditions** vc (m/min) = 124, fn (mm/rev) = 0.15
ap (mm) = 30, Through coolant
- **Tools** MSDP120-5P (PC325U)

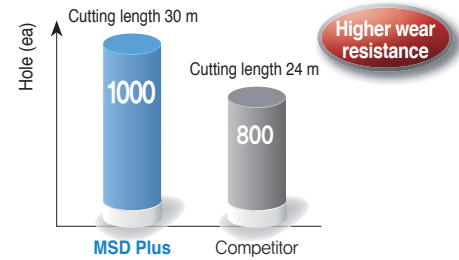


MSD Plus



Competitor

Test result

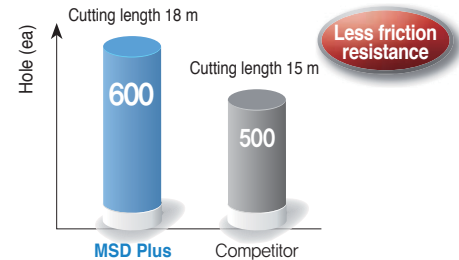


Lubricative coating layer of the new grade PC325U maximizes wear resistance.

- **Use** Part of Automobile
- **Workpiece** SM53C
- **Cutting conditions** vc (m/min) = 60, fn (mm/rev) = 0.25
ap (mm) = 30, External coolant
- **Tools** MSDP120-5P (PC325U)



Test result



Special treatment on coating surface minimized frictional resistance.

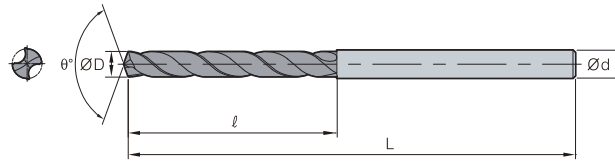
Recommended cutting conditions

Workpiece			Grade	vc (m/min)	Feed					
					Feed rate (mm/rev) per drill dia. (mm)					
ISO	Workpiece	HB			Ø1.0~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0	Ø12.1~Ø16.0	Ø16.1~Ø20.0	
P	Carbon steel	Low carbon steel	80~120	PC325U	90 (80~150)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40
		High carbon steel	Over 250	PC325U	50 (40~80)	0.08~0.20	0.08~0.20	0.10~0.25	0.15~0.25	0.15~0.30
	Alloy steel	Low alloy steel	140~260	PC325U	90 (80~150)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40
		Hardened low alloy steel	200~400	PC325U	60 (50~100)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40
		High alloy steel	50~260	PC325U	50 (40~80)	0.08~0.20	0.08~0.20	0.10~0.25	0.15~0.25	0.15~0.30
		Hardened high alloy steel	Over 250	PC325U	50 (40~80)	0.08~0.20	0.08~0.20	0.10~0.25	0.15~0.25	0.15~0.30
M	Stainless steel	Austenite series	135~275	PC325U	45 (25~80)	0.05~0.20	0.05~0.20	0.10~0.25	0.10~0.25	0.15~0.30
		Ferrite series Martensite series	135~275	PC325U	50 (30~80)	0.05~0.20	0.05~0.20	0.10~0.25	0.10~0.25	0.15~0.30
K	Cast iron	Gray cast iron	150~230	PC325U	100 (80~150)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40
		Ductile cast iron	160~260	PC325U	90 (70~140)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40
N	Aluminum	Aluminum alloy	30~150	FG2	150 (125~220)	0.24~0.38	0.38~0.53	0.53~0.75	0.61~0.85	0.68~0.98
	Copper alloy	Copper alloy	150~160	FG2	150 (125~220)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40

- Cutting conditions above are for the case of less than 5D depth of cut and through coolant system applied
- In case of external coolant system, reduce the above feed values by 20%



MSDP-□(P/M/K/N)



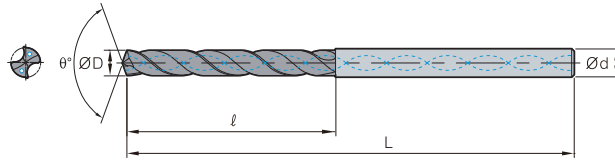
Terminology	P	M	K	N
Grade	PC325U	FG2		
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°	135°		
Twist angle	30°			
Thinning	X type			
Coolant	External			

■ Steel
 ■ Stainless steel
 ■ Cast iron
 ■ Non-ferrous metal

(mm)

Designation	ØD	Ød	3P,M,K,N		5P,M,K,N	
			ℓ	L	ℓ	L
MSDP 010 - □ P,M,K,N	1.0	3.0	6	45	12	66
011 - □ P,M,K,N	1.1	3.0	7	45	12	66
012 - □ P,M,K,N	1.2	3.0	8	45	12	66
013 - □ P,M,K,N	1.3	3.0	8	45	12	66
014 - □ P,M,K,N	1.4	3.0	9	45	12	66
015 - □ P,M,K,N	1.5	3.0	9	45	12	66
016 - □ P,M,K,N	1.6	3.0	10	45	15	66
017 - □ P,M,K,N	1.7	3.0	10	45	15	66
018 - □ P,M,K,N	1.8	3.0	11	45	15	66
019 - □ P,M,K,N	1.9	3.0	11	45	15	66
020 - □ P,M,K,N	2.0	3.0	14	53	20	66
021 - □ P,M,K,N	2.1	3.0	14	53	20	66
022 - □ P,M,K,N	2.2	3.0	14	53	20	66
023 - □ P,M,K,N	2.3	3.0	14	53	20	66
024 - □ P,M,K,N	2.4	3.0	14	53	20	66

MSDP(H)- □(P/M/K/N)



Terminology	P	M	K	N
Grade	PC325U			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°		135°	
Twist angle	30°			
Thinning	X type			
Coolant	Through/External			

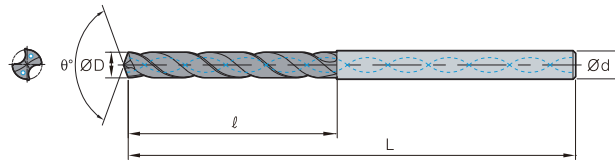
■ Steel
 ■ Stainless steel
 ■ Cast iron
 ■ Non-ferrous metal

(mm)

Designation	ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
			ℓ	L	ℓ	L	ℓ	L
MSDP(H) 025 - □ P,M,K,N	2.5	3.0	14	53	20	66	30	70
026 - □ P,M,K,N	2.6	3.0	17	53	20	66	30	70
027 - □ P,M,K,N	2.7	3.0	17	53	20	66	30	70
028 - □ P,M,K,N	2.8	3.0	17	53	20	66	30	70
029 - □ P,M,K,N	2.9	3.0	17	53	20	66	30	70
030 - □ P,M,K,N	3.0	3.0	17	53	20	66	30	70
031 - □ P,M,K,N	3.1	4.0	20	58	28	74	30	70
032 - □ P,M,K,N	3.2	4.0	20	58	28	74	30	70
033 - □ P,M,K,N	3.3	4.0	20	58	28	74	30	70
034 - □ P,M,K,N	3.4	4.0	20	58	28	74	37.5	75
035 - □ P,M,K,N	3.5	4.0	20	58	28	74	37.5	75
036 - □ P,M,K,N	3.6	4.0	22	58	32	74	37.5	75
037 - □ P,M,K,N	3.7	4.0	22	58	32	74	37.5	75
038 - □ P,M,K,N	3.8	4.0	22	58	32	74	37.5	75
039 - □ P,M,K,N	3.9	4.0	22	58	32	74	37.5	75
040 - □ P,M,K,N	4.0	4.0	22	58	32	74	37.5	75
041 - □ P,M,K,N	4.1	5.0	24	62	36	82	37.5	75
042 - □ P,M,K,N	4.2	5.0	24	62	36	82	37.5	75
043 - □ P,M,K,N	4.3	5.0	24	62	36	82	45	85
044 - □ P,M,K,N	4.4	5.0	24	62	36	82	45	85
045 - □ P,M,K,N	4.5	5.0	24	62	36	82	45	85
046 - □ P,M,K,N	4.6	5.0	26	62	38	82	45	85
047 - □ P,M,K,N	4.7	5.0	26	62	38	82	45	85
048 - □ P,M,K,N	4.8	5.0	26	62	38	82	50	90
049 - □ P,M,K,N	4.9	5.0	26	62	38	82	50	90
050 - □ P,M,K,N	5.0	5.0	26	62	38	82	50	90
051 - □ P,M,K,N	5.1	6.0	28	66	44	82	50	90
052 - □ P,M,K,N	5.2	6.0	28	66	44	82	50	90
053 - □ P,M,K,N	5.3	6.0	28	66	44	82	50	90
054 - □ P,M,K,N	5.4	6.0	28	66	44	82	50	90
055 - □ P,M,K,N	5.5	6.0	28	66	44	82	57	97
056 - □ P,M,K,N	5.6	6.0	28	66	44	82	57	97
057 - □ P,M,K,N	5.7	6.0	28	66	44	82	57	97
058 - □ P,M,K,N	5.8	6.0	28	66	44	82	57	97
059 - □ P,M,K,N	5.9	6.0	28	66	44	82	57	97
060 - □ P,M,K,N	6.0	6.0	28	66	44	82	57	97
061 - □ P,M,K,N	6.1	7.0	34	74	50	91	66	106
062 - □ P,M,K,N	6.2	7.0	34	74	50	91	66	106
063 - □ P,M,K,N	6.3	7.0	34	74	50	91	66	106
064 - □ P,M,K,N	6.4	7.0	34	74	50	91	66	106
065 - □ P,M,K,N	6.5	7.0	34	74	50	91	66	106
066 - □ P,M,K,N	6.6	7.0	34	74	50	91	66	106
067 - □ P,M,K,N	6.7	7.0	34	74	50	91	66	106
068 - □ P,M,K,N	6.8	7.0	34	74	50	91	66	106
069 - □ P,M,K,N	6.9	7.0	34	74	50	91	76	116
070 - □ P,M,K,N	7.0	7.0	34	74	50	91	76	116
071 - □ P,M,K,N	7.1	8.0	41	79	53	91	76	116
072 - □ P,M,K,N	7.2	8.0	41	79	53	91	76	116



MSDP(H)-□(P/M/K/N)

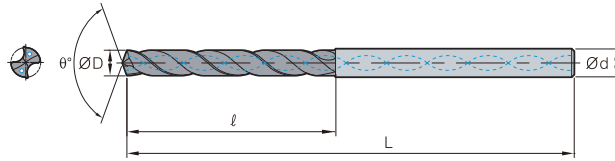


Terminology	P	M	K	N
Grade	PC325U			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°		135°	
Twist angle	30°			
Thinning	X type			
Coolant	Through/External			

Steel M Stainless steel K Cast iron N Non-ferrous metal

Designation	ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
			ℓ	L	ℓ	L	ℓ	L
MSDP(H) 073 - □ P,M,K,N	7.3	8.0	41	79	53	91	76	116
074 - □ P,M,K,N	7.4	8.0	41	79	53	91	76	116
075 - □ P,M,K,N	7.5	8.0	41	79	53	91	76	116
076 - □ P,M,K,N	7.6	8.0	41	79	53	91	76	116
077 - □ P,M,K,N	7.7	8.0	41	79	53	91	76	116
078 - □ P,M,K,N	7.8	8.0	41	79	53	91	76	116
079 - □ P,M,K,N	7.9	8.0	41	79	53	91	76	116
080 - □ P,M,K,N	8.0	8.0	43	84	58	98	87	131
081 - □ P,M,K,N	8.1	9.0	43	84	58	98	87	131
082 - □ P,M,K,N	8.2	9.0	43	84	58	98	87	131
083 - □ P,M,K,N	8.3	9.0	43	84	58	98	87	131
084 - □ P,M,K,N	8.4	9.0	43	84	58	98	87	131
085 - □ P,M,K,N	8.5	9.0	43	84	58	98	87	131
086 - □ P,M,K,N	8.6	9.0	43	84	58	98	87	131
087 - □ P,M,K,N	8.7	9.0	43	84	58	98	87	131
088 - □ P,M,K,N	8.8	9.0	43	84	58	98	87	131
089 - □ P,M,K,N	8.9	9.0	43	84	58	98	87	131
090 - □ P,M,K,N	9.0	9.0	43	84	58	98	87	131
091 - □ P,M,K,N	9.1	10.0	47	89	61	105	95	139
092 - □ P,M,K,N	9.2	10.0	47	89	61	105	95	139
093 - □ P,M,K,N	9.3	10.0	47	89	61	105	95	139
094 - □ P,M,K,N	9.4	10.0	47	89	61	105	95	139
095 - □ P,M,K,N	9.5	10.0	47	89	61	105	95	139
096 - □ P,M,K,N	9.6	10.0	47	89	61	105	95	139
097 - □ P,M,K,N	9.7	10.0	47	89	61	105	95	139
098 - □ P,M,K,N	9.8	10.0	47	89	61	105	95	139
099 - □ P,M,K,N	9.9	10.0	47	89	61	105	95	139
100 - □ P,M,K,N	10.0	10.0	47	89	61	105	95	139
101 - □ P,M,K,N	10.1	11.0	55	95	68	114	106	155
102 - □ P,M,K,N	10.2	11.0	55	95	68	114	106	155
103 - □ P,M,K,N	10.3	11.0	55	95	68	114	106	155
104 - □ P,M,K,N	10.4	11.0	55	95	68	114	106	155
105 - □ P,M,K,N	10.5	11.0	55	95	68	114	106	155
106 - □ P,M,K,N	10.6	11.0	55	95	68	114	106	155
107 - □ P,M,K,N	10.7	11.0	55	95	68	114	106	155
108 - □ P,M,K,N	10.8	11.0	55	95	68	114	106	155
109 - □ P,M,K,N	10.9	11.0	55	95	68	114	106	155
110 - □ P,M,K,N	11.0	11.0	55	95	68	114	106	155
111 - □ P,M,K,N	11.1	12.0	55	102	71	120	114	163
112 - □ P,M,K,N	11.2	12.0	55	102	71	120	114	163
113 - □ P,M,K,N	11.3	12.0	55	102	71	120	114	163
114 - □ P,M,K,N	11.4	12.0	55	102	71	120	114	163
115 - □ P,M,K,N	11.5	12.0	55	102	71	120	114	163
116 - □ P,M,K,N	11.6	12.0	55	102	71	120	114	163
117 - □ P,M,K,N	11.7	12.0	55	102	71	120	114	163
118 - □ P,M,K,N	11.8	12.0	55	102	71	120	114	163
119 - □ P,M,K,N	11.9	12.0	55	102	71	120	114	163
120 - □ P,M,K,N	12.0	12.0	55	102	71	120	114	163

MSDP(H)-□(P/M/K/N)



Terminology	P	M	K	N
Grade	PC325U			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°		135°	
Twist angle	30°			
Thinning	X type			
Coolant	Through/External			

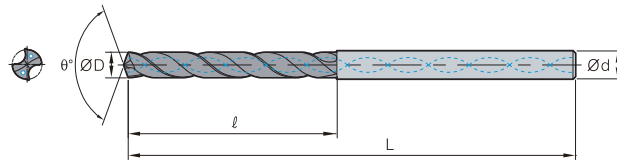
Steel Stainless steel Cast iron Non-ferrous metal

(mm)

Designation	ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
			ℓ	L	ℓ	L	ℓ	L
MSDP(H) 121 - □ P,M,K,N	12.1	13.0	60	107	77	124	133	182
122 - □ P,M,K,N	12.2	13.0	60	107	77	124	133	182
123 - □ P,M,K,N	12.3	13.0	60	107	77	124	133	182
124 - □ P,M,K,N	12.4	13.0	60	107	77	124	133	182
125 - □ P,M,K,N	12.5	13.0	60	107	77	124	133	182
126 - □ P,M,K,N	12.6	13.0	60	107	77	124	133	182
127 - □ P,M,K,N	12.7	13.0	60	107	77	124	133	182
128 - □ P,M,K,N	12.8	13.0	60	107	77	124	133	182
129 - □ P,M,K,N	12.9	13.0	60	107	77	124	133	182
130 - □ P,M,K,N	13.0	13.0	60	107	77	124	133	182
131 - □ P,M,K,N	13.1	14.0	62	107	80	133	133	182
132 - □ P,M,K,N	13.2	14.0	62	107	80	133	133	182
133 - □ P,M,K,N	13.3	14.0	62	107	80	133	133	182
134 - □ P,M,K,N	13.4	14.0	62	107	80	133	133	182
135 - □ P,M,K,N	13.5	14.0	62	107	80	133	133	182
136 - □ P,M,K,N	13.6	14.0	62	107	80	133	133	182
137 - □ P,M,K,N	13.7	14.0	62	107	80	133	133	182
138 - □ P,M,K,N	13.8	14.0	62	107	80	133	133	182
139 - □ P,M,K,N	13.9	14.0	62	107	80	133	133	182
140 - □ P,M,K,N	14.0	14.0	62	107	80	133	133	182
141 - □ P,M,K,N	14.1	15.0	65	115	85	143	152	204
142 - □ P,M,K,N	14.2	15.0	65	115	85	143	152	204
143 - □ P,M,K,N	14.3	15.0	65	115	85	143	152	204
144 - □ P,M,K,N	14.4	15.0	65	115	85	143	152	204
145 - □ P,M,K,N	14.5	15.0	65	115	85	143	152	204
146 - □ P,M,K,N	14.6	15.0	65	115	85	143	152	204
147 - □ P,M,K,N	14.7	15.0	65	115	85	143	152	204
148 - □ P,M,K,N	14.8	15.0	65	115	85	143	152	204
149 - □ P,M,K,N	14.9	15.0	65	115	85	143	152	204
150 - □ P,M,K,N	15.0	15.0	65	115	85	143	152	204
151 - □ P,M,K,N	15.1	16.0	68	115	88	143	152	204
152 - □ P,M,K,N	15.2	16.0	68	115	88	143	152	204
153 - □ P,M,K,N	15.3	16.0	68	115	88	143	152	204
154 - □ P,M,K,N	15.4	16.0	68	115	88	143	152	204
155 - □ P,M,K,N	15.5	16.0	68	115	88	143	152	204
156 - □ P,M,K,N	15.6	16.0	68	115	88	143	152	204
157 - □ P,M,K,N	15.7	16.0	68	115	88	143	152	204
158 - □ P,M,K,N	15.8	16.0	68	115	88	143	152	204
159 - □ P,M,K,N	15.9	16.0	68	115	88	143	152	204
160 - □ P,M,K,N	16.0	16.0	68	115	88	143	152	204
161 - □ P,M,K,N	16.1	17.0	73	123	93	153	171	223
162 - □ P,M,K,N	16.2	17.0	73	123	93	153	171	223
163 - □ P,M,K,N	16.3	17.0	73	123	93	153	171	223
164 - □ P,M,K,N	16.4	17.0	73	123	93	153	171	223
165 - □ P,M,K,N	16.5	17.0	73	123	93	153	171	223
166 - □ P,M,K,N	16.6	17.0	73	123	93	153	171	223
167 - □ P,M,K,N	16.7	17.0	73	123	93	153	171	223
168 - □ P,M,K,N	16.8	17.0	73	123	93	153	171	223



MSDP(H)- □(P/M/K/N)



Terminology	P	M	K	N
Grade	PC325U			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°		135°	
Twist angle	30°			
Thinning	X type			
Coolant	Through/External			

Steel M Stainless steel Cast iron Non-ferrous metal

(mm)

Designation	ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
			ℓ	L	ℓ	L	ℓ	L
MSDP(H) 169 - □ P,M,K,N	16.9	17.0	73	123	93	153	171	223
170 - □ P,M,K,N	17.0	17.0	73	123	93	153	171	223
171 - □ P,M,K,N	17.1	18.0	73	123	98	153	171	223
172 - □ P,M,K,N	17.2	18.0	73	123	98	153	171	223
173 - □ P,M,K,N	17.3	18.0	73	123	98	153	171	223
174 - □ P,M,K,N	17.4	18.0	73	123	98	153	171	223
175 - □ P,M,K,N	17.5	18.0	73	123	98	153	171	223
176 - □ P,M,K,N	17.6	18.0	73	123	98	153	171	223
177 - □ P,M,K,N	17.7	18.0	73	123	98	153	171	223
178 - □ P,M,K,N	17.8	18.0	73	123	98	153	171	223
179 - □ P,M,K,N	17.9	18.0	73	123	98	153	171	223
180 - □ P,M,K,N	18.0	18.0	73	123	98	153	171	223
181 - □ P,M,K,N	18.1	19.0	79	131	103	153	190	244
182 - □ P,M,K,N	18.2	19.0	79	131	103	153	190	244
183 - □ P,M,K,N	18.3	19.0	79	131	103	153	190	244
184 - □ P,M,K,N	18.4	19.0	79	131	103	153	190	244
185 - □ P,M,K,N	18.5	19.0	79	131	103	153	190	244
186 - □ P,M,K,N	18.6	19.0	79	131	103	153	190	244
187 - □ P,M,K,N	18.7	19.0	79	131	103	153	190	244
188 - □ P,M,K,N	18.8	19.0	79	131	103	153	190	244
189 - □ P,M,K,N	18.9	19.0	79	131	103	153	190	244
190 - □ P,M,K,N	19.0	19.0	79	131	103	153	190	244
191 - □ P,M,K,N	19.1	20.0	79	131	107	153	190	244
192 - □ P,M,K,N	19.2	20.0	79	131	107	153	190	244
193 - □ P,M,K,N	19.3	20.0	79	131	107	153	190	244
194 - □ P,M,K,N	19.4	20.0	79	131	107	153	190	244
195 - □ P,M,K,N	19.5	20.0	79	131	107	153	190	244
196 - □ P,M,K,N	19.6	20.0	79	131	107	153	190	244
197 - □ P,M,K,N	19.7	20.0	79	131	107	153	190	244
198 - □ P,M,K,N	19.8	20.0	79	131	107	153	190	244
199 - □ P,M,K,N	19.9	20.0	79	131	107	153	190	244
200 - □ P,M,K,N	20.0	20.0	79	131	107	153	190	244

G Technical Information for Mach Solid Drill Plus-S

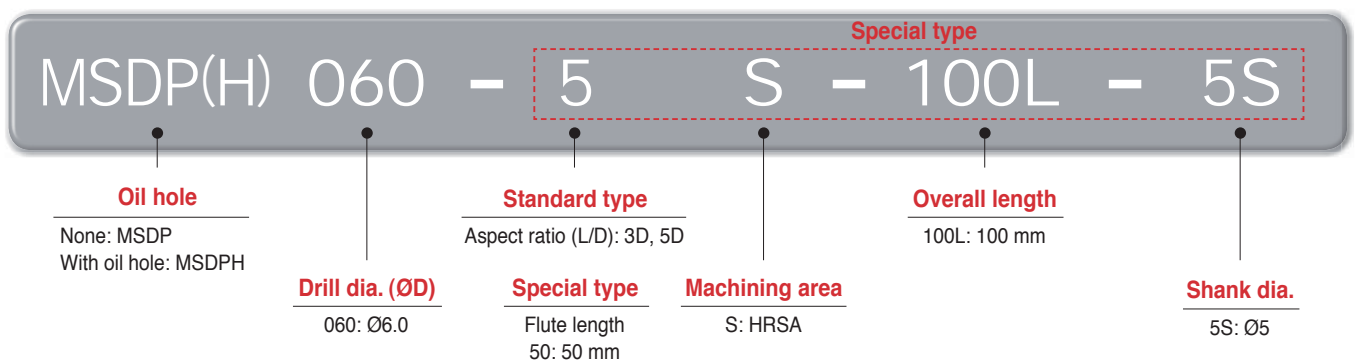
Specialized for heat-resistant alloys used in the aerospace, energy, power generation and automotive industries

MSD Plus-S new

Mach Solid Drill Plus-S

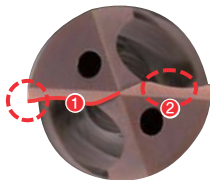
- Improved Productivity and Excellent Machinability
 - Ensuring machinability with optimized blade design and chip pockets
- Stronger wear resistance
 - Provides extended tool life due to its excellent coating with improved high temperature and chipping resistance

Code system

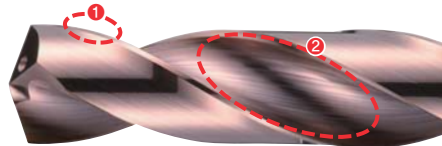


Features

- Notch-controlled blade design and specially treated cutting edges prevent chipping and breakage
- Optimized margin and back-tapered design

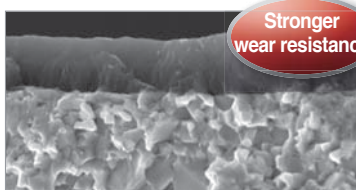


- ① Cutting edges designed for low cutting resistance
- ② Tip relief angle and shape optimized for heat evacuation



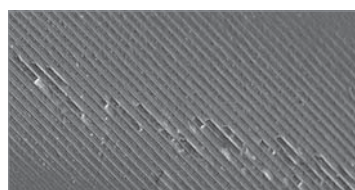
- ① Reduced friction resistance and cutting temperature
- ② Wider chip pockets improve chip evacuation

- Improved resistance to heat and oxidation thanks to the newly applied grade, PC325T
- Reduced friction resistance and improved chip evacuation due to excellent surface finish
- Exceptional wear resistance when machining heat-resistant alloys at high temperatures



PC325T

Stronger wear resistance



Smooth coating surface



Performance evaluation

- **Workpiece** Inconel718 (HRC40~45)
- **Cutting conditions** Drill dia.(mm) = Ø10, vc (m/min) = 20, fn (mm/rev) = 0.09, ap (mm) = 30, wet
- **Tools** MSDPH100-5S (PC325T)

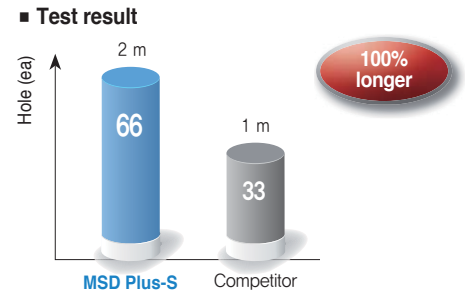


- **Workpiece** Ti-6Al-4V (HRC42~47)
- **Cutting conditions** Drill dia.(mm) = Ø10, vc (m/min) = 40, fn (mm/rev) = 0.09, ap (mm) = 30, wet
- **Tools** MSDPH100-5S (PC325T)

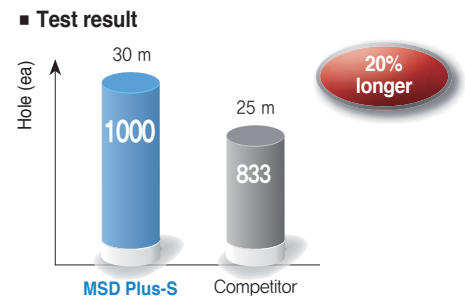


Application examples

- **Use** Aircraft parts (turbine disks, turbine shafts, etc.) and components used in the power generation industry
- **Workpiece** Inconel718 (HRC40~45)
- **Cutting conditions** Drill dia.(mm) = Ø6.0, vc (m/min) = 20, fn (mm/rev) = 0.09, ap (mm) = 30, wet
- **Tools** MSDPH060-5S



- **Use** Aircraft parts (engines, engine housings and turbine disks) and components used in the power generation industry
- **Workpiece** Ti-6Al-4V (HRC42~47)
- **Cutting conditions** Drill dia.(mm) = Ø6.0, vc (m/min) = 40, fn (mm/rev) = 0.09, ap (mm) = 30, wet
- **Tools** MSDPH060-5S

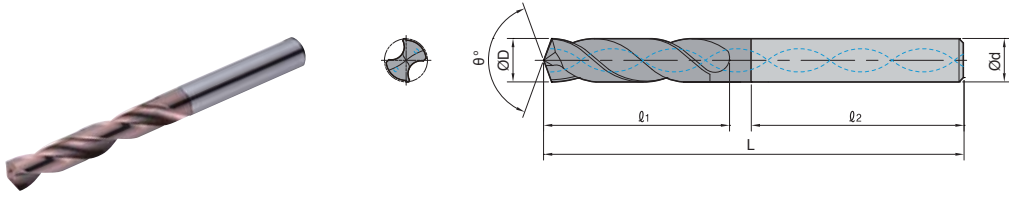


Recommended cutting conditions

Workpiece			Grade	vc (m/min)	Aspect ratio (L/D) = 3D~5D				
ISO	Workpiece	HB			Feed rate (mm/rev) per drill dia. (mm)				
					Ø2.5~Ø5.0	Ø5.1~Ø8.0	Ø8.1~Ø12.0	Ø12.1~Ø16.0	
S	HRSA (Inconel 718 and etc.)	Fe-base	25~35	PC325T	25~30	0.055~0.07	0.07~0.10	0.08~0.13	0.10~0.15
		Ni or Co base	35~45	PC325T	20~25	0.045~0.06	0.06~0.09	0.07~0.12	0.09~0.14
	Titanium alloy (Ti-6Al-4V and etc.)	Pure titanium	10~15	PC325T	40~50	0.07~0.11	0.09~0.14	0.12~0.18	0.16~0.23
		α and β alloys	35~45	PC325T	30~40	0.05~0.09	0.07~0.12	0.10~0.16	0.14~0.21

※ Cutting conditions above are for the case of less than 5D depth of cut and through coolant system applied.

MSDPH-S



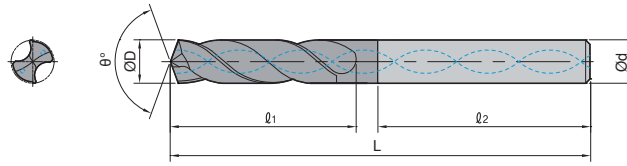
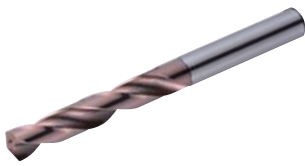
Specification	S
Grade	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
Point angle (θ°)	140°
Twist angle	30°
Thinning	X type
International standard	DIN 6537
Shank type	DIN 6535 HA
Coolant	Internal

S HRSA

Designation	ØD	Ød	3S		5S		ℓ2
			ℓ1	L	ℓ1	L	
MSDPH 030-□S	3.0	6	20	62	28	66	36
031-□S	3.1	6	20	62	28	66	36
0318-□S	3.18	6	20	62	28	66	36
032-□S	3.2	6	20	62	28	66	36
033-□S	3.3	6	20	62	28	66	36
034-□S	3.4	6	20	62	28	66	36
035-□S	3.5	6	20	62	28	66	36
0357-□S	3.57	6	20	62	28	66	36
036-□S	3.6	6	20	62	28	66	36
037-□S	3.7	6	20	62	28	66	36
038-□S	3.8	6	24	66	36	74	36
039-□S	3.9	6	24	66	36	74	36
0397-□S	3.97	6	24	66	36	74	36
040-□S	4.0	6	24	66	36	74	36
041-□S	4.1	6	24	66	36	74	36
042-□S	4.2	6	24	66	36	74	36
043-□S	4.3	6	24	66	36	74	36
0437-□S	4.37	6	24	66	36	74	36
044-□S	4.4	6	24	66	36	74	36
045-□S	4.5	6	24	66	36	74	36
046-□S	4.6	6	24	66	36	74	36
047-□S	4.7	6	24	66	36	74	36
0476-□S	4.76	6	28	66	44	82	36
048-□S	4.8	6	28	66	44	82	36
049-□S	4.9	6	28	66	44	82	36
050-□S	5.0	6	28	66	44	82	36
051-□S	5.1	6	28	66	44	82	36
0516-□S	5.16	6	28	66	44	82	36
052-□S	5.2	6	28	66	44	82	36
053-□S	5.3	6	28	66	44	82	36
054-□S	5.4	6	28	66	44	82	36
055-□S	5.5	6	28	66	44	82	36
0556-□S	5.56	6	28	66	44	82	36
056-□S	5.6	6	28	66	44	82	36
057-□S	5.7	6	28	66	44	82	36
058-□S	5.8	6	28	66	44	82	36
059-□S	5.9	6	28	66	44	82	36
0595-□S	5.95	6	28	66	44	82	36
060-□S	6.0	6	28	66	44	82	36
061-□S	6.1	8	34	79	53	91	36
062-□S	6.2	8	34	79	53	91	36
063-□S	6.3	8	34	79	53	91	36
0635-□S	6.35	8	34	79	53	91	36
064-□S	6.4	8	34	79	53	91	36
065-□S	6.5	8	34	79	53	91	36



MSDPH-S

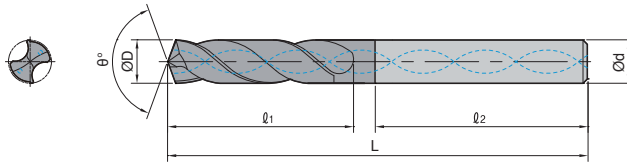
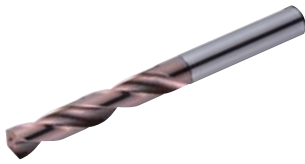


Specification	S
Grade	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
Point angle (θ°)	140°
Twist angle	30°
Thinning	X type
International standard	DIN 6537
Shank type	DIN 6535 HA
Coolant	Internal

S HRSA

Designation	ØD	Ød	3S		5S		l2
			l1	L	l1	L	
			(mm)				
MSDPH 066-□S	6.6	8	34	79	53	91	36
067-□S	6.7	8	34	79	53	91	36
0675-□S	6.75	8	34	79	53	91	36
068-□S	6.8	8	34	79	53	91	36
069-□S	6.9	8	34	79	53	91	36
070-□S	7.0	8	34	79	53	91	36
071-□S	7.1	8	41	79	53	91	36
0714-□S	7.14	8	41	79	53	91	36
072-□S	7.2	8	41	79	53	91	36
073-□S	7.3	8	41	79	53	91	36
074-□S	7.4	8	41	79	53	91	36
075-□S	7.5	8	41	79	53	91	36
0754-□S	7.54	8	41	79	53	91	36
076-□S	7.6	8	41	79	53	91	36
077-□S	7.7	8	41	79	53	91	36
078-□S	7.8	8	41	79	53	91	36
079-□S	7.9	8	41	79	53	91	36
0794-□S	7.94	8	41	79	53	91	36
080-□S	8.0	8	41	79	53	91	36
081-□S	8.1	10	47	89	61	103	40
082-□S	8.2	10	47	89	61	103	40
083-□S	8.3	10	47	89	61	103	40
0833-□S	8.33	10	47	89	61	103	40
084-□S	8.4	10	47	89	61	103	40
085-□S	8.5	10	47	89	61	103	40
086-□S	8.6	10	47	89	61	103	40
087-□S	8.7	10	47	89	61	103	40
0873-□S	8.73	10	47	89	61	103	40
088-□S	8.8	10	47	89	61	103	40
089-□S	8.9	10	47	89	61	103	40
090-□S	9.0	10	47	89	61	103	40
091-□S	9.1	10	47	89	61	103	40
0913-□S	9.13	10	47	89	61	103	40
092-□S	9.2	10	47	89	61	103	40
093-□S	9.3	10	47	89	61	103	40
094-□S	9.4	10	47	89	61	103	40
095-□S	9.5	10	47	89	61	103	40
0953-□S	9.53	10	47	89	61	103	40
096-□S	9.6	10	47	89	61	103	40
097-□S	9.7	10	47	89	61	103	40
098-□S	9.8	10	47	89	61	103	40
099-□S	9.9	10	47	89	61	103	40
0992-□S	9.92	10	47	89	61	103	40
100-□S	10.0	10	47	89	61	103	40

MSDPH-S



Specification	S
Grade	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
Point angle (θ°)	140°
Twist angle	30°
Thinning	X type
International standard	DIN 6537
Shank type	DIN 6535 HA
Coolant	Internal

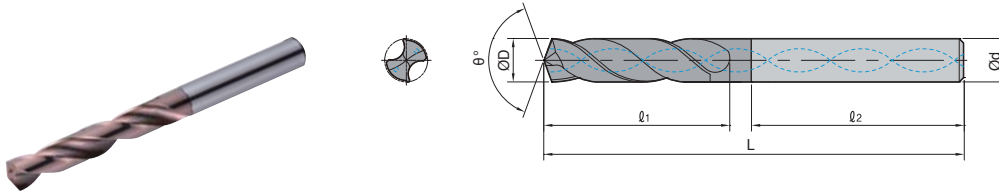
S HRSA

(mm)

Designation	ØD	Ød	3S		5S		l2
			l1	L	l1	L	
MSDPH 101-□S	10.1	12	55	102	71	118	45
102-□S	10.2	12	55	102	71	118	45
103-□S	10.3	12	55	102	71	118	45
1032-□S	10.32	12	55	102	71	118	45
104-□S	10.4	12	55	102	71	118	45
105-□S	10.5	12	55	102	71	118	45
106-□S	10.6	12	55	102	71	118	45
107-□S	10.7	12	55	102	71	118	45
1072-□S	10.72	12	55	102	71	118	45
108-□S	10.8	12	55	102	71	118	45
109-□S	10.9	12	55	102	71	118	45
110-□S	11.0	12	55	102	71	118	45
111-□S	11.1	12	55	102	71	118	45
1111-□S	11.11	12	55	102	71	118	45
112-□S	11.2	12	55	102	71	118	45
113-□S	11.3	12	55	102	71	118	45
114-□S	11.4	12	55	102	71	118	45
115-□S	11.5	12	55	102	71	118	45
1151-□S	11.51	12	55	102	71	118	45
116-□S	11.6	12	55	102	71	118	45
117-□S	11.7	12	55	102	71	118	45
118-□S	11.8	12	55	102	71	118	45
119-□S	11.9	12	55	102	71	118	45
1191-□S	11.91	12	55	102	71	118	45
120-□S	12.0	12	55	102	71	118	45
121-□S	12.1	14	60	107	77	124	45
122-□S	12.2	14	60	107	77	124	45
123-□S	12.3	14	60	107	77	124	45
124-□S	12.4	14	60	107	77	124	45
125-□S	12.5	14	60	107	77	124	45
126-□S	12.6	14	60	107	77	124	45
127-□S	12.7	14	60	107	77	124	45
128-□S	12.8	14	60	107	77	124	45
129-□S	12.9	14	60	107	77	124	45
130-□S	13.0	14	60	107	77	124	45
131-□S	13.1	14	60	107	77	124	45
132-□S	13.2	14	60	107	77	124	45
133-□S	13.3	14	60	107	77	124	45
134-□S	13.4	14	60	107	77	124	45
1349-□S	13.49	14	60	107	77	124	45
135-□S	13.5	14	60	107	77	124	45



MSDPH-S



Specification	S
Grade	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
Point angle (θ°)	140°
Twist angle	30°
Thinning	X type
International standard	DIN 6537
Shank type	DIN 6535 HA
Coolant	Internal

S HRSA

Designation	ØD	Ød	3S		5S		l2
			l1	L	l1	L	
MSDPH 136-□S	13.6	14	60	107	77	124	45
137-□S	13.7	14	60	107	77	124	45
138-□S	13.8	14	60	107	77	124	45
139-□S	13.9	14	60	107	77	124	45
140-□S	14.0	14	60	107	77	124	45
141-□S	14.1	16	65	115	83	133	48
142-□S	14.2	16	65	115	83	133	48
1429-□S	14.29	16	65	115	83	133	48
143-□S	14.3	16	65	115	83	133	48
144-□S	14.4	16	65	115	83	133	48
145-□S	14.5	16	65	115	83	133	48
146-□S	14.6	16	65	115	83	133	48
147-□S	14.7	16	65	115	83	133	48
148-□S	14.8	16	65	115	83	133	48
149-□S	14.9	16	65	115	83	133	48
150-□S	15.0	16	65	115	83	133	48
151-□S	15.1	16	65	115	83	133	48
152-□S	15.2	16	65	115	83	133	48
153-□S	15.3	16	65	115	83	133	48
154-□S	15.4	16	65	115	83	133	48
155-□S	15.5	16	65	115	83	133	48
156-□S	15.6	16	65	115	83	133	48
157-□S	15.7	16	65	115	83	133	48
158-□S	15.8	16	65	115	83	133	48
1587-□S	15.87	16	65	115	83	133	48
159-□S	15.9	16	65	115	83	133	48
160-□S	16.0	16	65	115	83	133	48

G Technical Information for Mach Solid Drill Plus CFRP

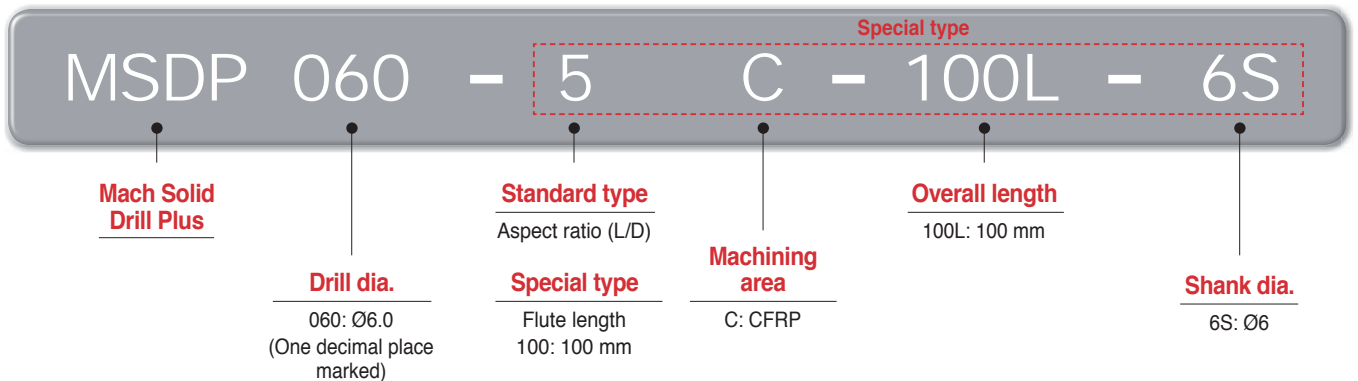
Optimized tool for hole making of CFRP

MSD Plus CFRP **new**

Mach Solid Drill Plus CFRP

- KORLOY's new diamond coated grade ND2110 offers excellent wear resistance
- The optimal cutting edge reduces burrs.

Code system

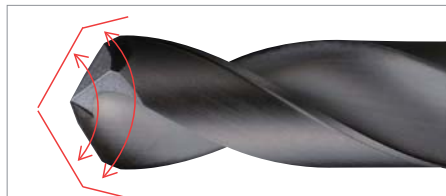


Features

- The cutting edge with a 2 step shape reduces the cutting load
- The optimal point angle of cutting edge reduces burrs
- Higher hardness of cutting edge increases wear resistance



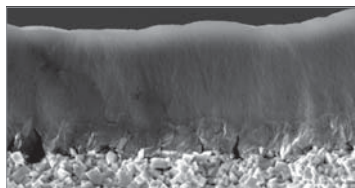
ND2110



- Diamond coating specialized in CFRP machining
- Diamond-coated substrate optimized for CFRP cutting



High hardness diamond coating maintains well-cut shapes



Diamond coating's strong grip to the substrate

- Inhibited burr creation by keeping cutting edges in good shape



Inhibited flaking
Less wear and flaking on the rake surface



Fewer burrs on workpieces



Performance evaluation

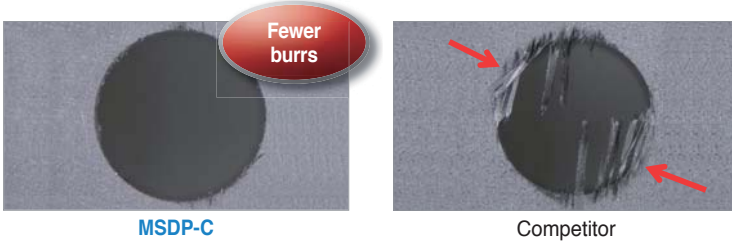
- **Workpiece** CFRP
- **Cutting conditions** vc (m/min) = 100, fn (mm/rev) = 0.05, ap (mm) = 10, Air
- **Cutting length** 7.2 m (720 holes)
- **Tools** MSDP060-5C (ND2110)

Improved performance quality



- **Workpiece** CFRP
- **Cutting conditions** vc (m/min) = 100, fn (mm/rev) = 0.05, ap (mm) = 10, Air
- **Cutting length** 7.2 m (720 holes)
- **Tools** MSDP060-5C (ND2110)

Machinability in high quality hole making

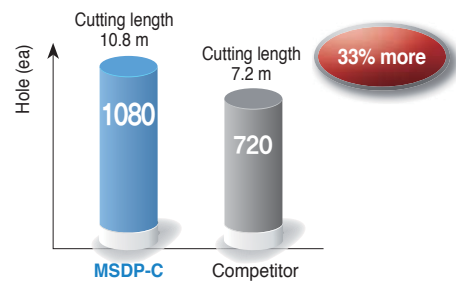


Application examples

- **Use** Wing Tail
- **Workpiece** CFRP
- **Cutting conditions** vc (m/min) = 100, fn (mm/rev) = 0.05, ap (mm) = 10, Air
- **Tools** MSDP060-5C (ND2110)



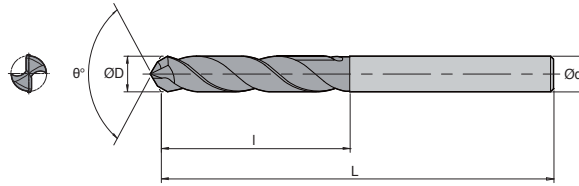
Test result



Recommended cutting conditions

Workpiece	Grade	vc (m/min)	Aspect ratio (L/D) = 5D		
			Feed rate (mm/rev) per drill dia. (mm)		
			Ø2.5~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0
CFRP	ND2110	100 (100~150)	0.03~0.07	0.03~0.07	0.03~0.07

MSDP (5C)



Specification	C
Grade	ND2110
Tolerance (drill Dia.)	m7
Tolerance (shank Dia.)	h6
Point angle	118°
Twist angle	30°
Thinning	X type
Coolant	External
☑ CFRP	

(mm)

Designation	ØD		Ød	5C	
	mm	inch		l	L
MSDP 030-5C	3	-	6	28	66
040-5C	4	-	6	36	74
0476-5C	4.76	3/16	6	44	82
050-5C	5	-	6	44	82
060-5C	6	-	6	44	82
0635-5C	6.35	1/4	8	53	91
070-5C	7	-	8	53	91
0794-5C	7.94	5/16	8	53	91
080-5C	8	-	8	53	91
090-5C	9	-	10	61	103
0952-5C	9.52	3/8	10	61	103
100-5C	10	-	10	61	103
110-5C	11	-	12	71	118
1111-5C	11.11	7/16	12	71	118
120-5C	12	-	12	71	118
127-5C	12.7	1/2	14	71	124



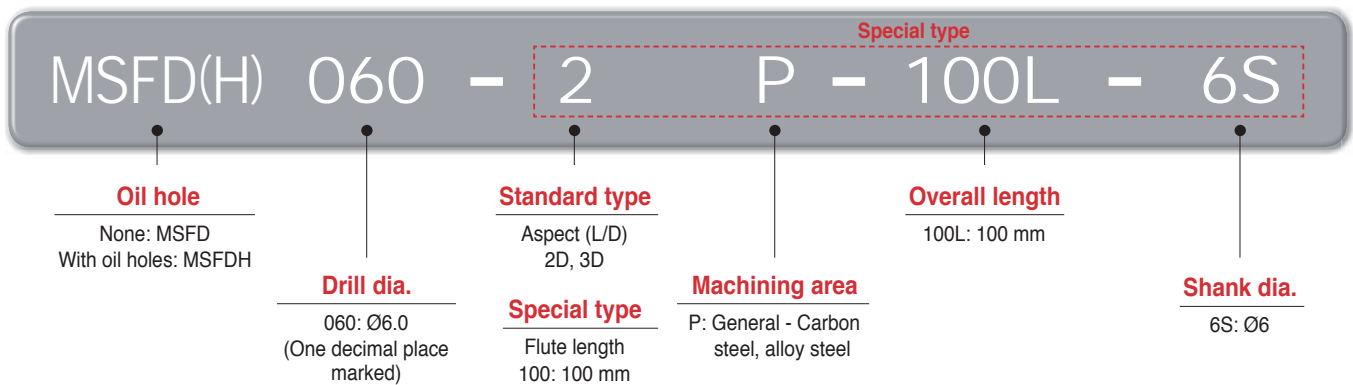
The best tool for ramped, curved or flat workpieces

MSFD **new**

Mach Solid Flat Drill

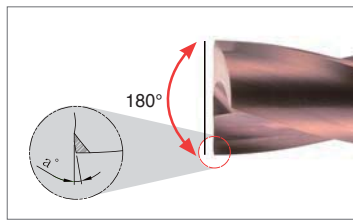
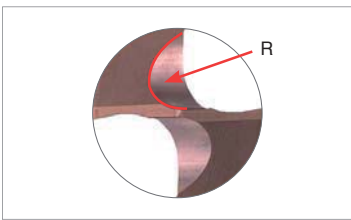
- High quality hole making capability with 180°-point angle
- Improved anti chipping and welding resistance by edge honing and chamfering
Minimized creation of burrs compared to general drills

Code system

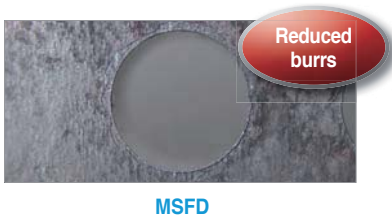
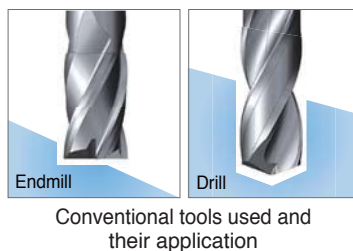


Features

- Excellent straightness with its 180°-point angle when drilling on ramped surface
- Stronger resistance to chipping through corner chamfering
- Widened chip pockets by the use of 'R' shape on the thinning part



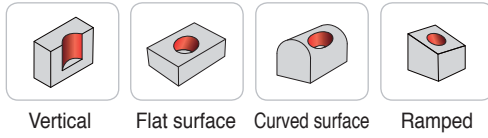
- Multi-functional capability - end milling and drilling using a single MSFD



G Technical Information for Mach Solid Flat Drill

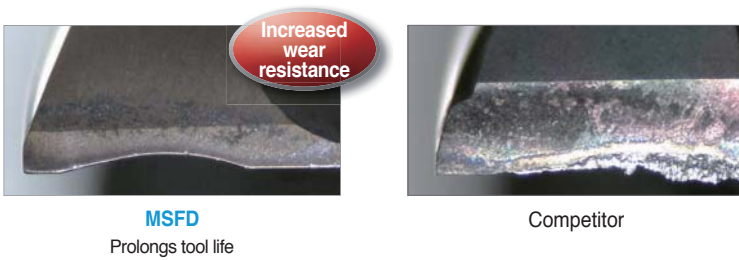
Wide applications

- A wide range of applications and improved cutting performance

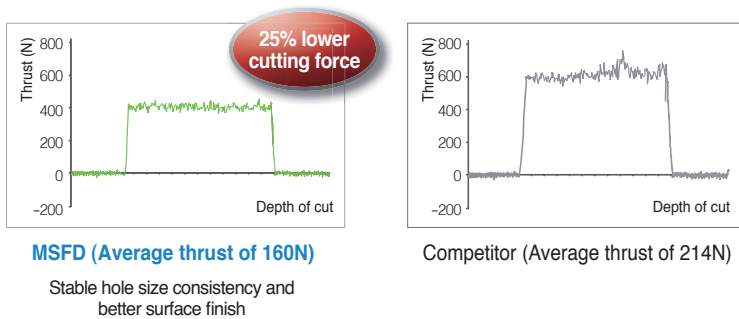


Performance evaluation

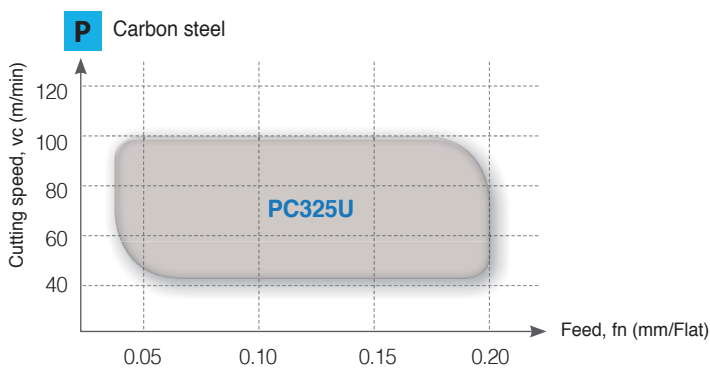
- **Workpiece** SM48C
- **Cutting conditions** vc (m/min) = 80, fn (mm/min) = 0.10, ap (mm) = 15, wet
- **Cutting length** 7.2 m (600 holes)
- **Tools** MSFD060-2P (PC325U)



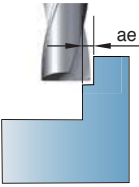

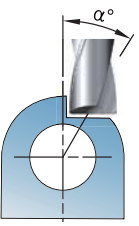
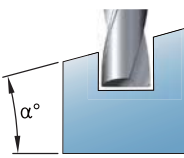
- **Workpiece** SM45C
- **Cutting conditions** vc (m/min) = 70, fn (mm/min) = 0.10, ap (mm) = 15, wet
- **Tools** MSFDH060-3P (PC325U)



Application range



Application methods

Application type	Recommended machining conditions	Application type	Recommended machining conditions																										
	<ul style="list-style-type: none"> Radial depth of cuts should be less than half the drill radius In case of increasing depth of cuts, divide the machining process into two passes 		<ul style="list-style-type: none"> Reduce the feed rate by half the recommended condition when the tool enters the workpiece Reduce the feed rate by half the recommended condition when the tool penetrates the workpiece to the end part Recommended depth of cut is under 2D 																										
	<ul style="list-style-type: none"> Use the tool within 30° from the center of the curve Reduce the feed rate when the tool penetrates the workpiece to the end part <table border="1"> <thead> <tr> <th>Workpiece (Ø)</th> <th>Slope angle (α°)</th> <th>Performance</th> <th>Applied (fn)</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≤ Ø100</td> <td>≤ 20°</td> <td>◎</td> <td>100%</td> </tr> <tr> <td>20° < ~40°</td> <td>○</td> <td>80%</td> </tr> <tr> <td>≥ 40°</td> <td>△</td> <td>60%</td> </tr> </tbody> </table>	Workpiece (Ø)	Slope angle (α°)	Performance	Applied (fn)	≤ Ø100	≤ 20°	◎	100%	20° < ~40°	○	80%	≥ 40°	△	60%		<ul style="list-style-type: none"> Recommended slope angle range is under 30° In case of machining at slope angle over 30°, reduce the feed rate when the tool enters the workpiece <table border="1"> <thead> <tr> <th>Slope angle (α°)</th> <th>Performance</th> <th>Applied (fn)</th> </tr> </thead> <tbody> <tr> <td>≤ 20°</td> <td>◎</td> <td>100%</td> </tr> <tr> <td>20° < ~40°</td> <td>○</td> <td>80%</td> </tr> <tr> <td>≥ 40°</td> <td>△</td> <td>60%</td> </tr> </tbody> </table>	Slope angle (α°)	Performance	Applied (fn)	≤ 20°	◎	100%	20° < ~40°	○	80%	≥ 40°	△	60%
Workpiece (Ø)	Slope angle (α°)	Performance	Applied (fn)																										
≤ Ø100	≤ 20°	◎	100%																										
	20° < ~40°	○	80%																										
	≥ 40°	△	60%																										
Slope angle (α°)	Performance	Applied (fn)																											
≤ 20°	◎	100%																											
20° < ~40°	○	80%																											
≥ 40°	△	60%																											

Recommended cutting conditions

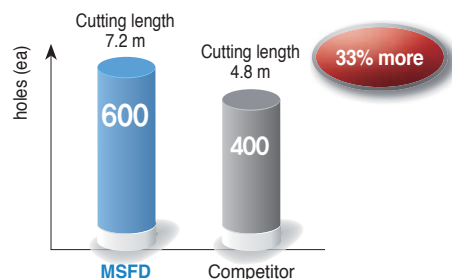
Workpiece			Grade	vc (m/min)	Aspect ratio (L/D) = 2D~3D			
ISO	Workpiece	HB			Feed rate (mm/rev) per drill dia. (mm)			
					Ø2.5~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0	
P	Carbon steel	Low carbon steel	80~120	PC325U	75 (60~90)	0.03~0.10	0.05~0.15	0.10~0.20
		High carbon steel	180~280	PC325U	75 (60~80)	0.03~0.10	0.05~0.15	0.10~0.20
	Alloy steel	Low alloy steel	140~260	PC325U	65 (50~80)	0.03~0.10	0.05~0.15	0.10~0.20
		High alloy steel	50~260	PC325U	65 (50~80)	0.03~0.10	0.05~0.15	0.10~0.20

Application examples

- **Workpiece** Carbon steel (SM45C)
- **Cutting conditions**
 - vc (m/min) = 80
 - fn (mm/min) = 0.1
 - ap (mm) = 12, wet
- **Tools** MSFD060-2P (PC325U)



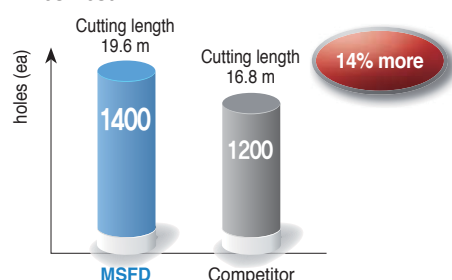
Test result



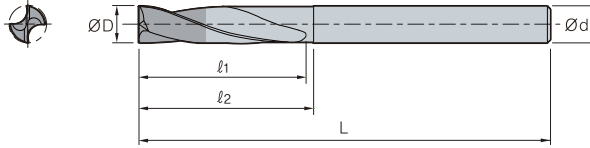
- **Workpiece** Alloy steel (SCM440)
- **Cutting conditions**
 - vc (m/min) = 100
 - fn (mm/min) = 0.1
 - ap (mm) = 14, wet
- **Tools** MSFDH060-3P (PC325U)



Test result



MSFD (2P)



Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	20°
Thinning	R type
Coolant	External

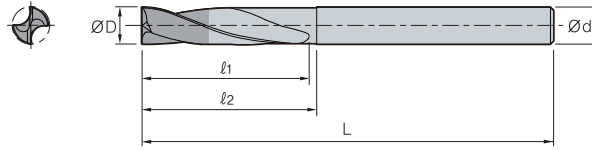
Steel

(mm)

Designation	ØD	Ød	2P		
			ℓ1	ℓ2	L
MSFD 025-2P	2.5	4.0	10.5	11.5	50
026-2P	2.6	4.0	10.9	11.9	50
027-2P	2.7	4.0	11.3	12.3	50
028-2P	2.8	4.0	11.8	12.8	50
029-2P	2.9	4.0	12.2	13.2	50
030-2P	3.0	6.0	12.6	13.6	50
031-2P	3.1	6.0	13.0	14.0	50
032-2P	3.2	6.0	13.4	14.4	50
033-2P	3.3	6.0	13.9	14.9	50
034-2P	3.4	6.0	14.3	15.3	50
035-2P	3.5	6.0	14.7	15.7	50
036-2P	3.6	6.0	15.1	16.1	50
037-2P	3.7	6.0	15.5	16.5	50
038-2P	3.8	6.0	16.0	17.0	50
039-2P	3.9	6.0	16.4	17.4	50
040-2P	4.0	6.0	16.8	17.8	50
041-2P	4.1	6.0	17.2	18.2	60
042-2P	4.2	6.0	17.6	18.6	60
043-2P	4.3	6.0	18.1	19.1	60
044-2P	4.4	6.0	18.5	19.5	60
045-2P	4.5	6.0	18.9	19.9	60
046-2P	4.6	6.0	19.3	20.3	60
047-2P	4.7	6.0	19.7	20.7	60
048-2P	4.8	6.0	20.2	21.2	60
049-2P	4.9	6.0	20.6	21.6	60
050-2P	5.0	6.0	21.0	22.0	60
051-2P	5.1	6.0	21.4	22.4	60
052-2P	5.2	6.0	21.8	22.8	60
053-2P	5.3	6.0	22.3	23.3	60
054-2P	5.4	6.0	22.7	23.7	60
055-2P	5.5	6.0	23.1	24.1	60
056-2P	5.6	6.0	23.5	24.5	60
057-2P	5.7	6.0	23.9	24.9	60
058-2P	5.8	6.0	24.4	25.4	60
059-2P	5.9	6.0	24.8	25.8	60
060-2P	6.0	6.0	25.2	26.2	60
061-2P	6.1	8.0	25.6	26.6	70
062-2P	6.2	8.0	26.0	27.0	70
063-2P	6.3	8.0	26.5	27.5	70
064-2P	6.4	8.0	26.9	27.9	70
065-2P	6.5	8.0	27.3	28.3	70
066-2P	6.6	8.0	27.7	28.7	70
067-2P	6.7	8.0	28.1	29.1	70
068-2P	6.8	8.0	28.6	29.6	70
069-2P	6.9	8.0	29.0	30.0	70
070-2P	7.0	8.0	29.4	30.4	70



MSFD (2P)



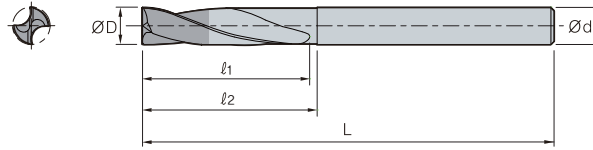
Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	20°
Thinning	R type
Coolant	External

■ Steel

Designation	ØD	Ød	2P		
			l ₁	l ₂	L
MSFD 071-2P	7.1	8.0	29.8	30.8	70
072-2P	7.2	8.0	30.2	31.2	70
073-2P	7.3	8.0	30.7	31.7	70
074-2P	7.4	8.0	31.1	32.1	70
075-2P	7.5	8.0	31.5	32.5	70
076-2P	7.6	8.0	31.9	32.9	70
077-2P	7.7	8.0	32.3	33.3	70
078-2P	7.8	8.0	32.8	33.8	70
079-2P	7.9	8.0	33.2	34.2	70
080-2P	8.0	8.0	33.6	34.6	70
081-2P	8.1	10.0	34.0	35.0	80
082-2P	8.2	10.0	34.4	35.4	80
083-2P	8.3	10.0	34.9	35.9	80
084-2P	8.4	10.0	35.3	36.3	80
085-2P	8.5	10.0	35.7	36.7	80
086-2P	8.6	10.0	36.1	37.1	80
087-2P	8.7	10.0	36.5	37.5	80
088-2P	8.8	10.0	37.0	38.0	80
089-2P	8.9	10.0	37.4	38.4	80
090-2P	9.0	10.0	37.8	38.8	80
091-2P	9.1	10.0	38.2	39.2	80
092-2P	9.2	10.0	38.6	39.6	80
093-2P	9.3	10.0	39.1	40.1	80
094-2P	9.4	10.0	39.5	40.5	80
095-2P	9.5	10.0	39.9	40.9	80
096-2P	9.6	10.0	40.3	41.3	80
097-2P	9.7	10.0	40.7	41.7	80
098-2P	9.8	10.0	41.2	42.2	80
099-2P	9.9	10.0	41.6	42.6	80
100-2P	10.0	10.0	42.0	43	80
101-2P	10.1	12.0	42.4	43.4	90
102-2P	10.2	12.0	42.8	43.8	90
103-2P	10.3	12.0	43.3	44.3	90
104-2P	10.4	12.0	43.7	44.7	90
105-2P	10.5	12.0	44.1	45.1	90
106-2P	10.6	12.0	44.5	45.5	90
107-2P	10.7	12.0	44.9	45.9	90
108-2P	10.8	12.0	45.4	46.4	90
109-2P	10.9	12.0	45.8	46.8	90
110-2P	11.0	12.0	46.2	47.2	90
111-2P	11.1	12.0	46.6	47.6	90
112-2P	11.2	12.0	47.0	48.0	90
113-2P	11.3	12.0	47.5	48.5	90
114-2P	11.4	12.0	47.9	48.9	90
115-2P	11.5	12.0	48.3	49.3	90
116-2P	11.6	12.0	48.7	49.7	90
117-2P	11.7	12.0	49.1	50.1	90
118-2P	11.8	12.0	49.6	50.6	90
119-2P	11.9	12.0	50.0	51.0	90
120-2P	12.0	12.0	50.4	51.4	90

(mm)

MSFD (2P)



Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	30°
Thinning	R type
Coolant	Through

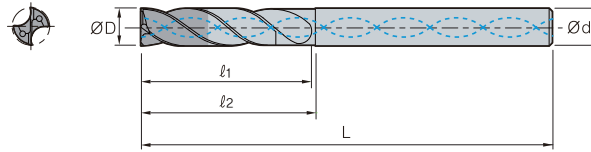
Steel

(mm)

Designation	ØD	Ød	2P		
			l ₁	l ₂	L
MSFD 121-2P	12.1	14.0	50.8	51.8	100
122-2P	12.2	14.0	51.2	52.2	100
123-2P	12.3	14.0	51.7	52.7	100
124-2P	12.4	14.0	52.1	53.1	100
125-2P	12.5	14.0	52.5	53.5	100
126-2P	12.6	14.0	52.9	53.9	100
127-2P	12.7	14.0	53.3	54.3	100
128-2P	12.8	14.0	53.8	54.8	100
129-2P	12.9	14.0	54.2	55.2	100
130-2P	13.0	14.0	54.6	55.6	100
131-2P	13.1	14.0	55.0	56.0	100
132-2P	13.2	14.0	55.4	56.4	100
133-2P	13.3	14.0	55.9	56.9	100
134-2P	13.4	14.0	56.3	57.3	100
135-2P	13.5	14.0	56.7	57.7	110
136-2P	13.6	14.0	57.1	58.1	110
137-2P	13.7	14.0	57.5	58.5	110
138-2P	13.8	14.0	58.0	59.0	110
139-2P	13.9	14.0	58.4	59.4	110
140-2P	14.0	14.0	58.8	59.8	110
141-2P	14.1	16.0	59.2	60.2	110
142-2P	14.2	16.0	59.6	60.6	110
143-2P	14.3	16.0	60.1	61.1	110
144-2P	14.4	16.0	60.5	61.5	110
145-2P	14.5	16.0	60.9	61.9	110
146-2P	14.6	16.0	61.3	62.3	110
147-2P	14.7	16.0	61.7	62.7	110
148-2P	14.8	16.0	62.2	63.2	110
149-2P	14.9	16.0	62.6	63.6	110
150-2P	15.0	16.0	63.0	64.0	110
151-2P	15.1	16.0	65.0	66.0	115
152-2P	15.2	16.0	65.0	66.0	115
153-2P	15.3	16.0	65.1	66.1	115
154-2P	15.4	16.0	65.1	66.1	115
155-2P	15.5	16.0	65.1	66.1	115
156-2P	15.6	16.0	67.1	68.1	115
157-2P	15.7	16.0	67.1	68.1	115
158-2P	15.8	16.0	67.2	68.2	115
159-2P	15.9	16.0	67.2	68.2	115
160-2P	16.0	16.0	67.2	68.2	115



MSFDH (3P)



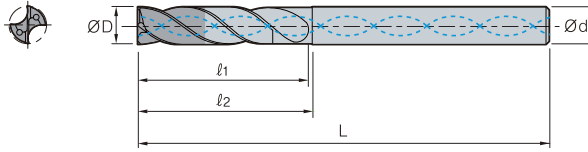
Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	30°
Thinning	R type
Coolant	Through

■ Steel

Designation	ØD	Ød	3P		
			l ₁	l ₂	L
MSFDH 025-3P	2.5	3.0	17	18	58
026-3P	2.6	3.0	17	18	58
027-3P	2.7	3.0	17	18	58
028-3P	2.8	3.0	17	18	58
029-3P	2.9	3.0	17	18	58
030-3P	3.0	6.0	20	21	62
031-3P	3.1	6.0	20	21	62
032-3P	3.2	6.0	20	21	62
033-3P	3.3	6.0	20	21	62
034-3P	3.4	6.0	20	21	62
035-3P	3.5	6.0	20	21	62
036-3P	3.6	6.0	20	21	62
037-3P	3.7	6.0	20	21	62
038-3P	3.8	6.0	24	25	66
039-3P	3.9	6.0	24	25	66
040-3P	4.0	6.0	24	25	66
041-3P	4.1	6.0	24	25	66
042-3P	4.2	6.0	24	25	66
043-3P	4.3	6.0	24	25	66
044-3P	4.4	6.0	24	25	66
045-3P	4.5	6.0	24	25	66
046-3P	4.6	6.0	24	25	66
047-3P	4.7	6.0	24	25	66
048-3P	4.8	6.0	28	29	66
049-3P	4.9	6.0	28	29	66
050-3P	5.0	6.0	28	29	66
051-3P	5.1	6.0	28	29	66
052-3P	5.2	6.0	28	29	66
053-3P	5.3	6.0	28	29	66
054-3P	5.4	6.0	28	29	66
055-3P	5.5	6.0	28	29	66
056-3P	5.6	6.0	28	29	66
057-3P	5.7	6.0	28	29	66
058-3P	5.8	6.0	28	29	66
059-3P	5.9	6.0	28	29	66
060-3P	6.0	6.0	28	29	66
061-3P	6.1	8.0	34	35	79
062-3P	6.2	8.0	34	35	79
063-3P	6.3	8.0	34	35	79
064-3P	6.4	8.0	34	35	79
065-3P	6.5	8.0	34	35	79
066-3P	6.6	8.0	34	35	79
067-3P	6.7	8.0	34	35	79
068-3P	6.8	8.0	34	35	79
069-3P	6.9	8.0	34	35	79
070-3P	7.0	8.0	34	35	79

(mm)

MSFDH (3P)



Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	30°
Thinning	R type
Coolant	Through

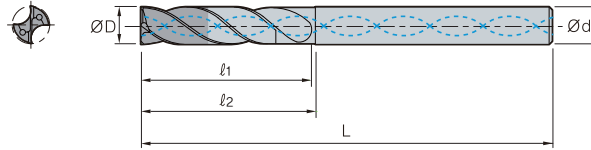
Steel

(mm)

Designation	ØD	Ød	3P		
			ℓ1	ℓ2	L
MSFDH 071-3P	7.1	8.0	41	42	79
072-3P	7.2	8.0	41	42	79
073-3P	7.3	8.0	41	42	79
074-3P	7.4	8.0	41	42	79
075-3P	7.5	8.0	41	42	79
076-3P	7.6	8.0	41	42	79
077-3P	7.7	8.0	41	42	79
078-3P	7.8	8.0	41	42	79
079-3P	7.9	8.0	41	42	79
080-3P	8.0	8.0	41	42	79
081-3P	8.1	10.0	47	48	89
082-3P	8.2	10.0	47	48	89
083-3P	8.3	10.0	47	48	89
084-3P	8.4	10.0	47	48	89
085-3P	8.5	10.0	47	48	89
086-3P	8.6	10.0	47	48	89
087-3P	8.7	10.0	47	48	89
088-3P	8.8	10.0	47	48	89
089-3P	8.9	10.0	47	48	89
090-3P	9.0	10.0	47	48	89
091-3P	9.1	10.0	47	48	89
092-3P	9.2	10.0	47	48	89
093-3P	9.3	10.0	47	48	89
094-3P	9.4	10.0	47	48	89
095-3P	9.5	10.0	47	48	89
096-3P	9.6	10.0	47	48	89
097-3P	9.7	10.0	47	48	89
098-3P	9.8	10.0	47	48	89
099-3P	9.9	10.0	47	48	89
100-3P	10.0	10.0	47	48	89
101-3P	10.1	12.0	55	56	102
102-3P	10.2	12.0	55	56	102
103-3P	10.3	12.0	55	56	102
104-3P	10.4	12.0	55	56	102
105-3P	10.5	12.0	55	56	102
106-3P	10.6	12.0	55	56	102
107-3P	10.7	12.0	55	56	102
108-3P	10.8	12.0	55	56	102
109-3P	10.9	12.0	55	56	102
110-3P	11.0	12.0	55	56	102
111-3P	11.1	12.0	55	56	102
112-3P	11.2	12.0	55	56	102
113-3P	11.3	12.0	55	56	102
114-3P	11.4	12.0	55	56	102
115-3P	11.5	12.0	55	56	102
116-3P	11.6	12.0	55	56	102
117-3P	11.7	12.0	55	56	102
118-3P	11.8	12.0	55	56	102
119-3P	11.9	12.0	55	56	102
120-3P	12.0	12.0	55	56	102



MSFDH (3P)



Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	30°
Thinning	R type
Coolant	Through

■ Steel

Designation	ØD	Ød	3P		
			l ₁	l ₂	L
MSFDH 121-3P	12.1	14.0	60	61	107
122-3P	12.2	14.0	60	61	107
123-3P	12.3	14.0	60	61	107
124-3P	12.4	14.0	60	61	107
125-3P	12.5	14.0	60	61	107
126-3P	12.6	14.0	60	61	107
127-3P	12.7	14.0	60	61	107
128-3P	12.8	14.0	60	61	107
129-3P	12.9	14.0	60	61	107
130-3P	13.0	14.0	60	61	107
131-3P	13.1	14.0	60	61	107
132-3P	13.2	14.0	60	61	107
133-3P	13.3	14.0	60	61	107
134-3P	13.4	14.0	60	61	107
135-3P	13.5	14.0	60	61	107
136-3P	13.6	14.0	60	61	107
137-3P	13.7	14.0	60	61	107
138-3P	13.8	14.0	60	61	107
139-3P	13.9	14.0	60	61	107
140-3P	14.0	14.0	60	61	107
141-3P	14.1	16.0	65	66	115
142-3P	14.2	16.0	65	66	115
143-3P	14.3	16.0	65	66	115
144-3P	14.4	16.0	65	66	115
145-3P	14.5	16.0	65	66	115
146-3P	14.6	16.0	65	66	115
147-3P	14.7	16.0	65	66	115
148-3P	14.8	16.0	65	66	115
149-3P	14.9	16.0	65	66	115
150-3P	15.0	16.0	65	66	115
151-3P	15.1	16.0	65	66	115
152-3P	15.2	16.0	65	66	115
153-3P	15.3	16.0	65	66	115
154-3P	15.4	16.0	65	66	115
155-3P	15.5	16.0	65	66	115
156-3P	15.6	16.0	65	66	115
157-3P	15.7	16.0	65	66	115
158-3P	15.8	16.0	65	66	115
159-3P	15.9	16.0	65	66	115
160-3P	16.0	16.0	65	66	115

(mm)

G Technical Information for Mach Long Solid Drill Plus

The most optimized tool for high precision and quality on hole making process

MLD Plus new

Mach Long Solid Drill Plus

Code system

Special type MLD 0600N - 10 P - 100L - 10S					
Mach Long Solid Drill Plus (MLD Plus)	Drill dia. (ØD) 0600: Ø6.00 (Two decimal place marked)	Standard type Aspect ratio (L/D) 10D, 15D, 20D, 25D	Machining area P: Carbon steel, alloy steel K: Cast iron N: Aluminum, copper alloy	Overall length 100L: 100 mm	Shank dia. 10S: Ø10
		Special type Flute length 100: 100 mm			

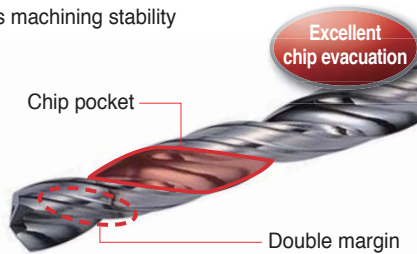
Features

Cutting edge and flute shape

- Straight cutting edge provides better rigidity
- Excellent chip evacuation due to wider chip pocket and improved flute surface roughness
- Double margin secures machining stability



Cutting edge shape



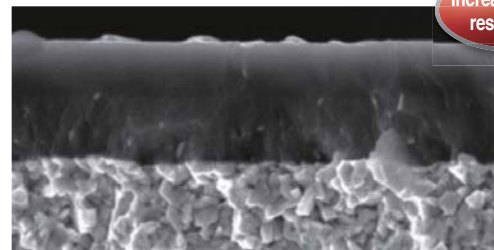
Chip pocket

Excellent chip evacuation

Double margin

New grade (PC315G)

- Ultra-fine substrate and new coating applied
- Lubricative coating layer improves chip evacuation with lower frictional resistance
- Longer tool life due to higher wear resistance

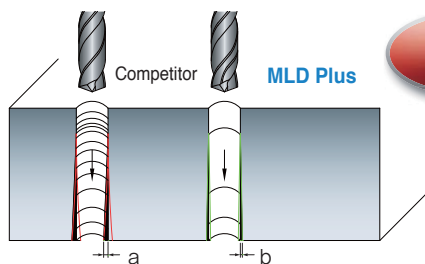


Increased wear resistance

PC315G

Machining accuracy

- Improved machining precision
 - Bent holes reduced, Inside hole surface roughness improved
 - Hole size uniformity increased
- Improved point shape
 - Precise location secured



Competitor

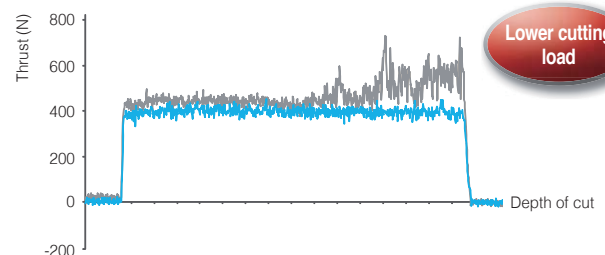
MLD Plus

Excellent precision

Reduced bent holes compared to competitors (a > b)

Cutting load

- **Workpiece** SM45C
- **Cutting conditions** Drill Dia.(m) = Ø6.0, vc (m/min) = 70
fn (mm/rev) = 0.12, ap (mm) = 60, wet
- **Tools** MLD0600N-20P



Lower cutting load

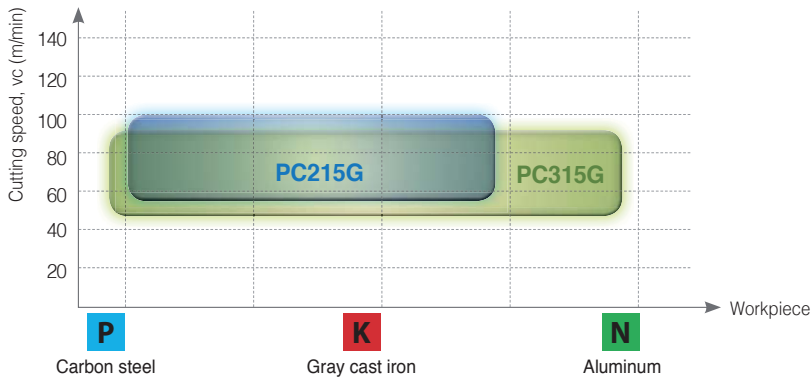
MLD Plus

Competitor



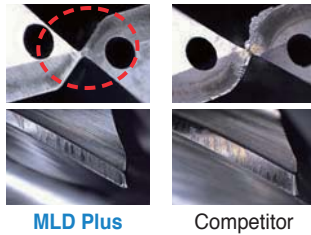
Application area

- **PC215G** – Excellent performance when machining cast iron and alloy steel at high speed
- **PC315G** – Universal grade excellent when machining carbon steel, cast iron, etc. at middle to low cutting speed

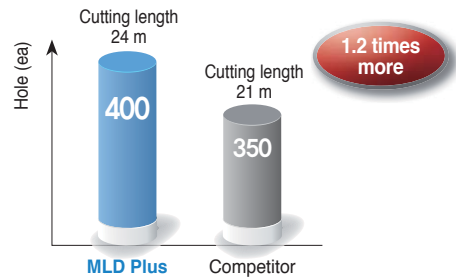


Application examples

- **Use** Part of Automobile
- **Workpiece** SM45C
- **Cutting conditions** vc (m/min) = 70, fn (mm/rev) = 0.12, ap (mm) = 60, Through coolant
- **Tools** MLD0400N-20P (PC315G)



Test result

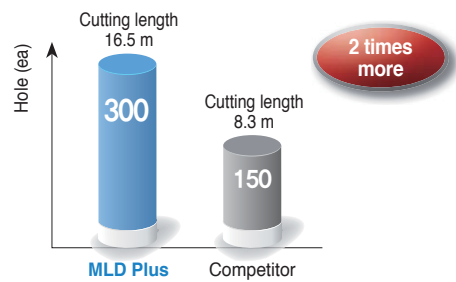


New grade PC315G's coating layer has been applied to improve wear resistance when machining carbon steel materials

- **Use** Part of Automobile
- **Workpiece** SCM440H
- **Cutting conditions** vc (m/min) = 70, fn (mm/rev) = 0.12, ap (mm) = 55, Through coolant
- **Tools** MLD0507N-15P (PC315G)



Test result

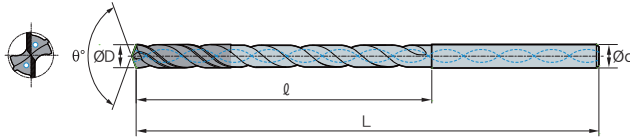


Double margin has been applied to improve stability and machining precision

Recommended cutting condition

Workpiece		Grade	vc (m/min)	Aspect ratio (L/D) = 10D~25D				
				Feed rate (mm/rev) per drill dia. (mm)				
ISO	Workpiece	HB	Recommended	Ø3.0~Ø5.0	Ø5.1~Ø8.0	Ø8.1~Ø10.0		
P	Carbon steel	Low carbon steel	80~120	PC315G	80 (60~90)	0.10~0.15	0.15~0.20	0.20~0.25
		High carbon steel	180~280	PC315G	70 (60~80)	0.10~0.15	0.15~0.20	0.20~0.25
	Alloy steel	Low alloy steel	140~260	PC215G	80 (60~90)	0.10~0.15	0.12~0.17	0.15~0.20
		Low carbon steel	50~260	PC215G	70 (60~80)	0.08~0.15	0.10~0.15	0.15~0.20
K	Cast iron	Gray cast iron	150~230	PC215G	80 (60~100)	0.10~0.20	0.15~0.20	0.15~0.20
		Ductile cast iron	160~260	PC215G	70 (60~80)	0.10~0.20	0.15~0.20	0.15~0.20
N	Aluminum	Aluminum alloy	30~150	FG2	120 (100~150)	0.12~0.17	0.15~0.20	0.20~0.25
	Copper alloy	Copper alloy	150~160	FG2	120 (100~150)	0.12~0.17	0.15~0.20	0.20~0.25

MLD-□□(P/K/N)



Terminology	P	K	N
Grade	PC215G PC315G		FG2
Tolerance (drill Dia.)	h7		
Tolerance (shank Dia.)	h6		
Point angle	135°		
Twist angle	30°		
Thinning	X type		
Coolant	Through		
	Steel	Cast iron	Non-ferrous metal

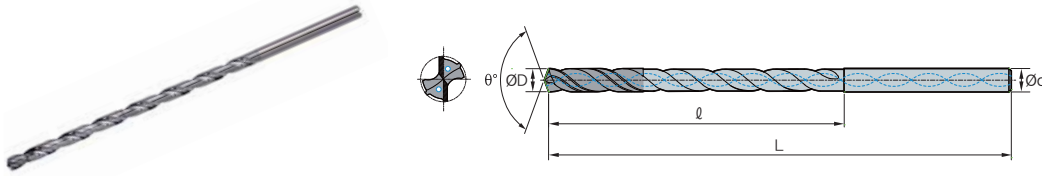
(mm)

Designation	ØD	Ød	10P,K,N		15P,K,N		20P,K,N		25P,K,N	
			ℓ	L	ℓ	L	ℓ	L	ℓ	L
MLD 0300N-□□P,K,N	3.0	3.0	40	90	55	105	70	120	-	-
0310N-□□P,K,N	3.1	4.0	45	100	60	125	80	140	-	-
0320N-□□P,K,N	3.2	4.0	45	100	60	125	80	140	-	-
0330N-□□P,K,N	3.3	4.0	45	100	60	125	80	140	-	-
0340N-□□P,K,N	3.4	4.0	50	100	65	125	85	140	-	-
0350N-□□P,K,N	3.5	4.0	50	100	65	125	85	140	-	-
0360N-□□P,K,N	3.6	4.0	50	100	65	125	85	140	-	-
0370N-□□P,K,N	3.7	4.0	50	100	65	125	85	140	-	-
0380N-□□P,K,N	3.8	4.0	50	100	75	125	90	140	-	-
0390N-□□P,K,N	3.9	4.0	50	100	75	125	90	140	-	-
0400N-□□P,K,N	4.0	4.0	50	100	75	125	90	140	115	165
0410N-□□P,K,N	4.1	5.0	55	115	75	140	100	165	120	190
0420N-□□P,K,N	4.2	5.0	55	115	75	140	100	165	120	190
0430N-□□P,K,N	4.3	5.0	60	115	85	140	110	165	135	190
0440N-□□P,K,N	4.4	5.0	60	115	85	140	110	165	135	190
0450N-□□P,K,N	4.5	5.0	60	115	85	140	110	165	135	190
0460N-□□P,K,N	4.6	5.0	60	115	85	140	110	165	135	190
0470N-□□P,K,N	4.7	5.0	60	115	85	140	110	165	135	190
0480N-□□P,K,N	4.8	5.0	65	115	90	140	115	165	140	190
0490N-□□P,K,N	4.9	5.0	65	115	90	140	115	165	140	190



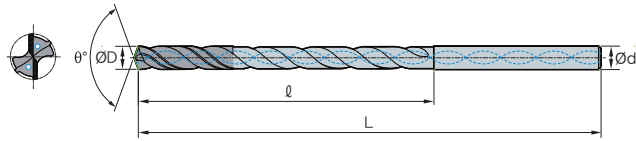
MLD-□□(P/K/N)

Terminology	P	K	N
Grade	PC215G		FG2
Tolerance (drill Dia.)	h7		
Tolerance (shank Dia.)	h6		
Point angle	135°		
Twist angle	30°		
Thinning	X type		
Coolant	Through		
	Steel	Cast iron	Non-ferrous metal



Designation		ØD	Ød	10P,K,N		15P,K,N		20P,K,N		25P,K,N	
				ℓ	L	ℓ	L	ℓ	L	ℓ	L
MLD	0500N-□□P,K,N	5.0	5.0	65	115	90	140	115	165	140	190
	0510N-□□P,K,N	5.1	6.0	70	128	95	160	120	190	150	220
	0520N-□□P,K,N	5.2	6.0	70	128	95	160	120	190	150	220
	0530N-□□P,K,N	5.3	6.0	70	128	95	160	120	190	150	220
	0540N-□□P,K,N	5.4	6.0	78	128	110	160	140	190	170	220
	0550N-□□P,K,N	5.5	6.0	78	128	110	160	140	190	170	220
	0560N-□□P,K,N	5.6	6.0	78	128	110	160	140	190	170	220
	0570N-□□P,K,N	5.7	6.0	78	128	110	160	140	190	170	220
	0580N-□□P,K,N	5.8	6.0	78	128	110	160	140	190	170	220
	0590N-□□P,K,N	5.9	6.0	78	128	110	160	140	190	170	220
	0600N-□□P,K,N	6.0	6.0	78	128	110	160	140	190	170	220
	0610N-□□P,K,N	6.1	7.0	87	140	120	175	155	210	190	250
	0620N-□□P,K,N	6.2	7.0	87	140	120	175	155	210	190	250
	0630N-□□P,K,N	6.3	7.0	87	140	120	175	155	210	190	250
	0640N-□□P,K,N	6.4	7.0	87	140	120	175	155	210	190	250
	0650N-□□P,K,N	6.5	7.0	87	140	120	175	155	210	190	250
	0660N-□□P,K,N	6.6	7.0	87	140	120	175	155	210	190	250
	0670N-□□P,K,N	6.7	7.0	87	140	120	175	155	210	190	250
	0680N-□□P,K,N	6.8	7.0	90	140	125	175	160	210	200	250
	0690N-□□P,K,N	6.9	7.0	90	140	125	175	160	210	200	250

MLD-□□(P/K/N)



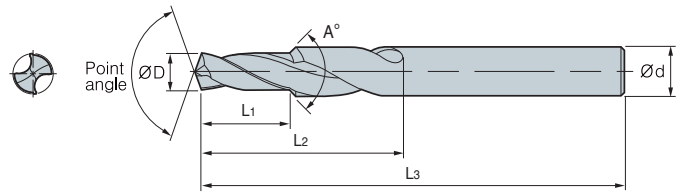
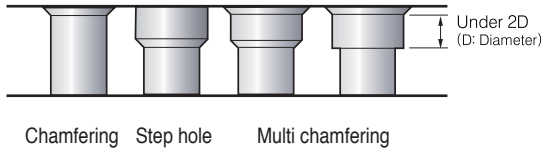
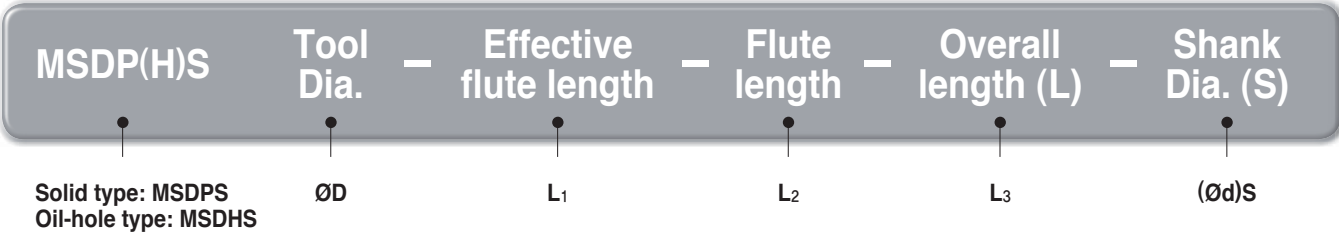
Terminology	P	K	N
Grade	PC215G	PC315G	FG2
Tolerance (drill Dia.)	h7		
Tolerance (shank Dia.)	h6		
Point angle	135°		
Twist angle	30°		
Thinning	X type		
Coolant	Through		
	Steel	Cast iron	Non-ferrous metal

(mm)

Designation	ØD	Ød	10P,K,N		15P,K,N		20P,K,N		25P,K,N	
			ℓ	L	ℓ	L	ℓ	L	ℓ	L
MLD 0700N-□□P,K,N	7.0	7.0	90	140	125	175	160	210	200	250
0710N-□□P,K,N	7.1	8.0	100	155	135	195	170	230	-	-
0720N-□□P,K,N	7.2	8.0	100	155	135	195	170	230	-	-
0730N-□□P,K,N	7.3	8.0	100	155	135	195	170	230	-	-
0740N-□□P,K,N	7.4	8.0	100	155	135	195	170	230	-	-
0750N-□□P,K,N	7.5	8.0	100	155	135	195	170	230	-	-
0760N-□□P,K,N	7.6	8.0	105	155	145	195	180	230	-	-
0770N-□□P,K,N	7.7	8.0	105	155	145	195	180	230	-	-
0780N-□□P,K,N	7.8	8.0	105	155	145	195	180	230	-	-
0790N-□□P,K,N	7.9	8.0	105	155	145	195	180	230	-	-
0800N-□□P,K,N	8.0	8.0	105	155	145	195	180	230	-	-
0810N-□□P,K,N	8.1	9.0	110	165	155	210	195	260	-	-
0820N-□□P,K,N	8.2	9.0	110	165	155	210	195	260	-	-
0830N-□□P,K,N	8.3	9.0	110	165	155	210	195	260	-	-
0840N-□□P,K,N	8.4	9.0	110	165	155	210	195	260	-	-
0850N-□□P,K,N	8.5	9.0	110	165	155	210	195	260	-	-
0860N-□□P,K,N	8.6	9.0	115	165	160	210	210	260	-	-
0870N-□□P,K,N	8.7	9.0	115	165	160	210	210	260	-	-
0880N-□□P,K,N	8.8	9.0	115	165	160	210	210	260	-	-
0890N-□□P,K,N	8.9	9.0	115	165	160	210	210	260	-	-
0900N-□□P,K,N	9.0	9.0	115	165	160	210	210	260	-	-
0910N-□□P,K,N	9.1	10.0	125	190	170	240	-	-	-	-
0920N-□□P,K,N	9.2	10.0	125	190	170	240	-	-	-	-
0930N-□□P,K,N	9.3	10.0	125	190	170	240	-	-	-	-
0940N-□□P,K,N	9.4	10.0	125	190	170	240	-	-	-	-
0950N-□□P,K,N	9.5	10.0	125	190	170	240	-	-	-	-
0960N-□□P,K,N	9.6	10.0	130	190	180	240	-	-	-	-
0970N-□□P,K,N	9.7	10.0	130	190	180	240	-	-	-	-
0980N-□□P,K,N	9.8	10.0	130	190	180	240	-	-	-	-
0990N-□□P,K,N	9.9	10.0	130	190	180	240	-	-	-	-
1000N-□□P,K,N	10.0	10.0	130	190	180	240	-	-	-	-

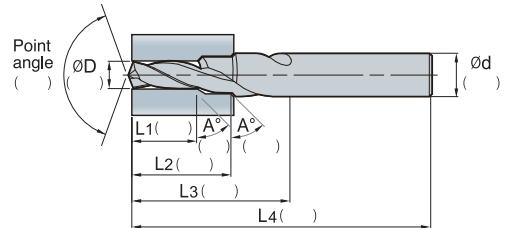
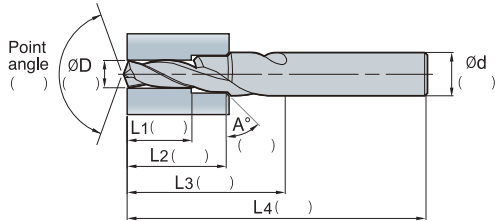


Code system for mach step drill



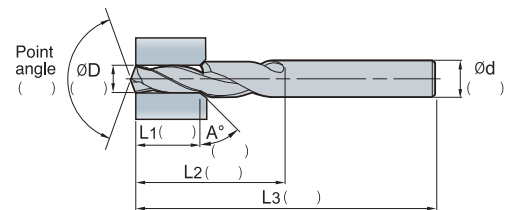
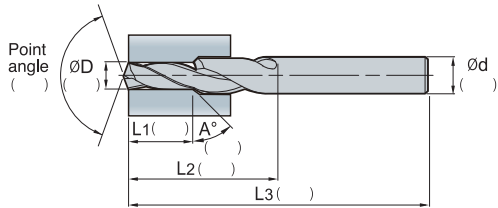
Multi chamfering
(Coolant: Through system External system

Multi chamfering
(Coolant: Through system External system

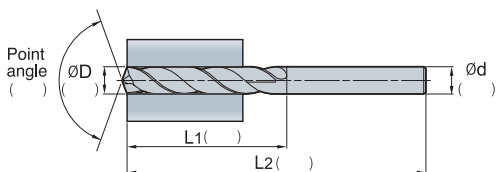


Step hole
(Coolant: Through system External system

Chamfering
(Coolant: Through system External system



Drilling
(Coolant: Through system External system

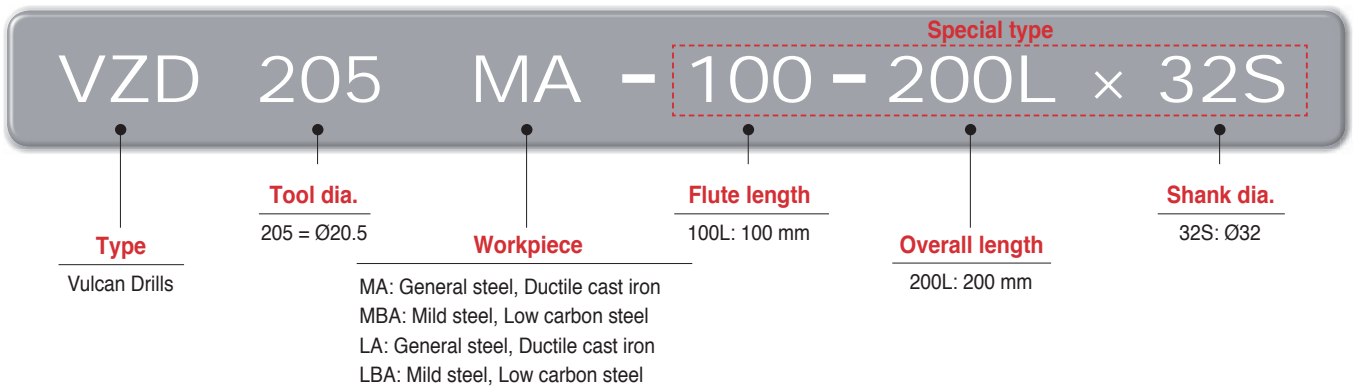


High feed and precision machining with our specially designed point edge

Vulcan Drill

- High feed and precision machining due to specially designed point edge
- Vulcan drills ensure longer tool life under high speed condition because of increased thermal & wear resistance. It also uses a PVD coating with an exclusive substrate to help maintain reduced frictional resistance
- Low cutting resistance by the best design of clearance angle is possible to increase feed
- Smoother chip control due to improved chip breakage
- Rmax: 6~25s, Hole tolerance: IT8 ~ 10
- Strong shock resistance ensures long tool life under the heavy interrupted machining

Code system



Application for vulcan drill

- General steel, Alloy steel, Mild steel, Dice steel, Stainless steel, Cast iron, Ductile cast iron, Non-ferrous metal, etc

Notice

- **Unsuitable drilling**
 - Avoid the inclination or unevenness of entering and piercing section of hole as possible
 - Reduce the feed 0.1~0.15 mm/rev when drilling at inclined and unevenness
- **Clamping of workpiece**
 - In case of wide flat panel or rotation by horizontal component, please clamp to be prevented bending of central part of workpiece for high efficiency

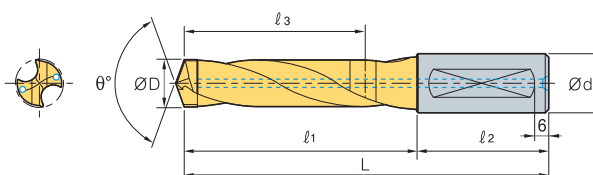
Recommended cutting condition

Form	Workpiece	Hardness	~Ø15		~Ø20		~Ø40	
			vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)
MA LA	Mild steel, General steel, Alloy steel	Under HB250	40~90 (65)	0.15~0.30 (0.20)	40~90 (65)	0.20~0.40 (0.30)	40~90 (70)	0.20~0.45 (0.35)
	General steel, Alloy steel	Under HB320	40~90 (60)	0.10~0.25 (0.20)	40~90 (60)	0.15~0.35 (0.25)	40~90 (65)	0.20~0.40 (0.30)
	Mold steel	HB250	40~70 (50)	0.10~0.25 (0.20)	40~70 (50)	0.15~0.30 (0.25)	40~70 (50)	0.20~0.35 (0.30)
	Stainless steel	HB250	30~50 (45)	0.10~0.20 (0.15)	30~50 (45)	0.15~0.25 (0.20)	30~50 (45)	0.20~0.30 (0.25)
	Ductile cast iron	-	50~100 (70)	0.20~0.35 (0.30)	50~100 (70)	0.20~0.40 (0.35)	50~100 (70)	0.25~0.50 (0.40)
MBA LBA	Mild steel, General steel, Alloy steel	Under HB250	40~90 (75)	0.20~0.40 (0.30)	40~90 (75)	0.20~0.40 (0.30)	40~90 (80)	0.20~0.45 (0.35)
	General steel, Alloy steel	Under HB320	35~80 (55)	0.15~0.30 (0.25)	35~80 (55)	0.15~0.30 (0.25)	40~80 (60)	0.15~0.40 (0.30)



Vulcan Drill (VZD-MA, MBA)

Type	MA	MBA
Grade	PC230F	
Tolerance (drill Dia.)	h7	
Tolerance (shank Dia.)	h7	
Point angle	140°	150°
Twist angle	25°	20°
Thinning	X type	
Coolant	Through	



		(mm)					
Designation	ØD	Ød	L	ℓ ₁	ℓ ₂	ℓ ₃	
VZD	126~135MA, MBA	12.6~13.5	16	110	62	48	44
	136~145MA, MBA	13.6~14.5	16	115	67	48	48
	146~155MA, MBA	14.6~15.5	20	125	75	50	55
	156~165MA, MBA	15.6~16.5	20	130	80	50	59
	166~175MA, MBA	16.6~17.5	20	135	85	50	63
	176~185MA, MBA	17.6~18.5	20	140	90	50	66
	186~195MA, MBA	18.6~19.5	25	155	99	56	74
	196~205MA, MBA	19.6~20.5	25	155	99	56	73
	206~215MA, MBA	20.6~21.5	25	155	99	56	72
	216~225MA, MBA	21.6~22.5	25	160	104	56	76
	226~235MA, MBA	22.6~23.5	25	160	104	56	74
	236~245MA, MBA	23.6~24.5	32	170	110	60	79
	246~255MA, MBA	24.6~25.5	32	170	110	60	78
	256~265MA, MBA	25.6~26.5	32	175	115	60	82
	266~275MA, MBA	26.6~27.5	32	175	115	60	80
	276~285MA, MBA	27.6~28.5	32	180	120	60	84
	286~295MA, MBA	28.6~29.5	32	185	125	60	88
	296~305MA, MBA	29.6~30.5	32	185	125	60	87
	306~315MA, MBA	30.6~31.5	40	205	135	70	95
	316~325MA, MBA	31.6~32.5	40	210	140	70	98
326~335MA, MBA	32.6~33.5	40	215	145	70	101	
336~345MA, MBA	33.6~34.5	40	220	150	70	104	
346~355MA, MBA	34.6~35.5	40	225	155	70	107	
356~365MA, MBA	35.6~36.5	40	225	155	70	110	
366~375MA, MBA	36.6~37.5	40	230	160	70	113	
376~385MA, MBA	37.6~38.5	40	235	165	70	116	
386~395MA, MBA	38.6~39.5	40	240	170	70	119	
396~405MA, MBA	39.6~40.5	40	245	175	70	122	

※ VZD□□□MA: For General steel, Ductile cast iron
 MBA: For Mild steel, Low carbon steel

※ Order made items: VZD□□□M□-Flute length-Total length L

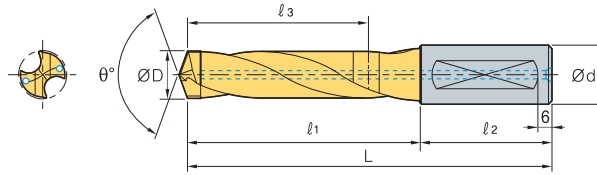
Ex.1) MA Type, Machined diameter: Ø18.6 mm, Flute length: 110 mm, Total length: 200 mm
 --- VZD186MA x 110-200L

Ex.2) MA Type, Machined diameter: Ø18.63, Flute length: 110 mm, Total length: 200 mm
 --- VZD1863MA x 110-200L

Ex.3) MA Type, Machined diameter: Ø18.6, Standard
 --- VZD186MA

Vulcan Drill (VZD-LA, LBA)

Type	LA	LBA
Grade	PC230F	
Tolerance (drill Dia.)	h7	
Tolerance (shank Dia.)	h7	
Point angle	140°	150°
Twist angle	25°	20°
Thinning	X type	
Coolant	Through	



(mm)

Designation	ØD	Ød	L	l ₁	l ₂	l ₃
VZD 126~135LA, LBA	12.6~13.5	16	140	92	48	74
136~145LA, LBA	13.6~14.5	16	145	97	48	78
146~155LA, LBA	14.6~15.5	20	155	105	50	85
156~165LA, LBA	15.6~16.5	20	165	115	50	94
166~175LA, LBA	16.6~17.5	20	170	120	50	98
176~185LA, LBA	17.6~18.5	20	175	125	50	101
186~195LA, LBA	18.6~19.5	25	190	134	56	109
196~205LA, LBA	19.6~20.5	25	195	139	56	113
206~215LA, LBA	20.6~21.5	25	195	139	56	112
216~225LA, LBA	21.6~22.5	25	200	144	56	116
226~235LA, LBA	22.6~23.5	25	210	154	56	124
236~245LA, LBA	23.6~24.5	32	220	160	60	129
246~255LA, LBA	24.6~25.5	32	225	165	60	133
256~265LA, LBA	25.6~26.5	32	230	170	60	137
266~275LA, LBA	26.6~27.5	32	235	175	60	141
276~285LA, LBA	27.6~28.5	32	240	180	60	144
286~295LA, LBA	28.6~29.5	32	245	185	60	148
296~305LA, LBA	29.6~30.5	32	255	195	60	157
306~315LA, LBA	30.6~31.5	40	275	205	70	166
316~325LA, LBA	31.6~32.5	40	280	210	70	172
326~335LA, LBA	32.6~33.5	40	280	215	70	173
336~345LA, LBA	33.6~34.5	40	290	220	70	177
346~355LA, LBA	34.6~35.5	40	295	225	70	181
356~365LA, LBA	35.6~36.5	40	300	230	70	183
366~375LA, LBA	36.6~37.5	40	305	235	70	188
376~385LA, LBA	37.6~38.5	40	315	245	70	193
386~395LA, LBA	38.6~39.5	40	320	250	70	198
396~405LA, LBA	39.6~40.5	40	325	255	70	203

※ VZD□□□LA: For General steel, Ductile cast iron
 LBA: For Mild steel, Low carbon steel

※ Order made items: VZD□□□L□-Flute length-Total length L

Ex.1) LA Type, Machined diameter: Ø18.6 mm, Flute length: 110 mm, Total length: 200 mm
 --- VZD186LA x 110-200L

Ex.2) LA Type, Machined diameter: Ø18.63, Flute length: 110 mm, Total length: 200 mm
 --- VZD1863LA x 110-200L

Ex.3) LA Type, Machined diameter: Ø18.6, Standard
 --- VZD186LA



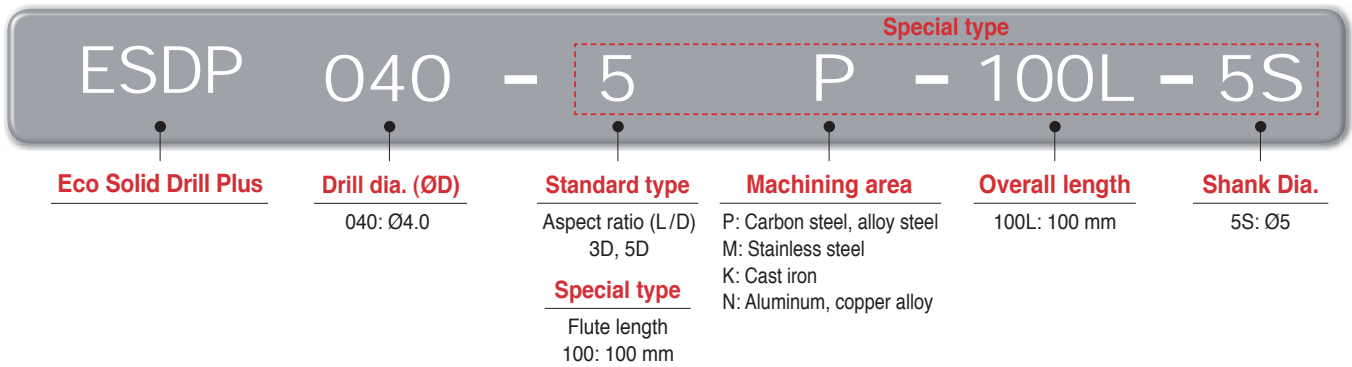
Economical Solid Drill

ESD Plus **new**

Eco Solid Drill Plus

- Great Value for Budget - Excellent performance and cost efficiency
- Increased Wear Resistance - Strong wear resistance due to our new PC325U grade

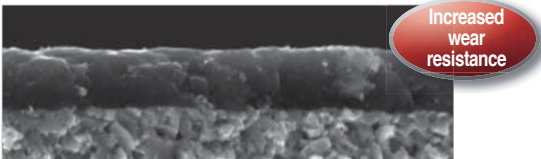
Code system



Features

New grade (PC325U)

- Lubricative coating layer improves welding resistance at middle to high speed
- Increase wear resistance in machining carbon steel



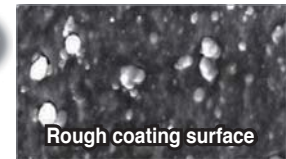
PC325U

Surface of coating layer

- Excellent welding resistance and lower cutting load
- Reduced frictional resistance at cutting edges and on the flute



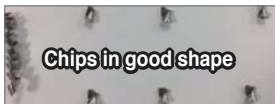
PC325U



Competitor

Chip control

- **Workpiece** SCM440
- **Cutting conditions** vc (m/min) = 40
fn (mm/rev) = 0.1, ap (mm) = 30, wet
- **Tools** ESDP060-5P



ESD Plus



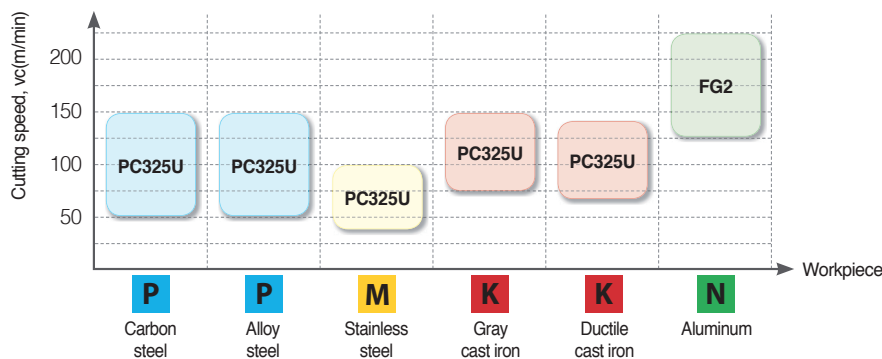
Competitor

Flute shape

- Improved chip evacuation due to wider chip pocket



Application area

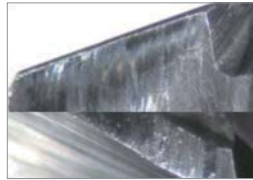


Performance evaluation

- **Workpiece** Alloy steel (SCM440)
- **Cutting conditions** vc (m/min) = 95
 fn (mm/rev) = 0.12, ap (mm) = 20, External coolant
- **Tools** ESDP060-5P

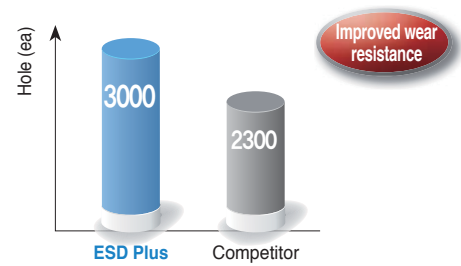


ESD Plus



Competitor

Test result



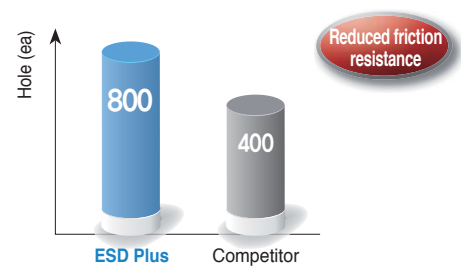
Lubricative coating layer of the new grade PC325U maximizes wear resistance

Application examples

- **Workpiece** Carbon steel (SM45C)
- **Cutting conditions** vc (m/min) = 50
 fn (mm/rev) = 0.08, ap (mm) = 23.5, External coolant
- **Tools** ESDP090-5P



Test result



Special treatment on coating surface minimizes frictional resistance

Recommended cutting condition

Workpiece			Grade	vc (m/min)	Feed					
ISO	Workpiece	HB			Feed rate (mm/rev) per drill dia. (mm)					
					Ø2.5~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0	Ø12.1~Ø16.0	Ø16.1~Ø20.0	
P	Carbon steel	Low carbon steel	80~120	PC325U	72(64~120)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32
		High carbon steel	Over 250	PC325U	40(32~64)	0.06~0.16	0.06~0.16	0.08~0.20	0.12~0.20	0.12~0.24
	Alloy steel	Low alloy steel	140~260	PC325U	72(64~120)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32
		Hardened low alloy steel	200~400	PC325U	48(40~80)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32
		High alloy steel	50~260	PC325U	40(32~64)	0.06~0.16	0.06~0.16	0.08~0.20	0.12~0.20	0.12~0.24
		Hardened high alloy steel	Over 250	PC325U	40(32~64)	0.06~0.16	0.06~0.16	0.08~0.20	0.12~0.20	0.12~0.24
M	Stainless steel	Austenite series	135~275	PC325U	36(20~64)	0.04~0.16	0.04~0.16	0.08~0.20	0.08~0.20	0.12~0.24
		Ferrite series Martensite series	135~275	PC325U	40(24~64)	0.04~0.16	0.04~0.16	0.08~0.20	0.08~0.20	0.12~0.24
K	Cast iron	Gray cast iron	150~230	PC325U	80(64~120)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32
		Ductile cast iron	160~260	PC325U	72(56~112)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32
N	Aluminum	Aluminum alloy	30~150	FG2	120(100~176)	0.19~0.30	0.30~0.42	0.42~0.60	0.49~0.68	0.54~0.78
	Copper alloy	Copper alloy	150~160	FG2	120(100~176)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32

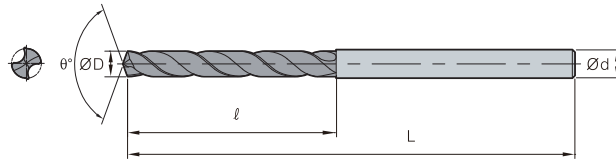
* Cutting conditions above are for the case of less than 5D depth of cut and external coolant system applied



ESDP-□P

Specification	P	M	K	N
Grade	PC325U			FG2
Tolerance(drill Dia.)	h7			
Tolerance(shank Dia.)	h6			
Point angle	140°		135°	
Twist angle	30°			
Thinning	X type			
Coolant	External system			

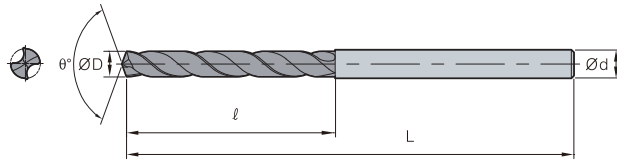
■ Steel
 ■ Stainless steel
 ■ Cast iron
 ■ Non-ferrous metal



Designation	ØD	Ød	3P		5P		7P	
			ℓ	L	ℓ	L	ℓ	L
ESDP 010 - □ P	1.0	3	5	45	8	45	12	60
011 - □ P	1.1	3	6	45	9	45	12	60
012 - □ P	1.2	3	6	45	10	45	12	60
013 - □ P	1.3	3	7	45	10	45	15	60
014 - □ P	1.4	3	7	45	11	45	15	60
015 - □ P	1.5	3	7	45	11	45	15	60
016 - □ P	1.6	3	8	45	12	45	20	60
017 - □ P	1.7	3	8	45	12	45	20	60
018 - □ P	1.8	3	9	45	13	45	20	60
019 - □ P	1.9	3	9	45	14	45	20	60
020 - □ P	2.0	3	10	50	18	50	25	66
021 - □ P	2.1	3	10	50	18	50	25	66
022 - □ P	2.2	3	12	50	18	50	25	66
023 - □ P	2.3	3	12	50	18	50	25	66
024 - □ P	2.4	3	12	50	18	50	30	66
025 - □ P	2.5	3	12	50	18	50	30	66
026 - □ P	2.6	3	12	50	18	50	30	66
027 - □ P	2.7	3	15	50	18	50	30	66
028 - □ P	2.8	3	15	50	18	50	30	66
029 - □ P	2.9	3	15	50	18	50	30	66
030 - □ P	3.0	3	16	55	20	55	45	80
031 - □ P	3.1	4	16	55	20	55	45	80
032 - □ P	3.2	4	16	55	20	55	45	80
033 - □ P	3.3	4	16	55	20	55	45	80
034 - □ P	3.4	4	16	55	20	55	45	80
035 - □ P	3.5	4	16	55	20	55	45	80
036 - □ P	3.6	4	18	55	25	55	45	80
037 - □ P	3.7	4	18	55	25	55	45	80
038 - □ P	3.8	4	20	55	25	55	45	80
039 - □ P	3.9	4	20	55	25	55	45	80
040 - □ P	4.0	4	20	55	25	55	45	80
041 - □ P	4.1	5	20	55	25	55	45	80
042 - □ P	4.2	5	20	63	33	63	45	80
043 - □ P	4.3	5	23	63	33	63	45	80
044 - □ P	4.4	5	23	63	33	63	45	80
045 - □ P	4.5	5	23	63	33	63	45	80
046 - □ P	4.6	5	23	63	33	63	45	80
047 - □ P	4.7	5	23	63	33	63	45	80
048 - □ P	4.8	5	25	63	33	63	45	80
049 - □ P	4.9	5	25	63	33	63	45	80
050 - □ P	5.0	5	25	63	33	63	45	80

※ Pre-orders can be made in advance for non-stock items

ESDP-□P



Specification	P	M	K	N
Grade	PC325U			FG2
Tolerance(drill Dia.)	h7			
Tolerance(shank Dia.)	h6			
Point angle	140°	135°		
Twist angle	30°			
Thinning	X type			
Coolant	External system			

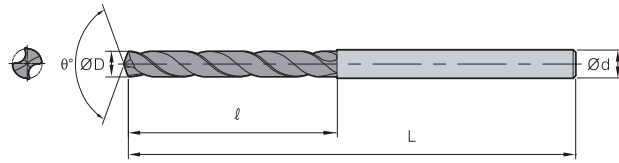
■ Steel
 ■ Stainless steel
 ■ Cast iron
 ■ Non-ferrous metal

(mm)

Designation	ØD	Ød	3P		5P		7P	
			ℓ	L	ℓ	L	ℓ	L
ESDP 051 - □ P	5.1	6	25	63	33	63	45	80
052 - □ P	5.2	6	28	66	36	66	50	83
053 - □ P	5.3	6	28	66	36	66	50	83
054 - □ P	5.4	6	28	66	36	66	50	83
055 - □ P	5.5	6	28	66	36	66	50	83
056 - □ P	5.6	6	28	66	36	66	50	83
057 - □ P	5.7	6	28	66	36	66	50	83
058 - □ P	5.8	6	28	66	36	66	50	83
059 - □ P	5.9	6	28	66	36	66	50	83
060 - □ P	6.0	6	30	66	36	66	50	83
061 - □ P	6.1	7	30	66	36	66	50	83
062 - □ P	6.2	7	32	75	42	75	53	85
063 - □ P	6.3	7	32	75	42	75	53	85
064 - □ P	6.4	7	32	75	42	75	53	85
065 - □ P	6.5	7	32	75	42	75	53	85
066 - □ P	6.6	7	32	75	42	75	53	85
067 - □ P	6.7	7	32	75	42	75	53	85
068 - □ P	6.8	7	32	75	42	75	53	85
069 - □ P	6.9	7	32	75	42	75	53	85
070 - □ P	7.0	7	32	75	42	75	53	85
071 - □ P	7.1	8	32	75	42	75	53	85
072 - □ P	7.2	8	36	80	46	80	58	90
073 - □ P	7.3	8	36	80	46	80	58	90
074 - □ P	7.4	8	36	80	46	80	58	90
075 - □ P	7.5	8	36	80	46	80	58	90
076 - □ P	7.6	8	36	80	46	80	58	90
077 - □ P	7.7	8	36	80	46	80	58	90
078 - □ P	7.8	8	36	80	46	80	58	90
079 - □ P	7.9	8	36	80	46	80	58	90
080 - □ P	8.0	8	36	80	46	80	58	90
081 - □ P	8.1	9	36	80	46	80	58	90
082 - □ P	8.2	9	38	85	50	85	64	98
083 - □ P	8.3	9	38	85	50	85	64	98
084 - □ P	8.4	9	38	85	50	85	64	98
085 - □ P	8.5	9	38	85	50	85	64	98
086 - □ P	8.6	9	40	85	50	85	64	98
087 - □ P	8.7	9	40	85	50	85	64	98
088 - □ P	8.8	9	40	85	50	85	64	98
089 - □ P	8.9	9	40	85	50	85	64	98
090 - □ P	9.0	9	40	85	50	85	64	98



ESDP-□P



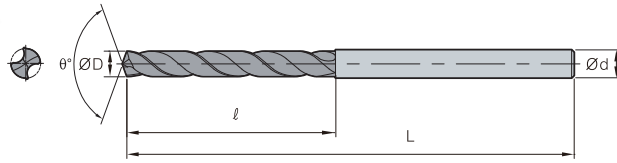
Specification	P	M	K	N
Grade	PC325U		FG2	
Tolerance(drill Dia.)	h7			
Tolerance(shank Dia.)	h6			
Point angle	140°		135°	
Twist angle	30°			
Thinning	X type			
Coolant	External system			

■ Steel
 ■ Stainless steel
 ■ Cast iron
 ■ Non-ferrous metal

(mm)

Designation	ØD	Ød	3P		5P		7P	
			ℓ	L	ℓ	L	ℓ	L
ESDP 091 - □ P	9.1	10	42	85	50	85	64	98
092 - □ P	9.2	10	42	90	55	90	68	105
093 - □ P	9.3	10	42	90	55	90	68	105
094 - □ P	9.4	10	42	90	55	90	68	105
095 - □ P	9.5	10	42	90	55	90	68	105
096 - □ P	9.6	10	45	90	55	90	68	105
097 - □ P	9.7	10	45	90	55	90	68	105
098 - □ P	9.8	10	45	90	55	90	68	105
099 - □ P	9.9	10	45	90	55	90	68	105
100 - □ P	10.0	10	45	90	55	90	68	105
101 - □ P	10.1	11	-	-	55	90	68	105
102 - □ P	10.2	11	-	-	57	95	73	110
103 - □ P	10.3	11	-	-	57	95	73	110
104 - □ P	10.4	11	-	-	57	95	73	110
105 - □ P	10.5	11	-	-	57	95	73	110
106 - □ P	10.6	11	-	-	57	95	73	110
107 - □ P	10.7	11	-	-	57	95	73	110
108 - □ P	10.8	11	-	-	57	95	73	110
109 - □ P	10.9	11	-	-	57	95	73	110
110 - □ P	11.0	11	-	-	57	95	73	110
111 - □ P	11.1	12	-	-	57	95	73	110
112 - □ P	11.2	12	-	-	63	102	80	120
113 - □ P	11.3	12	-	-	63	102	80	120
114 - □ P	11.4	12	-	-	63	102	80	120
115 - □ P	11.5	12	-	-	63	102	80	120
116 - □ P	11.6	12	-	-	63	102	80	120
117 - □ P	11.7	12	-	-	63	102	80	120
118 - □ P	11.8	12	-	-	63	102	80	120
119 - □ P	11.9	12	-	-	63	102	80	120
120 - □ P	12.0	12	-	-	63	102	80	120
121 - □ P	12.1	13	-	-	63	102	80	120
122 - □ P	12.2	13	-	-	63	102	90	137
123 - □ P	12.3	13	-	-	63	102	90	137
124 - □ P	12.4	13	-	-	63	102	90	137
125 - □ P	12.5	13	-	-	63	102	90	137
126 - □ P	12.6	13	-	-	63	102	90	137
127 - □ P	12.7	13	-	-	63	102	90	137
128 - □ P	12.8	13	-	-	63	102	90	137
129 - □ P	12.9	13	-	-	63	102	90	137
130 - □ P	13.0	13	-	-	63	102	90	137

ESDP-□P



Specification	P	M	K	N
Grade	PC325U			FG2
Tolerance(drill Dia.)	h7			
Tolerance(shank Dia.)	h6			
Point angle	140°	135°		
Twist angle	30°			
Thinning	X type			
Coolant	External system			

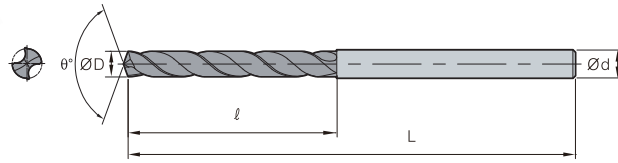
■ Steel
 ■ Stainless steel
 ■ Cast iron
 ■ Non-ferrous metal

(mm)

Designation	ØD	Ød	5P		7P	
			ℓ	L	ℓ	L
ESDP 131 - □ P	13.1	14	63	102	90	137
132 - □ P	13.2	14	65	107	96	147
133 - □ P	13.3	14	65	107	96	147
134 - □ P	13.4	14	65	107	96	147
135 - □ P	13.5	14	65	107	96	147
136 - □ P	13.6	14	65	107	96	147
137 - □ P	13.7	14	65	107	96	147
138 - □ P	13.8	14	65	107	96	147
139 - □ P	13.9	14	65	107	96	147
140 - □ P	14.0	14	65	107	96	147
141 - □ P	14.1	15	65	107	96	147
142 - □ P	14.2	15	68	115	100	153
143 - □ P	14.3	15	68	115	100	153
144 - □ P	14.4	15	68	115	100	153
145 - □ P	14.5	15	68	115	100	153
146 - □ P	14.6	15	68	115	100	153
147 - □ P	14.7	15	68	115	100	153
148 - □ P	14.8	15	68	115	100	153
149 - □ P	14.9	15	68	115	100	153
150 - □ P	15.0	15	68	115	100	153
151 - □ P	15.1	16	68	115	100	153
152 - □ P	15.2	16	70	120	112	160
153 - □ P	15.3	16	70	120	112	160
154 - □ P	15.4	16	70	120	112	160
155 - □ P	15.5	16	70	120	112	160
156 - □ P	15.6	16	70	120	112	160
157 - □ P	15.7	16	70	120	112	160
158 - □ P	15.8	16	70	120	112	160
159 - □ P	15.9	16	70	120	112	160
160 - □ P	16.0	16	70	120	112	160
161 - □ P	16.1	17	70	120	112	160
162 - □ P	16.2	17	70	120	112	160
163 - □ P	16.3	17	70	120	112	160
164 - □ P	16.4	17	70	120	112	160
165 - □ P	16.5	17	72	125	112	160
166 - □ P	16.6	17	72	125	112	160
167 - □ P	16.7	17	72	125	112	160
168 - □ P	16.8	17	72	125	112	160
169 - □ P	16.9	17	72	125	112	160
170 - □ P	17.0	17	72	125	112	160



ESDP-□P



Specification	P	M	K	N
Grade	PC325U		FG2	
Tolerance(drill Dia.)	h7			
Tolerance(shank Dia.)	h6			
Point angle	140°		135°	
Twist angle	30°			
Thinning	X type			
Coolant	External system			

■ Steel
 ■ Stainless steel
 ■ Cast iron
 ■ Non-ferrous metal

(mm)

Designation	ØD	Ød	5P		7P	
			ℓ	L	ℓ	L
ESDP 171 - □ P	17.1	18	72	125	112	160
172 - □ P	17.2	18	72	125	112	160
173 - □ P	17.3	18	72	125	112	160
174 - □ P	17.4	18	72	125	112	160
175 - □ P	17.5	18	75	130	112	160
176 - □ P	17.6	18	75	130	112	160
177 - □ P	17.7	18	75	130	112	160
178 - □ P	17.8	18	75	130	112	160
179 - □ P	17.9	18	75	130	112	160
180 - □ P	18.0	18	75	130	112	160
181 - □ P	18.1	19	75	130	112	160
182 - □ P	18.2	19	75	130	112	160
183 - □ P	18.3	19	75	130	112	160
184 - □ P	18.4	19	75	130	112	160
185 - □ P	18.5	19	78	130	112	160
186 - □ P	18.6	19	78	130	112	160
187 - □ P	18.7	19	78	130	112	160
188 - □ P	18.8	19	78	130	112	160
189 - □ P	18.9	19	78	130	112	160
190 - □ P	19.0	19	78	130	112	160
191 - □ P	19.1	20	78	130	112	160
192 - □ P	19.2	20	78	130	112	160
193 - □ P	19.3	20	78	130	112	160
194 - □ P	19.4	20	78	130	112	160
195 - □ P	19.5	20	82	135	112	160
196 - □ P	19.6	20	82	135	112	160
197 - □ P	19.7	20	82	135	112	160
198 - □ P	19.8	20	82	135	112	160
199 - □ P	19.9	20	82	135	112	160
200 - □ P	20.0	20	82	135	112	160

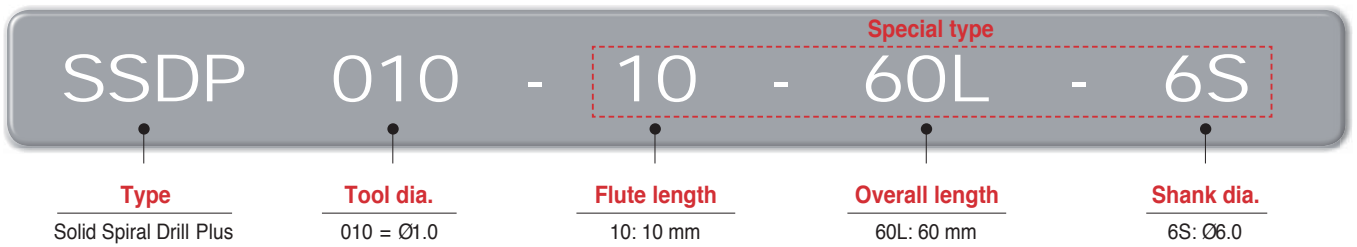
G Technical Information for Carbide Drill (SSDP)

High quality solid drill for high performance

SSD Plus new

- Improved chip control thanks to the new flute design
- Higher quality machining achieved from improved surface finish and forming
- Increased productivity thanks to stable tool life
- A variety of workpiece materials available including mild steel and non-ferrous

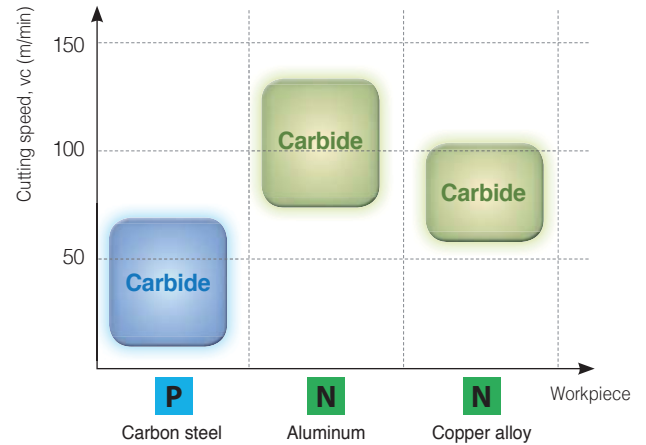
Code system



Features

Division	Shape	Application area
SSD Plus (SSDP)		P, N
existing SSD		N

Application area

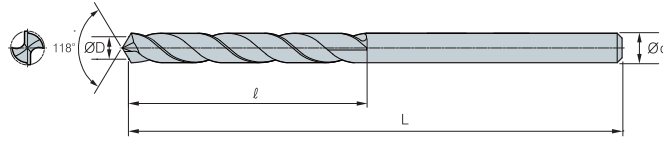


Recommended cutting condition

Workpiece				Grade	Cutting speed vc (m/min)	Feed rate (mm/rev) per drill dia. (mm)			
ISO	Workpiece	HB	Ø2.5~Ø4.0			Ø4.1~Ø8.0	Ø8.1~Ø12.0	Ø12.1~Ø15.0	
P	Carbon steel	Low carbon steel	80~120	Carbide	35 (20~65)	0.02~0.06	0.04~0.08	0.06~0.12	0.10~0.16
N	Aluminum	Aluminum alloy	30~150		100 (94~120)	0.03~0.06	0.05~0.08	0.08~0.12	0.12~0.18
	Copper alloy	Copper alloy	150~160		80 (65~95)	0.03~0.06	0.05~0.08	0.08~0.12	0.12~0.18



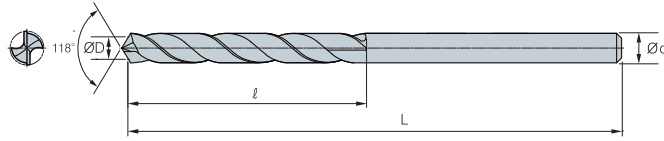
SSDP



Coating	x
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h7
Point angle	118°
Twist angle	30°
Thinning	X type
Coolant	External

					(mm)				
Designation		ØD = Ød	ℓ	L	Designation		ØD = Ød	ℓ	L
SSDP	010	1.0	10	32	SSDP	048	4.8	38	65
	011	1.1	10	32		049	4.9	38	65
	012	1.2	10	32		050	5.0	38	65
	013	1.3	10	32		051	5.1	38	65
	014	1.4	10	32		052	5.2	38	65
	015	1.5	13	35		053	5.3	38	65
	016	1.6	13	35		054	5.4	38	65
	017	1.7	13	35		055	5.5	38	65
	018	1.8	13	35		056	5.6	40	75
	019	1.9	13	35		057	5.7	40	75
	020	2.0	18	40		058	5.8	40	75
	021	2.1	18	40		059	5.9	40	75
	022	2.2	18	40		060	6.0	40	75
	023	2.3	18	40		061	6.1	40	75
	024	2.4	18	40		062	6.2	40	75
	025	2.5	22	45		063	6.3	40	75
	026	2.6	22	45		064	6.4	40	75
	027	2.7	22	45		065	6.5	40	75
	028	2.8	22	45		066	6.6	46	80
	029	2.9	22	45		067	6.7	46	80
	030	3.0	25	50		068	6.8	46	80
	031	3.1	25	50		069	6.9	46	80
	032	3.2	25	50		070	7.0	46	80
	033	3.3	28	50		071	7.1	46	80
	034	3.4	28	50		072	7.2	46	80
	035	3.5	28	50		073	7.3	46	80
	036	3.6	30	55		074	7.4	46	80
	037	3.7	30	55		075	7.5	46	80
	038	3.8	30	55		076	7.6	50	85
	039	3.9	30	55		077	7.7	50	85
	040	4.0	30	55		078	7.8	50	85
	041	4.1	34	60		079	7.9	50	85
	042	4.2	34	60		080	8.0	50	85
	043	4.3	34	60		081	8.1	50	85
	044	4.4	34	60		082	8.2	50	85
	045	4.5	34	60		083	8.3	50	85
	046	4.6	38	65		084	8.4	50	85
	047	4.7	38	65		085	8.5	50	85

SSDP



Coating	x
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h6
Point angle	118°
Twist angle	30°
Thinning	X type
Coolant	External

(mm)

Designation	ØD = Ød	ℓ	L	Designation	ØD = Ød	ℓ	L
SSDP 086	8.6	50	95	SSDP 097	9.7	50	100
087	8.7	50	95	098	9.8	50	100
088	8.8	50	95	099	9.9	50	100
089	8.9	50	95	100	10.0	50	100
090	9.0	50	95	105	10.5	60	115
091	9.1	50	95	110	11.0	60	115
092	9.2	50	95	115	11.5	65	120
093	9.3	50	95	120	12.0	65	120
094	9.4	50	95	125	12.5	65	125
095	9.5	50	95	130	13.0	65	125
096	9.6	50	100	150	15.0	70	130

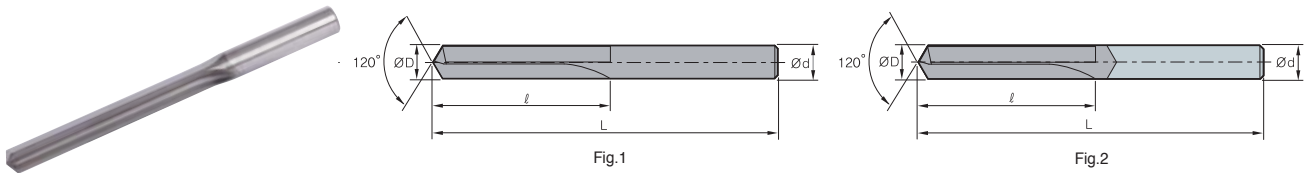


Burnishing Drill

Recommended cutting condition

Workpiece	Cutting speed vc (m/min)	Feed rate (mm/rev) per drill dia. (mm)				
		Ø2.0~Ø3.0	Ø3.5~Ø5.0	Ø5.5~Ø8.0	Ø8.5~Ø12	Ø12.5~Ø18
Aluminum alloy, Copper alloy	30~60	0.02~0.05	0.03~0.10	0.04~0.15	0.05~0.20	0.05~0.30
Aluminum alloy for die castings	50~80	0.02~0.05	0.03~0.10	0.04~0.15	0.05~0.20	0.05~0.30
Cast iron (GC) Ductile cast	25~60	0.01~0.04	0.02~0.08	0.05~0.12	0.05~0.20	0.05~0.30
Iron (GCD)	20~50	0.01~0.03	0.02~0.05	0.03~0.08	0.04~0.12	0.05~0.15

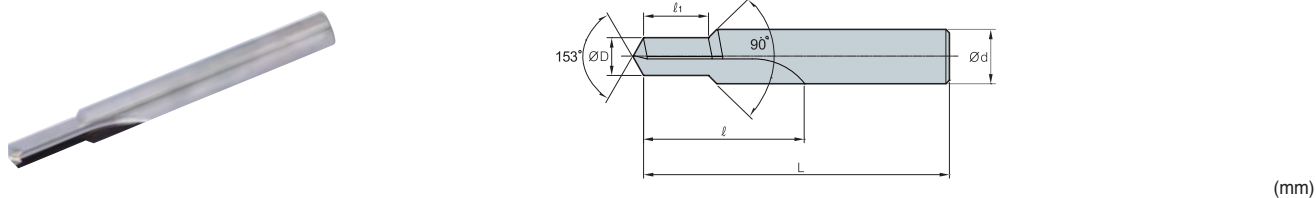
Burnishing Drill-BDS



Designation	ØD	Ød	ℓ	L	Fig.
BDS	040S	4.0	35	80	1
	050S	5.0	40	85	1
	060S	6.0	50	95	1
	070S	7.0	55	100	1
	080S	8.0	65	110	1
	090S	9.0	70	120	1
	100S	10.0	80	130	1
	110S	11.0	90	140	1
	120B	12.0	95	150	2
	130B	13.0	105	160	2
	140B	14.0	110	170	2
	150B	15.0	120	185	2
	160B	16.0	125	190	2

Step Burnishing Drill-BDT

For tapping a foundation hole



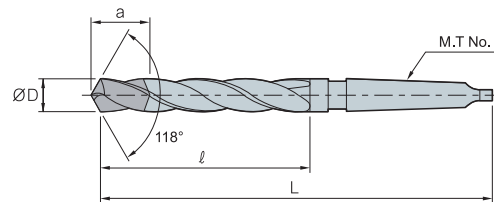
Designation	ØD	Ød	ℓ	ℓ ₁	L	Tap
BDT	M05080-ℓ 1	4.2	35	9~15	90	M5XP0.8
	M06100-ℓ 1	5.0	40	11~18	95	M6XP1.0
	M08125-ℓ 1	6.8	50	15~24	105	M8XP1.25
	M10125-ℓ 1	8.8	55	17~30	110	M10XP1.25
	M10150-ℓ 1	8.5	55	17~30	110	M10XP1.5
	M12125-ℓ 1	10.8	60	19~36	120	M12XP1.25
	M12150-ℓ 1	10.5	60	19~36	120	M12XP1.5
	M12175-ℓ 1	10.3	60	19~36	120	M12XP1.75

Top Solid Drill

Recommended cutting condition

Diameter	Cutting condition	Ductile cast iron	Gray cast iron	Soft steel
Ø8~Ø10	vc (m/min)	30 (20~35)	40 (20~60)	100 (50~150)
	fn (mm/rev)	0.30 (0.20~0.40)	0.30 (0.20~0.40)	0.15 (0.10~0.20)
Ø10.1~Ø15	vc (m/min)	50 (30~70)	60 (30~80)	130 (70~200)
	fn (mm/rev)	0.35 (0.30~0.40)	0.35 (0.30~0.40)	0.15 (0.10~0.20)
Ø15.1~Ø25	vc (m/min)	60 (50~60)	75 (50~100)	150 (100~250)
	fn (mm/rev)	0.35 (0.30~0.45)	0.40 (0.30~0.50)	0.15 (0.10~0.20)

Top Solid Drill-TSDM



Designation		ØD	L	ℓ	a	M.T No
TSDM	080~085	8.0~8.5	168	85	25	1
	086~090	8.6~9.0	172	88	25	1
	091~095	9.1~9.5	175	92	26	1
	096~100	9.6~10.0	178	95	26	1
	101~105	10.1~10.5	182	98	26	1
	106~110	10.6~11.0	185	102	26	1
	111~115	11.1~11.5	188	105	26	1
	116~120	11.6~12.0	192	108	26	1
	121~125	12.1~12.5	195	112	26	1
	126~130	12.6~13.0	198	115	26	2
	131~135	13.1~13.5	202	118	27	2
	136~140	13.6~14.0	205	122	27	2
	141~145	14.1~14.5	222	122	27	2
	146~150	14.6~15.0	225	125	27	2
	151~155	15.1~15.5	228	125	27	2
	156~160	15.6~16.0	230	130	27	2
	161~165	16.1~16.5	232	132	27	2
	166~170	16.6~17.0	234	135	27	2
	171~180	17.1~18.0	240	140	27	2
	181~190	18.1~19.0	245	145	27	2
191~200	19.1~20.0	250	150	30	2	
201~210	20.1~21.0	255	155	30	2	
211~220	21.1~22.0	260	160	30	2	
221~230	22.1~23.0	265	165	30	2	
231~250	23.1~25.0	285	165	34	3	

※ Order form : TSDM125



High accuracy hole machining for aluminum alloy

PCD Drill

- High accuracy hole machining for aluminum alloy
- Drilling tolerance: IT7~8 class
- Recommendation with high accuracy and high spindle machine

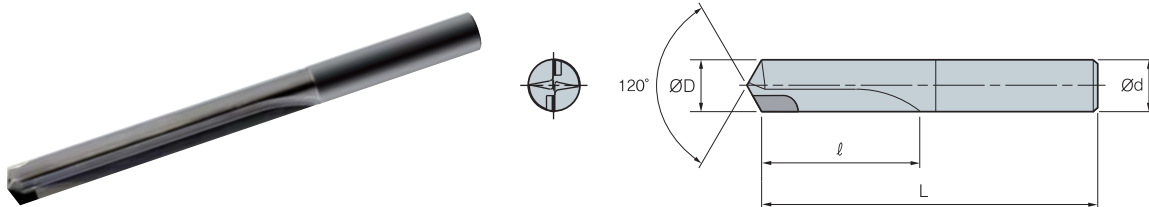
Code system



Recommended cutting condition

Workpiece	vc (m/min)	fn (mm/rev)
Aluminum alloy	50~250	0.05~0.20 0.10~0.40

PDD



Designation		ØD	Ød	ℓ	L
PDD	0500	5.0	5.0	30	80
	0550	5.5	5.5	30	80
	0600	6.0	6.0	30	80
	0650	6.5	6.5	40	95
	0700	7.0	7.0	40	95
	0750	7.5	7.5	45	100
	0800	8.0	8.0	45	100
	0850	8.5	8.5	50	110
	0900	9.0	9.0	50	110
	0950	9.5	9.5	55	115
	1000	10.0	10.0	55	115
	1050	10.5	10.5	60	120
	1100	11.0	11.0	60	120
	1150	11.5	11.5	65	125
	1200	12.0	12.0	65	125

G Technical Information for Gun Drill

Stable performance and hole quality with our unique cutting edge and guide pad available regrinding

Gun Drill

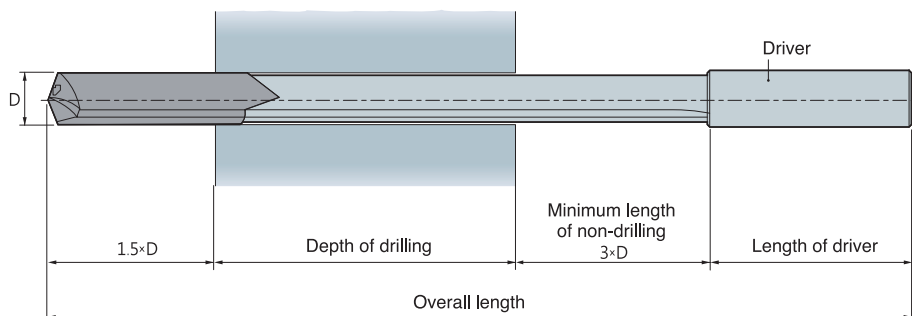
- High efficiency in deep hole machining
- High accuracy (Hole tolerance: IT9, surface finish: Ra0.1~3.0S)
- Stable Quality due to unique cutting edge and guide pad available regrinding
- Used drill can recycle as change part of carbide
- Depending on request, the drills can change geometry of cutting edge and drive specification
- For ordering, please check length of drill

Code system

KGD	S	12.05	-	1500	/	D30
<u>KORLOY Gun Drill</u>	<u>Lib type</u> S: Single T: Twin	<u>Drill dia.</u> Ø12.05		<u>Length of drill</u> 1500 mm		<u>Drive no.</u> D30

Features

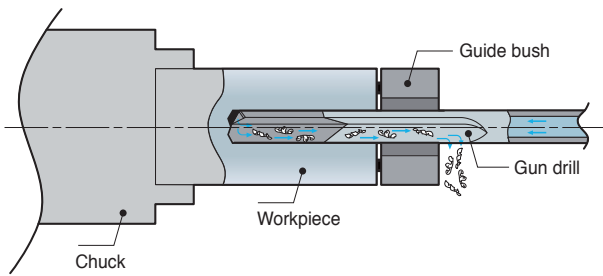
	Single lip type	Twin lip type
Shape		
Drill Dia.	Ø2.0~Ø33.0	Ø8.0~Ø24.0
Depth of drilling	≥ 2,000 mm	≥ 1,000 mm
Tolerance	IT9	IT10
Surface finish	Ra 0.1~3.0 µm	Ra 1.0~4.0 µm
Application	For all kinds of workpiece machining	<ul style="list-style-type: none"> • Workpieces with good chip evacuation • Machining of at higher feed than single lip type's



- Refer to the code system and the above drawing when ordering
- Refer to the page 112 for the size of a driver
- The overall length can be chosen by order



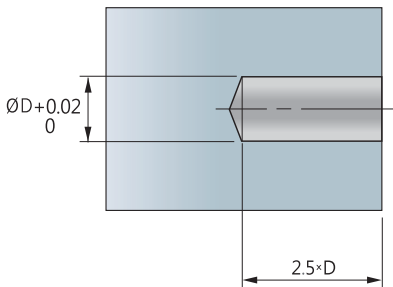
Application of Gun Drill on exclusive machine



- The guide bush is necessary for centering before gun-drilling

Application of Gun Drill on machining center

1 Machining of a pilot hole

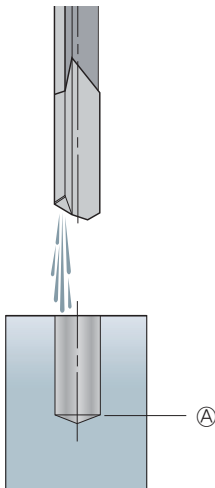


1. A pilot hole is necessary in machining on a machining center instead of a guide bush
2. The diameter of the pilot hole should be 0.01~0.02 (H7) larger bigger than one of the Gun Drill diameter and the depth of drilling should be about $2.5 \times D$
3. Use Mach Drill (MSD) for machining of a pilot hole



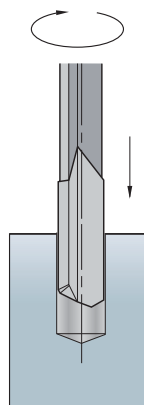
MSD

2 Moving the Gun Drill to the pilot hole



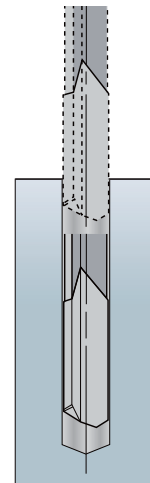
1. The Gun Drill should not drill before entering the pilot hole
2. Coolant is necessary for gun drilling

3 Start Gun Drilling



1. Rotate the spindle
2. Machine with drilling to vertical axis

4 After Gun Drilling



1. Return the drill
2. Stop drilling and supplying coolant
3. Remove the Gun Drill

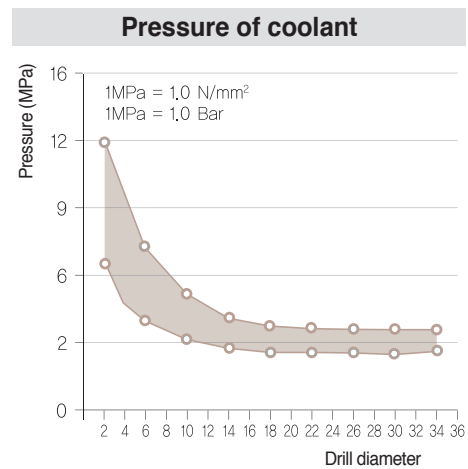
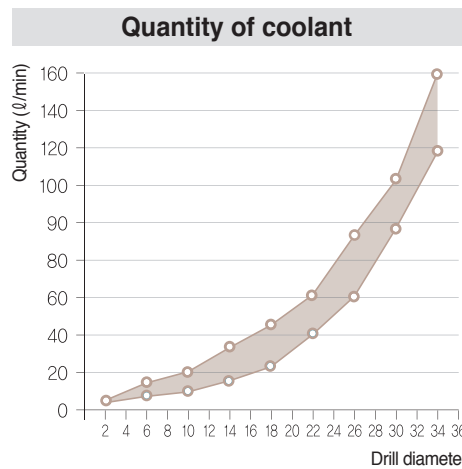
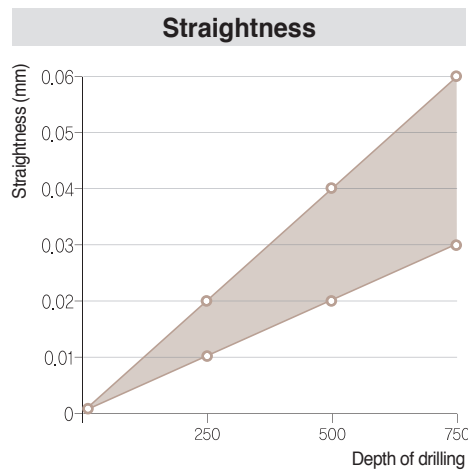
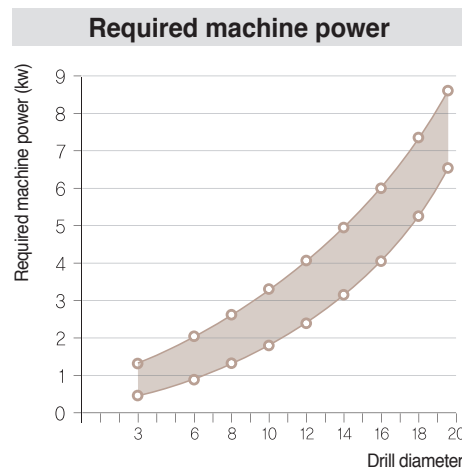
Recommended cutting condition

Workpiece	Hardness (HB)	Cutting speed vc (m/min)	Feed rate (mm/rev) per drill dia. (mm)					
			~Ø4	~Ø6	~Ø10	~Ø14	~Ø24	Ø25~
Carbon steel Alloy steel	~150	100~150	0.005~0.015	0.010~0.025	0.015~0.035	0.020~0.050	0.030~0.070	0.040~0.080
	150~250	80~120	0.005~0.010	0.010~0.020	0.015~0.030	0.020~0.040	0.030~0.060	0.030~0.060
	250~350	50~100	0.005~0.010	0.005~0.010	0.010~0.020	0.015~0.030	0.020~0.040	0.020~0.040
	350~	~30	-	0.005~0.010	0.005~0.010	0.010~0.020	0.020~0.035	0.020~0.035
Stainless steel	~250	50~80	0.005~0.015	0.010~0.020	0.010~0.020	0.010~0.030	0.020~0.035	0.020~0.040
	250~350	40~50	-	0.005~0.015	0.010~0.015	0.010~0.020	0.010~0.020	0.010~0.020
Cast iron	~220	80~100	0.010~0.0120	0.020~0.040	0.030~0.050	0.040~0.080	0.080~0.120	0.100~0.150
	220~	40~80	0.005~0.010	0.005~0.015	0.010~0.020	0.015~0.030	0.020~0.050	0.025~0.070
Aluminum alloy	-	180~250	0.010~0.020	0.020~0.040	0.030~0.060	0.040~0.080	0.100~0.180	0.150~0.200
Light alloy	-	120~200	0.005~0.010	0.010~0.020	0.020~0.025	0.020~0.030	0.030~0.040	0.040~0.060

Technical information

The factors below determine the straightness of hole

- Drill diameter and depth of drilling
- Cutting condition and kind of application
- Kind of workpiece and machine
- Drill bush

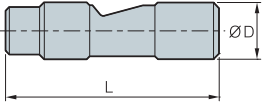
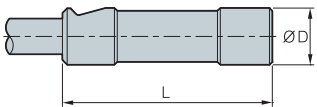
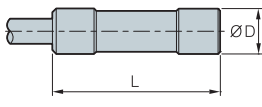
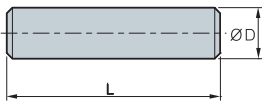
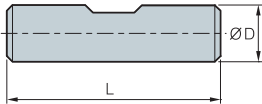
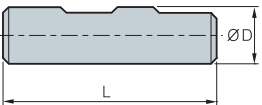
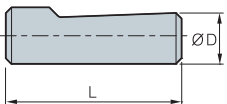
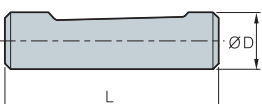


The above graph shows general information and it is changeable depending on kind of tool, workpieces, and cutting conditions etc

- **Pressure and quantity of coolant** - High pressure of coolant ensures excellent chip evacuation and cooling the cutting edge
- **Use a filter for removing impurities** - The diameter of a filter should be less than 20 μ m. Impurities could make bad flow of coolant, wear on a tool, and high load on the cooling pump
- **Temperature of coolant** - Proper temperature of coolant: 20°C~22°C / Do not use coolant at 50°C above



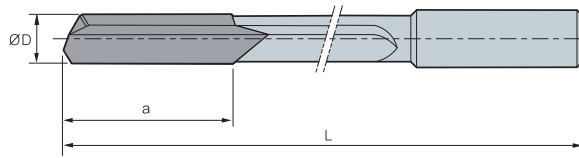
Driver standard

Type	Shape	No.	ØD×L		Carbide type	
			ØD×L	Thread	Tipped	Solid
Central clamping surface 15°		D01	10x40		●	●
		D02	16x45		●	
		D03	19.05x69.8		●	
		D04	25x70		●	
		D05	25.4x69.8		●	
Frontal clamping surface 15°		D06	16x50		●	
Central clamping tapered		D07	12.7x38.1		●	●
		D08	16x70			
		D09	19.05x69.8		●	
		D10	20x70			
Cylindrical DIN1835A DIN6535HA		D11	4x28		●	●
		D12	6x36		●	●
		D13	10x40		●	●
		D14	16x48		●	●
		D15	20x50		●	
		D16	25x56		●	
Weldon DIN1835B		D17	10x40		●	●
		D18	12x45		●	●
		D19	16x48		●	●
		D20	20x50		●	●
Weldon DIN6535HB		D21	25x56		●	
		D22	32x60		●	
		D23	40x70			
Whistle Notch DIN1835E		D24	10x40		●	●
		D25	12x45		●	●
		D26	16x48		●	●
		D27	20x50		●	●
		D28	25x56		●	
		D29	32x60		●	
Whistle notch DIN6535HE		D30	10x40		●	●
		D31	12x45		●	●
		D32	16x48		●	●
		D33	20x50		●	●

* Special types are available for quotation with shape and size information

Gun Drill-KGDS

Single Lip type



Designation description	
○.○○	Diameter
□□□□	Length
D□□	Driver code no.

(mm)

Designation	ØD	a
KGDS ○.○○-□□□□ / D□□	2.00~2.49	18
○.○○-□□□□ / D□□	2.50~2.99	18
○.○○-□□□□ / D□□	3.00~3.49	19
○.○○-□□□□ / D□□	3.50~3.99	19
○.○○-□□□□ / D□□	4.00~4.49	23
○.○○-□□□□ / D□□	4.50~4.99	23
○.○○-□□□□ / D□□	5.00~5.49	24
○.○○-□□□□ / D□□	5.50~5.99	26
○.○○-□□□□ / D□□	6.00~6.49	27
○.○○-□□□□ / D□□	6.50~6.99	28
○.○○-□□□□ / D□□	7.00~7.49	29
○.○○-□□□□ / D□□	7.50~7.99	30
○.○○-□□□□ / D□□	8.00~8.49	31
○.○○-□□□□ / D□□	8.50~8.99	31
○.○○-□□□□ / D□□	9.00~8.49	31
○.○○-□□□□ / D□□	9.50~9.99	31
○.○○-□□□□ / D□□	10.00~10.49	31
○.○○-□□□□ / D□□	10.50~10.99	32
○.○○-□□□□ / D□□	11.00~11.49	35
○.○○-□□□□ / D□□	11.50~11.99	35
○.○○-□□□□ / D□□	12.00~12.49	38
○.○○-□□□□ / D□□	12.50~12.99	38
○.○○-□□□□ / D□□	13.00~13.99	38
○.○○-□□□□ / D□□	14.00~14.99	38
○.○○-□□□□ / D□□	15.00~15.99	39
○.○○-□□□□ / D□□	16.00~16.99	39
○.○○-□□□□ / D□□	17.00~17.99	40
○.○○-□□□□ / D□□	18.00~18.99	41
○.○○-□□□□ / D□□	19.00~19.99	41
○.○○-□□□□ / D□□	20.00~20.99	44
○.○○-□□□□ / D□□	21.00~21.99	46
○.○○-□□□□ / D□□	22.00~22.99	49
○.○○-□□□□ / D□□	23.00~23.99	51
○.○○-□□□□ / D□□	24.00~24.99	52
○.○○-□□□□ / D□□	25.00~25.99	54
○.○○-□□□□ / D□□	26.00~26.99	54
○.○○-□□□□ / D□□	27.00~27.99	54
○.○○-□□□□ / D□□	28.00~28.99	54
○.○○-□□□□ / D□□	29.00~29.99	56
○.○○-□□□□ / D□□	30.00~30.99	59
○.○○-□□□□ / D□□	31.00~31.99	61
○.○○-□□□□ / D□□	32.00~32.99	61

※ When ordering, please mark the overall length and driver number (or drawing)

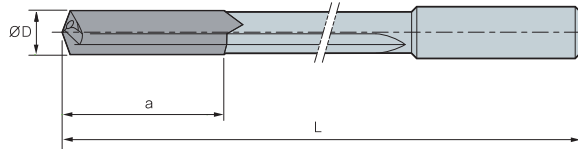
Available overall length

Designation	Drill Dia.	Overall length				
		250 mm	500 mm	1000 mm	1500 mm	2000 mm
KGDS	2.00~2.99	○	○			
	3.00~3.49	○	○	○		
	3.50~32.99	○	○	○	○	○



Gun Drill-KGDT

Twin Lip type



Designation description	
○.○○	Diameter
□□□□	Length
D□□	Driver code no.



Designation	ØD	a
○.○○-□□□□ / D□□	8.00~8.49	38
○.○○-□□□□ / D□□	8.50~8.99	38
○.○○-□□□□ / D□□	9.00~8.49	40
○.○○-□□□□ / D□□	9.50~9.99	40
○.○○-□□□□ / D□□	10.00~10.49	40
○.○○-□□□□ / D□□	10.50~10.99	40
○.○○-□□□□ / D□□	11.00~11.49	45
○.○○-□□□□ / D□□	11.50~11.99	45
○.○○-□□□□ / D□□	12.00~12.49	45
○.○○-□□□□ / D□□	12.50~12.99	48
○.○○-□□□□ / D□□	13.00~13.99	48
○.○○-□□□□ / D□□	14.00~14.99	48
○.○○-□□□□ / D□□	15.00~15.99	48
○.○○-□□□□ / D□□	16.00~16.99	50
○.○○-□□□□ / D□□	17.00~17.99	50
○.○○-□□□□ / D□□	18.00~18.99	50
○.○○-□□□□ / D□□	19.00~19.99	50
○.○○-□□□□ / D□□	20.00~20.99	55
○.○○-□□□□ / D□□	21.00~21.99	55
○.○○-□□□□ / D□□	22.00~22.99	55
○.○○-□□□□ / D□□	23.00~23.99	60

※ When ordering, please mark the overall length and driver number (or drawing)

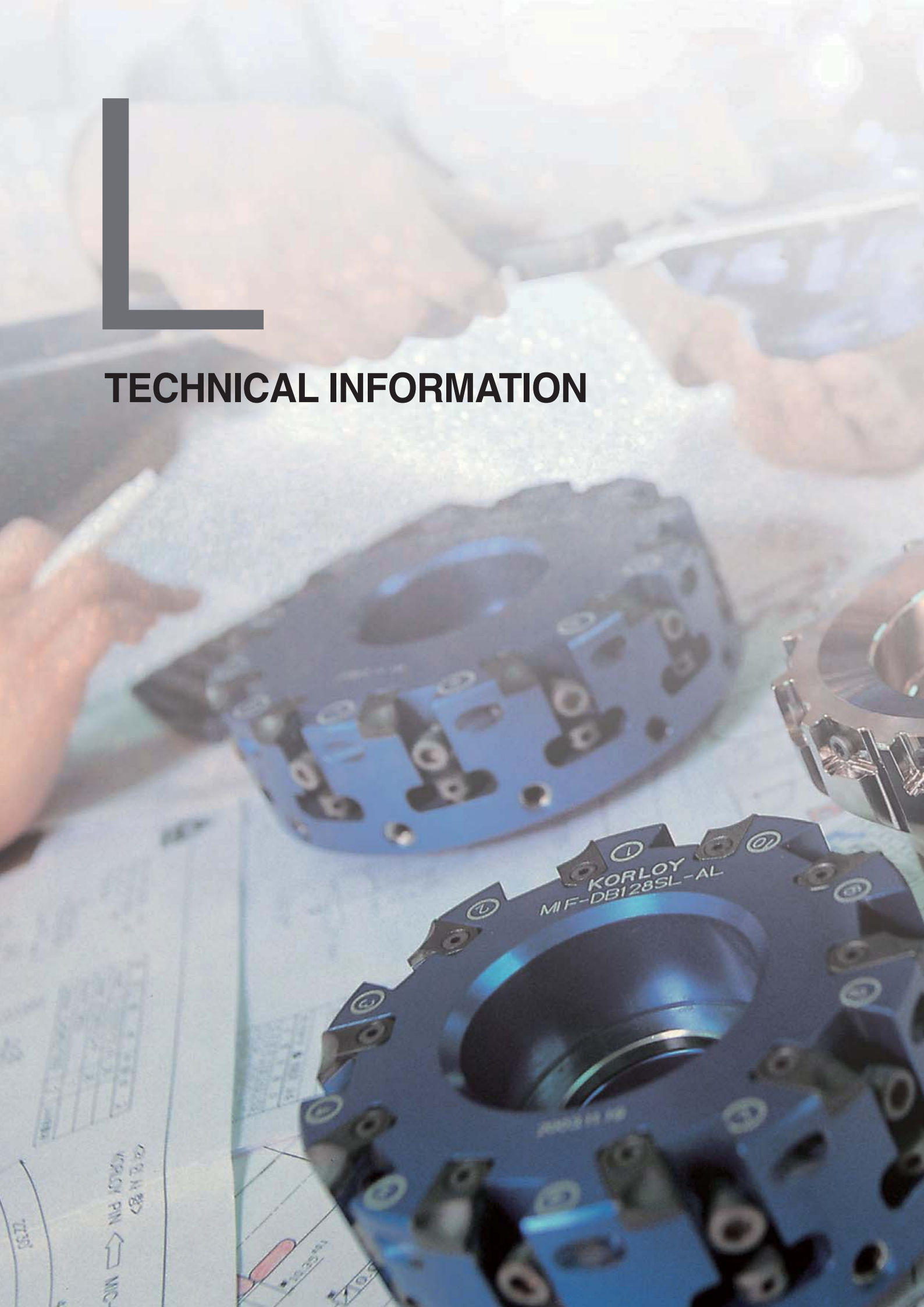
Available overall length

Designation	Drill Dia.	Overall length				
		250 mm	500 mm	1000 mm	1500 mm	2000 mm
KGDT	8.00~24.00	○	○	○		

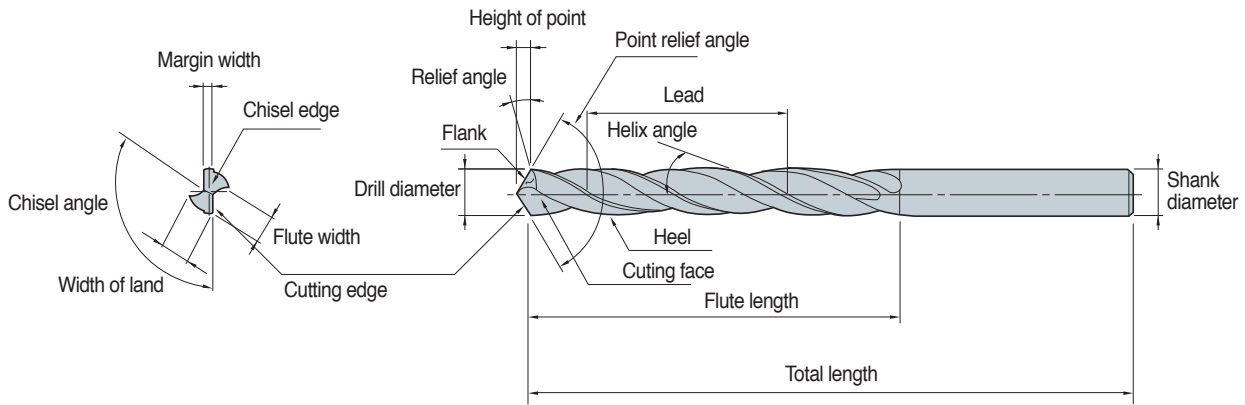


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TECHNICAL INFORMATION



➤ The shape of drills and the names



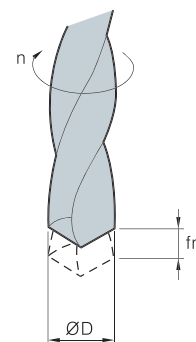
➤ Shape and the feature of cutting

Helix angle	<p>Plays rake angle of cutting edge's role. If helix angle increases Cutting force decreases. On the other hand If helix angle is too big Drill rigidity decreases</p> <p>Poor machinability ◀ low - Helix angle - high ▶ Hard workpiece (hardened steel) ▶ soft material (aluminum etc)</p>												
Length of flute	<p>The path of both chip evacuation and cooling lubricant</p> <p>Too big length of flute weakens drill rigidity and too small length of flute worsens chip evacuation to breakage</p>												
Point angle	<p>Point angle has big influence on cutting performance. It mainly depends on workpiece. In case of standard drills Point angle is generally 118</p> <p>thrust resistance decrease ◀ low - Point angle - high ▶ thrust resistance increase Torque increase, Burr on exit increase ▶ Torque decrease, Burr on exit decrease Soft material (aluminum etc) ▶ Hard workpiece (hardened steel)</p>												
Margin	<p>While machining Margin is the part of contact between workpiece and drill's external. It prevents bending and plays guide's role It depends on drill size</p> <p>Cutting force decrease ◀ small - Margin - big ▶ Cutting force increase Poor guide ▶ Good guide</p>												
Web thickness	<p>Web is the part of center of drill and drill's rigidity depends on the web. Drill needs cutting edge, chisel edge, at the tip of drill because drill makes a hole at the beginning of drilling . When web thickness is big Thinning is needed to reduce cutting force</p> <p>Cutting force decrease ◀ small - Web thickness - big ▶ Cutting force increase Rigidity decrease ▶ Rigidity increase Good chip evacuation ▶ Bad chip evacuation Soft material (aluminum etc) ▶ Hard workpiece (hardened steel)</p>												
Back taper	<p>Drill diameter size is getting smaller from point to shank in order to avoid the friction between drill periphery and workpiece. The decrease of diameter divided by flute length 100mm generally becomes 0.04~0.1mm. As for high performance drills and drills for hole shrinkage workpiece during operation have big back taper</p>												
Thinning	<p>In general drills Thrust effects on chisel over 50%. Chisel edge length depends on web thickness and chisel angle. But if web is thin Drill rigidity weaken. Therefore without web thickness change Thinning makes chisel edge short or gives rake angle. In other words, Thinning makes rake angle at chisel and improves chip evacuation and decrease thrust</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Types of</th> <th style="width: 20%;">Edge shape</th> <th style="width: 30%;">Feature</th> <th style="width: 30%;">Korloy's drills</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">X type</td> <td style="text-align: center;"></td> <td>Good centering High central thickness Crank shaft</td> <td>Mach solid drill (MSD) Vulcan drill (VZD)</td> </tr> <tr> <td style="text-align: center;">S type</td> <td style="text-align: center;"></td> <td>For wide use For general Easy regrinding</td> <td>Solid drill (SSD)</td> </tr> </tbody> </table>	Types of	Edge shape	Feature	Korloy's drills	X type		Good centering High central thickness Crank shaft	Mach solid drill (MSD) Vulcan drill (VZD)	S type		For wide use For general Easy regrinding	Solid drill (SSD)
Types of	Edge shape	Feature	Korloy's drills										
X type		Good centering High central thickness Crank shaft	Mach solid drill (MSD) Vulcan drill (VZD)										
S type		For wide use For general Easy regrinding	Solid drill (SSD)										



Major cutting formulas

Cutting speed	Feed	Helix angle	Machining time
$vc = \frac{\pi \cdot D \cdot n}{1000} \text{ (m/min)}$ <ul style="list-style-type: none"> vc: Cutting speed (m/min) D: Drill diameter (mm) n: Revolution per minute (min⁻¹) π: Circular constant (3.14) 	$fn = \frac{vf}{n} \text{ (mm/rev)}$ <ul style="list-style-type: none"> fn: Feed per revolution (mm/rev) vf: Feed per minute (mm/min) n: Revolution per minute (min⁻¹) 	$\delta = \tan^{-1} \left(\frac{\pi D}{L} \right)$ <ul style="list-style-type: none"> δ: Helix angle D: Drill diameter (mm) L: Lead (mm) π: Circular constant (3.14) 	$tc = \frac{ld}{n \cdot fn} \text{ (min)}$ <ul style="list-style-type: none"> tc: Machining time (min) n: Revolution per minute (min⁻¹) ld: Drilling time (mm) fn: Feed (mm/rev)



Cutting torque and thrust (calculation formulas)		
$Md = KD^2 \times (0.0631 + 1.686 \times fn) \text{ (kg·cm)}$ $T = 57.95KDfn^{0.88} \text{ (kg)}$	<ul style="list-style-type: none"> Md: Cutting torque (kg·cm) T: Cutting thrust (kg) D: Drill diameter (mm) 	<ul style="list-style-type: none"> fn: Feed per revolution (mm/rev) K: Material coefficient

Workpiece material (SAE/AISI)		Tensile strength (kgf)	Hardness (HB)	Material coefficient K
Cast iron	Cast iron (Gray)	21	177	1.00
	Cast iron	28	198	1.39
	Cast iron (Ductile)	35	224	1.88
General steel	1020(carbon steel C 0.2%)	55	160	2.22
	1112(C 0.12, S 0.2%)	62	183	1.42
	1335(Mn 1.75%)	63	197	1.45
Nickel Chrome steel	3115 (Ni 1.25, Cr 0.6, Mn 0.5)	53	163	1.56
	3120 (Ni 1.25, Cr 0.6, Mn 0.7)	69	174	2.02
	3140	88	241	2.32
Chrome molybdenum steel	4115 (Cr 0.5, Mo 0.11, Mn 0.8)	63	167	1.62
	4130 (Cr 0.95, Mo 0.2, Mn 0.5)	77	229	2.10
	4140 (Cr 0.95, Mo 0.2, Mn 0.85)	94	269	2.41
Nickel molybdenum steel	4615 (Ni 1.8, Mo 0.25, Mn 0.5)	75	212	2.12
	4820 (Ni 3.5, Mo 0.25, Mn 0.6)	140	390	3.44
Chrome steel	5150 (Cr 0.8, Mn 0.8)	95	277	2.46
Chrome vanadium steel	6115 (Cr 0.6, Mn 0.6, V 0.12)	58	174	2.08
	6120 (Cr 0.8, Mn 0.8, V 0.1)	80	255	2.22

Cutting torque and thrust (empirical formula)			
$Md = K_1 d^2 \cdot fn^m$ $T = K_2 d \cdot fn^n$	<ul style="list-style-type: none"> Md: Cutting torque (kg·cm) T: Thrust (kg) 	<ul style="list-style-type: none"> fn: Feed (mm/rev) K₁, K₂, m, n: Experimental Data Characteristic value 	<ul style="list-style-type: none"> d: Drill diameter (mm)

Workpiece	K ₁	m	K ₂	n
Soft steel	5.9	1.00	125.0	0.88
Rolled steel	3.5	1.00	55.0	0.88
7-3 brass	2.5	0.94	44.4	0.87
Aluminum	1.5	0.90	33.3	0.78
Zinc	1.4	0.88	27.0	0.74
Gun metal	2.0	0.94	21.6	0.75
Galvanized iron	0.3	0.57	6.4	0.55



Tool failures and solutions

Trouble	Causes	Solutions																
		Cutting condition					Tool shape					Grade		etc				
		Cutting speed	Feed	Step feed	Initial feed	Coolant	Relief angle	Point angle	Thinning angle	Honing	Flute width rate	Thinning	Toughness	Hardness	Machine rigidity	Machine vibration	Guide bush	Clamping workpiece
Chipping	• Too sharp cutting edge (too big relief angle) (thinning edge is too sharp)						↓		↓	↑			↑					
	• Excessive cutting speed	↓				●												
	• Built-up edge					●	↓		↓	↑			↑					
	• Vibration and chattering	↓												↑	↓		●	
Wear	• Excessive cutting speed (Abnormal wear at margin)	↓				●												
	• Insufficient cutting speed (Abnormal wear at center)	↑				●												
Chip	• Long chip	↑	↑			●				↓								
	• Over lap	↑	↑															
	• Chip burning	↑				●												
Hole precision burr, poor surface finish	• Tool clamping precision				↓			↓		↓				↑	↓		●	
	• Excessive feed, sharp point angle		↓						↑	↓								
	• Excessive cutting speed (Considered tool grade)	↑				●	↓	⊙					↑					
Fracture	Breakage on contact	• Poor surface finish			●	↓											●	
		• Insufficient machine rigidity												↑				●
		• Improper cutting condition	↑	↓														
	Breakage at hole bottom	• Crooked hole	↑							↑			●			↓	●	
		• Chip clogging		↓	●								↑					

↑: Increase ↓: Decrease ●: use ⊙: Correct use



 Hole size for threading

● Metric coarse screw threads

Specification	Hole diameter
M1 X 0.25	0.75
M1.1 X 0.25	0.85
M1.2 X 0.25	0.95
M1.4 X 0.3	1.1
M1.6 X 0.35	1.25
M1.7 X 0.35	1.35
M1.8 X 0.35	1.45
M2 X 0.4	1.6
M2.2 X 0.45	1.75
M2.3 X 0.4	1.9
M2.5 X 0.45	2.1
M2.6 X 0.45	2.2
M3 X 0.6	2.4
M3 X 0.5	2.5
M3.5 X 0.6	2.9
M4 X 0.75	3.25
M4 X 0.7	3.3
M4.5 X 0.75	3.8
M5 X 0.9	4.1
M5 X 0.8	4.2
M5.5 X 0.9	4.6
M6 X 1	5
M7 X 1	6
M8 X 1.25	6.8
M9 X 1.25	7.8
M10 X 1.5	8.5
M11 X 1.5	9.5
M12 X 1.75	10.3
M14 X 2	12
M16 X 2	14
M18 X 2.5	15.5
M20 X 2.5	17.5
M22 X 2.5	19.5
M24 X 3	21
M27 X 3	24
M30 X 3.5	26.5
M33 X 3.5	29.5
M36 X 4	32
M39 X 4	35
M42 X 4.5	37.5
M45 X 4.5	40.5
M48 X 5	43

● Metric coarse screw threads

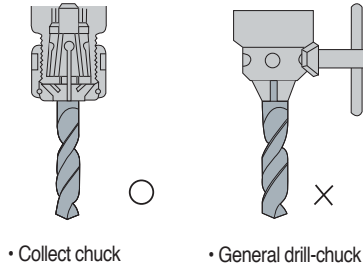
Specification	Hole diameter
M2.5 X 0.35	2.2
M3 X 0.35	2.7
M3.5 X 0.35	3.2
M4 X 0.5	3.5
M4.5 X 0.5	4
M5 X 0.5	4.5
M5.5 X 0.5	5
M6 X 0.75	5.3
M7 X 0.75	6.3
M8 X 1	7
M8 X 0.75	7.3
M9 X 1	8
M9 X 0.75	8.3
M10 X 1.25	8.8
M10 X 1	9
M10 X 0.75	9.3
M11 X 1	10
M11 X 0.75	10.3
M12 X 1.5	10.5
M12 X 1.25	10.8
M12 X 1	11
M14 X 1.5	12.5
M14 X 1	13
M15 X 1.5	13.5
M15 X 1	14
M16 X 1.5	14.5
M16 X 1	15
M17 X 1.5	15.5
M17 X 1	16
M18 X 2	16
M18 X 1.5	16.5
M18 X 1	17
M20 X 2	18
M20 X 1.5	18.5
M20 X 1	19
M22 X 2	20
M22 X 1.5	20.5
M22 X 1	21
M24 X 2	22
M24 X 1.5	22.5
M24 X 1	23
M25 X 2	23
M25 X 1.5	23.5
M25 X 1	24
M26 X 1.5	24.5
M27 X 2	25



⚠ Cautions

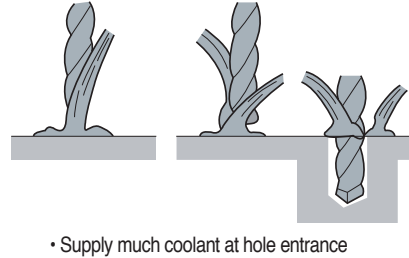
● Selection of drill chuck

- Collect chuck is favorable Because it has strong grip power (General drill-chuck and Keyless chuck don't have enough grip power.)



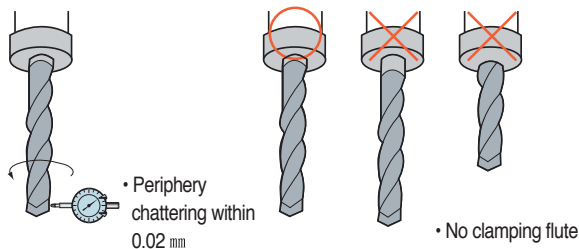
● Coolant supply

- Supply enough coolant around hole entrance
- Standard cutting oil pressure: 3~5 kg/cm², Flux: 2~5 l/min



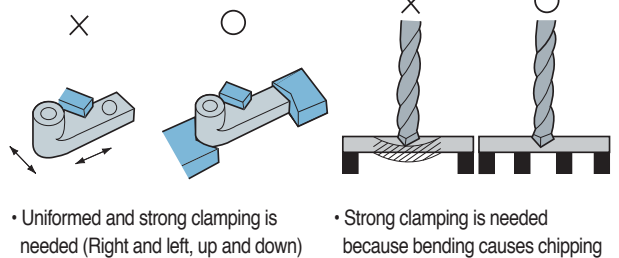
● Mounting drill

- When mounting drill Periphery chattering should be within 0.02 mm
- Flute should not be clamped



● How to clamp workpiece

- At high performance drilling High thrust, torque and horizontal cutting force work at the same time so that workpiece should be clamped strongly to prevent chattering

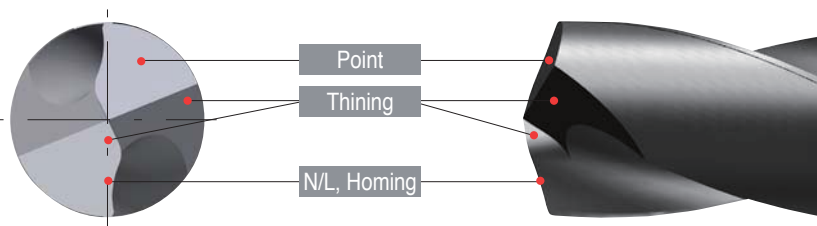


⚠ Notice

- 1) For better drill's life, small damage and wear are favorable to be regrinding
- 2) Damage and wear size should be within 1.5 mm for regrinding
- 3) If drill has crack, regrinding is impossible
- 4) Ordering for regrinding is acceptable or purchase regrinding machine

⚠ Regrinding procedures

● Regrinding method (Mach Drill)



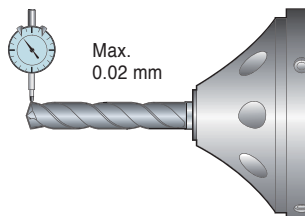
1) Preparation Determination of regrinding areas

- Check the cutting edge for damage and wear If large fracture is found, remove it by rough grinding



2) Grinding operation Drills setting

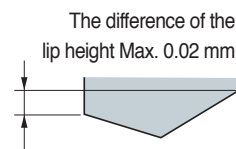
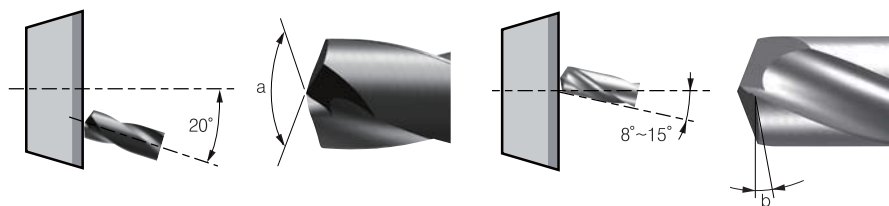
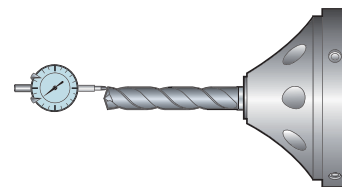
- Drill is clamped to collet chuck Chattering is kept within 0.02 mm



3) Grinding operation-Grinding point

- Check damage and wear at the point and remove it completely
- The difference of the lip height is kept within 0.02 mm

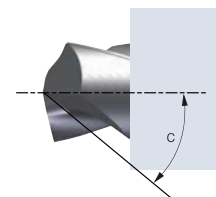
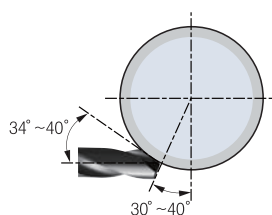
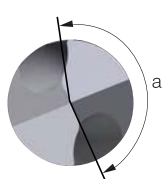
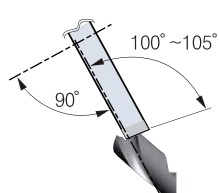
Point angle (a): 140°
Point relief angle (b): 8°~15°



4) Grinding operation-Thinning grinding

- Considering N/L width Cutting edge length from the center of drill axis should be 0.03~0.08mm for balancing
- Set the wheel to tilt drill axis by 34°~40°.

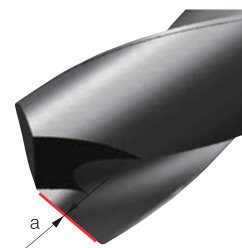
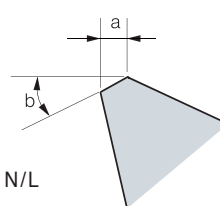
Thinning angle (a): 155°~160° Thinning open angle (b): 100°~105°
Thinning relief angle (c): 34°~40°



5) Grinding-N/L grinding and honing

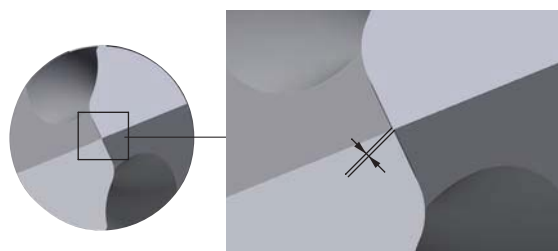
- Using diamond chisel Grinds the width flat along point cutting edge
- After negaland operation Finishes with brush or handstone

N/L width (a): 0.05mm~0.16mm/N/L angle (b): 24°~26°



● TIP

- Making point
 - Without center drill, the point width should be below 0.10 mm
- Recommended grinding condition
 - Diamond wheel: 240~400 mesh
 - Diamond chisel: 400~600 mesh
 - Diamond hand stone: 800~1500 mesh



➤ Hexagonal socket bolt (clamping screw) size

● Counter boring and size of bolt hole for hexagonal socket bolt

ISO (d)	M3	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30
Ød _i	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
Ød'	3.4	4.5	5.5	6.5	8.5	11	14	16	18	20	22	24	26	30	33
ØD	5.5	7	8.5	10	13	16	18	21	24	27	30	33	36	40	45
ØD'	5	8	9.5	11	14	17.5	20	23	26	29	32	35	39	43	48
H	3	4	5	6	8	10	12	14	16	18	20	22	24	27	30
H'	2.7	3.6	4.6	5.5	7.4	9.2	11.0	12.8	14.5	16.5	18.5	20.5	22.5	25	28
H''	3.3	4.4	5.4	6.5	8.6	10.8	13.0	15.2	17.5	19.5	21.5	23.5	25.5	29	32

