KORLOY
TECH-NEWS

MSD Plus-S

(3D, 5D, 8D, 10D)

Mach solid Drill Plus-S for Inconel and Titanium cutting

- Realizing stable cutting due to the optimal cutting edge shape and chip pocket
- Increased tool life from applying coating layer with good chipping resistance at high temperature



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Mach solid Drill Plus-S for Inconel and Titanium cutting

MSD Plus-S

In recent years, the key components' weight went light in the aerospace, power generation and energy industries for the better efficiency, and the use of heat-resistant alloys, with light weight and high strength properties, has greatly increased. Among the heat-resistant alloys, inconel and titanium alloys have characteristics of high temp high strength and low heat conductivity, which causes problems such as thermal shock, work hardening and vibrations due to high concentration of cutting heat during machining; and shorter tool life and lower productivity due to chipping and sudden breakage. To meet these challenges, KORLOY has developed the MSD Plus-S, specialized for inconel and titanium machining, designed to greatly improve machinability and tool life.

The **MSD Plus-S** prevents chipping and sudden breakage with notch-control cutting edges and special edge preparation. Wide chip pockets and the optimized tip flank design significantly improve chip and heat evacuation. This boosts productivity with stable machining even in high temp cutting conditions.

The new grade **PC325T** features stable tool life with excellent heat resistance and oxidation resistance, its exceptional surface finish minimizes built-up edges while smooth chip flow reduces the cutting load at high temperature.

We assure our customers that the MSD Plus-S is the next-generation solution for hole making of components made of inconel & titanium in the aerospace, power generation and energy industries.

» Applying cutting edge with low cutting load and special treatment on it

- Excellent chip control
- Enhancing stable cutting

» Solving troubles in Inconel cutting

- Preventing chipping on the cutting edge and fracture of tools
- Maximizing tool life and cutting performance

» New coating application

- Stable machining even at the maximum high temperature
- Exclusive HRSA hole making grave with excellent wear resistance and chipping resistance at high temperature

» Longer tool life

- Increased productivity and reduced tool cost



Code system

Special type

MSDP(H)	060	-	5	S	-	100L	-	6S

Mach Solid Drill Plus

Oil hole
None : MSDP
With oil holes : MSDPH

Drill dia.
060 : Ø6.0
One decimal place marked (00.0)

Standard type
Aspect ratio (L/D)

Special type
Flute length
100 : 100mm

Machining area
S : HRSA

Overall length
100L : 100mm

Shank dia.
6S : Ø6

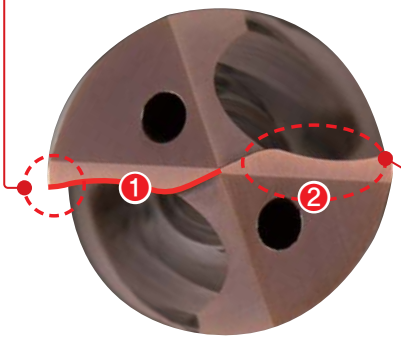
Features

3D, 5D

- Specially prepared cutting edges and optimized blade design prevent chipping and sudden tool breakage
- Optimized tip flank design improves heat evacuation

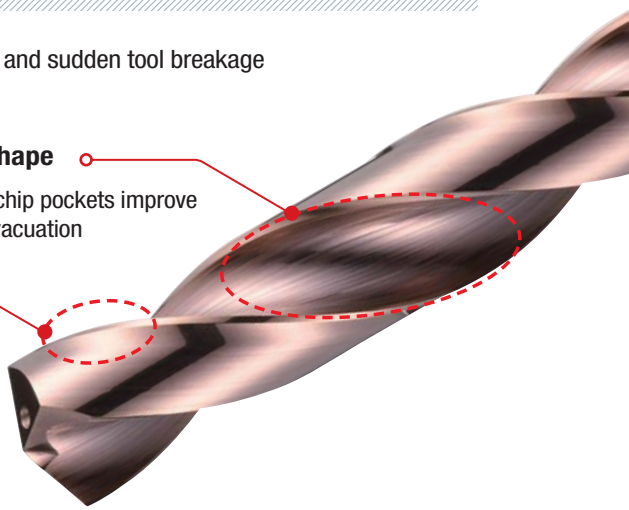
Optimal margin and back-tapered design

- Reduced friction resistance and cutting temperature



Flute shape

- Wider chip pockets improve chip evacuation



Cutting edge design

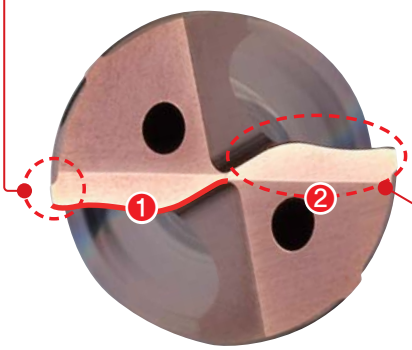
- Notch-control blade design and specially treated cutting edges prevent chipping and breakage
  ① Cutting edges designed for low cutting resistance
  ② Tip relief angle and shape optimized for heat evacuation

8D, 10D New

- Enhancing chip evacuation and preventing fracture of tool from proper design of flute for deep hole drilling

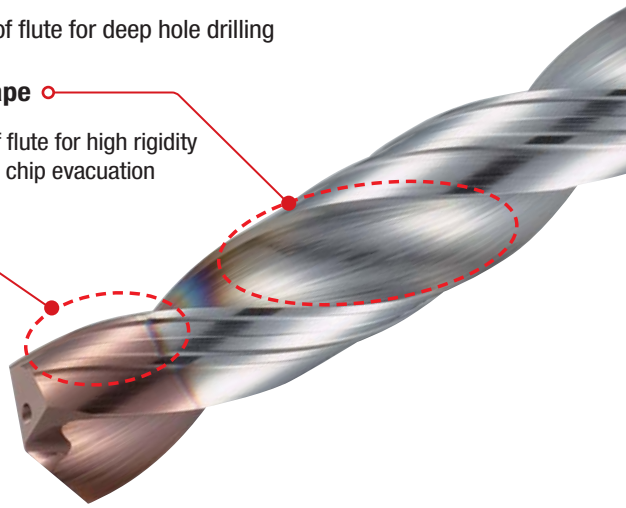
Optimal margin and back-tapered design

- Reduced friction resistance and cutting temperature
- Realized cutting stability by applying double margin



Flute shape

- Design of flute for high rigidity and good chip evacuation



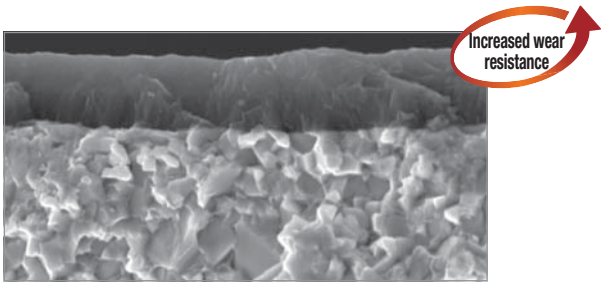
Cutting edge design

- Designing cutting edge for chip shape control and applying optimal cutting edge treatment
  ① Proper chip shape and cutting edge for low cutting resistance
  ② Tip relief angle and shape optimized for heat evacuation

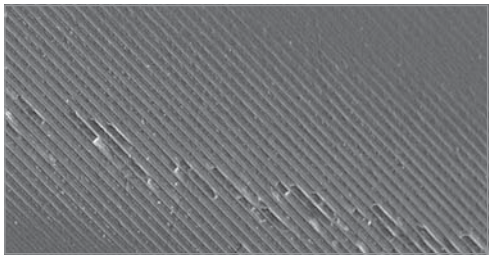
Features

The new grade PC325T

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



[PC325T]



[Smooth coating surface]

Recommended cutting condition

Workpiece			Hardness (HRC)	Grade	Depth of cut	Cutting speed vc (m/min)	Feed rate (mm/rev) per Drill dia. (mm)			
ISO	Workpiece material						Ø3.0~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0	Ø12.1~Ø16.0
S	HRSA (INCONEL718 and etc.)	Fe-base	25~35	PC325T	3D, 5D	25~30	0.055~0.07	0.07~0.10	0.08~0.13	0.10~0.15
					8D, 10D	20~25	0.06~0.08	0.08~0.13	0.11~0.15	0.13~0.17
		Ni or Co base	35~45	PC325T	3D, 5D	20~25	0.045~0.06	0.06~0.09	0.07~0.12	0.09~0.14
					8D, 10D	15~20	0.05~0.07	0.07~0.12	0.10~0.14	0.12~0.16
	Titanium alloy (Ti-6Al-4V and etc.)	Pure titanium	10~15	PC325T	3D, 5D	40~50	0.07~0.11	0.09~0.14	0.12~0.18	0.16~0.23
					8D, 10D	40~50	0.07~0.11	0.09~0.14	0.12~0.18	0.16~0.23
		□ and □ alloys	35~45	PC325T	3D, 5D	30~40	0.05~0.09	0.07~0.12	0.10~0.16	0.14~0.21
					8D, 10D	30~40	0.05~0.09	0.07~0.12	0.10~0.16	0.14~0.21

※ The recommended cutting condition above is for applying internal coolant.

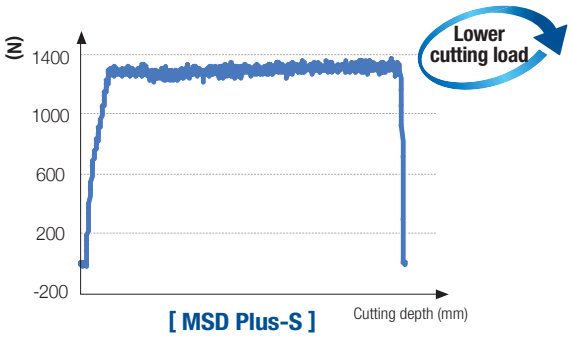
Performance Evaluation

Cutting load

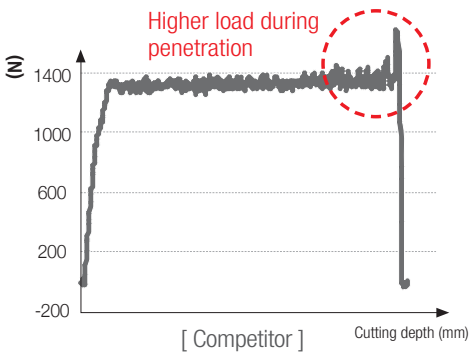
Workpiece	Inconel (Inconel718, HRC40~45)
Cutting condition	vc (m/min) = 20, fn (mm/rev) = 0.09, ap (mm) = 25, Wet
Tool	MSDPH060-5S (Tool dia. = Ø6.0mm, PC325T)

MSD Plus-S
Average thrust: 1300N, Standard deviation: 25

Competitor
Average thrust : 1350N, Standard deviation: 45



[MSD Plus-S]



[Competitor]

Performance Evaluation

Surface roughness

Workpiece	Inconel (Inconel718, HRC40~45)
Cutting condition	vc (m/min) = 20, fn (mm/rev) = 0.09, ap (mm) = 30, Wet
Tool	MSDPH100-5S (Tool dia. = Ø10.0mm, PC325T)

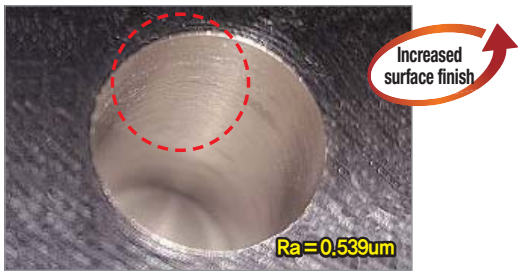


[MSD Plus-S]

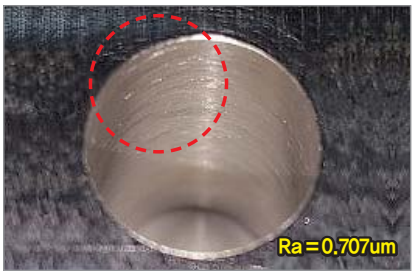


[Competitor]

Workpiece	Titanium (Ti-6Al-4V, HRC42~47)
Cutting condition	vc (m/min) = 40, fn (mm/rev) = 0.09, ap (mm) = 30, Wet
Tool	MSDPH100-5S (Tool dia. = Ø10.0mm, PC325T)



[MSD Plus-S]



[Competitor]

Chip control

Workpiece	Inconel (Inconel718, HRC40~45)
Cutting condition	vc (m/min) = 20, fn (mm/rev) = 0.09, ap (mm) = 30, Wet
Tool	MSDPH100-5S (Tool dia. = Ø10.0mm, PC325T)



[MSD Plus-S]



[Competitor]

Workpiece	Titanium (Ti-6Al-4V, HRC42~47)
Cutting condition	vc (m/min) = 40, fn (mm/rev) = 0.09, ap (mm) = 25, Wet
Tool	MSDPH100-5S (Tool dia. = Ø10.0mm, PC325T)



[MSD Plus-S]



[Competitor]

Workpiece	Titanium (Ti-6Al-4V, HRC50)
Cutting condition	vc (m/min) = 40, fn (mm/rev) = 0.09, ap (mm) = 60, Wet
Tool New	MSDPH060-10S (Tool dia. = Ø6.0mm, PC325T)



[MSD Plus-S]



[Competitor]

» Regular chip shape due to optimal cutting edge shape

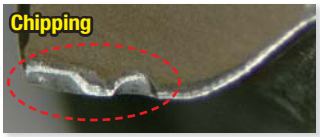
Application Examples

Inconel718 (HRC40~45)

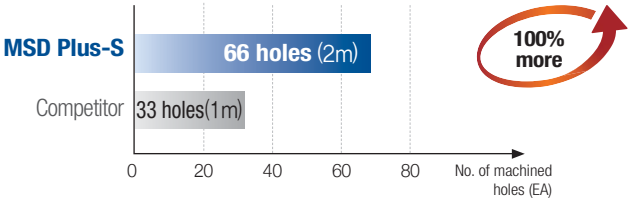
Workpiece	Aircraft parts (turbine disks, turbine shafts, etc.) and components used in the power generation industry
Cutting condition	vc (m/min) = 20, fn (mm/rev) = 0.09, ap (mm) = 30, Wet
Tool	MSDPH060-5S (Tool dia. = Ø6.0mm)



[MSD Plus-S]



[Competitor]



» Stable machining and 100% longer max. tool life compared to the competitor

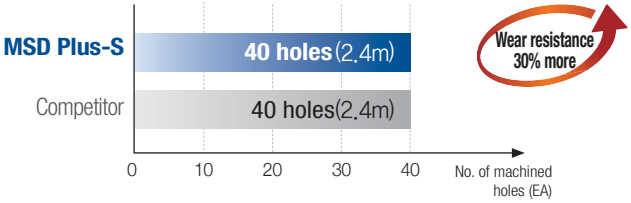
Cutting condition	vc (m/min) = 20, fn (mm/rev) = 0.09, ap (mm) = 60, Wet
Tool New	MSDPH060-10S (Tool dia. = Ø6.0mm)



[MSD Plus-S]



[Competitor]



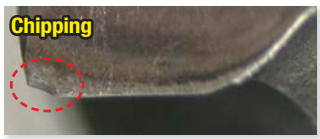
» 30% more wear resistance to the competitor

Ti-6Al-4V (HRC42~47)

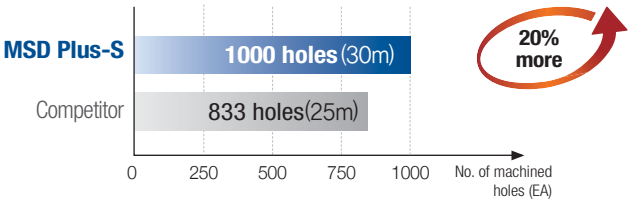
Workpiece	Aircraft parts (engines, engine housings and turbine disks) and components used in the power generation industry
Cutting condition	vc (m/min) = 40, fn (mm/rev) = 0.09, ap (mm) = 30, Wet
Tool	HSDPH060-5S (Tool dia. = Ø6.0mm)



[MSD Plus-S]



[Competitor]

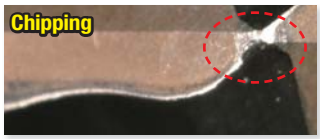


» 20% longer tool life compared to the competitor

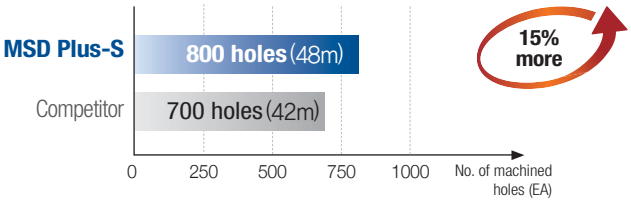
Cutting condition	vc (m/min) = 30, fn (mm/rev) = 0.09, ap (mm) = 60, Wet
Tool New	MSDPH060-10S (Tool dia. = Ø6.0mm)



[MSD Plus-S]



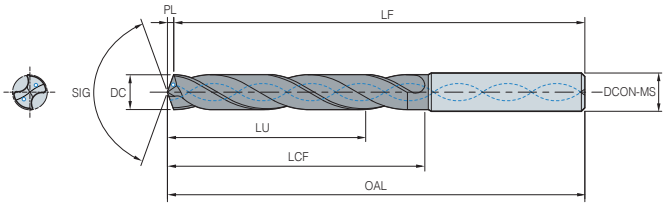
[타사]



» 15% longer tool life compared to the competitor

MSDPH-S (3D, 5D)





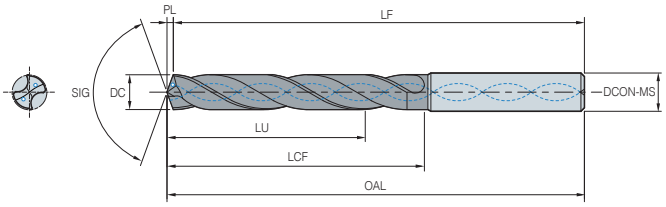
Terminology	S
Coated	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
SIG	140°
Twist angle	30°
Thinning	X Type
Coolant	Internal
Standard	DIN 6537
Shank Type	DIN 6535 HA

(mm)

Designation		DC		DCON-MS	PL	3S				5S			
		Metric	Fraction(Inch)			LU	LCF	LF	OAL	LU	LCF	LF	OAL
MSDPH	030-□S	3	-	6	0.5	9	20	61.5	62	15	28	65.5	66
	031-□S	3.1	-	6	0.6	9.3	20	61.4	62	15.5	28	65.4	66
	0318-□S	3.18	1/8	6	0.6	9.54	20	61.4	62	15.9	28	65.4	66
	032-□S	3.2	-	6	0.6	9.6	20	61.4	62	16	28	65.4	66
	033-□S	3.3	-	6	0.6	9.9	20	61.4	62	16.5	28	65.4	66
	034-□S	3.4	-	6	0.6	10.2	20	61.4	62	17	28	65.4	66
	035-□S	3.5	-	6	0.6	10.5	20	61.4	62	17.5	28	65.4	66
	0357-□S	3.57	9/64	6	0.6	10.71	20	61.4	62	17.85	28	65.4	66
	036-□S	3.6	-	6	0.7	10.8	20	61.3	62	18	28	65.3	66
	037-□S	3.7	-	6	0.7	11.1	20	61.3	62	18.5	28	65.3	66
	038-□S	3.8	-	6	0.7	11.4	24	65.3	66	19	36	73.3	74
	039-□S	3.9	-	6	0.7	11.7	24	65.3	66	19.5	36	73.3	74
	0397-□S	3.97	5/32	6	0.7	11.91	24	65.3	66	19.85	36	73.3	74
	040-□S	4	-	6	0.7	12	24	65.3	66	20	36	73.3	74
	041-□S	4.1	-	6	0.7	12.3	24	65.3	66	20.5	36	73.3	74
	042-□S	4.2	-	6	0.8	12.6	24	65.2	66	21	36	73.2	74
	043-□S	4.3	-	6	0.8	12.9	24	65.2	66	21.5	36	73.2	74
	0437-□S	4.37	11/64	6	0.8	13.11	24	65.2	66	21.85	36	73.2	74
	044-□S	4.4	-	6	0.8	13.2	24	65.2	66	22	36	73.2	74
	045-□S	4.5	-	6	0.8	13.5	24	65.2	66	22.5	36	73.2	74
	046-□S	4.6	-	6	0.8	13.8	24	65.2	66	23	36	73.2	74
	047-□S	4.7	-	6	0.9	14.1	24	65.1	66	23.5	36	73.1	74
	0476-□S	4.76	3/16	6	0.9	14.28	28	65.1	66	23.8	44	81.1	82
	048-□S	4.8	-	6	0.9	14.4	28	65.1	66	24	44	81.1	82
	049-□S	4.9	-	6	0.9	14.7	28	65.1	66	24.5	44	81.1	82
	050-□S	5	-	6	0.9	15	28	65.1	66	25	44	81.1	82
	051-□S	5.1	-	6	0.9	15.3	28	65.1	66	25.5	44	81.1	82
	0516-□S	5.16	13/64	6	0.9	15.48	28	65.1	66	25.8	44	81.1	82
	052-□S	5.2	-	6	0.9	15.6	28	65.1	66	26	44	81.1	82
	053-□S	5.3	-	6	1	15.9	28	65.0	66	26.5	44	81.0	82
	054-□S	5.4	-	6	1	16.2	28	65.0	66	27	44	81.0	82
	055-□S	5.5	-	6	1	16.5	28	65.0	66	27.5	44	81.0	82
	0556-□S	5.56	7/32	6	1	16.68	28	65.0	66	27.8	44	81.0	82
	056-□S	5.6	-	6	1	16.8	28	65.0	66	28	44	81.0	82
	057-□S	5.7	-	6	1	17.1	28	65.0	66	28.5	44	81.0	82
	058-□S	5.8	-	6	1.1	17.4	28	64.9	66	29	44	80.9	82
	059-□S	5.9	-	6	1.1	17.7	28	64.9	66	29.5	44	80.9	82
	0595-□S	5.95	15/64	6	1.1	17.85	28	64.9	66	29.75	44	80.9	82
	060-□S	6	-	6	1.1	18	28	64.9	66	30	44	80.9	82

MSDPH-S (3D, 5D)





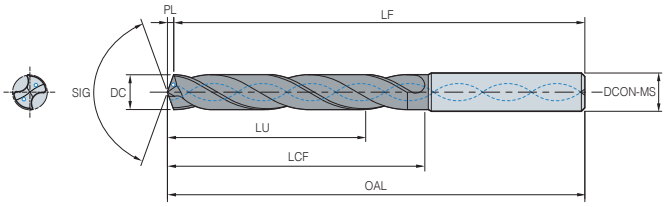
Terminology	S
Coated	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
SIG	140°
Twist angle	30°
Thinning	X Type
Coolant	Internal
Standard	DIN 6537
Shank Type	DIN 6535 HA

(mm)

Designation		DC		DCON-MS	PL	3S				5S			
		Metric	Fraction(Inch)			LU	LCF	LF	OAL	LU	LCF	LF	OAL
MSDPH	**061-□S**	6.1	-	8	1.1	18.3	34	77.9	79	30.5	53	89.9	91
	062-□S	6.2	-	8	1.1	18.6	34	77.9	79	31	53	89.9	91
	063-□S	6.3	-	8	1.1	18.9	34	77.9	79	31.5	53	89.9	91
	0635-□S	6.35	1/4	8	1.2	19.05	34	77.8	79	31.75	53	89.8	91
	064-□S	6.4	-	8	1.2	19.2	34	77.8	79	32	53	89.8	91
	065-□S	6.5	-	8	1.2	19.5	34	77.8	79	32.5	53	89.8	91
	066-□S	6.6	-	8	1.2	19.8	34	77.8	79	33	53	89.8	91
	067-□S	6.7	-	8	1.2	20.1	34	77.8	79	33.5	53	89.8	91
	0675-□S	6.75	17/64	8	1.2	20.25	34	77.8	79	33.75	53	89.8	91
	068-□S	6.8	-	8	1.2	20.4	34	77.8	79	34	53	89.8	91
	069-□S	6.9	-	8	1.3	20.7	34	77.7	79	34.5	53	89.7	91
	070-□S	7	-	8	1.3	21	34	77.7	79	35	53	89.7	91
	071-□S	7.1	-	8	1.3	21.3	41	77.7	79	35.5	53	89.7	91
	0714-□S	7.14	9/32	8	1.3	21.42	41	77.7	79	35.7	53	89.7	91
	072-□S	7.2	-	8	1.3	21.6	41	77.7	79	36	53	89.7	91
	073-□S	7.3	-	8	1.3	21.9	41	77.7	79	36.5	53	89.7	91
	074-□S	7.4	-	8	1.3	22.2	41	77.7	79	37	53	89.7	91
	075-□S	7.5	-	8	1.4	22.5	41	77.6	79	37.5	53	89.6	91
	0754-□S	7.54	19/64	8	1.4	22.62	41	77.6	79	37.7	53	89.6	91
	076-□S	7.6	-	8	1.4	22.8	41	77.6	79	38	53	89.6	91
	077-□S	7.7	-	8	1.4	23.1	41	77.6	79	38.5	53	89.6	91
	078-□S	7.8	-	8	1.4	23.4	41	77.6	79	39	53	89.6	91
	079-□S	7.9	-	8	1.4	23.7	41	77.6	79	39.5	53	89.6	91
	0794-□S	7.94	5/16	8	1.4	23.82	41	77.6	79	39.7	53	89.6	91
	080-□S	8	-	8	1.5	24	41	77.5	79	40	53	89.5	91
	081-□S	8.1	-	10	1.5	24.3	47	87.5	89	40.5	61	101.5	103
	082-□S	8.2	-	10	1.5	24.6	47	87.5	89	41	61	101.5	103
	083-□S	8.3	-	10	1.5	24.9	47	87.5	89	41.5	61	101.5	103
	0833-□S	8.33	21/64	10	1.5	24.99	47	87.5	89	41.65	61	101.5	103
	084-□S	8.4	-	10	1.5	25.2	47	87.5	89	42	61	101.5	103
	085-□S	8.5	-	10	1.5	25.5	47	87.5	89	42.5	61	101.5	103
	086-□S	8.6	-	10	1.6	25.8	47	87.4	89	43	61	101.4	103
	087-□S	8.7	-	10	1.6	26.1	47	87.4	89	43.5	61	101.4	103
	0873-□S	8.73	11/32	10	1.6	26.19	47	87.4	89	43.65	61	101.4	103
	088-□S	8.8	-	10	1.6	26.4	47	87.4	89	44	61	101.4	103
	089-□S	8.9	-	10	1.6	26.7	47	87.4	89	44.5	61	101.4	103
	090-□S	9	-	10	1.6	27	47	87.4	89	45	61	101.4	103
	091-□S	9.1	-	10	1.7	27.3	47	87.3	89	45.5	61	101.3	103
	0913-□S	9.13	23/64	10	1.7	27.39	47	87.3	89	45.65	61	101.3	103

MSDPH-S (3D, 5D)





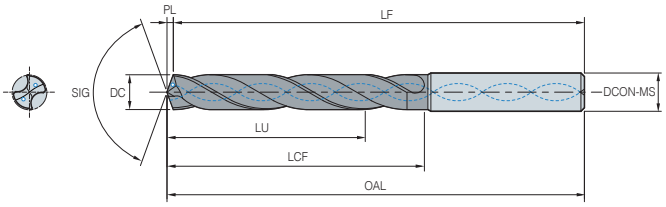
Terminology	S
Coated	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
SIG	140°
Twist angle	30°
Thinning	X Type
Coolant	Internal
Standard	DIN 6537
Shank Type	DIN 6535 HA

(mm)

Designation		DC		DCON-MS	PL	3S				5S			
		Metric	Fraction(Inch)			LU	LCF	LF	OAL	LU	LCF	LF	OAL
MSDPH	092-□S	9.2	-	10	1.7	27.6	47	87.3	89	46	61	101.3	103
	093-□S	9.3	-	10	1.7	27.9	47	87.3	89	46.5	61	101.3	103
	094-□S	9.4	-	10	1.7	28.2	47	87.3	89	47	61	101.3	103
	095-□S	9.5	-	10	1.7	28.5	47	87.3	89	47.5	61	101.3	103
	0953-□S	9.53	3/8	10	1.7	28.59	47	87.3	89	47.65	61	101.3	103
	096-□S	9.6	-	10	1.7	28.8	47	87.3	89	48	61	101.3	103
	097-□S	9.7	-	10	1.8	29.1	47	87.2	89	48.5	61	101.2	103
	098-□S	9.8	-	10	1.8	29.4	47	87.2	89	49	61	101.2	103
	099-□S	9.9	-	10	1.8	29.7	47	87.2	89	49.5	61	101.2	103
	0992-□S	9.92	25/64	10	1.8	29.76	47	87.2	89	49.6	61	101.2	103
	100-□S	10	-	10	1.8	30	47	87.2	89	50	61	101.2	103
	101-□S	10.1	-	12	1.8	30.3	55	100.2	102	50.5	71	116.2	118
	102-□S	10.2	-	12	1.9	30.6	55	100.1	102	51	71	116.1	118
	103-□S	10.3	-	12	1.9	30.9	55	100.1	102	51.5	71	116.1	118
	1032-□S	10.32	13/32	12	1.9	30.96	55	100.1	102	51.6	71	116.1	118
	104-□S	10.4	-	12	1.9	31.2	55	100.1	102	52	71	116.1	118
	105-□S	10.5	-	12	1.9	31.5	55	100.1	102	52.5	71	116.1	118
	106-□S	10.6	-	12	1.9	31.8	55	100.1	102	53	71	116.1	118
	107-□S	10.7	-	12	1.9	32.1	55	100.1	102	53.5	71	116.1	118
	1072-□S	10.72	27/64	12	2	32.16	55	100.0	102	53.6	71	116.0	118
	108-□S	10.8	-	12	2	32.4	55	100.0	102	54	71	116.0	118
	109-□S	10.9	-	12	2	32.7	55	100.0	102	54.5	71	116.0	118
	110-□S	11	-	12	2	33	55	100.0	102	55	71	116.0	118
	111-□S	11.1	-	12	2	33.3	55	100.0	102	55.5	71	116.0	118
	1111-□S	11.11	7/16	12	2	33.33	55	100.0	102	55.55	71	116.0	118
	112-□S	11.2	-	12	2	33.6	55	100.0	102	56	71	116.0	118
	113-□S	11.3	-	12	2.1	33.9	55	99.9	102	56.5	71	115.9	118
	114-□S	11.4	-	12	2.1	34.2	55	99.9	102	57	71	115.9	118
	115-□S	11.5	-	12	2.1	34.5	55	99.9	102	57.5	71	115.9	118
	1151-□S	11.51	29/64	12	2.1	34.53	55	99.9	102	57.55	71	115.9	118
	116-□S	11.6	-	12	2.1	34.8	55	99.9	102	58	71	115.9	118
	117-□S	11.7	-	12	2.1	35.1	55	99.9	102	58.5	71	115.9	118
	118-□S	11.8	-	12	2.1	35.4	55	99.9	102	59	71	115.9	118
	119-□S	11.9	-	12	2.2	35.7	55	99.8	102	59.5	71	115.8	118
	1191-□S	11.91	15/32	12	2.2	35.73	55	99.8	102	59.55	71	115.8	118
	120-□S	12	-	12	2.2	36	55	99.8	102	60	71	115.8	118
	121-□S	12.1	-	14	2.2	36.3	60	104.8	107	60.5	77	121.8	124
	122-□S	12.2	-	14	2.2	36.6	60	104.8	107	61	77	121.8	124
	123-□S	12.3	31/64	14	2.2	36.9	60	104.8	107	61.5	77	121.8	124

MSDPH-S (3D, 5D)





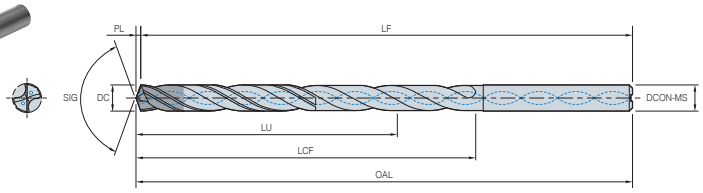
Terminology	S
Coated	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
SIG	140°
Twist angle	30°
Thinning	X Type
Coolant	Internal
Standard	DIN 6537
Shank Type	DIN 6535 HA

(mm)

Designation		DC		DCON-MS	PL	3S				5S			
		Metric	Fraction(Inch)			LU	LCF	LF	OAL	LU	LCF	LF	OAL
MSDPH	124-□S	12.4	-	14	2.3	37.2	60	104.7	107	62	77	121.7	124
	125-□S	12.5	-	14	2.3	37.5	60	104.7	107	62.5	77	121.7	124
	126-□S	12.6	-	14	2.3	37.8	60	104.7	107	63	77	121.7	124
	127-□S	12.7	1/2	14	2.3	38.1	60	104.7	107	63.5	77	121.7	124
	128-□S	12.8	-	14	2.3	38.4	60	104.7	107	64	77	121.7	124
	129-□S	12.9	-	14	2.3	38.7	60	104.7	107	64.5	77	121.7	124
	130-□S	13	-	14	2.4	39	60	104.6	107	65	77	121.6	124
	131-□S	13.1	33/64	14	2.4	39.3	60	104.6	107	65.5	77	121.6	124
	132-□S	13.2	-	14	2.4	39.6	60	104.6	107	66	77	121.6	124
	133-□S	13.3	-	14	2.4	39.9	60	104.6	107	66.5	77	121.6	124
	134-□S	13.4	-	14	2.4	40.2	60	104.6	107	67	77	121.6	124
	1349-□S	13.49	17/32	14	2.5	40.47	60	104.5	107	67.45	77	121.5	124
	135-□S	13.5	-	14	2.5	40.5	60	104.5	107	67.5	77	121.5	124
	136-□S	13.6	-	14	2.5	40.8	60	104.5	107	68	77	121.5	124
	137-□S	13.7	-	14	2.5	41.1	60	104.5	107	68.5	77	121.5	124
	138-□S	13.8	-	14	2.5	41.4	60	104.5	107	69	77	121.5	124
	139-□S	13.9	-	14	2.5	41.7	60	104.5	107	69.5	77	121.5	124
	140-□S	14	-	14	2.5	42	60	104.5	107	70	77	121.5	124
	141-□S	14.1	-	16	2.6	42.3	65	112.4	115	70.5	83	130.4	133
	142-□S	14.2	-	16	2.6	42.6	65	112.4	115	71	83	130.4	133
	1429-□S	14.29	9/16	16	2.6	42.87	65	112.4	115	71.45	83	130.4	133
	143-□S	14.3	-	16	2.6	42.9	65	112.4	115	71.5	83	130.4	133
	144-□S	14.4	-	16	2.6	43.2	65	112.4	115	72	83	130.4	133
	145-□S	14.5	-	16	2.6	43.5	65	112.4	115	72.5	83	130.4	133
	146-□S	14.6	-	16	2.7	43.8	65	112.3	115	73	83	130.3	133
	147-□S	14.7	-	16	2.7	44.1	65	112.3	115	73.5	83	130.3	133
	148-□S	14.8	-	16	2.7	44.4	65	112.3	115	74	83	130.3	133
	149-□S	14.9	-	16	2.7	44.7	65	112.3	115	74.5	83	130.3	133
	150-□S	15	-	16	2.7	45	65	112.3	115	75	83	130.3	133
	151-□S	15.1	-	16	2.7	45.3	65	112.3	115	75.5	83	130.3	133
	152-□S	15.2	-	16	2.8	45.6	65	112.2	115	76	83	130.2	133
	153-□S	15.3	-	16	2.8	45.9	65	112.2	115	76.5	83	130.2	133
	154-□S	15.4	-	16	2.8	46.2	65	112.2	115	77	83	130.2	133
	155-□S	15.5	-	16	2.8	46.5	65	112.2	115	77.5	83	130.2	133
	156-□S	15.6	-	16	2.8	46.8	65	112.2	115	78	83	130.2	133
	157-□S	15.7	-	16	2.9	47.1	65	112.1	115	78.5	83	130.1	133
	158-□S	15.8	-	16	2.9	47.4	65	112.1	115	79	83	130.1	133
	1587-□S	15.87	5/8	16	2.9	47.61	65	112.1	115	79.35	83	130.1	133
	159-□S	15.9	-	16	2.9	47.7	65	112.1	115	79.5	83	130.1	133
	160-□S	16	-	16	2.9	48	65	112.1	115	80	88	130.1	133

MSDPH-S (8D, 10D)





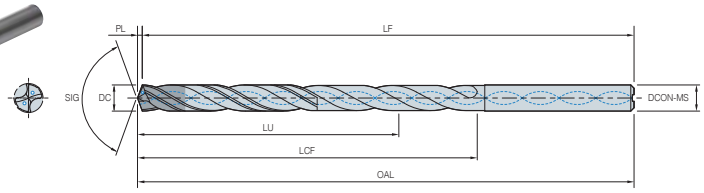
Terminology	S
Coated	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
SIG	140°
Twist angle	30°
Thinning	XR Type
Coolant	Internal

(mm)

Designation		DC		DCON-MS	PL	8S				10S			
		Metric	Fraction(Inch)			LU	LCF	LF	OAL	LU	LCF	LF	OAL
MSDPH	030-□S	3	-	6	0.5	24	33	82.5	83	30	39	88.5	89
	031-□S	3.1	-	6	0.6	24.8	38	93.4	94	31	45	101.4	102
	0318-□S	3.18	1/8	6	0.6	25.44	38	93.4	94	31.8	45	101.4	102
	032-□S	3.2	-	6	0.6	25.6	38	93.4	94	32	45	101.4	102
	033-□S	3.3	-	6	0.6	26.4	38	93.4	94	33	45	101.4	102
	034-□S	3.4	-	6	0.6	27.2	38	93.4	94	34	45	101.4	102
	035-□S	3.5	-	6	0.6	28	38	93.4	94	35	45	101.4	102
	0357-□S	3.57	9/64	6	0.6	28.56	44	93.4	94	35.7	52	101.4	102
	036-□S	3.6	-	6	0.7	28.8	44	93.3	94	36	52	101.3	102
	037-□S	3.7	-	6	0.7	29.6	44	93.3	94	37	52	101.3	102
	038-□S	3.8	-	6	0.7	30.4	44	93.3	94	38	52	101.3	102
	039-□S	3.9	-	6	0.7	31.2	44	93.3	94	39	52	101.3	102
	0397-□S	3.97	5/32	6	0.7	31.76	44	93.3	94	39.7	52	101.3	102
	040-□S	4	-	6	0.7	32	44	93.3	94	40	52	101.3	102
	041-□S	4.1	-	6	0.7	32.8	49	104.3	105	41	58	114.3	115
	042-□S	4.2	-	6	0.8	33.6	49	104.2	105	42	58	114.2	115
	043-□S	4.3	-	6	0.8	34.4	49	104.2	105	43	58	114.2	115
	0437-□S	4.37	11/64	6	0.8	34.96	49	104.2	105	43.7	58	114.2	115
	044-□S	4.4	-	6	0.8	35.2	49	104.2	105	44	58	114.2	115
	045-□S	4.5	-	6	0.8	36	49	104.2	105	45	58	114.2	115
	046-□S	4.6	-	6	0.8	36.8	55	104.2	105	46	65	114.2	115
	047-□S	4.7	-	6	0.9	37.6	55	104.1	105	47	65	114.1	115
	0476-□S	4.76	3/16	6	0.9	38.08	55	104.1	105	47.6	65	114.1	115
	048-□S	4.8	-	6	0.9	38.4	55	104.1	105	48	65	114.1	115
	049-□S	4.9	-	6	0.9	39.2	55	104.1	105	49	65	114.1	115
	050-□S	5	-	6	0.9	40	55	104.1	105	50	65	114.1	115
	051-□S	5.1	-	6	0.9	40.8	60	115.1	116	51	71	127.1	128
	0516-□S	5.16	13/64	6	0.9	41.28	60	115.1	116	51.6	71	127.1	128
	052-□S	5.2	-	6	0.9	41.6	60	115.1	116	52	71	127.1	128
	053-□S	5.3	-	6	1	42.4	60	115.0	116	53	71	127.0	128
	054-□S	5.4	-	6	1	43.2	60	115.0	116	54	71	127.0	128
	055-□S	5.5	-	6	1	44	60	115.0	116	55	71	127.0	128
	0556-□S	5.56	7/32	6	1	44.48	66	115.0	116	55.6	78	127.0	128
	056-□S	5.6	-	6	1	44.8	66	115.0	116	56	78	127.0	128
	057-□S	5.7	-	6	1	45.6	66	115.0	116	57	78	127.0	128
	058-□S	5.8	-	6	1.1	46.4	66	114.9	116	58	78	126.9	128
	0595-□S	5.95	-	6	1.1	47.2	66	114.9	116	59	78	126.9	128
	059-□S	5.95	15/64	6	1.1	47.6	66	114.9	116	59.5	78	126.9	128
	060-□S	6	-	6	1.1	48	66	114.9	116	60	78	126.9	128

MSDPH-S (8D, 10D)





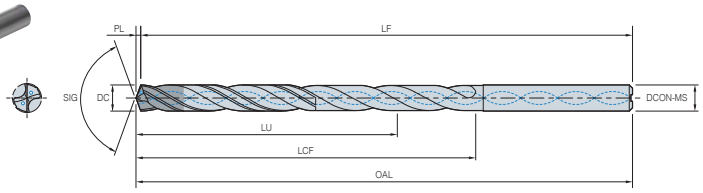
Terminology	S
Coated	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
SIG	140°
Twist angle	30°
Thinning	XR Type
Coolant	Internal

(mm)

Designation		DC		DCON-MS	PL	8S				10S			
		Metric	Fraction(Inch)			LU	LCF	LF	OAL	LU	LCF	LF	OAL
MSDPH	**061-□S**	6.1	-	8	1.1	48.8	71	125.9	127	61	84	139.9	141
	062-□S	6.2	-	8	1.1	49.6	71	125.9	127	62	84	139.9	141
	063-□S	6.3	-	8	1.1	50.4	71	125.9	127	63	84	139.9	141
	0635-□S	6.35	1/4	8	1.2	50.8	71	125.8	127	63.5	84	139.8	141
	064-□S	6.4	-	8	1.2	51.2	71	125.8	127	64	84	139.8	141
	065-□S	6.5	-	8	1.2	52	71	125.8	127	65	84	139.8	141
	066-□S	6.6	-	8	1.2	52.8	77	125.8	127	66	91	139.8	141
	067-□S	6.7	-	8	1.2	53.6	77	125.8	127	67	91	139.8	141
	0675-□S	6.75	17/64	8	1.2	54	77	125.8	127	67.5	91	139.8	141
	068-□S	6.8	-	8	1.2	54.4	77	125.8	127	68	91	139.8	141
	069-□S	6.9	-	8	1.3	55.2	77	125.7	127	69	91	139.7	141
	070-□S	7	-	8	1.3	56	77	125.7	127	70	91	139.7	141
	071-□S	7.1	-	8	1.3	56.8	82	136.7	138	71	97	152.7	154
	0714-□S	7.14	9/32	8	1.3	57.12	82	136.7	138	71.4	97	152.7	154
	072-□S	7.2	-	8	1.3	57.6	82	136.7	138	72	97	152.7	154
	073-□S	7.3	-	8	1.3	58.4	82	136.7	138	73	97	152.7	154
	074-□S	7.4	-	8	1.3	59.2	82	136.7	138	74	97	152.7	154
	075-□S	7.5	-	8	1.4	60	82	136.6	138	75	97	152.6	154
	0754-□S	7.54	19/64	8	1.4	60.32	88	136.6	138	75.4	104	152.6	154
	076-□S	7.6	-	8	1.4	60.8	88	136.6	138	76	104	152.6	154
	077-□S	7.7	-	8	1.4	61.6	88	136.6	138	77	104	152.6	154
	078-□S	7.8	-	8	1.4	62.4	88	136.6	138	78	104	152.6	154
	079-□S	7.9	-	8	1.4	63.2	88	136.6	138	79	104	152.6	154
	0794-□S	7.94	5/16	8	1.4	63.52	88	136.6	138	79.4	104	152.6	154
	080-□S	8	-	8	1.5	64	88	136.5	138	80	104	152.5	154
	081-□S	8.1	-	10	1.5	64.8	93	147.5	149	81	110	165.5	167
	082-□S	8.2	-	10	1.5	65.6	93	147.5	149	82	110	165.5	167
	083-□S	8.3	-	10	1.5	66.4	93	147.5	149	83	110	165.5	167
	0833-□S	8.33	21/64	10	1.5	66.64	93	147.5	149	83.3	110	165.5	167
	084-□S	8.4	-	10	1.5	67.2	93	147.5	149	84	110	165.5	167
	085-□S	8.5	-	10	1.5	68	93	147.5	149	85	110	165.5	167
	086-□S	8.6	-	10	1.6	68.8	99	147.4	149	86	117	165.4	167
	087-□S	8.7	-	10	1.6	69.6	99	147.4	149	87	117	165.4	167
	0873-□S	8.73	11/32	10	1.6	69.84	99	147.4	149	87.3	117	165.4	167
	088-□S	8.8	-	10	1.6	70.4	99	147.4	149	88	117	165.4	167
	089-□S	8.9	-	10	1.6	71.2	99	147.4	149	89	117	165.4	167
	090-□S	9	-	10	1.6	72	99	147.4	149	90	117	165.4	167
	091-□S	9.1	-	10	1.7	72.8	110	168.3	170	91	130	188.3	190
	0913-□S	9.13	23/64	10	1.7	73.04	110	168.3	170	91.3	130	188.3	190

MSDPH-S (8D, 10D)





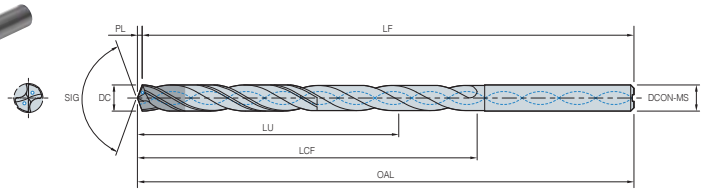
Terminology	S
Coated	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
SIG	140°
Twist angle	30°
Thinning	XR Type
Coolant	Internal

(mm)

Designation		DC		DCON-MS	PL	8S				10S			
		Metric	Fraction(Inch)			LU	LCF	LF	OAL	LU	LCF	LF	OAL
MSDPH	092-□S	9.2	-	10	1.7	73.6	110	168.3	170	92	130	188.3	190
	093-□S	9.3	-	10	1.7	74.4	110	168.3	170	93	130	188.3	190
	094-□S	9.4	-	10	1.7	75.2	110	168.3	170	94	130	188.3	190
	095-□S	9.5	-	10	1.7	76	110	168.3	170	95	130	188.3	190
	0953-□S	9.53	3/8	10	1.7	76.24	110	168.3	170	95.3	130	188.3	190
	096-□S	9.6	-	10	1.7	76.8	110	168.3	170	96	130	188.3	190
	097-□S	9.7	-	10	1.8	77.6	110	168.2	170	97	130	188.2	190
	098-□S	9.8	-	10	1.8	78.4	110	168.2	170	98	130	188.2	190
	099-□S	9.9	-	10	1.8	79.2	110	168.2	170	99	130	188.2	190
	0992-□S	9.92	25/64	10	1.8	79.36	110	168.2	170	99.2	130	188.2	190
	100-□S	10	-	10	1.8	80	110	168.2	170	100	130	188.2	190
	101-□S	10.1	-	12	1.8	80.8	121	179.2	181	101	143	201.2	203
	102-□S	10.2	-	12	1.9	81.6	121	179.1	181	102	143	201.1	203
	103-□S	10.3	-	12	1.9	82.4	121	179.1	181	103	143	201.1	203
	1032-□S	10.32	13/32	12	1.9	82.56	121	179.1	181	103.2	143	201.1	203
	104-□S	10.4	-	12	1.9	83.2	121	179.1	181	104	143	201.1	203
	105-□S	10.5	-	12	1.9	84	121	179.1	181	105	143	201.1	203
	106-□S	10.6	-	12	1.9	84.8	121	179.1	181	106	143	201.1	203
	107-□S	10.7	-	12	1.9	85.6	121	179.1	181	107	143	201.1	203
	1072-□S	10.72	27/64	12	2	85.76	121	179.0	181	107.2	143	201.0	203
	108-□S	10.8	-	12	2	86.4	121	179.0	181	108	143	201.0	203
	109-□S	10.9	-	12	2	87.2	121	179.0	181	109	143	201.0	203
	110-□S	11	-	12	2	88	121	179.0	181	110	143	201.0	203
	111-□S	11.1	-	12	2	88.8	132	190.0	192	111	156	214.0	216
	1111-□S	11.11	7/16	12	2	88.88	132	190.0	192	111.1	156	214.0	216
	112-□S	11.2	-	12	2	89.6	132	190.0	192	112	156	214.0	216
	113-□S	11.3	-	12	2.1	90.4	132	189.9	192	113	156	213.9	216
	114-□S	11.4	-	12	2.1	91.2	132	189.9	192	114	156	213.9	216
	115-□S	11.5	-	12	2.1	92	132	189.9	192	115	156	213.9	216
	1151-□S	11.51	29/64	12	2.1	92.08	132	189.9	192	115.1	156	213.9	216
	116-□S	11.6	-	12	2.1	92.8	132	189.9	192	116	156	213.9	216
	117-□S	11.7	-	12	2.1	93.6	132	189.9	192	117	156	213.9	216
	118-□S	11.8	-	12	2.1	94.4	132	189.9	192	118	156	213.9	216
	119-□S	11.9	-	12	2.2	95.2	132	189.8	192	119	156	213.8	216
	1191-□S	11.91	15/32	12	2.2	95.28	132	189.8	192	119.1	156	213.8	216
	120-□S	12	-	12	2.2	96	132	189.8	192	120	156	213.8	216
	121-□S	12.1	-	14	2.2	96.8	143	200.8	203	121	169	226.8	229
	122-□S	12.2	-	14	2.2	97.6	143	200.8	203	122	169	226.8	229
	123-□S	12.3	31/64	14	2.2	98.4	143	200.8	203	123	169	226.8	229

MSDPH-S (8D, 10D)





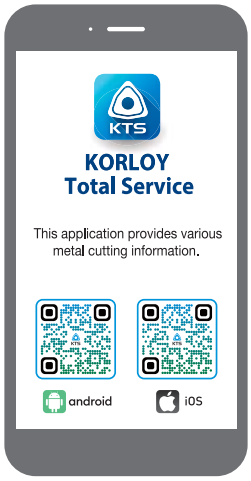
Terminology	S
Coated	PC325T
Tolerance (Drill dia.)	h7
Tolerance (Shank dia.)	h6
SIG	140°
Twist angle	30°
Thinning	XR Type
Coolant	Internal

(mm)

Designation		DC		DCON-MS	PL	8S				10S			
		Metric	Fraction(Inch)			LU	LCF	LF	OAL	LU	LCF	LF	OAL
MSDPH	124-□S	12.4	-	14	2.3	99.2	143	200.7	203	124	169	226.7	229
	125-□S	12.5	-	14	2.3	100	143	200.7	203	125	169	226.7	229
	126-□S	12.6	-	14	2.3	100.8	143	200.7	203	126	169	226.7	229
	127-□S	12.7	1/2	14	2.3	101.6	143	200.7	203	127	169	226.7	229
	128-□S	12.8	-	14	2.3	102.4	143	200.7	203	128	169	226.7	229
	129-□S	12.9	-	14	2.3	103.2	143	200.7	203	129	169	226.7	229
	130-□S	13	-	14	2.4	104	143	200.6	203	130	169	226.6	229
	131-□S	13.1	33/64	14	2.4	104.8	154	211.6	214	131	182	239.6	242
	132-□S	13.2	-	14	2.4	105.6	154	211.6	214	132	182	239.6	242
	133-□S	13.3	-	14	2.4	106.4	154	211.6	214	133	182	239.6	242
	134-□S	13.4	-	14	2.4	107.2	154	211.6	214	134	182	239.6	242
	1349-□S	13.49	17/32	14	2.5	107.92	154	211.5	214	134.9	182	239.5	242
	135-□S	13.5	-	14	2.5	108	154	211.5	214	135	182	239.5	242
	136-□S	13.6	-	14	2.5	108.8	154	211.5	214	136	182	239.5	242
	137-□S	13.7	-	14	2.5	109.6	154	211.5	214	137	182	239.5	242
	138-□S	13.8	-	14	2.5	110.4	154	211.5	214	138	182	239.5	242
	139-□S	13.9	-	14	2.5	111.2	154	211.5	214	139	182	239.5	242
	140-□S	14	-	14	2.5	112	154	211.5	214	140	182	239.5	242
	141-□S	14.1	-	16	2.6	112.8	165	222.4	225	141	195	252.4	255
	142-□S	14.2	-	16	2.6	113.6	165	222.4	225	142	195	252.4	255
	1429-□S	14.29	9/16	16	2.6	114.32	165	222.4	225	142.9	195	252.4	255
	143-□S	14.3	-	16	2.6	114.4	165	222.4	225	143	195	252.4	255
	144-□S	14.4	-	16	2.6	115.2	165	222.4	225	144	195	252.4	255
	145-□S	14.5	-	16	2.6	116	165	222.4	225	145	195	252.4	255
	146-□S	14.6	-	16	2.7	116.8	165	222.3	225	146	195	252.3	255
	147-□S	14.7	-	16	2.7	117.6	165	222.3	225	147	195	252.3	255
	148-□S	14.8	-	16	2.7	118.4	165	222.3	225	148	195	252.3	255
	149-□S	14.9	-	16	2.7	119.2	165	222.3	225	149	195	252.3	255
	150-□S	15	-	16	2.7	120	165	222.3	225	150	195	252.3	255
	151-□S	15.1	-	16	2.7	120.8	176	233.3	236	151	208	265.3	268
	152-□S	15.2	-	16	2.8	121.6	176	233.2	236	152	208	265.2	268
	153-□S	15.3	-	16	2.8	122.4	176	233.2	236	153	208	265.2	268
	154-□S	15.4	-	16	2.8	123.2	176	233.2	236	154	208	265.2	268
	155-□S	15.5	-	16	2.8	124	176	233.2	236	155	208	265.2	268
	156-□S	15.6	-	16	2.8	124.8	176	233.2	236	156	208	265.2	268
	157-□S	15.7	-	16	2.9	125.6	176	233.1	236	157	208	265.1	268
	158-□S	15.8	-	16	2.9	126.4	176	233.1	236	158	208	265.1	268
	1587-□S	15.87	5/8	16	2.9	126.96	176	233.1	236	158.7	208	265.1	268
	159-□S	15.9	-	16	2.9	127.2	176	233.1	236	159	208	265.1	268
	160-□S	16	-	16	2.9	128	176	233.1	236	160	208	265.1	268

⚠ For the safe metalcutting

- Use safety supplies such as protective gloves to prevent possible injury while touching the edge of tools.
- Use safety glasses or safety cover to hedge possible dangers. Inappropriate usage or excessive cutting condition may lead tool's breakage or even the fragment's scattering.
- Clamp the workpiece tightly enough to prevent its movement while its machining.
- Properly manage the tool change phase because the inordinately used tool can be easily broken under the excessive cutting load or severe wear, and it may threat the operator's safety.
- Use safety cover because chips evacuated during cutting are hot and sharp and may cause burns and cuts. To remove chips safely, stop machining, put on protective gloves, and use a hook or other tools.
- Prepare for fire prevention measures as the use of the non-water soluble cutting oil may cause fire.
- Use safety cover and other safety supplies because the spare parts or the tools can be pulled out due to centrifugal force while high speed machining.



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