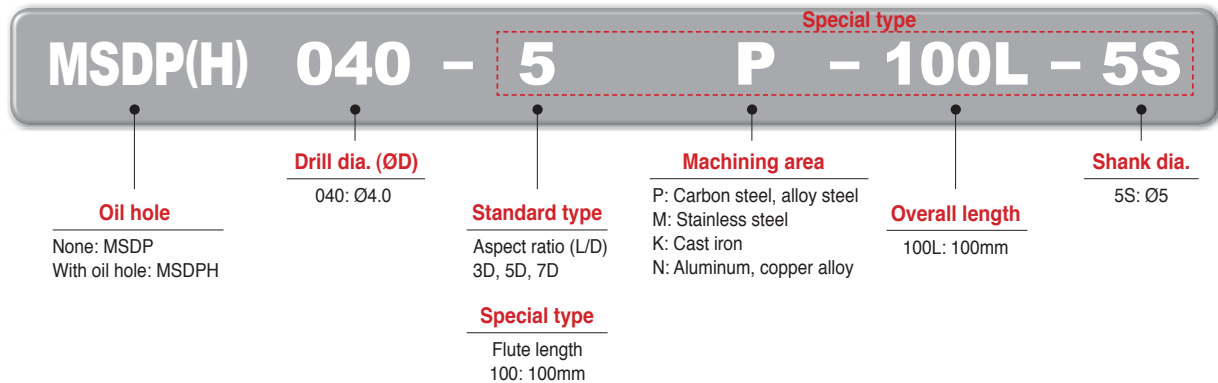


Highly efficient hole making for various workpieces including automobile components

MSD Plus ^{new}

Mach Solid Drill Plus

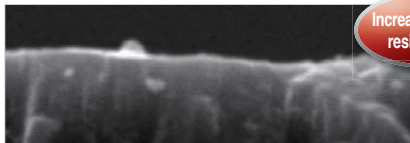
Code system



Features

New grade (PC325U)

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



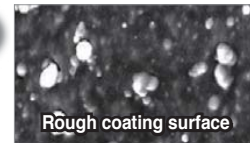
PC325U

Surface of coating layer

- Increased 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) = 90, fn (mm/rev) = 0.2
ap (mm) = 30, wet
- Tools** MSDPH060-5P (PC325U)



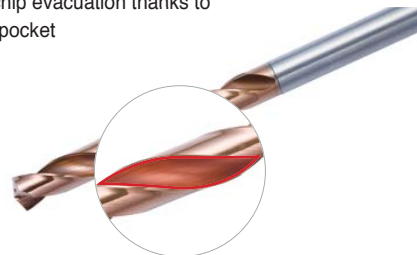
MSD Plus



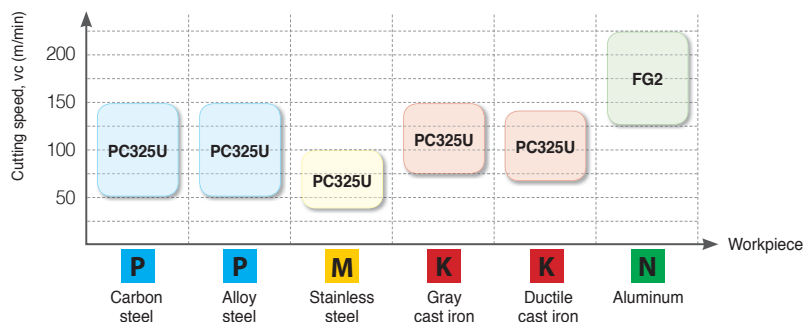
Competitor

Flute shape

- Improved chip evacuation thanks to wider chip pocket



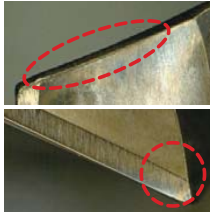
Application area



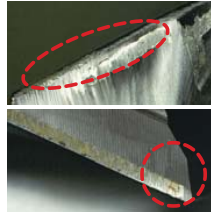
G Technical Information for Mach Solid Drill Plus

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)

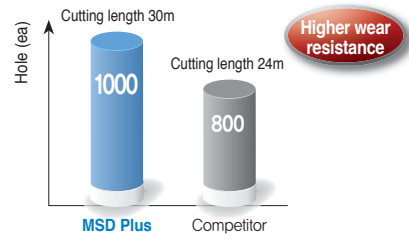


MSD Plus



Competitor

Test result

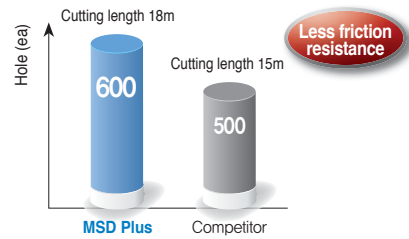


Lubricative coating layer of the new grade PC325U maximizes wear resistance.

- **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.

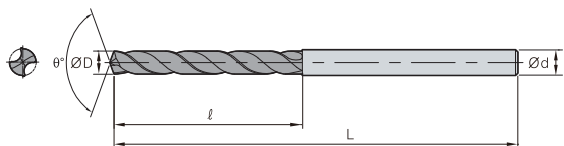
Recommended cutting conditions

Workpiece			Grade	vc (m/min)	Depth of cut = 10D~25D 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)



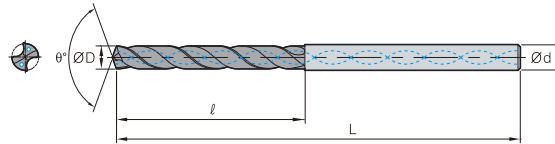
Terminology	P	M	K	N
Grade	PC325U			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°		135°	
Twist angle	30°			
Thinning	X type			
Coolant	External			

 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			

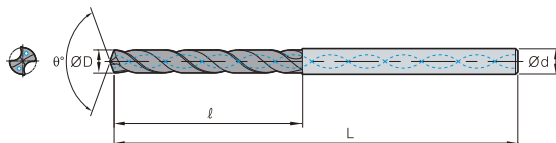
Steel Stainless steel Cast iron Non-ferrous metal

(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			

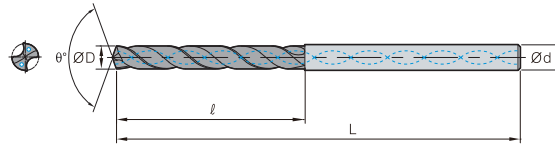
Steel Stainless steel Cast iron Non-ferrous metal

(mm)

Designation		ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
				ℓ	L	ℓ	L	ℓ	L
MSDP(H)	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			

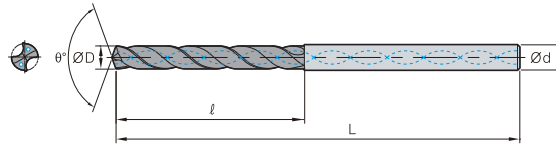
Steel Stainless steel Cast iron Non-ferrous metal

(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 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 CFRP

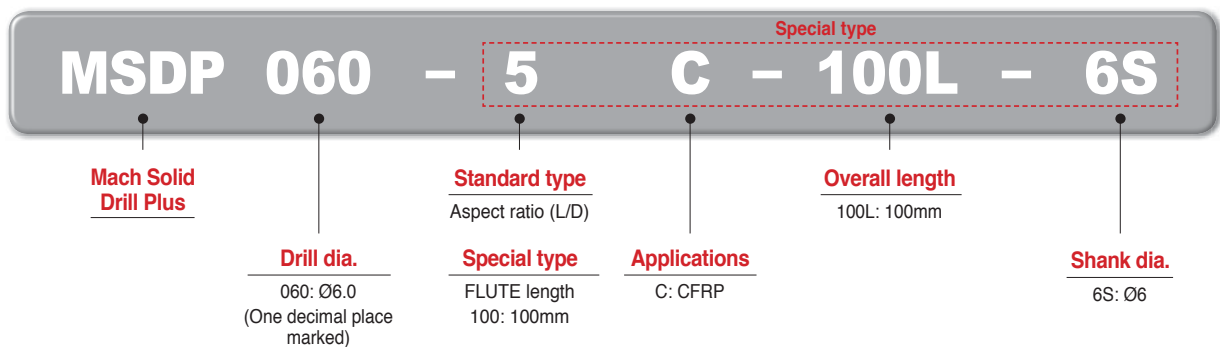
Optimized tool for hole making of CFRP

MSD Plus CFRP ^{new}

Mach Solid Drill Plus for Machining CFRP

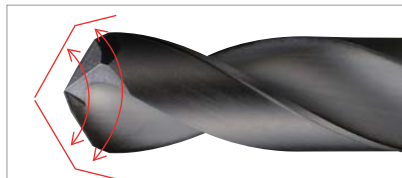
- Excellent wear resistance thanks due to the new diamond-coated grade, ND2100
- Reduced burrs when machining CFRP thanks to high rake cutting edges

Code system



Features

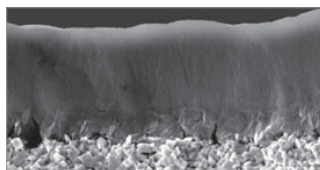
- Reduced thrust around corners thanks to the 2-step point angle
- Reduced burrs when drilling CFRP thanks to high rake cutting edges



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

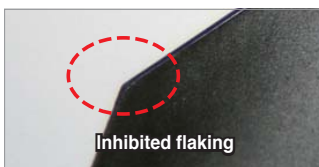


High hardness diamond coating maintains well-cut shapes



Diamond coating's strong grip to the substrate

- Inhibited burr creation by keeping cutting edges in good shape



Less wear and flaking on the rake surface



Fewer burrs on workpieces



Performance evaluation

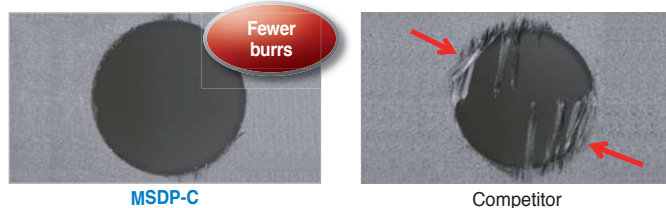
- **Workpiece** CFRP
- **Cutting conditions** vc (m/min) = 100, fn (mm/rev) = 0.05, ap (mm) = 10, Air
- **Cutting length** 7.2m (720 holes)
- **Tools** MSDP060-5C (ND2100)

Improved performance quality



- **Workpiece** CFRP
- **Cutting conditions** vc (m/min) = 100, fn (mm/rev) = 0.05, ap (mm) = 10, Air
- **Cutting length** 7.2m (720 holes)
- **Tools** MSDP060-5C (ND2100)

Machinability in high quality hole making

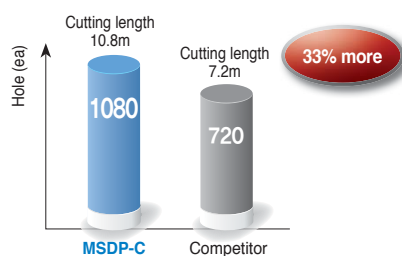


Application examples

- **Use** Wing Tail
- **Workpiece** CFRP
- **Cutting conditions** vc (m/min) = 100, fn (mm/rev) = 0.05, ap (mm) = 10, Air
- **Tools** MSDP060-5C (ND2100)



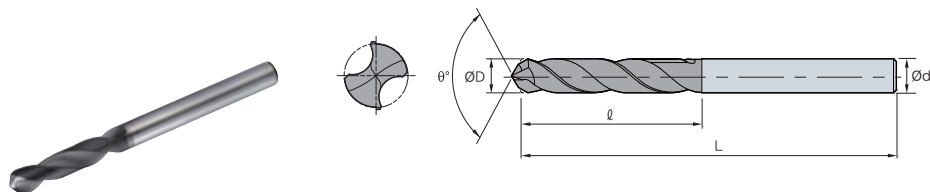
Test result



Recommended cutting conditions

Workpiece	Grade	vc (m/min)	Depth of cut = 5D Feed rate (mm/rev) per drill dia. (mm)		
			Ø2.5~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0
CFRP	ND2100	100 (100~150)	0.03~0.07	0.03~0.07	0.03~0.07

MSDP-5C



Specification	C
Grade	ND2100
Tolerance (drill Dia.)	m7
Tolerance (shank Dia.)	h6
Point angle	118°
Twist angle	30°
Thinning	X type
Coolant	External

CFRP

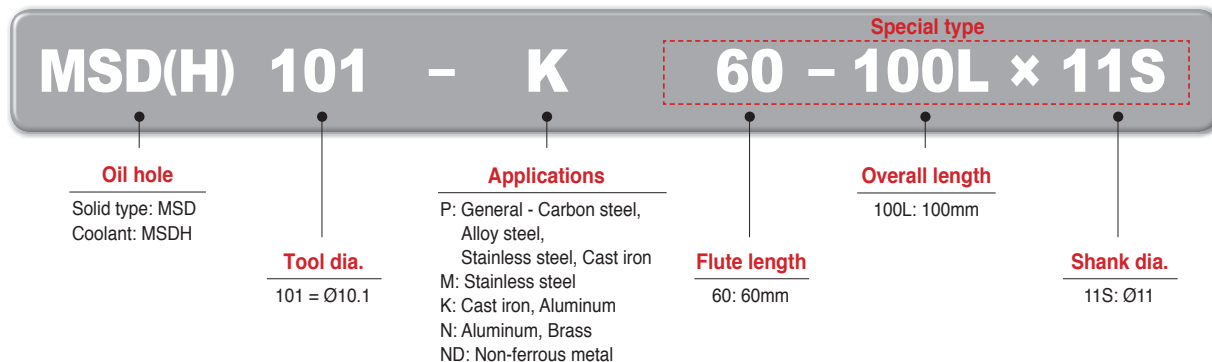
(mm)					
Designation		ØD	Ød	5C	
				ℓ	L
MSDP	030-5C	3	6	28	66
	040-5C	4	6	36	74
	0476-5C	4.76	6	44	82
	050-5C	5	6	44	82
	060-5C	6	6	44	82
	0635-5C	6.35	8	53	91
	070-5C	7	8	53	91
	0794-5C	7.94	8	53	91
	080-5C	8	8	53	91
	090-5C	9	10	61	103
	0952-5C	9.52	10	61	103
	100-5C	10	10	61	103
	110-5C	11	12	71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



Various designations of MSD & MSDH enable to do any drilling

Mach Solid Drill

Code system



Features

- **Optimally designed chip pocket**
 - Wide and deep chip pocket improve chip control to minimizing friction during an operation
- **A curvilinear edge**
 - A curvilinear edge offers excellent wear resistance and shock resistance by dispersing the cutting load
- **3D, 5D, 7D Standardization**
 - For example) diameter Ø10mm and depth 30mm and outer coolant system, Take MSD100-3P!
- **MSD: Solid type & MSDH: Through oil-hole type**
 - Various designations of MSD & MSDH enable to do any drilling
- **Low cutting resistance edge**
 - The MSD & MSDH low cutting resistance edge guarantees a better surface roughness and chip control while allowing the drill to center itself
- **Rigid neck of drill**
 - The new design of this drill has an increased rigidity at neck. This prevents breakage of neck on the drill

Line-up as per workpiece

- P: Steel (Carbon steel, Alloy steel)
General - Carbon steel, Alloy steel, Stainless steel, Cast iron Low cutting resistance edge, Ultra micro grain substrate, K-Black coating
- K: Cast iron, Die casting, Ductile cast iron
Coolant system: Through/Outer (MQL)
- M: Stainless steel, Reduced built-up edge and cutting resistance
Coolant system: Through/Outer (MQL)
- N: Aluminum (Carbide drills), Medium & Low speed cutting performance
Coolant system: Through/Outer (MQL)
- ND: Non-ferrous metal, High speed, High efficiency performance
Improved welding resistance due to applied DLC coating
Coolant system: Through/Outer (MQL)



G Technical Information for Mach Solid Drill

Features

• Low cutting resistance edge

- Uniformity in cutting edge treatment: Reinforces repeatable quality in every machined part
- Protecting workpiece: Low cutting resistance edge operates well in medium to finishing machining, workpiece protection and good surface roughness
- Better chip breaking: Based on our cutting processes studies, our drills assure better chip breaking in high or low speeds

• Features of TiAlN Coating

- Decreasing of micro particle → Chipping free from macro particle
- Better hardness and toughness → Covering wide cutting speed and feed rate range
- Special coating layer at most-outer edge → Special TiAlN with better lubrication guarantees welding resistance
- Pre-treatment before coating process → Higher adhesion by pre-treatment

Specification line-up

Line-up as per aspect ratio (L: Overall length, D: Tool Dia.)



MSD□□□-7P



MSD□□□-5P



MSD□□□-3P

Line-up as per aspect ratio (Mach Drills: Ø2.5 mm~Ø20 mm)
Various choices as per aspect ratio (3D,5D,7D)
• For example) Solid, Ø10.2 mm, 50 mm
Piercing = $50 \div 10.2 \div 5 \rightarrow$ MSD102-5P

Line-up as per coolant type



MSD Type



MSDH Type

Wide choices for coolant type
• For example) Solid type: MSD,
Through coolant type: MSDH

Line-up as per workpiece

P	General - Carbon steel, Alloy steel, Stainless steel, Cast iron
M	Stainless steel
K	Cast iron, Aluminum
N	Aluminum, Brass
ND	Non-ferrous metal

Cutting condition formula

$$vc = \frac{\pi \times D \times n}{1000} \text{ (m/min)}, \quad fn = \frac{vf}{n} \text{ (mm/rev)} \left[n = \frac{vc \times 1000}{\pi \times D} \text{ (min}^{-1}\text{)}, \quad vf = fn \times n \text{ (mm/min)} \right]$$

n: Revolution per minute (min⁻¹)

vc: Cutting speed (m/min)

vf: Feed per minute (mm/min)

fn: Feed per revolution (mm/rev)

D: Drill Dia. (mm)

π: 3.1416



Recommended cutting condition

Mach Drill: Solid type [MSD ○○○-□P,M,K]

Tool dia.		Ø2.5~Ø5.0		Ø5.1~Ø8.0		Ø8.1~Ø10.0		Ø10.1~Ø12.0		Ø12.1~Ø14.0		Ø14.1~Ø20.0	
		vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)
Mild steel, Alloy steel, General steel (Under Hrc25)	SCM440	40~70 (55)	0.15 ~0.25	50~110 (65)	0.20 ~0.35	50~110 (70)	0.20 ~0.35	50~120 (75)	0.25 ~0.35	50~120 (75)	0.25 ~0.35	60~120 (80)	0.25 ~0.40
	SM45C	40~80 (60)	0.15 ~0.25	50~120 (70)	0.20 ~0.30	50~120 (75)	0.20 ~0.30	60~120 (80)	0.20 ~0.30	60~120 (80)	0.25 ~0.35	70~120 (90)	0.30 ~0.40
High alloy steel, High carbon steel (Over Hrc25)	STD11	15~35 (30)	0.08 ~0.15	20~40 (30)	0.10 ~0.20	20~50 (35)	0.10 ~0.20	20~60 (35)	0.15 ~0.25	20~60 (40)	0.15 ~0.25	30~65 (40)	0.15 ~0.25
Stainless steel	STS	15~30 (25)	0.05 ~0.10	15~45 (25)	0.10 ~0.20	15~50 (30)	0.10 ~0.20	20~60 (35)	0.10 ~0.20	20~65 (35)	0.10 ~0.20	20~70 (40)	0.10 ~0.20
Cast iron	GC	40~90 (70)	0.15 ~0.30	50~120 (80)	0.20 ~0.35	50~120 (80)	0.20 ~0.35	60~130 (90)	0.25 ~0.35	60~130 (95)	0.25 ~0.40	60~140 (95)	0.25 ~0.40
	GCD	40~80 (60)	0.10 ~0.25	50~110 (75)	0.20 ~0.35	50~110 (80)	0.20 ~0.35	50~130 (80)	0.25 ~0.35	50~130 (85)	0.25 ~0.35	60~130 (90)	0.25 ~0.40

Mach Drill: Through oil-hole type [MSDH ○○○-□P,M,K]

Tool dia.		vc (m/min)	Ø2.5~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0	Ø12.1~Ø16.0	Ø16.1~Ø20.0
			fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
Mild steel, Alloy steel, General steel (Under Hrc25)	SCM440	60~140	0.15~0.35	0.15~0.35	0.20~0.35	0.25~0.40	0.30~0.40
	SM45C	60~140	0.15~0.30	0.15~0.30	0.20~0.30	0.25~0.35	0.30~0.40
High alloy steel, High carbon steel (Over Hrc25)	STD11	40~80	0.08~0.20	0.08~0.20	0.10~0.25	0.15~0.25	0.15~0.30
Stainless steel	STS	25~80	0.05~0.20	0.05~0.20	0.10~0.25	0.10~0.25	0.15~0.30
Cast iron	GC	55~155	0.15~0.35	0.15~0.35	0.20~0.35	0.25~0.40	0.25~0.40
	GCD	55~145	0.10~0.35	0.10~0.35	0.20~0.35	0.25~0.35	0.25~0.40

- Note) 1. Decrease cutting speed 30%~40% contrast with recommended condition when machining forged steel
2. Decrease cutting condition considering the overhang of drill, machined rigidity, precision of spindle, clamping and surface of workpiece, etc
3. For longer tool life, Please apply to step feed at every 1.5D
4. Put the drill clamping between edge groove and shank boundary part in order to be located in the suitable position
5. Coolant pressure for through hole type = 3~5kg/cm², volume = 2~5l/min

Mach Drills: Through coolant type [MSD(H) ○○○-□N] cemented carbide

Tool dia.		Ø2.5~Ø4.0		Ø5.1~Ø10.0		Ø10.1~Ø16.0		Ø16.1~Ø20.0	
		vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)
Aluminum	Alloy steel (Al6061)	60~100	0.20~0.35	90~100	0.30~0.40	100~120	0.30~0.40	100~120	0.30~0.45
	Die-casting (AC,ADC)	60~100	0.20~0.35	90~100	0.30~0.40	100~120	0.30~0.40	100~120	0.30~0.45
Copper alloy (C1100)		60~80	0.08~0.15	60~100	0.10~0.20	80~100	0.10~0.25	80~100	0.10~0.25

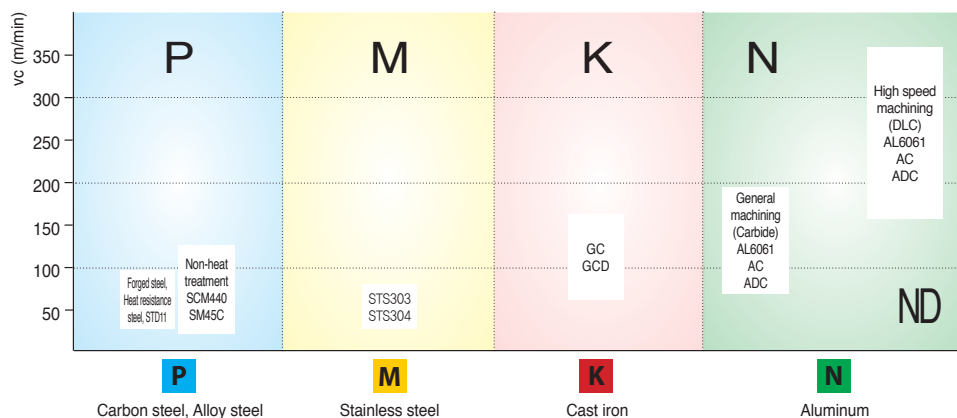
Mach Drills : Through coolant type [MSDH ○○○-□ND] DLC coated

Tool dia.		Ø2.5~Ø4.0		Ø5.1~Ø10.0		Ø10.1~Ø16.0		Ø16.1~Ø20.0	
		vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)
Aluminum	Alloy steel (Al6061)	80~160	0.08~0.30	80~180	0.12~0.35	80~180	0.15~0.40	80~200	0.15~0.45
	Die-casting (AC,ADC)	80~180	0.08~0.30	80~200	0.12~0.35	80~200	0.15~0.40	80~200	0.15~0.45
Copper alloy (C1100)		80~160	0.08~0.15	80~180	0.10~0.20	80~180	0.10~0.25	80~200	0.10~0.25

- Note) Recommended cutting speed is one of the important factors for the drill performance. In case of using further cutting speed or feed rate than recommended conditions to improve the productivity, please apply it after enough tests because it could be occurred some problems like early wear, built-up edge, chipping, fracture, etc

G Technical Information for Mach Solid Drill

Recommended cutting condition by series



Setting of drills

Outer tolerance	Setting condition	Coolant (External system)
Max. 0.02mm	Do not clamp the drill too deep	

To improve machining method

• Machining for strength of wheel



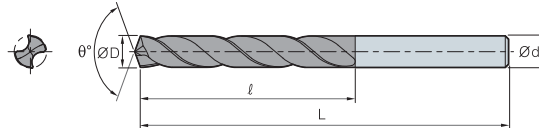
Using short flute length

• Improvement of drilling

Piercing stage	Circular surface	Inclined surface	Boring
Decrease feed 1/2	First, center drilling with large point angle	First, facing with endmills	No recommendation



MSD-□(P/M/K/N)



Terminology	P	M	K	N
Grade	PC205F			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

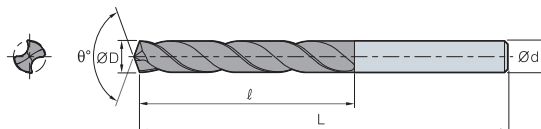
		(mm)							
Designation	ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N		
			ℓ	L	ℓ	L	ℓ	L	
MSD	025-□P,M,K,N	2.5	3.0	20	65	25	70	30	75
	026-□P,M,K,N	2.6	3.0	20	65	25	70	30	75
	027-□P,M,K,N	2.7	3.0	20	65	25	70	30	75
	028-□P,M,K,N	2.8	3.0	20	65	25	70	30	75
	029-□P,M,K,N	2.9	3.0	20	65	25	70	30	75
	030-□P,M,K,N	3.0	3.0	20	65	25	70	30	75
	031-□P,M,K,N	3.1	4.0	25	71	34	80	40	86
	032-□P,M,K,N	3.2	4.0	25	71	34	80	40	86
	033-□P,M,K,N	3.3	4.0	25	71	34	80	40	86
	034-□P,M,K,N	3.4	4.0	25	71	34	80	40	86
	035-□P,M,K,N	3.5	4.0	25	71	34	80	40	86
	036-□P,M,K,N	3.6	4.0	25	71	34	80	40	86
	037-□P,M,K,N	3.7	4.0	25	71	34	80	40	86
	038-□P,M,K,N	3.8	4.0	25	71	34	80	40	86
	039-□P,M,K,N	3.9	4.0	25	71	34	80	40	86
	040-□P,M,K,N	4.0	4.0	25	71	34	80	40	86
	041-□P,M,K,N	4.1	5.0	30	77	43	90	50	97
	042-□P,M,K,N	4.2	5.0	30	77	43	90	50	97
	043-□P,M,K,N	4.3	5.0	30	77	43	90	50	97
	044-□P,M,K,N	4.4	5.0	30	77	43	90	50	97
	045-□P,M,K,N	4.5	5.0	30	77	43	90	50	97
	046-□P,M,K,N	4.6	5.0	30	77	43	90	50	97
	047-□P,M,K,N	4.7	5.0	30	77	43	90	50	97
	048-□P,M,K,N	4.8	5.0	30	77	43	90	50	97
	049-□P,M,K,N	4.9	5.0	30	77	43	90	50	97
	050-□P,M,K,N	5.0	5.0	30	77	43	90	50	97
	051-□P,M,K,N	5.1	6.0	35	81	48	96	60	108
	052-□P,M,K,N	5.2	6.0	35	81	48	96	60	108
	053-□P,M,K,N	5.3	6.0	35	81	48	96	60	108
	054-□P,M,K,N	5.4	6.0	35	81	48	96	60	108
	055-□P,M,K,N	5.5	6.0	35	81	48	96	60	108
	056-□P,M,K,N	5.6	6.0	35	81	48	96	60	108
	057-□P,M,K,N	5.7	6.0	35	81	48	96	60	108
	058-□P,M,K,N	5.8	6.0	35	81	48	96	60	108
	059-□P,M,K,N	5.9	6.0	35	81	48	96	60	108
	060-□P,M,K,N	6.0	6.0	35	81	48	96	60	108
	061-□P,M,K,N	6.1	7.0	40	84	56	105	70	120
	062-□P,M,K,N	6.2	7.0	40	84	56	105	70	120
	063-□P,M,K,N	6.3	7.0	40	84	56	105	70	120
	064-□P,M,K,N	6.4	7.0	40	84	56	105	70	120
	065-□P,M,K,N	6.5	7.0	40	84	56	105	70	120
	066-□P,M,K,N	6.6	7.0	40	84	56	105	70	120
	067-□P,M,K,N	6.7	7.0	40	84	56	105	70	120
	068-□P,M,K,N	6.8	7.0	40	84	56	105	70	120

※ Order made items: MSD□□□-Material (P,M,K,N) × Flute length - Total length L×Shank diameter S

Ex.1)Workpiece: SM45C, Machined diameter: Ø10.1mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD101-P × 60 - 80L × 11S

Ex.2)Workpiece: STS303, Machined diameter: Ø10.12mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD1012 - M × 60 - 80L × 11S

MSD-□(P/M/K/N)



Terminology	P	M	K	N
Grade	PC205F			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°			135°
Twist angle	30°			
Thinning	X type			
Coolant	External			
P Steel M Stainless steel K Cast iron N Non-ferrous metal				

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
MSD								
069-□P,M,K,N	6.9	7.0	40	84	56	105	70	120
070-□P,M,K,N	7.0	7.0	40	84	56	105	70	120
071-□P,M,K,N	7.1	8.0	45	90	60	105	80	120
072-□P,M,K,N	7.2	8.0	45	90	60	110	80	130
073-□P,M,K,N	7.3	8.0	45	90	60	110	80	130
074-□P,M,K,N	7.4	8.0	45	90	60	110	80	130
075-□P,M,K,N	7.5	8.0	45	90	60	110	80	130
076-□P,M,K,N	7.6	8.0	45	90	60	110	80	130
077-□P,M,K,N	7.7	8.0	45	90	60	110	80	130
078-□P,M,K,N	7.8	8.0	45	90	60	110	80	130
079-□P,M,K,N	7.9	8.0	45	90	60	110	80	130
080-□P,M,K,N	8.0	8.0	45	90	60	110	80	130
081-□P,M,K,N	8.1	9.0	48	97	72	125	90	143
082-□P,M,K,N	8.2	9.0	48	97	72	125	90	143
083-□P,M,K,N	8.3	9.0	48	97	72	125	90	143
084-□P,M,K,N	8.4	9.0	48	97	72	125	90	143
085-□P,M,K,N	8.5	9.0	48	97	72	125	90	143
086-□P,M,K,N	8.6	9.0	48	97	72	125	90	143
087-□P,M,K,N	8.7	9.0	48	97	72	125	90	143
088-□P,M,K,N	8.8	9.0	48	97	72	125	90	143
089-□P,M,K,N	8.9	9.0	48	97	72	125	90	143
090-□P,M,K,N	9.0	9.0	48	97	72	125	90	143
091-□P,M,K,N	9.1	10.0	52	106	75	129	95	150
092-□P,M,K,N	9.2	10.0	52	106	75	129	95	150
093-□P,M,K,N	9.3	10.0	52	106	75	129	95	150
094-□P,M,K,N	9.4	10.0	52	106	75	129	95	150
095-□P,M,K,N	9.5	10.0	52	106	75	129	95	150
096-□P,M,K,N	9.6	10.0	52	106	75	129	95	150
097-□P,M,K,N	9.7	10.0	52	106	75	129	95	150
098-□P,M,K,N	9.8	10.0	52	106	75	129	95	150
099-□P,M,K,N	9.9	10.0	52	106	75	129	95	150
100-□P,M,K,N	10.0	10.0	52	106	75	129	95	150
101-□P,M,K,N	10.1	11.0	56	111	83	140	105	160
102-□P,M,K,N	10.2	11.0	56	111	83	140	105	160
103-□P,M,K,N	10.3	11.0	56	111	83	140	105	160
104-□P,M,K,N	10.4	11.0	56	111	83	140	105	160
105-□P,M,K,N	10.5	11.0	56	111	83	140	105	160
106-□P,M,K,N	10.6	11.0	56	111	83	140	105	160
107-□P,M,K,N	10.7	11.0	56	111	83	140	105	160
108-□P,M,K,N	10.8	11.0	56	111	83	140	105	160
109-□P,M,K,N	10.9	11.0	56	111	83	140	105	160
110-□P,M,K,N	11.0	11.0	56	111	83	140	105	160
111-□P,M,K,N	11.1	12.0	60	118	90	148	114	172
112-□P,M,K,N	11.2	12.0	60	118	90	148	114	172

※ Order made items: MSD□□□-Material (P,M,K,N) × Flute length - Total length L × Shank diameter S

Ex.1)Workpiece: SM45C, Machined diameter: Ø10.1mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD101-P × 60 - 80L × 11S

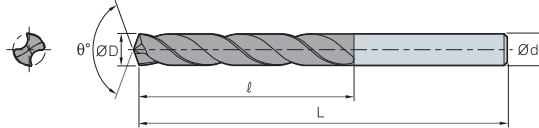
Ex.2)Workpiece: STS303, Machined diameter: Ø10.12mm, Flute length: Flute length:60mm, Total length: 80mm, Shank diameter: Ø11 → MSD1012 - M × 60 - 80L × 11S



G

Drills

MSD-□(P/M/K/N)



Terminology	P	M	K	N
Grade	PC205F			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		7P,M,K,N	
				ℓ	L	ℓ	L	ℓ	L
MSD	113-□P,M,K,N	11.3	12.0	60	118	90	148	114	172
	114-□P,M,K,N	11.4	12.0	60	118	90	148	114	172
	115-□P,M,K,N	11.5	12.0	60	118	90	148	114	172
	116-□P,M,K,N	11.6	12.0	60	118	90	148	114	172
	117-□P,M,K,N	11.7	12.0	60	118	90	148	114	172
	118-□P,M,K,N	11.8	12.0	60	118	90	148	114	172
	119-□P,M,K,N	11.9	12.0	60	118	90	148	114	172
	120-□P,M,K,N	12.0	12.0	60	118	90	148	114	172
	121-□P,M,K,N	12.1	13.0	65	125	98	158	124	184
	122-□P,M,K,N	12.2	13.0	65	125	98	158	124	184
	123-□P,M,K,N	12.3	13.0	65	125	98	158	124	184
	124-□P,M,K,N	12.4	13.0	65	125	98	158	124	184
	125-□P,M,K,N	12.5	13.0	65	125	98	158	124	184
	126-□P,M,K,N	12.6	13.0	65	125	98	158	124	184
	127-□P,M,K,N	12.7	13.0	65	125	98	158	124	184
	128-□P,M,K,N	12.8	13.0	65	125	98	158	124	184
	129-□P,M,K,N	12.9	13.0	65	125	98	158	124	184
	130-□P,M,K,N	13.0	13.0	65	125	98	158	124	184
	131-□P,M,K,N	13.1	14.0	70	132	105	167	133	195
	132-□P,M,K,N	13.2	14.0	70	132	105	167	133	195
	133-□P,M,K,N	13.3	14.0	70	132	105	167	133	195
	134-□P,M,K,N	13.4	14.0	70	132	105	167	133	195
	135-□P,M,K,N	13.5	14.0	70	132	105	167	133	195
	136-□P,M,K,N	13.6	14.0	70	132	105	167	133	195
	137-□P,M,K,N	13.7	14.0	70	132	105	167	133	195
	138-□P,M,K,N	13.8	14.0	70	132	105	167	133	195
	139-□P,M,K,N	13.9	14.0	70	132	105	167	133	195
	140-□P,M,K,N	14.0	14.0	70	132	105	167	133	195
	141-□P,M,K,N	14.1	15.0	75	139	108	172	138	202
	142-□P,M,K,N	14.2	15.0	75	139	108	172	138	202
	143-□P,M,K,N	14.3	15.0	75	139	108	172	138	202
	144-□P,M,K,N	14.4	15.0	75	139	108	172	138	202
	145-□P,M,K,N	14.5	15.0	75	139	108	172	138	202
	146-□P,M,K,N	14.6	15.0	75	139	108	172	138	202
	147-□P,M,K,N	14.7	15.0	75	139	108	172	138	202
	148-□P,M,K,N	14.8	15.0	75	139	108	172	138	202
	149-□P,M,K,N	14.9	15.0	75	139	108	172	138	202
	150-□P,M,K,N	15.0	15.0	75	139	108	172	138	202
	151-□P,M,K,N	15.1	16.0	80	146	112	178	144	210
	152-□P,M,K,N	15.2	16.0	80	146	112	178	144	210
	153-□P,M,K,N	15.3	16.0	80	146	112	178	144	210
	154-□P,M,K,N	15.4	16.0	80	146	112	178	144	210
	155-□P,M,K,N	15.5	16.0	80	146	112	178	144	210
	156-□P,M,K,N	15.6	16.0	80	146	112	178	144	210

※ Order made items: MSD□□□-Material (P,M,K,N) × Flute length - Total length L × Shank diameter S

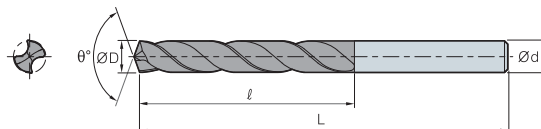
Ex.1) Workpiece: SM45C, Machined diameter: Ø10.1mm, Flute length: 60mm, Total length : 80mm, Shank diameter: Ø11 → MSD101-P × 60 - 80L × 11S

Ex.2) Workpiece: STS303, Machined diameter: Ø10.12mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD1012 - M × 60 - 80L × 11S

Drills

G

MSD-□(P/M/K/N)



Terminology	P	M	K	N
Grade	PC205F			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°		135°	
Twist angle	30°			
Thinning	X type			
Coolant	External			
P Steel M Stainless steel K Cast iron N Non-ferrous metal				

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
MSD	157-□P,M,K,N	15.7	16.0	80	146	112	178	144	210
	158-□P,M,K,N	15.8	16.0	80	146	112	178	144	210
	159-□P,M,K,N	15.9	16.0	80	146	112	178	144	210
	160-□P,M,K,N	16.0	16.0	80	146	112	178	144	210
	161-□P,M,K,N	16.1	17.0	85	151	120	186	153	220
	162-□P,M,K,N	16.2	17.0	85	151	120	186	153	220
	163-□P,M,K,N	16.3	17.0	85	151	120	186	153	220
	164-□P,M,K,N	16.4	17.0	85	151	120	186	153	220
	165-□P,M,K,N	16.5	17.0	85	151	120	186	153	220
	166-□P,M,K,N	16.6	17.0	85	151	120	186	153	220
	167-□P,M,K,N	16.7	17.0	85	151	120	186	153	220
	168-□P,M,K,N	16.8	17.0	85	151	120	186	153	220
	169-□P,M,K,N	16.9	17.0	85	151	120	186	153	220
	170-□P,M,K,N	17.0	17.0	85	151	120	186	153	220
	171-□P,M,K,N	17.1	18.0	85	153	120	188	162	230
	172-□P,M,K,N	17.2	18.0	85	153	120	188	162	230
	173-□P,M,K,N	17.3	18.0	85	153	120	188	162	230
	174-□P,M,K,N	17.4	18.0	85	153	120	188	162	230
	175-□P,M,K,N	17.5	18.0	85	153	120	188	162	230
	176-□P,M,K,N	17.6	18.0	85	153	120	188	162	230
	177-□P,M,K,N	17.7	18.0	85	153	120	188	162	230
	178-□P,M,K,N	17.8	18.0	85	153	120	188	162	230
	179-□P,M,K,N	17.9	18.0	85	153	120	188	162	230
	180-□P,M,K,N	18.0	18.0	85	153	120	188	162	230
	181-□P,M,K,N	18.1	19.0	88	157	124	193	171	240
	182-□P,M,K,N	18.2	19.0	88	157	124	193	171	240
	183-□P,M,K,N	18.3	19.0	88	157	124	193	171	240
	184-□P,M,K,N	18.4	19.0	88	157	124	193	171	240
	185-□P,M,K,N	18.5	19.0	88	157	124	193	171	240
	186-□P,M,K,N	18.6	19.0	88	157	124	193	171	240
	187-□P,M,K,N	18.7	19.0	88	157	124	193	171	240
	188-□P,M,K,N	18.8	19.0	88	157	124	193	171	240
	189-□P,M,K,N	18.9	19.0	88	157	124	193	171	240
	190-□P,M,K,N	19.0	19.0	88	157	124	193	171	240
	191-□P,M,K,N	19.1	20.0	90	160	130	200	180	250
	192-□P,M,K,N	19.2	20.0	90	160	130	200	180	250
	193-□P,M,K,N	19.3	20.0	90	160	130	200	180	250
	194-□P,M,K,N	19.4	20.0	90	160	130	200	180	250
	195-□P,M,K,N	19.5	20.0	90	160	130	200	180	250
	196-□P,M,K,N	19.6	20.0	90	160	130	200	180	250
	197-□P,M,K,N	19.7	20.0	90	160	130	200	180	250
	198-□P,M,K,N	19.8	20.0	90	160	130	200	180	250
	199-□P,M,K,N	19.9	20.0	90	160	130	200	180	250
	200-□P,M,K,N	20.0	20.0	90	160	130	200	180	250

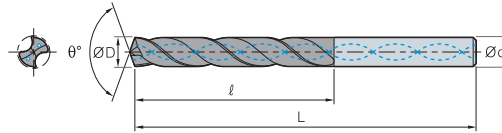
※ Order made items: MSD□□□-Material (P,M,K,N) × Flute length - Total length L × Shank diameter S

Ex.1)Workpiece: SM45C, Machined diameter: Ø10.1mm, Flute length: 60mm, Total length : 80mm, Shank diameter: Ø11 → MSD101-P × 60 - 80L × 11S

Ex.2)Workpiece: STS303, Machined diameter: Ø10.12mm, Flute length: Flute length:60mm, Total length: 80mm, Shank diameter: Ø11 → MSD1012 - M × 60 - 80L × 11S



MSDH-□(P/M/K/N)



Terminology	P	M	K	N	ND
Grade	PC205F		FG2	PD3000-1	
Tolerance (drill Dia.)	h7				
Tolerance (shank Dia.)	h6				
Point angle	140°	135°	140°		
Twist angle	30°				
Thinning	X type			N type	
Coolant	Through				
Steel Stainless steel Cast iron Non-ferrous metal Aluminum alloy					

Steel Stainless steel Cast iron Non-ferrous metal Aluminum alloy



(mm)

Designation		ØD	Ød	3P,M,K,N,ND		5P,M,K,N,ND		7P,M,K,N,ND	
				l	L	l	L	l	L
MSDH	025-□P,M,K,N	2.5	3.0	20	65	25	70	30	75
	026-□P,M,K,N	2.6	3.0	20	65	25	70	30	75
	027-□P,M,K,N	2.7	3.0	20	65	25	70	30	75
	028-□P,M,K,N	2.8	3.0	20	65	25	70	30	75
	029-□P,M,K,N	2.9	3.0	20	65	25	70	30	75
	030-□P,M,K,N	3.0	3.0	20	65	25	70	30	75
	031-□P,M,K,N	3.1	4.0	25	71	34	80	40	86
	032-□P,M,K,N	3.2	4.0	25	71	34	80	40	86
	033-□P,M,K,N	3.3	4.0	25	71	34	80	40	86
	034-□P,M,K,N	3.4	4.0	25	71	34	80	40	86
	035-□P,M,K,N	3.5	4.0	25	71	34	80	40	86
	036-□P,M,K,N	3.6	4.0	25	71	34	80	40	86
	037-□P,M,K,N	3.7	4.0	25	71	34	80	40	86
	038-□P,M,K,N	3.8	4.0	25	71	34	80	40	86
	039-□P,M,K,N	3.9	4.0	25	71	34	80	40	86
	040-□P,M,K,N	4.0	4.0	25	71	34	80	40	86
	041-□P,M,K,N	4.1	5.0	30	77	43	90	50	97
	042-□P,M,K,N	4.2	5.0	30	77	43	90	50	97
	043-□P,M,K,N	4.3	5.0	30	77	43	90	50	97
	044-□P,M,K,N	4.4	5.0	30	77	43	90	50	97
	045-□P,M,K,N	4.5	5.0	30	77	43	90	50	97
	046-□P,M,K,N	4.6	5.0	30	77	43	90	50	97
	047-□P,M,K,N	4.7	5.0	30	77	43	90	50	97
	048-□P,M,K,N	4.8	5.0	30	77	43	90	50	97
	049-□P,M,K,N	4.9	5.0	30	77	43	90	50	97
	050-□P,M,K,N	5.0	5.0	30	77	43	90	50	97
	051-□P,M,K,N	5.1	6.0	35	81	48	96	60	108
	052-□P,M,K,N	5.2	6.0	35	81	48	96	60	108
	053-□P,M,K,N	5.3	6.0	35	81	48	96	60	108
	054-□P,M,K,N	5.4	6.0	35	81	48	96	60	108
	055-□P,M,K,N	5.5	6.0	35	81	48	96	60	108
	056-□P,M,K,N	5.6	6.0	35	81	48	96	60	108
	057-□P,M,K,N	5.7	6.0	35	81	48	96	60	108
	058-□P,M,K,N	5.8	6.0	35	81	48	96	60	108
	059-□P,M,K,N	5.9	6.0	35	81	48	96	60	108
	060-□P,M,K,N	6.0	6.0	35	81	48	96	60	108
	061-□P,M,K,N	6.1	7.0	40	84	56	105	70	120
	062-□P,M,K,N	6.2	7.0	40	84	56	105	70	120
	063-□P,M,K,N	6.3	7.0	40	84	56	105	70	120
	064-□P,M,K,N	6.4	7.0	40	84	56	105	70	120
	065-□P,M,K,N	6.5	7.0	40	84	56	105	70	120
	066-□P,M,K,N	6.6	7.0	40	84	56	105	70	120
	067-□P,M,K,N	6.7	7.0	40	84	56	105	70	120
	068-□P,M,K,N	6.8	7.0	40	84	56	105	70	120

※ Order made items: MSD□□□-Material (P,M,K,N) × Flute length - Total length L × Shank diameter S

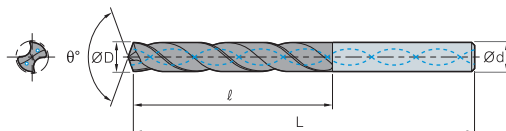
Ex.1) Workpiece: SM45C, Machined diameter: Ø10.1mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD101-P × 60 - 80L × 11S

Ex.2) Workpiece: STS303, Machined diameter: Ø10.12mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD1012 - M × 60 - 80L × 11S

Drills


G

MSDH-□(P/M/K/N)



Terminology	P	M	K	N	ND
Grade	PC205F			FG2	PD3000-1
Tolerance (drill Dia.)	h7				
Tolerance (shank Dia.)	h6				
Point angle	140°		135°	140°	
Twist angle	30°				
Thinning	X type			N type	
Coolant	Through				
P Steel M Stainless steel K Cast iron N Non-ferrous metal ND Aluminum alloy					

Steel Stainless steel Cast iron Non-ferrous metal Aluminum alloy

(mm)

Designation		ØD	Ød	3P,M,K,N,ND		5P,M,K,N,ND		7P,M,K,N,ND	
				ℓ	L	ℓ	L	ℓ	L
MSDH	069-□P,M,K,N	6.9	7.0	40	84	56	105	70	120
	070-□P,M,K,N	7.0	7.0	40	84	56	105	70	120
	071-□P,M,K,N	7.1	8.0	45	90	60	105	80	120
	072-□P,M,K,N	7.2	8.0	45	90	60	110	80	130
	073-□P,M,K,N	7.3	8.0	45	90	60	110	80	130
	074-□P,M,K,N	7.4	8.0	45	90	60	110	80	130
	075-□P,M,K,N	7.5	8.0	45	90	60	110	80	130
	076-□P,M,K,N	7.6	8.0	45	90	60	110	80	130
	077-□P,M,K,N	7.7	8.0	45	90	60	110	80	130
	078-□P,M,K,N	7.8	8.0	45	90	60	110	80	130
	079-□P,M,K,N	7.9	8.0	45	90	60	110	80	130
	080-□P,M,K,N	8.0	8.0	45	90	60	110	80	130
	081-□P,M,K,N	8.1	9.0	48	97	72	125	90	143
	082-□P,M,K,N	8.2	9.0	48	97	72	125	90	143
	083-□P,M,K,N	8.3	9.0	48	97	72	125	90	143
	084-□P,M,K,N	8.4	9.0	48	97	72	125	90	143
	085-□P,M,K,N	8.5	9.0	48	97	72	125	90	143
	086-□P,M,K,N	8.6	9.0	48	97	72	125	90	143
	087-□P,M,K,N	8.7	9.0	48	97	72	125	90	143
	088-□P,M,K,N	8.8	9.0	48	97	72	125	90	143
	089-□P,M,K,N	8.9	9.0	48	97	72	125	90	143
	090-□P,M,K,N	9.0	9.0	48	97	72	125	90	143
	091-□P,M,K,N	9.1	10.0	52	106	75	129	95	150
	092-□P,M,K,N	9.2	10.0	52	106	75	129	95	150
	093-□P,M,K,N	9.3	10.0	52	106	75	129	95	150
	094-□P,M,K,N	9.4	10.0	52	106	75	129	95	150
	095-□P,M,K,N	9.5	10.0	52	106	75	129	95	150
	096-□P,M,K,N	9.6	10.0	52	106	75	129	95	150
	097-□P,M,K,N	9.7	10.0	52	106	75	129	95	150
	098-□P,M,K,N	9.8	10.0	52	106	75	129	95	150
	099-□P,M,K,N	9.9	10.0	52	106	75	129	95	150
	100-□P,M,K,N	10.0	10.0	52	106	75	129	95	150
	101-□P,M,K,N	10.1	11.0	56	111	83	140	105	160
	102-□P,M,K,N	10.2	11.0	56	111	83	140	105	160
	103-□P,M,K,N	10.3	11.0	56	111	83	140	105	160
	104-□P,M,K,N	10.4	11.0	56	111	83	140	105	160
	105-□P,M,K,N	10.5	11.0	56	111	83	140	105	160
	106-□P,M,K,N	10.6	11.0	56	111	83	140	105	160
	107-□P,M,K,N	10.7	11.0	56	111	83	140	105	160
	108-□P,M,K,N	10.8	11.0	56	111	83	140	105	160
	109-□P,M,K,N	10.9	11.0	56	111	83	140	105	160
	110-□P,M,K,N	11.0	11.0	56	111	83	140	105	160
	111-□P,M,K,N	11.1	12.0	60	118	90	148	114	172
	112-□P,M,K,N	11.2	12.0	60	118	90	148	114	172

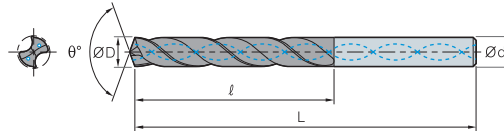
※ Order made items: MSD□□□-Material (P,M,K,N) × Flute length - Total length L × Shank diameter S

Ex.1)Workpiece: SM45C, Machined diameter: Ø10.1mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD101-P × 60 - 80L × 11S

Ex.2)Workpiece: STS303, Machined diameter: Ø10.12mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD1012 - M × 60 - 80L × 11S



MSDH-□(P/M/K/N)



Terminology	P	M	K	N	ND
Grade	PC205F		FG2	PD3000-1	
Tolerance (drill Dia.)	h7				
Tolerance (shank Dia.)	h6				
Point angle	140°	135°	140°		
Twist angle	30°				
Thinning	X type			N type	
Coolant	Through				
Steel Stainless steel Cast iron Non-ferrous metal Aluminum alloy					

Steel Stainless steel Cast iron Non-ferrous metal Aluminum alloy



(mm)

Designation		ØD	Ød	3P,M,K,N,ND		5P,M,K,N,ND		7P,M,K,N,ND	
				l	L	l	L	l	L
MSDH	113-□P,M,K,N	11.3	12.0	60	118	90	148	114	172
	114-□P,M,K,N	11.4	12.0	60	118	90	148	114	172
	115-□P,M,K,N	11.5	12.0	60	118	90	148	114	172
	116-□P,M,K,N	11.6	12.0	60	118	90	148	114	172
	117-□P,M,K,N	11.7	12.0	60	118	90	148	114	172
	118-□P,M,K,N	11.8	12.0	60	118	90	148	114	172
	119-□P,M,K,N	11.9	12.0	60	118	90	148	114	172
	120-□P,M,K,N	12.0	12.0	60	118	90	148	114	172
	121-□P,M,K,N	12.1	13.0	65	125	98	158	124	184
	122-□P,M,K,N	12.2	13.0	65	125	98	158	124	184
	123-□P,M,K,N	12.3	13.0	65	125	98	158	124	184
	124-□P,M,K,N	12.4	13.0	65	125	98	158	124	184
	125-□P,M,K,N	12.5	13.0	65	125	98	158	124	184
	126-□P,M,K,N	12.6	13.0	65	125	98	158	124	184
	127-□P,M,K,N	12.7	13.0	65	125	98	158	124	184
	128-□P,M,K,N	12.8	13.0	65	125	98	158	124	184
	129-□P,M,K,N	12.9	13.0	65	125	98	158	124	184
	130-□P,M,K,N	13.0	13.0	65	125	98	158	124	184
	131-□P,M,K,N	13.1	14.0	70	132	105	167	133	195
	132-□P,M,K,N	13.2	14.0	70	132	105	167	133	195
	133-□P,M,K,N	13.3	14.0	70	132	105	167	133	195
	134-□P,M,K,N	13.4	14.0	70	132	105	167	133	195
	135-□P,M,K,N	13.5	14.0	70	132	105	167	133	195
	136-□P,M,K,N	13.6	14.0	70	132	105	167	133	195
	137-□P,M,K,N	13.7	14.0	70	132	105	167	133	195
	138-□P,M,K,N	13.8	14.0	70	132	105	167	133	195
	139-□P,M,K,N	13.9	14.0	70	132	105	167	133	195
	140-□P,M,K,N	14.0	14.0	70	132	105	167	133	195
	141-□P,M,K,N	14.1	15.0	75	139	108	172	138	202
	142-□P,M,K,N	14.2	15.0	75	139	108	172	138	202
	143-□P,M,K,N	14.3	15.0	75	139	108	172	138	202
	144-□P,M,K,N	14.4	15.0	75	139	108	172	138	202
	145-□P,M,K,N	14.5	15.0	75	139	108	172	138	202
	146-□P,M,K,N	14.6	15.0	75	139	108	172	138	202
	147-□P,M,K,N	14.7	15.0	75	139	108	172	138	202
	148-□P,M,K,N	14.8	15.0	75	139	108	172	138	202
	149-□P,M,K,N	14.9	15.0	75	139	108	172	138	202
	150-□P,M,K,N	15.0	15.0	75	139	108	172	138	202
	151-□P,M,K,N	15.1	16.0	80	146	112	178	144	210
	152-□P,M,K,N	15.2	16.0	80	146	112	178	144	210
	153-□P,M,K,N	15.3	16.0	80	146	112	178	144	210
	154-□P,M,K,N	15.4	16.0	80	146	112	178	144	210
	155-□P,M,K,N	15.5	16.0	80	146	112	178	144	210
	156-□P,M,K,N	15.6	16.0	80	146	112	178	144	210

※ Order made items: MSD□□□-Material (P,M,K,N) × Flute length - Total length L × Shank diameter S

Ex.1) Workpiece: SM45C, Machined diameter: Ø10.1mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD101-P × 60 - 80L × 11S

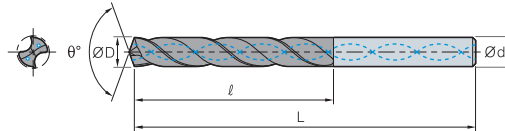
Ex.2) Workpiece: STS303, Machined diameter: Ø10.12mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD1012-M × 60 - 80L × 11S

Drills



G

MSDH-□(P/M/K/N)



Terminology	P	M	K	N	ND
Grade	PC205F		FG2	PD3000-1	
Tolerance (drill Dia.)	h7				
Tolerance (shank Dia.)	h6				
Point angle	140°		135°	140°	
Twist angle	30°				
Thinning	X type			N type	
Coolant	Through				
Steel Stainless steel Cast iron Non-ferrous metal Aluminum alloy					

Steel Stainless steel Cast iron Non-ferrous metal Aluminum alloy



(mm)

Designation		ØD	Ød	3P,M,K,N,ND		5P,M,K,N,ND		7P,M,K,N,ND	
				ℓ	L	ℓ	L	ℓ	L
MSDH	157-□P,M,K,N	15.7	16.0	80	146	112	178	144	210
	158-□P,M,K,N	15.8	16.0	80	146	112	178	144	210
	159-□P,M,K,N	15.9	16.0	80	146	112	178	144	210
	160-□P,M,K,N	16.0	16.0	80	146	112	178	144	210
	161-□P,M,K,N	16.1	17.0	85	151	120	186	153	220
	162-□P,M,K,N	16.2	17.0	85	151	120	186	153	220
	163-□P,M,K,N	16.3	17.0	85	151	120	186	153	220
	164-□P,M,K,N	16.4	17.0	85	151	120	186	153	220
	165-□P,M,K,N	16.5	17.0	85	151	120	186	153	220
	166-□P,M,K,N	16.6	17.0	85	151	120	186	153	220
	167-□P,M,K,N	16.7	17.0	85	151	120	186	153	220
	168-□P,M,K,N	16.8	17.0	85	151	120	186	153	220
	169-□P,M,K,N	16.9	17.0	85	151	120	186	153	220
	170-□P,M,K,N	17.0	17.0	85	151	120	186	153	220
	171-□P,M,K,N	17.1	18.0	85	153	120	188	162	230
	172-□P,M,K,N	17.2	18.0	85	153	120	188	162	230
	173-□P,M,K,N	17.3	18.0	85	153	120	188	162	230
	174-□P,M,K,N	17.4	18.0	85	153	120	188	162	230
	175-□P,M,K,N	17.5	18.0	85	153	120	188	162	230
	176-□P,M,K,N	17.6	18.0	85	153	120	188	162	230
	177-□P,M,K,N	17.7	18.0	85	153	120	188	162	230
	178-□P,M,K,N	17.8	18.0	85	153	120	188	162	230
	179-□P,M,K,N	17.9	18.0	85	153	120	188	162	230
	180-□P,M,K,N	18.0	18.0	85	153	120	188	162	230
	181-□P,M,K,N	18.1	19.0	88	157	124	193	171	240
	182-□P,M,K,N	18.2	19.0	88	157	124	193	171	240
	183-□P,M,K,N	18.3	19.0	88	157	124	193	171	240
	184-□P,M,K,N	18.4	19.0	88	157	124	193	171	240
	185-□P,M,K,N	18.5	19.0	88	157	124	193	171	240
	186-□P,M,K,N	18.6	19.0	88	157	124	193	171	240
	187-□P,M,K,N	18.7	19.0	88	157	124	193	171	240
	188-□P,M,K,N	18.8	19.0	88	157	124	193	171	240
	189-□P,M,K,N	18.9	19.0	88	157	124	193	171	240
	190-□P,M,K,N	19.0	19.0	88	157	124	193	171	240
	191-□P,M,K,N	19.1	20.0	90	160	130	200	180	250
	192-□P,M,K,N	19.2	20.0	90	160	130	200	180	250
	193-□P,M,K,N	19.3	20.0	90	160	130	200	180	250
	194-□P,M,K,N	19.4	20.0	90	160	130	200	180	250
	195-□P,M,K,N	19.5	20.0	90	160	130	200	180	250
	196-□P,M,K,N	19.6	20.0	90	160	130	200	180	250
	197-□P,M,K,N	19.7	20.0	90	160	130	200	180	250
	198-□P,M,K,N	19.8	20.0	90	160	130	200	180	250
	199-□P,M,K,N	19.9	20.0	90	160	130	200	180	250
	200-□P,M,K,N	20.0	20.0	90	160	130	200	180	250

※ Order made items: MSD□□□-Material (P,M,K,N) × Flute length - Total length L × Shank diameter S

Ex.1) Workpiece: SM45C, Machined diameter: Ø10.1mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD101-P × 60 - 80L × 11S

Ex.2) Workpiece: STS303, Machined diameter: Ø10.12mm, Flute length: 60mm, Total length: 80mm, Shank diameter: Ø11 → MSD1012 - M × 60 - 80L × 11S



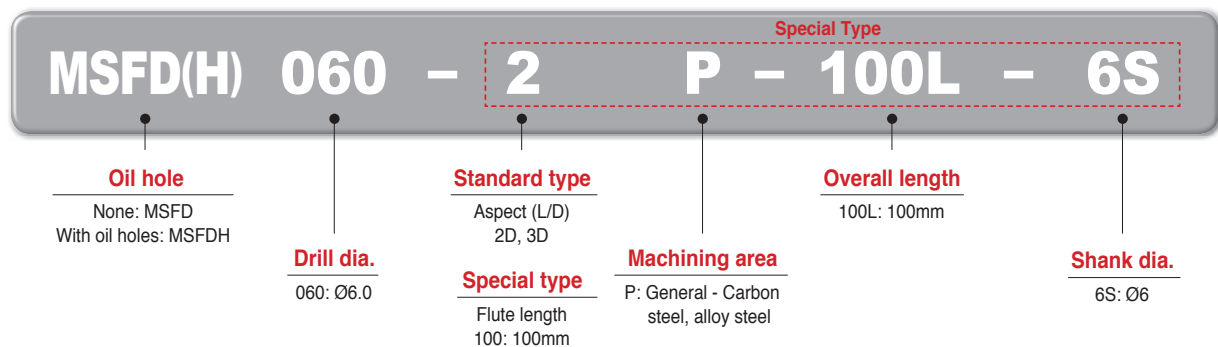
The best tool for ramped, curved or flat workpieces

MSFD ^{new}

Mach Solid Flat Drill

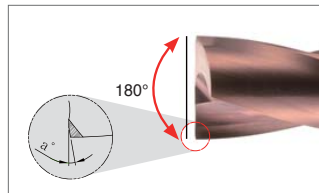
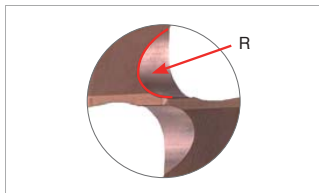
- High quality hole making capability with 180°-point angle
- Improved anti chipping and welding resistance by edge honing and chamfering
Minimized creation of burrs compared to general drills

Code system

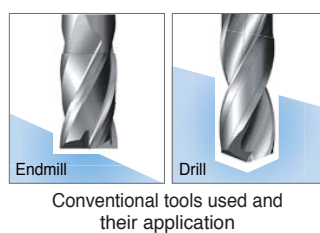
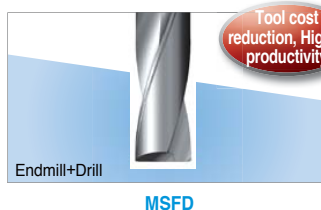


Features

- 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



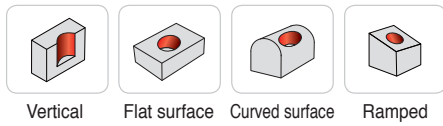
- Multi-functional capability - end milling and drilling using a single MSFD



G Technical Information for Mach Solid Flat Drill

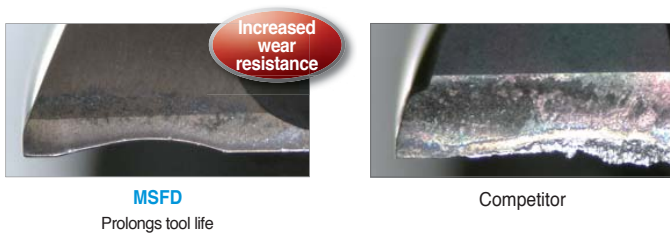
Wide applications

- A wide range of applications and improved cutting performance

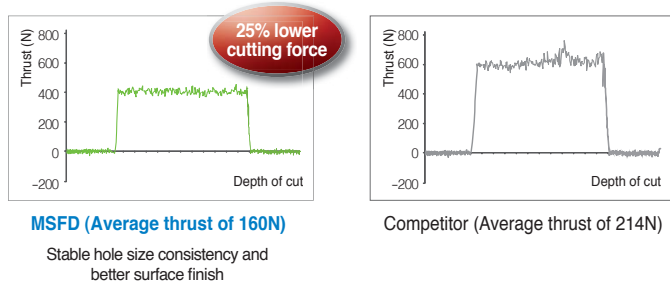


Performance evaluation

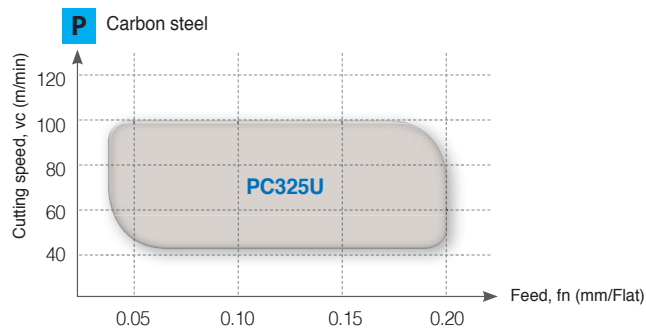
- Workpiece** SM48C
- Cutting conditions** vc (m/min) = 80, fn (mm/min) = 0.10, ap (mm) = 15, wet
- Cutting length** 7.2m (600 holes)
- Tools** MSFD060-2P (PC325U)



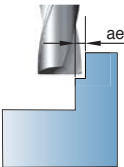
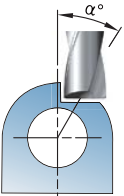
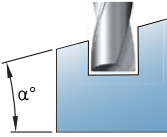
- Workpiece** SM45C
- Cutting conditions** vc (m/min) = 70, fn (mm/min) = 0.10, ap (mm) = 15, wet
- Tools** MSDP060-3P (PC325U)



Application range



Application methods

Application type	Recommended machining conditions	Application type	Recommended machining conditions																										
	- 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		- 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																										
	- 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><tr><th>Workpiece (D)</th><th>Slope angle (α°)</th><th>Performance</th><th>Applied (fn)</th></tr><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></table>	Workpiece (D)	Slope angle (α°)	Performance	Applied (fn)	≤ Ø100	≤ 20°	◎	100%	20° < ~40°	○	80%	≥ 40°	△	60%		- 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><tr><th>Slope angle (α°)</th><th>Performance</th><th>Applied (fn)</th></tr><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></table>	Slope angle (α°)	Performance	Applied (fn)	≤ 20°	◎	100%	20° < ~40°	○	80%	≥ 40°	△	60%
Workpiece (D)	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

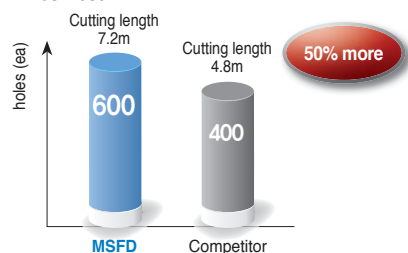
Workpiece			Grade	Cutting speed, vc (m/min)	Feed (Depth of cut = 2D~3D)			
					Feed rate (mm/rev) per drill dia. (mm)			
ISO	Workpiece materials	Hardness (HB)			Ø2.5~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0	
P	Carbon steel	Low carbon steel	80~120	PC325U	75 (60~90)	0.03~0.10	0.05~0.15	0.10~0.20
		High carbon steel	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)



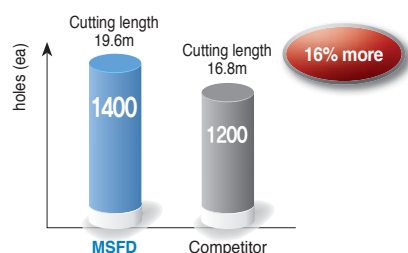
Test result



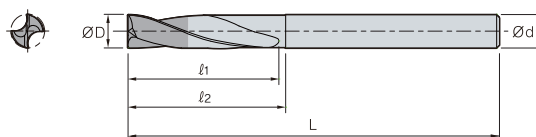
- **Workpiece** Alloy steel (SCM440)
- **Cutting conditions**
 - vc (m/min) = 100
 - fn (mm/min) = 0.1
 - ap (mm) = 14, wet
- **Tools** MSFDH060-3P (PC325U)



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

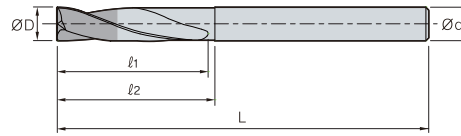
Steel

(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



MSFD-2P



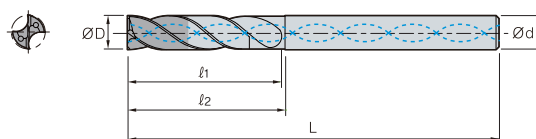
Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	20°
Thinning	R type
Coolant	External

Steel

(mm)

Designation		ØD	Ød	2P		
				l1	l2	L
MSFD	070-2P	7.0	8.0	29.4	30.4	70
	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

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

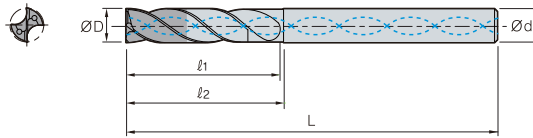
Steel

(mm)

Designation		ØD	Ød	3P		
				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
	071-3P	7.1	8.0	41	42	79
	072-3P	7.2	8.0	41	42	79



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		
				ℓ ₁	ℓ ₂	L
MSFDH	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

G Technical Information for Mach Long Solid Drill Plus

High precision results when machining deep holes

MLD Plus ^{new}

Mach Long Solid Drill Plus

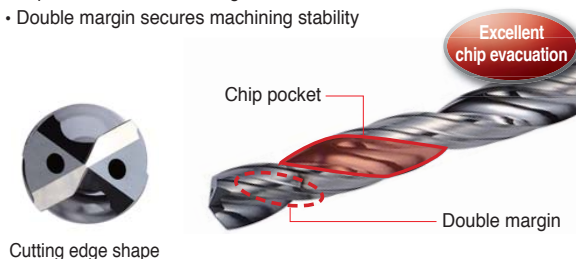
Code system

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

Features

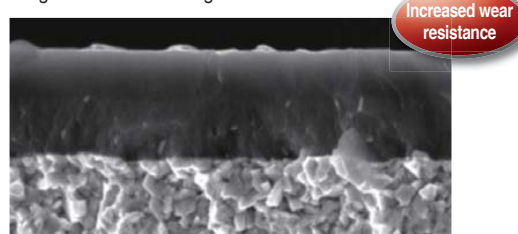
Cutting edge and flute shape

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



New grade (PC315G)

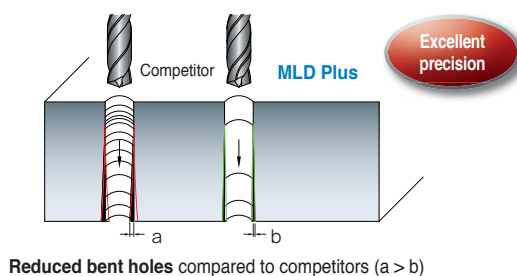
- Ultra-fine substrate and new coating applied
- Lubricative coating layer improves chip evacuation with lower frictional resistance
- Longer tool life due to higher wear resistance



PC315G

Degree of machining precision

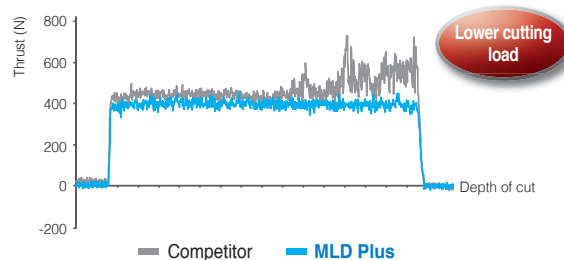
- Improved machining precision
 - Bent holes reduced, Inside hole surface roughness improved
 - Hole size uniformity increased
- Improved point shape
- Precise location secured



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

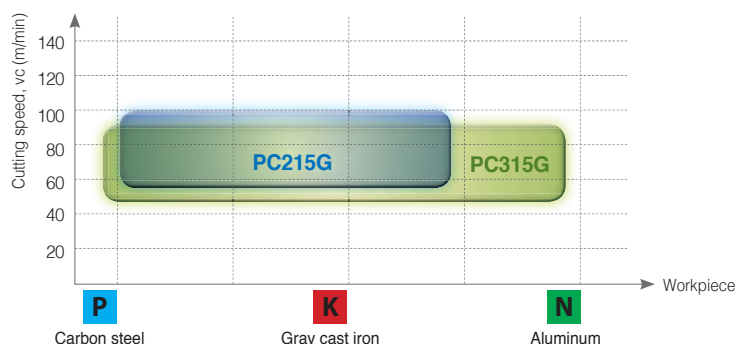


G

Drills

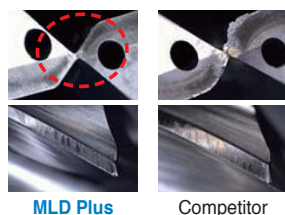
Application area

- **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

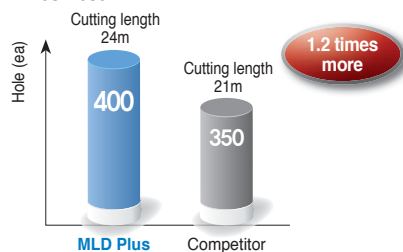


Application examples

- **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

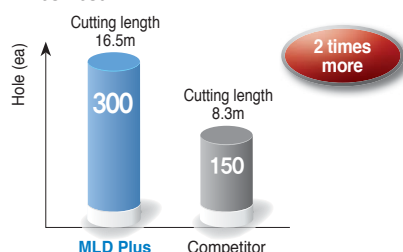


New grade PC315G's coating layer has been applied to improve wear resistance when machining carbon steel materials

- **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



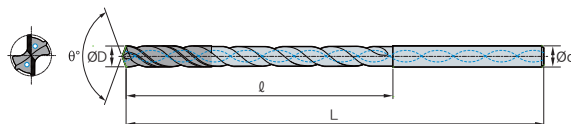
Double margin has been applied to improve stability and machining precision

Recommended cutting condition

Workpiece				Grade	vc (m/min)	Depth of cut = 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

G Mach Long Solid Drill Plus

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		

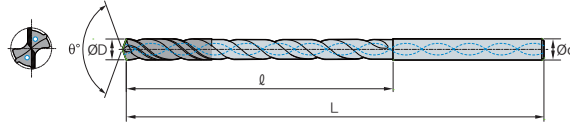
Steel Cast iron Non-ferrous metal

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

(mm)



MLD-□□(P/K/N)

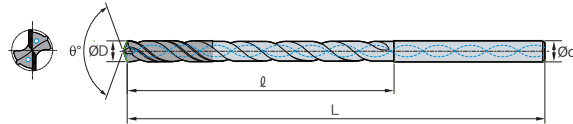


Terminology	P	K	N
Grade	PC215G PC315G		FG2
Tolerance (drill Dia.)	h7		
Tolerance (shank Dia.)	h6		
Point angle	135°		
Twist angle	30°		
Thinning	X type		
Coolant	Through		
Steel Cast iron Non-ferrous metal			

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

G Mach Long Solid Drill Plus

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			

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	-	-	-	-

(mm)

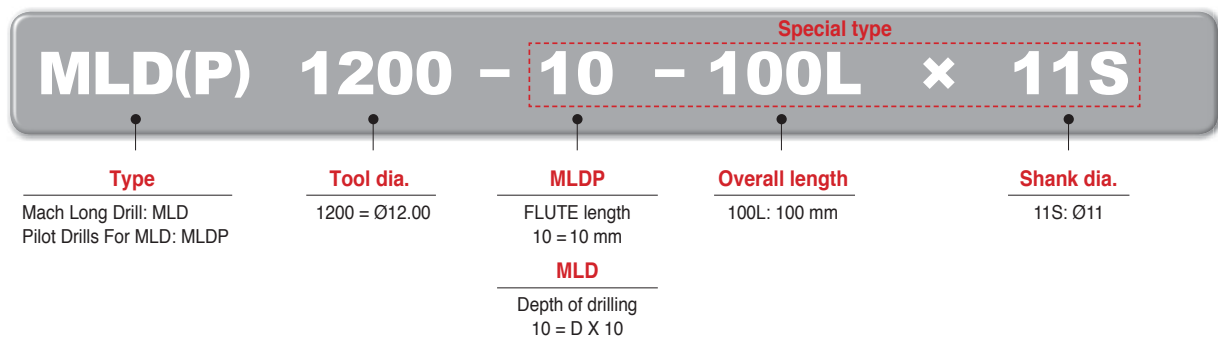


Stable deep hole drilling with specially designed low cutting resistance

Mach Long Solid Drill

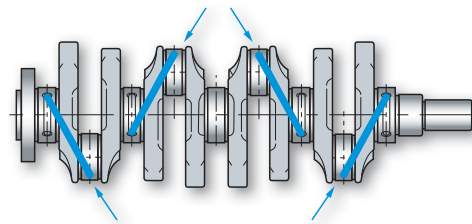
- Over 20D deep hole drilling is possible without step drilling
- The stable hole drilling due to specially designed low cutting resistance
- Special chip pocket has designed for effective chip evacuation
- Optimized design for drill rigidity to prevent the bending of the drill when entering operation
- The lubrication & thermal resistance of coating has been increased by adapting new TiAlN

Code system



Mach long drills-deep hole drilling

- **Mach Long Drills are ideal for....**
 - Deep and inclined hole drilling of crank shaft
 - Deep hole drilling of cam shaft
 - Deep hole drilling of mold and machinery
→ Deep hole drilling aspect ratio over 15D
- **Advantages of MLD**
 - Shorting cycle time for better productivity
 - Tool guide bush is not required
 - Reduce idle time by prolonged tool life
 - Green coolant solutions (MQL) to protect environment



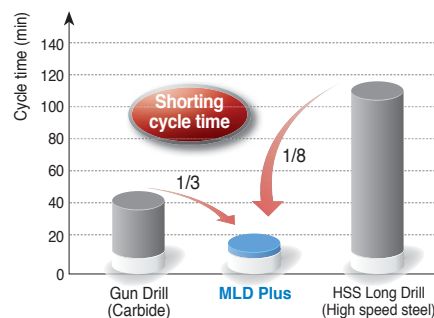
Application example (Oil hole for crank shaft, 20D)

MLD productivity: MLD0680-20 (Ø6.8 mm x 140 x 170L x 7S)

Tool	vc (m/min)	fn (mm/rev)	n (min ⁻¹)	vf (mm/min)	Coolant	Step operation
Gun Drills (Carbide)	100	0.04	4,683	187	Through coolant oil	No required
High Speed Steel Long Drills	15	0.10	703	70	Outer coolant oil	15mm/9times
Mach Long Drills	80	0.14	3,747	525	MQL- Air 0.5MPa, Oil 20cc/h	No required

Cycle time

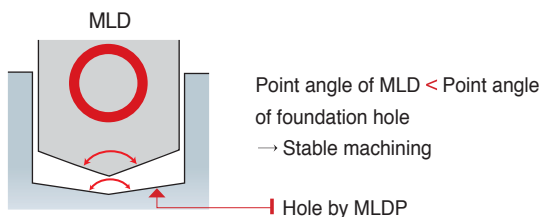
- Decreasing cycle time up to 1/3~1/8 times
- Increasing productivity by process reduction
- It is easy to reduce running cost
- Improving of effective working condition
- Drill guide bush is not required



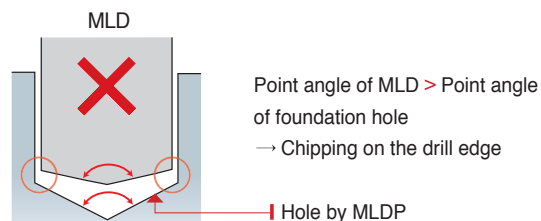
G Technical Information for Mach Long Solid Drill

Function of MLD & MLDP

Relationship of point angle between MLD & MLDP

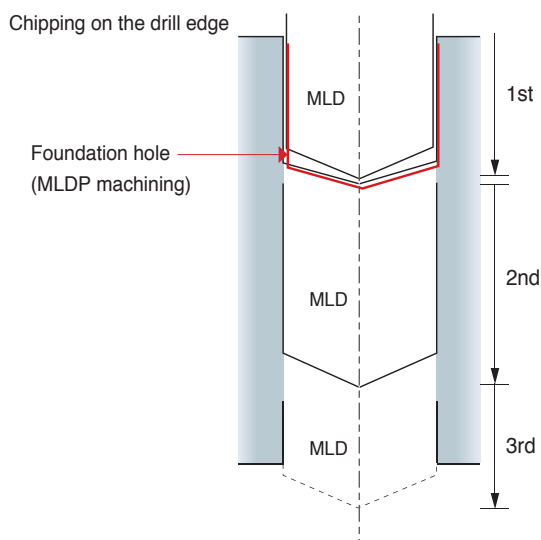


Large point angle of Pilot Drill: **Stable condition**



Small point angle of Pilot Drill: **Unstable condition**

To make the optimal of MLD



1st. Pilot drilling

- vc (m/min) = Normal
- fn (mm/rev) = Normal

2nd. Deep drilling by MLD

Approach the drill 1mm less than the depth of MLDP drilling.

- vc (m/min) = 15
- fn (mm/rev) = 0.5

2nd. MLD drilling (Machining stage)

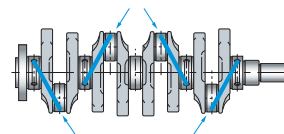
- vc (m/min) = Normal
- fn (mm/rev) = Normal

3rd. MLD drilling (Piercing stage)

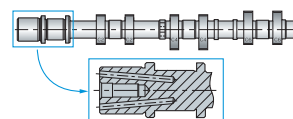
- vc (m/min) = Normal
- fn (mm/rev) = Normal feed/2

Application example

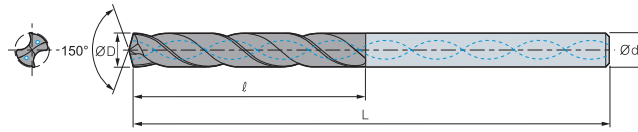
- **Use** Part of Automobile
- **Workpiece** SCM440H, HB255~330
- **Cutting conditions** vc (m/min) = 70, fn (mm/rev) = 0.18
MQL (30cc/hour), Air (MPa) = 0.7
- **Tools** MLD0600-22A (Ø6 mm, Aspect ratio 18D)
- **Machine** Horizontal milling machine
- **Tool life** 1000 holes



- **Use** Part of Automobile
- **Workpiece** GC250
- **Cutting conditions** vc (m/min) = 63, fn (mm/rev) = 0.1
water-soluble cutting fluid (3kg/cm², 2l/min)
- **Tools** MLD0400-25A (Ø4 mm, Aspect ratio 16D)
- **Machine** Rotary milling machine
- **Tool life** 440 holes



MLDP Mach pilot drills with oil hole



Grade	PC205F/PC325U
Tolerance (drill Dia.)	x6
Tolerance (shank Dia.)	h6
Point angle	150°
Twist angle	30°
Thinning	X type
Coolant	Through

(mm)

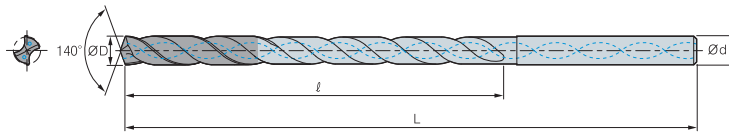
Designation	ØD	Ød	5(ℓ / ØD = 5)		7(ℓ / ØD = 7)	
			ℓ	L	ℓ	L
MLDP 0300-□	3.0	3.0	25	70	30	75
0400-□	4.0	4.0	34	80	40	86
0500-□	5.0	5.0	43	90	50	97
0600-□	6.0	6.0	48	96	60	108
0700-□	7.0	7.0	56	105	70	120
0800-□	8.0	8.0	60	110	80	130
0900-□	9.0	9.0	72	125	90	143
1000-□	10.0	10.0	75	129	95	150

※ Order made items: MLDP□□□□ × Flute length - Total length L × Shank diameter S

Ex.1) Machined diameter: Ø5.8 mm, Flute length: 50 mm, Total length: 100 mm, MLDP0580 × 50-100L × 6S

※ Precautions needed by tooling as NMLD and MLDP are one set

MLD Mach long drill



Grade	PC205F
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h6
Point angle	140°
Twist angle	30°
Thinning	X type
Coolant	Through

(mm)

Designation	ØD	Ød	20(ℓ / ØD = 20)		25(ℓ / ØD = 25)	
			ℓ	L	ℓ	L
MLD 0300-□	3.0	3.0	60	110	75	120
0400-□	4.0	4.0	80	130	100	150
0500-□	5.0	5.0	100	150	125	175
0600-□	6.0	6.0	120	170	150	200
0700-□	7.0	7.0	140	190	175	225
0800-□	8.0	8.0	160	210	200	250
0900-□	9.0	9.0	180	230	-	-
1000-□	10.0	10.0	200	250	-	-

※ Order made items: MLD□□□□-Aspect ratio

Ex.1) Machined diameter: Ø5.3 mm, Flute length: 120 mm, Total length: 180 mm, MLD0530-22 (Aspect ratio)

※ The last alphabet of the code refers to whether the product has been upgraded

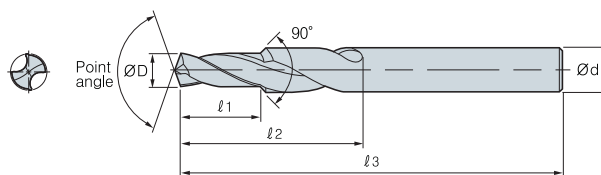
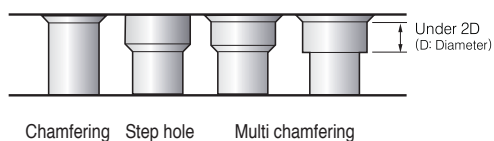
Tolerance code

Drill dia. (ØD)		h6	h7	x6
Over	Under			
-	3	0~-0.006	0~-0.010	+0.020~+0.026
3	6	0~-0.008	0~-0.012	+0.028~+0.036
6	10	0~-0.009	0~-0.015	+0.034~+0.043
10	14	0~-0.011	0~-0.018	+0.040~+0.051
14	18	0~-0.011	0~-0.018	+0.045~+0.056
18	24	0~-0.013	0~-0.021	+0.054~+0.067

G Mach step Drills Order Form

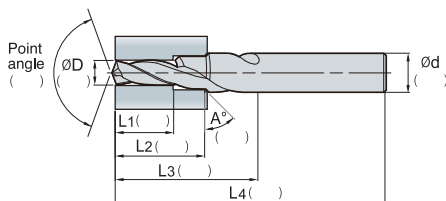
Code system for mach step drill

MSD(H)S	Tool Dia. ×	Effective flute length –	Flute length –	Overall length (L) ×	Shank Dia. (S)
Solid type: MSDS Oil-hole type: MSDHS	ØD	ℓ ₁	ℓ ₂	(ℓ ₃)L	(Ød)S



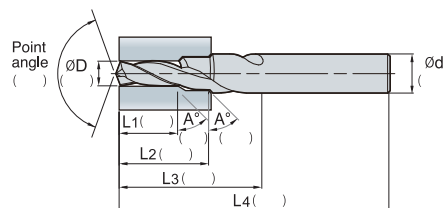
☐ Multi chamfering

(Coolant: Through system ☐ External system ☐)



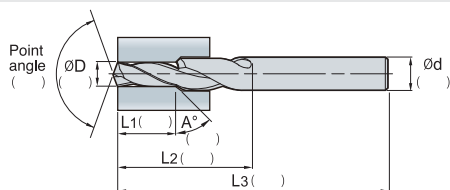
☐ Multi chamfering

(Coolant: Through system ☐ External system ☐)



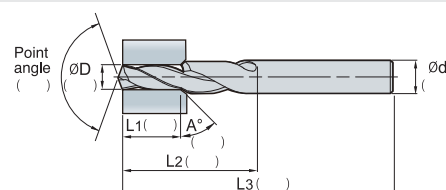
☐ Step hole

(Coolant: Through system ☐ External system ☐)



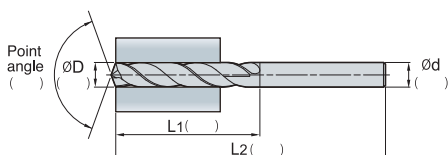
☐ Chamfering

(Coolant: Through system ☐ External system ☐)



☐ Drilling

(Coolant: Through system ☐ External system ☐)

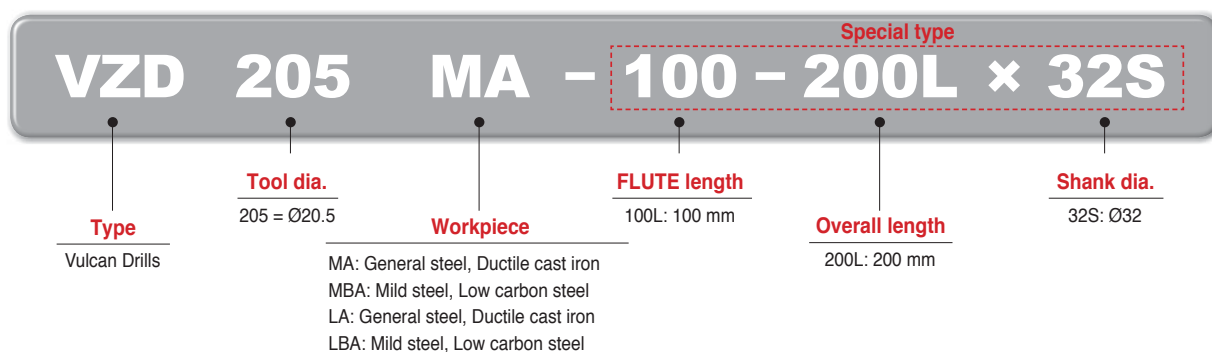


High feed and precision machining with our specially designed point edge

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

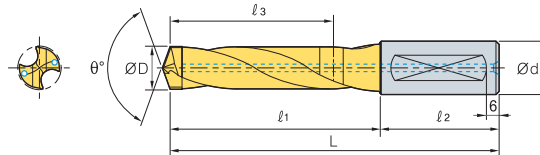
Notice

- **Unsuitable drilling**
 - Avoid the inclination or unevenness of entering and piercing section of hole as possible
 - Reduce the feed 0.1~0.15mm/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, MAB



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 × 110-200L

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

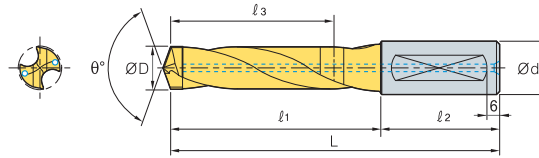
--- VZD1863MA × 110-200L

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□□□M□ x 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

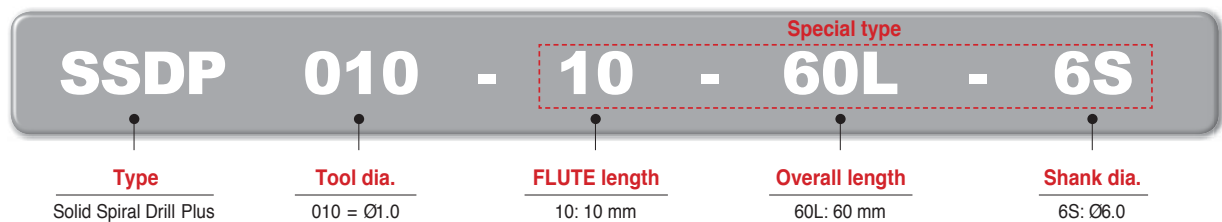
G Technical Information for Carbide Drill (SSDP)

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

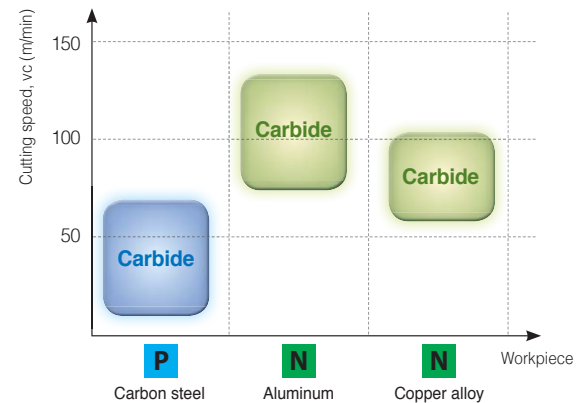
Code system



Features

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

Application area

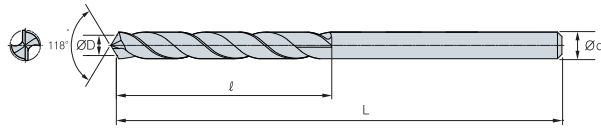


Recommended cutting condition

Workpiece			Grade	vc (m/min)	Depth of cut = 10D~25D 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	Carbide	35 (20~65)	0.02~0.06	0.04~0.08	0.06~0.12	0.10~0.16
N	Aluminum	Aluminum alloy		100 (94~120)	0.03~0.06	0.05~0.08	0.08~0.12	0.12~0.18
N	Copper alloy	Copper alloy		80 (65~95)	0.03~0.06	0.05~0.08	0.08~0.12	0.12~0.18



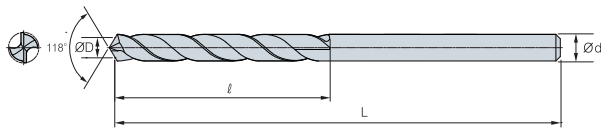
SSDP



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

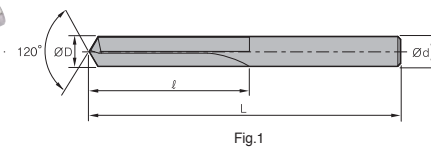


Fig.1

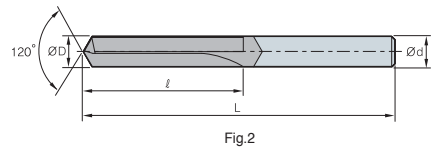


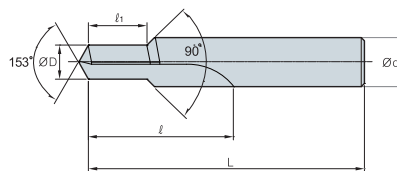
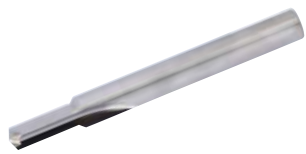
Fig.2

(mm)

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

Step Burnishing Drill-BDT

For tapping a foundation hole



(mm)

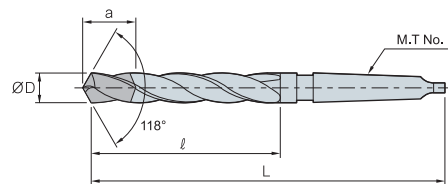
Designation	ØD	Ød	ℓ	ℓ₁	L	Tap
BDT						
M05080-ℓ 1	4.2	6.0	35	9~15	90	M5XP0.8
M06100-ℓ 1	5.0	7.0	40	11~18	95	M6XP1.0
M08125-ℓ 1	6.8	10.0	50	15~24	105	M8XP1.25
M10125-ℓ 1	8.8	12.0	55	17~30	110	M10XP1.25
M10150-ℓ 1	8.5	12.0	55	17~30	110	M10XP1.5
M12125-ℓ 1	10.8	14.0	60	19~36	120	M12XP1.25
M12150-ℓ 1	10.5	14.0	60	19~36	120	M12XP1.5
M12175-ℓ 1	10.3	14.0	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



(mm)

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

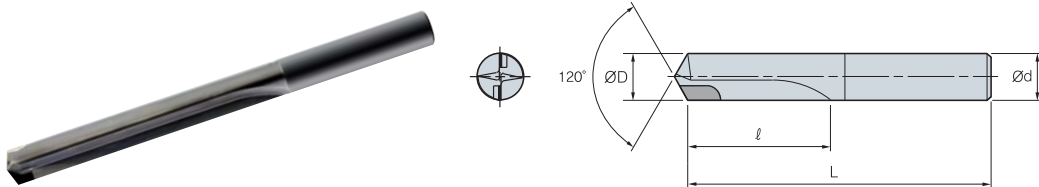
Code system



Recommended cutting condition

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

PDD



(mm)

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

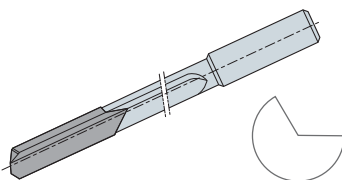
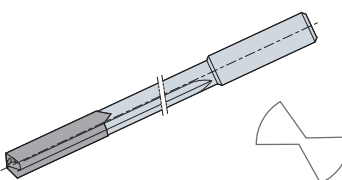
Gun Drill

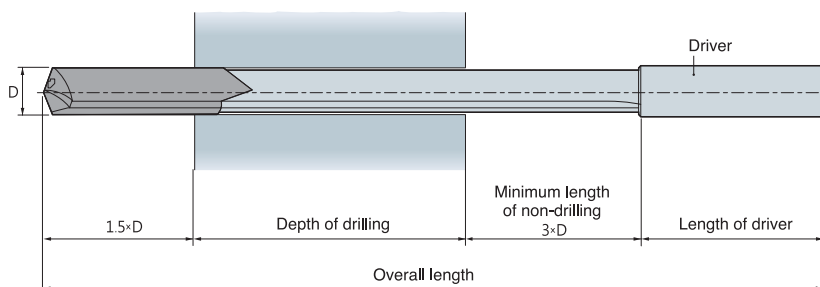
- High efficiency in deep hole machining
- High accuracy (Hole tolerance: IT9, surface finish: Ra0.1~3.0S)
- Stable Quality due to unique cutting edge and guide pad available regrinding
- Used drill can recycle as change part of carbide
- Depending on request, the drills can change geometry of cutting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

Code system

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

Features

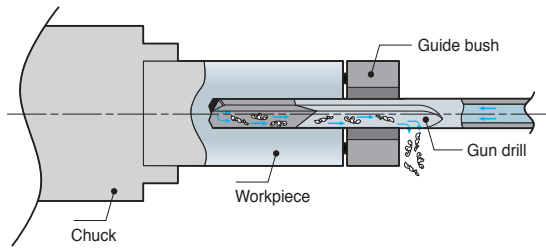
	Single lip type	Twin lip type
Shape		
Drill Dia.	Ø2.0~Ø33.0	Ø6.0~Ø26.5
Depth of drilling	≥ 2,000 mm	≥ 1,000 mm
Tolerance	IT9	IT10
Surface finish	Ra 0.1~3.0 µm	Ra 1.0~4.0 µm
Application	For all kinds of workpiece machining	• Workpieces with good chip evacuation • Machining of at higher feed than single lip type's



- Refer to the code system and the above drawing when ordering
- Refer to the page 68 for the size of a driver
- The overall length can be chosen by order



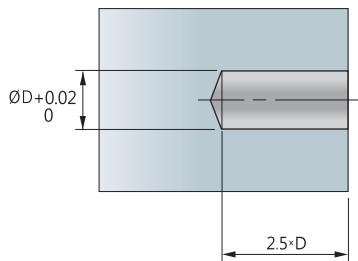
➤ Application of Gun Drill on exclusive machine



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

➤ Application of Gun Drill on machining center

1 Machining of a pilot hole

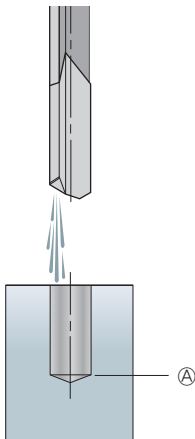


1. A pilot hole is necessary in machining on a machining center instead of a guide bush
2. The diameter of the pilot hole should be 0.01~0.02 (H7) larger bigger than one of the Gun Drill diameter and the depth of drilling should be about $2.5 \times D$
3. Use Mach Drill (MSD) for machining of a pilot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



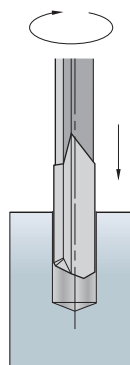
MSD

2 Moving the Gun Drill to the pilot hole



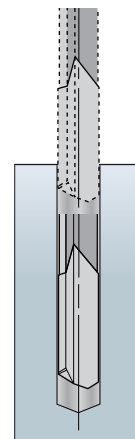
1. The Gun Drill should not drill before entering the pilot hole
2. Coolant is necessary for gun drilling

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

G Technical Information for Gun Drill

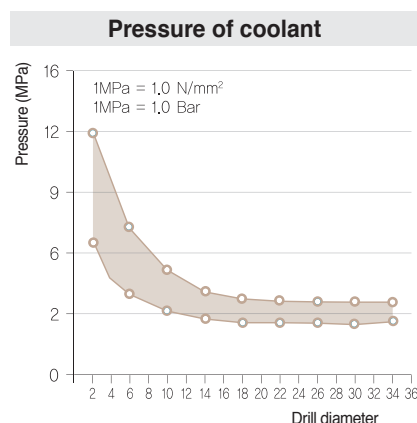
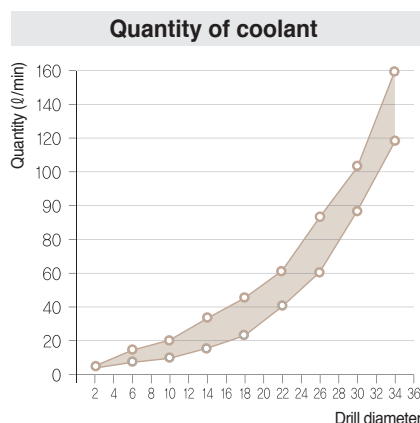
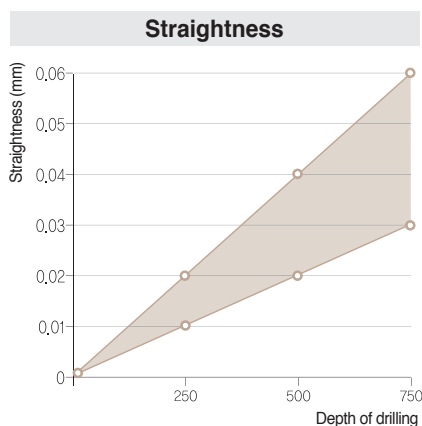
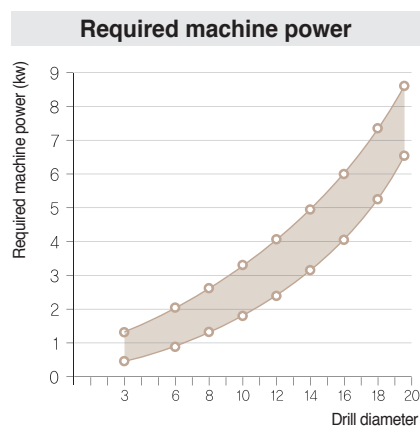
Recommended cutting condition

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

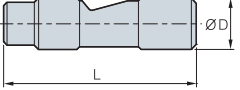
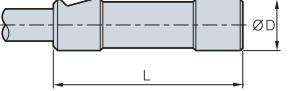
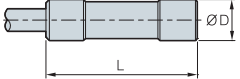
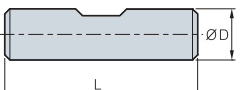
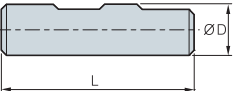
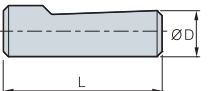
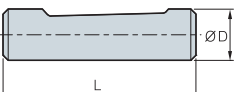


The above graph shows general information and it is changeable depending on kind of tool, workpieces, and cutting conditions etc

- **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



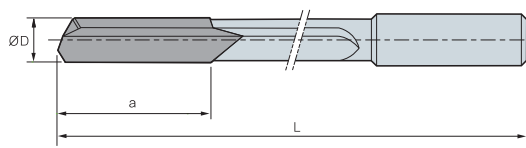
Driver standard

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	
0.00	Diameter
□□□□	Length
D□□	Driver code no.

(mm)

Designation	ØD	a
KGDS	0.00-□□□□ / D□□	2.00~2.49
	0.00-□□□□ / D□□	2.50~2.99
	0.00-□□□□ / D□□	3.00~3.49
	0.00-□□□□ / D□□	3.50~3.99
	0.00-□□□□ / D□□	4.00~4.49
	0.00-□□□□ / D□□	4.50~4.99
	0.00-□□□□ / D□□	5.00~5.49
	0.00-□□□□ / D□□	5.50~5.99
	0.00-□□□□ / D□□	6.00~6.49
	0.00-□□□□ / D□□	6.50~6.99
	0.00-□□□□ / D□□	7.00~7.49
	0.00-□□□□ / D□□	7.50~7.99
	0.00-□□□□ / D□□	8.00~8.49
	0.00-□□□□ / D□□	8.50~8.99
	0.00-□□□□ / D□□	9.00~8.49
	0.00-□□□□ / D□□	9.50~9.99
	0.00-□□□□ / D□□	10.00~10.49
	0.00-□□□□ / D□□	10.50~10.99
	0.00-□□□□ / D□□	11.00~11.49
	0.00-□□□□ / D□□	11.50~11.99
	0.00-□□□□ / D□□	12.00~12.49
	0.00-□□□□ / D□□	12.50~12.99
	0.00-□□□□ / D□□	13.00~13.99
	0.00-□□□□ / D□□	14.00~14.99
	0.00-□□□□ / D□□	15.00~15.99
	0.00-□□□□ / D□□	16.00~16.99
	0.00-□□□□ / D□□	17.00~17.99
	0.00-□□□□ / D□□	18.00~18.99
	0.00-□□□□ / D□□	19.00~19.99
	0.00-□□□□ / D□□	20.00~20.99
	0.00-□□□□ / D□□	21.00~21.99
	0.00-□□□□ / D□□	22.00~22.99
	0.00-□□□□ / D□□	23.00~23.99
	0.00-□□□□ / D□□	24.00~24.99
	0.00-□□□□ / D□□	25.00~25.99
	0.00-□□□□ / D□□	26.00~26.99
	0.00-□□□□ / D□□	27.00~27.99
	0.00-□□□□ / D□□	28.00~28.99
	0.00-□□□□ / D□□	29.00~29.99
	0.00-□□□□ / D□□	30.00~30.99
	0.00-□□□□ / D□□	31.00~31.99
	0.00-□□□□ / D□□	32.00~32.99

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

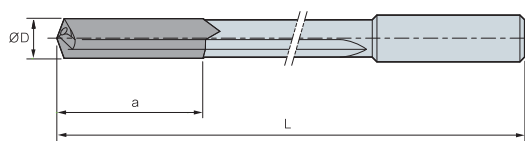
Available overall length

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	
0.00	Diameter
0000	Length
D00	Driver code no.

(mm)

Designation		ØD	a
KGDT	0.00-0000 / D00	6.00~6.49	35
	0.00-0000 / D00	6.50~6.99	35
	0.00-0000 / D00	7.00~7.49	38
	0.00-0000 / D00	7.50~7.99	38
	0.00-0000 / D00	8.00~8.49	38
	0.00-0000 / D00	8.50~8.99	38
	0.00-0000 / D00	9.00~8.49	40
	0.00-0000 / D00	9.50~9.99	40
	0.00-0000 / D00	10.00~10.49	40
	0.00-0000 / D00	10.50~10.99	40
	0.00-0000 / D00	11.00~11.49	45
	0.00-0000 / D00	11.50~11.99	45
	0.00-0000 / D00	12.00~12.49	45
	0.00-0000 / D00	12.50~12.99	48
	0.00-0000 / D00	13.00~13.99	48
	0.00-0000 / D00	14.00~14.99	48
	0.00-0000 / D00	15.00~15.99	48
	0.00-0000 / D00	16.00~16.99	50
	0.00-0000 / D00	17.00~17.99	50
	0.00-0000 / D00	18.00~18.99	50
	0.00-0000 / D00	19.00~19.99	50
	0.00-0000 / D00	20.00~20.99	55
	0.00-0000 / D00	21.00~21.99	55
	0.00-0000 / D00	22.00~22.99	55
	0.00-0000 / D00	23.00~23.99	60
	0.00-0000 / D00	24.00~24.99	60
	0.00-0000 / D00	25.00~25.99	65
	0.00-0000 / D00	26.00~26.50	65

※ 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	6.00~26.50	○	○	○		