



General Features

SumiDrill WDX type has excellent cutting balance that provides stable hole drilling on a wide range of work materials from general steel to stainless steel and aluminium alloy.

Available in three original chipbreaker styles, the WDX type features improved chip management and reduced cutting resistance for use in low rigidity set ups.

Characteristics and Applications

Design

Cutting resistance during machining is balanced between central and peripheral inserts, and the relative position of each insert are optimised to provide stable drilling.

Excellent Chip Management

A "chip control groove" in the centre of the breaker allows the direction of chip evacuation to be controlled. Three separate purpose-designed breakers drastically reduce chip troubles with a variety of different work materials in a variety of different conditions.

Economical, Four-Cornered Insert

Inserts can be used in either central or peripheral positions, with two corners for each position - a total of four corners.

Versatile Tool for a Variety of Machining Applications

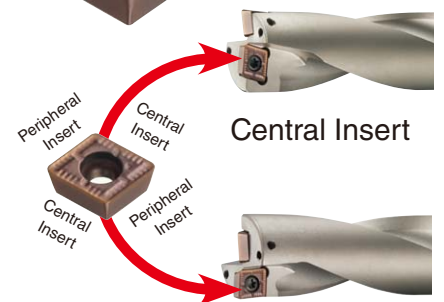
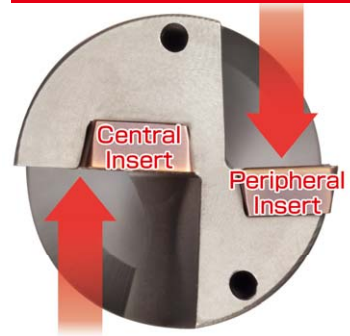
A special hard surface treatment gives added durability, allowing stable, long-term drilling in a variety of applications including hole widening, spot facing, external turning, and internal boring.

Supports Wide Range of Work Materials

Employs ACP300 with excellent fracture and wear resistance for steel and stainless steel, ACK300 for cast iron, and DL1500 with excellent adhesion resistance for non-ferrous metals.

Series	L Type	G Type		H Type
Feature	Low Feed/ Chip Management	General Purpose : For Non-ferrous metal machining		Strong Edge Type
Appearance				
Figure				

Design
Cutting resistance of central insert $\approx$
that of peripheral insert



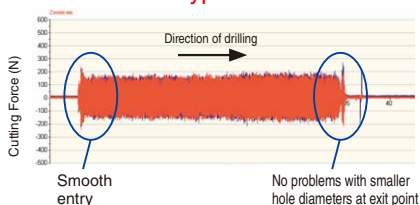
Central Insert
Peripheral Insert

Performance

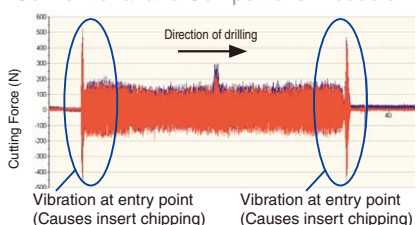
Balanced Design (Comparison of Horizontal Component Values)

Balance is maintained at the entry and exit points, and drilling is stable.

SumiDrill WDX Type



Conventional and Competitor's Products



Improved Chip Management

Drill : WDX200D3S25($\phi 20.0$)

Work Material : SUS304

Cutting Conditions : $v_c=130\text{m/min}$, $f=0.06\text{mm/rev}$

$H=50\text{mm}$, Wet

SumiDrill WDX Type

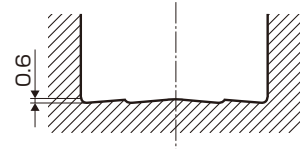


Conventional and Competitor's Products

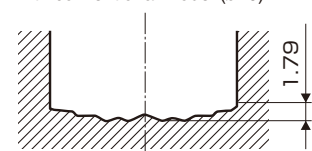


Finishing is easy because bottom of hole is almost flat

Bottom of hole after drilling with
WDX200D3S25



Bottom of hole after drilling
with conventional model ($\phi 20$)



New Insert Material AURORA coat DL1500 for Machining Non-Ferrous Metal

■ Characteristics

New insert material for machining non-ferrous metal DL1500 offers greatly improved adhesion resistance compared to conventional tools. Ideal for drilling holes in copper alloys as well as aluminium alloys.

Holder: WDX250D3S25 Insert: WDXT073506-G (DL1500) Work Material: ADC52
Cutting Conditions: $v_c=150\text{m/min}$ $f=0.10\text{mm/rev}$ $H=50\text{mm}$ (Through Hole) Wet



		ACK300	DL1500
Peripheral Insert	Rake Face		
	Relief Face		
Central Insert	Rake Face		
	Relief Face		

Drills for Deep Hole Drilling L/D = 5 (In stock from $\varnothing 13.0$ to $\varnothing 55.0$ mm)

■ Characteristics

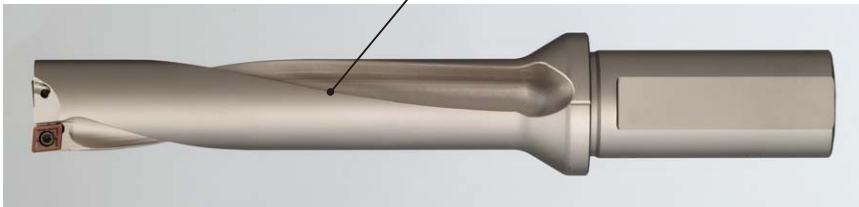
SumiDrill WDX type for 5D drilling features a specially designed groove shape + enlarged coolant hole for excellent chip evacuation even during deep hole drilling.

Large coolant hole



Coolant supply guidehole

L/D=5 Specially designed groove shape

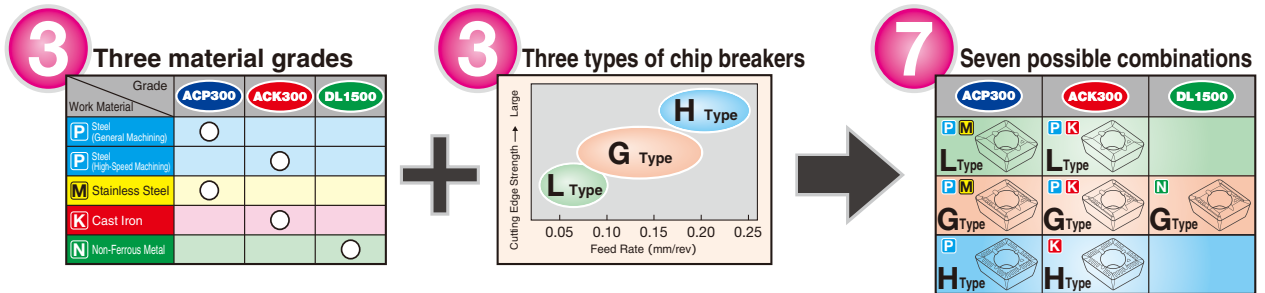


■ Performance

Characteristics	Figure	Cutting Resistance	Machined Surface (Exit)
WDX260D5S32 Special Groove Shape For L/D=5 * Designed with emphasis on chip evacuation Expanded flute design improves chip evacuation for stable drilling performance even with holes up to 5 L/D.			Good machined surface down to end of hole
WDX260D4S32 Groove Shape For L/D≤4 * Designed with emphasis on drill rigidity Flute design for greater rigidity of the drill enables stable drilling of deep holes up to 4 L/D.			Poor machined surface due to chip blockage at bottom of hole (near 5 L/D)

Insert: WDXT073506-G Work Material: SUS304
Cutting Conditions: $v_c=150\text{m/min}$ $f=0.05\text{mm/rev}$ $H=130\text{mm}$ (Through Hole) Wet

Insert Selection – WDX Type Insert Series Offers Wide Selection



2nd Recommendation

P Steel

Low Feed, Chip Management Type

L type ACP300

- For machining SS400, SCM415, SCM420, etc.
- In case of chip control problem, high speed with low feed rate is recommended.
- In case of vibration due to burnt chips, reduce the feed rate.

P Steel

Strong Edge Type

H type ACP300

- For interrupted machining (at entrance/exit) of angled surfaces, reduce the feed rate (to approximately 1/0.05) at each interruption.
- Ideal to use when the cutting edge is weakened due to machining hardened material (heat treatment)

P Steel

General Purpose

G type ACK300

- For application where severe flank wear may be caused by machining general alloy or alloy steel

P Steel

Low Feed, Chip Management Type

L type ACK300

- For low feed rate conditions

P Steel

Improvement of chip control (low-carbon steel, etc.)

P Steel

Reduction of initial chipping (caused by interrupted machining, machining hard material, etc.)

P Steel

Lack of wear resistance

1st Recommendation

Breaker

General Purpose

G type

Grade

P Steel

M Stainless Steel

For machining general steel, alloy steel or stainless steel

ACP300

K Cast Iron

For machining cast iron

ACK300

N Non-Ferrous Metal

For machining non-ferrous metals

DL1500

M Stainless Steel

Improvement of chip control

M Stainless Steel

Low feed, chip management type

L type ACP300

- L Type ACP300 is ideal to solve chip evacuation problem caused by low cutting speed and low feed rate due to facility reasons.

K Cast Iron

Reduction of initial chipping (interrupted/high feed rate machining, etc.)

K Cast Iron

Strong Edge Type

H type ACK300

- Similar to steel machining, H Type ACK300 is ideal for interrupted machining on angled surfaces.
- With strong edges, it is ideal for machining workpieces at high feed rate.

2nd Recommendation

M K

Drilling

Solid

Special

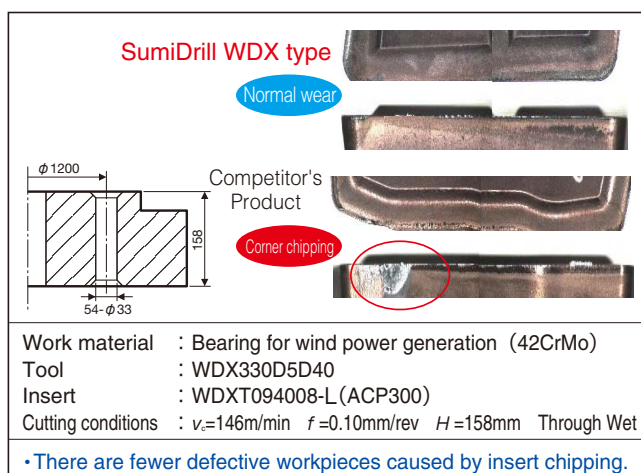
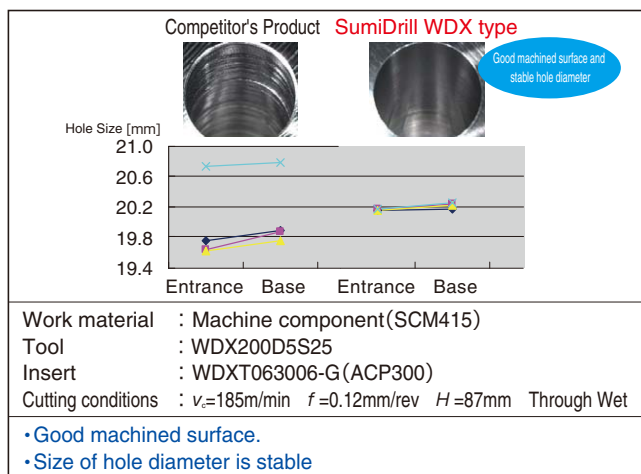
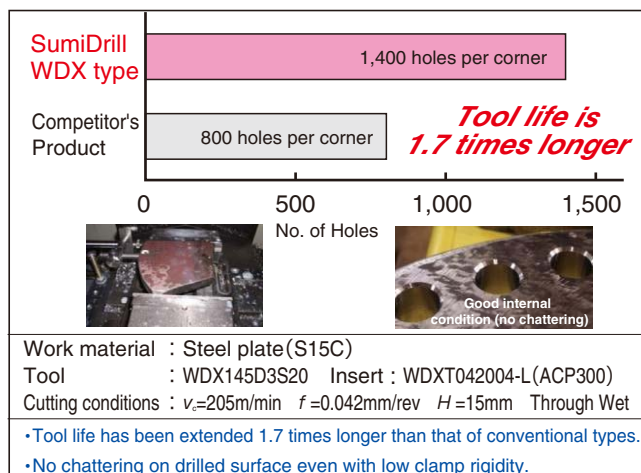
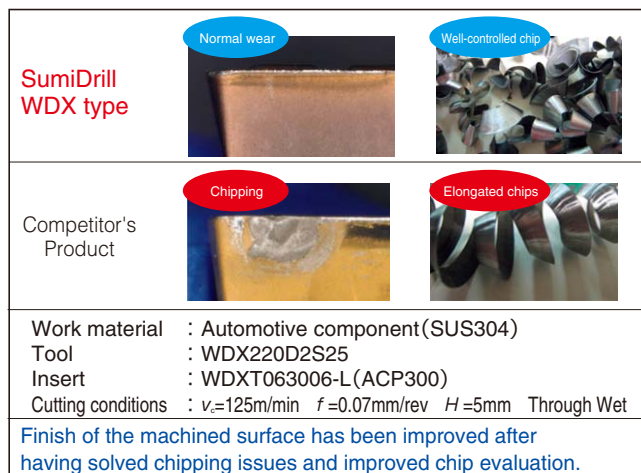
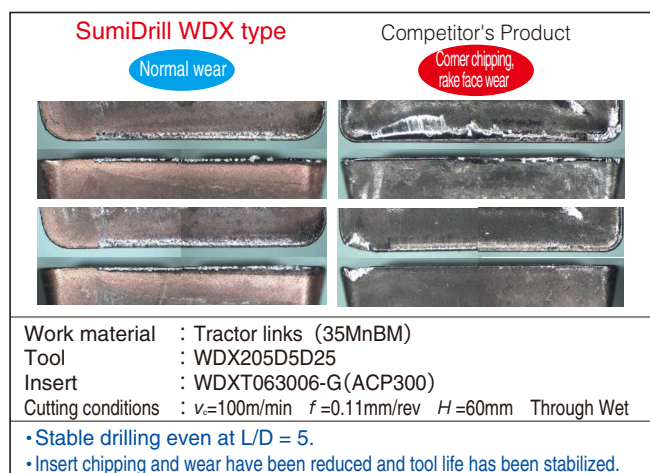
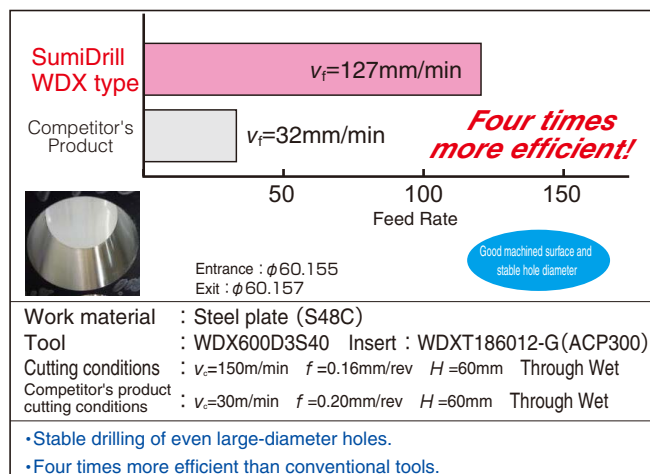
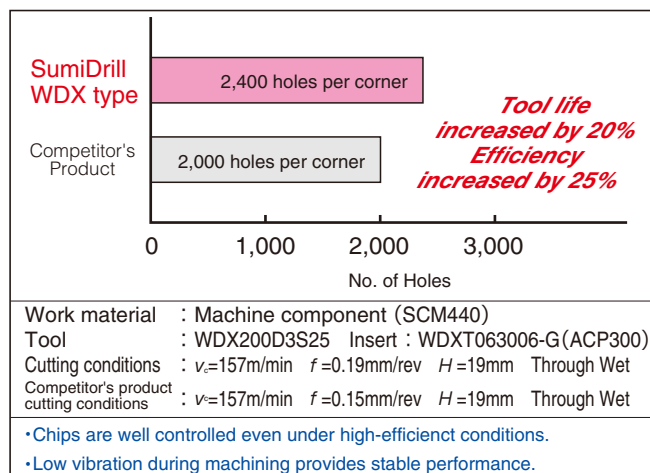
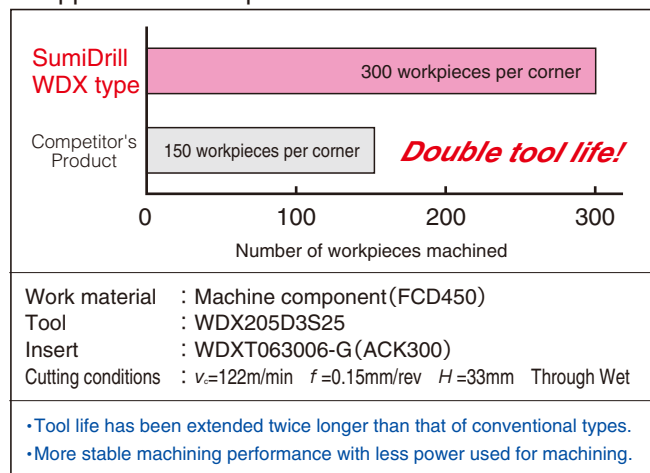
Indexable

Reamer

Brazed

Others

■ Application Examples

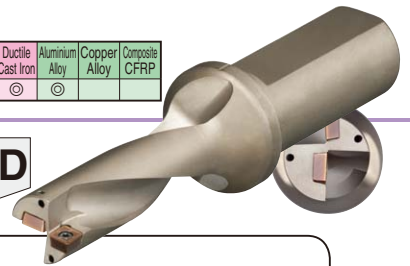


WDX Type (2D)

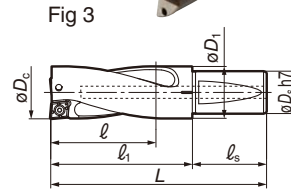
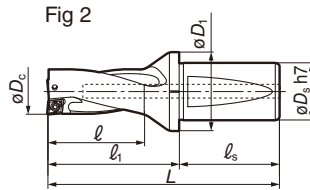
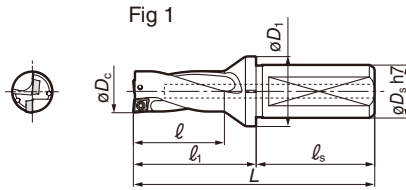
Carbon Steel, Alloy Steel Up to 0.28% C	Tempered Steel From 0.28% C	Hardened Steel Up to 49HRC From 49HRC	Stainless Steel	Ti-Alloy	Heat-resistant steels	Cast Iron	Ductile Cast Iron	Aluminum Alloy	Copper Alloy	Composite CFRP
◎	◎	○	◎	◎	◎	◎	◎	◎	◎	◎

For 2D Boring Depth

Guide for machining tolerance: -0.05 to +0.15
Maximum depth $\ell \geq 2 \times \phi D_c$



Recommended Cutting Conditions J62

■ Holder Diameter $\phi 13.0$ to $\phi 45.0$ mm (Refer to J60)

(mm)

Diameter ϕD_c	Shank Diameter ϕD_s	Cat. No.	Stock	L	ℓ	ℓ_1	ℓ_s	ϕD_1	Radial Offset (Max)	Applicable Insert	Fig
13.0	20	WDX 130D2S20	●	88	29	44			0.35		
13.5		135D2S20	●	89	30	45			0.30	WDX 042004	
14.0		140D2S20	●	90	31	46	44	28.0	0.25		
14.5		145D2S20	●	91	32	47			0.20		
15.0		150D2S20	●	92	33	48			0.15		
15.5	20	WDX 155D2S20	●	93	34	49			0.40		
16.0		160D2S20	●	94	35	50			0.40		
16.5		165D2S20	●	95	36	51			0.35	WDX 052504	
17.0		170D2S20	●	96	37	52			0.30		
17.5		175D2S25	●	109	38	53			0.25		
18.0	25	180D2S25	●	110	39	54	56	32.0	0.20		
18.5		WDX 185D2S25	●	111	40	55			0.50		
19.0		190D2S25	●	112	41	56			0.45		
19.5		195D2S25	●	113	42	57			0.40		
20.0		200D2S25	●	114	43	58			0.30	WDX 063006	
20.5	25	205D2S25	●	115	44	59	56	33.0	0.30		
21.0		210D2S25	●	116	45	60			0.20		
21.5		215D2S25	●	117	46	61			0.15		
22.0		220D2S25	●	118	47	62			0.10		
22.5		225D2S25	●	119	48	63			0.05		
23.0		WDX 230D2S25	●	123	49	67			0.70		
23.5		235D2S25	●	124	50	68			0.70		
24.0	25	240D2S25	●	125	51	69	56	37.0	0.60		
24.5		245D2S25	●	126	52	70			0.50		
25.0		250D2S25	●	127	53	71			0.50		
25.5		WDX 255D2S32	●	134	54	74			0.45	WDX 073506	
26.0		260D2S32	●	135	55	75			0.40		
26.5		265D2S32	●	136	56	76			0.35		
27.0		270D2S32	●	137	57	77	60	41.0	0.25		
27.5		275D2S32	●	138	58	78			0.20		
28.0		280D2S32	●	139	59	79			0.15		
28.5		285D2S32	●	140	60	80			0.10		
29.0		WDX 290D2S32	●	143	62	83			1.00		
29.5		295D2S32	●	144	63	84			0.95		
30.0	32	300D2S32	●	148	64	88	60		0.90		
31.0		310D2S32	●	150	66	90			0.80		
32.0		320D2S32	●	152	68	92			0.70		
30.0		WDX 300D2S40	●	158	64	88			0.90	WDX 094008	
31.0		310D2S40	●	160	66	90			0.80		
32.0		320D2S40	●	162	68	92			0.70		
33.0	40	330D2S40	●	164	70	94	70	54.0	0.55		
34.0		340D2S40	●	166	72	96			0.45		
35.0		350D2S40	●	168	74	98			0.35		
36.0		360D2S40	●	170	76	100			0.20		
37.0		WDX 370D2S40	●	179	79	109			1.00		
38.0		380D2S40	●	181	81	111			1.00		
39.0		390D2S40	●	183	83	113			0.90		
40.0		400D2S40	●	185	85	115			0.80		
41.0	40	410D2S40	●	187	87	117	70	49.5	0.70	WDX 125012	
42.0		420D2S40	●	189	89	119			0.60		
43.0		430D2S40	●	191	91	121			0.50		
44.0		440D2S40	●	193	93	123			0.50		
45.0		450D2S40	●	195	95	125			0.40		

Diameters $\phi 30$, $\phi 31$, $\phi 32$ are available in stock with shank diameters $\phi 32$ and $\phi 40$.

■ Spare Parts

Screw	Spanner	Spanner	Recommended Tightening Torque (N·m)	Applicable Holders
BFTX01604N	TRX06		0.3	WDX130D2S20 to WDX150D2S20
BFTX0204N	TRX06		0.5	WDX155D2S20 to WDX180D2S25
BFTY02206		TRD07	1.0	WDX185D2S25 to WDX225D2S25
BFTX02506N		TRD08	1.5	WDX230D2S25 to WDX285D2S32
BFTX03584		TRD15	3.5	WDX290D2S32 to WDX360D2S40
BFTX0511N		TRD20	5.0	WDX370D2S40 to WDX450D2S40
BFTX0615N		TRD25	5.0	WDX460D2S40 to WDX680D2S40

■ Holder Diameter $\phi 46.0$ to $\phi 68.0$ mm (Refer to J60)

(mm)

Diameter ϕD_c	Shank Diameter ϕD_s	Cat. No.	Stock	L	ℓ	ℓ_1	ℓ_s	ϕD_1	Radial Offset (Max)	Applicable Insert	Fig
46.0		WDX 460D2S40	●	197	97	127			1.50		
47.0		470D2S40	●	199	99	129			1.40		
48.0		480D2S40	●	201	101	131			1.30		
49.0		490D2S40	●	203	103	133			1.20		
50.0	40	500D2S40	●	205	105	135			1.10	WDX 156012	2
51.0		510D2S40	●	207	107	137			1.00		
52.0		520D2S40	●	209	109	139			0.90		
53.0		530D2S40	●	211	111	141			0.80		
54.0		540D2S40	●	213	113	143			0.60		
55.0		550D2S40	●	215	115	145			0.50		
56.0		WDX 560D2S40	●	222	120	152			2.00		
57.0		570D2S40	●	224	122	154			1.80		
58.0		580D2S40	●	226	124	156			1.70		
59.0		590D2S40	●	228	126	158			1.60		
60.0		600D2S40	●	230	128	160			1.50		
61.0		610D2S40	●	232	130	162			1.40		
62.0	40	620D2S40	●	234	132	164			1.30	WDX 186012	3
63.0		630D2S40	●	236	134	166			1.20		
64.0		640D2S40	●	238	136	168			1.00		
65.0		650D2S40	●	240	138	170			0.90		
66.0		660D2S40	●	242	140	172			0.70		
67.0		670D2S40	●	244	142	174			0.60		
68.0		680D2S40	●	246	144	176			0.50		

■ Inserts Steel Stainless Steel Cast Iron Non-Ferrous Metal Exotic Alloy Hardened Steel

Fig 4

L Type Chipbreaker
(Low feed, chip management type)

Fig 5

G Type Chipbreaker
(General purpose type)

Fig 6

H Type Chipbreaker
(Strong edge type)

Grade		Coated Carbide			Fig	Dimensions (mm)			Applicable Holders
Application	High Speed/Light			N		ℓ	Thickness	r _E	
	General Purpose								
	Roughing								
Cat. No.		ACP300	ACK300	DL1500					
WDX	042004-L	●	●		4	4.2	2.0	0.4	WDX130D2S20 to WDX150D2S20
	042004-G	●	●	●	5				
	042004-H	●	●		6				
WDX	052504-L	●	●		4	5.0	2.5	0.4	WDX155D2S20 to WDX180D2S25
	052504-G	●	●	●	5				
	052504-H	●	●		6				
WDX	063006-L	●	●		4	6.0	3.0	0.6	WDX185D2S25 to WDX225D2S25
	063006-G	●	●	●	5				
	063006-H	●	●		6				
WDX	073506-L	●	●		4	7.5	3.5	0.6	WDX230D2S25 to WDX285D2S32
	073506-G	●	●	●	5				
	073506-H	●	●		6				
WDX	094008-L	●	●		4	9.6	4.0	0.8	WDX290D2S32 to WDX360D2S40
	094008-G	●	●	●	5				
	094008-H	●	●		6				
WDX	125012-L	●	●		4	12.4	5.0	1.2	WDX370D2S40 to WDX450D2S40
	125012-G	●	●	●	5				
	125012-H	●	●		6				
WDX	156012-L	●	●		4	15.2	6.0	1.2	WDX460D2S40 to WDX550D2S40
	156012-G	●	●	●	5				
	156012-H	●	●		6				
WDX	186012-L	●	●		4	18.0	6.0	1.2	WDX560D2S40 to WDX680D2S40
	186012-G	●	●	●	5				
	186012-H	●	●		6				

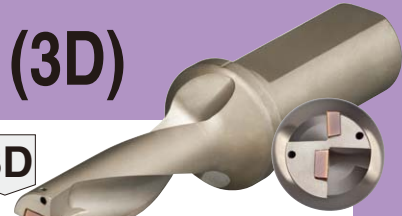
Insert Identification

J59

Carbon Steel, Alloy Steel Up to 0.28% C From 0.29%	Tempered Steel Up to 45HRC From 46HRC	Hardened Steel Up to 45HRC From 46HRC	Stainless Steel	Ti-Alloy	Heat-resistant steels	Cast Iron	Ductile Cast Iron	Aluminum Alloy	Copper Alloy	Composite CFRP
◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

SumiDrill

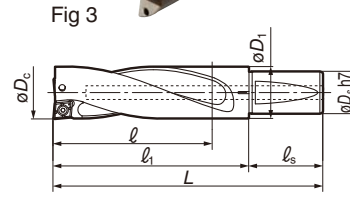
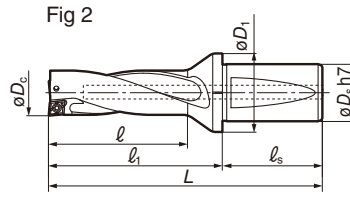
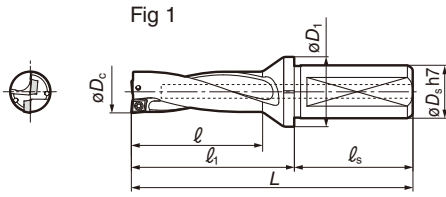
WDX Type (3D)



For 3D Boring Depth

Guide for machining tolerance: 0 to +0.20
Maximum depth $\ell \leq 3 \times \phi D_c$

Recommended Cutting Conditions **J62**



Holder Diameter $\phi 13.0$ to $\phi 45.0$ mm (Refer to J60) (mm)

Diameter ϕD_c	Shank Diameter ϕD_s	Cat. No.	Stock	L	ℓ	ℓ_1	ℓ_2	ϕD_1	Radial Offset (Max)	Applicable Insert	Fig
13.0		WDX 130D3S20	●	101.0	42.0	57.0			0.35		
13.5		135D3S20	●	102.5	43.5	58.5			0.30		
14.0	20	140D3S20	●	104.0	45.0	60.0	44	28.0	0.25	WDX 042004	
14.5		145D3S20	●	105.5	46.5	61.5			0.20		
15.0		150D3S20	●	107.0	48.0	63.0			0.15		
15.5		WDX 155D3S20	●	108.5	49.5	64.5			0.40		
16.0	20	160D3S20	●	110.0	51.0	66.0			0.40		
16.5		165D3S20	●	111.5	52.5	67.5	44	30.0	0.35	WDX 052504	
17.0		170D3S20	●	113.0	54.0	69.0			0.30		
17.5	25	175D3S25	●	126.5	55.5	70.5			0.25		
18.0		180D3S25	●	128.0	57.0	72.0	56	32.0	0.20		
18.5		WDX 185D3S25	●	129.5	58.5	73.5			0.50		
19.0		190D3S25	●	131.0	60.0	75.0			0.45		
19.5		195D3S25	●	132.5	61.5	76.5			0.40		
20.0	25	200D3S25	●	134.0	63.0	78.0			0.30	WDX 063006	
20.5		205D3S25	●	135.5	64.5	79.5	56	33.0	0.30		
21.0		210D3S25	●	137.0	66.0	81.0			0.20		
21.5		215D3S25	●	138.5	67.5	82.5			0.15		
22.0		220D3S25	●	140.0	69.0	84.0			0.10		
22.5		225D3S25	●	141.5	70.5	85.5			0.05		
23.0		WDX 230D3S25	●	146.0	72.0	90.0			0.70		
23.5	25	235D3S25	●	147.5	73.5	91.5			0.70		
24.0		240D3S25	●	149.0	75.0	93.0	56	37.0	0.60		
24.5		245D3S25	●	150.5	76.5	94.5			0.50		
25.0		250D3S25	●	152.0	78.0	96.0			0.50		
25.5		WDX 255D3S32	●	159.5	79.5	99.5			0.45	WDX 073506	
26.0		260D3S32	●	161.0	81.0	101.0			0.40		
26.5	32	265D3S32	●	162.5	82.5	102.5			0.35		
27.0		270D3S32	●	164.0	84.0	104.0	60	41.0	0.25		
27.5		275D3S32	●	165.5	85.5	105.5			0.20		
28.0		280D3S32	●	167.0	87.0	107.0			0.15		
28.5		285D3S32	●	168.5	88.5	108.5			0.10		
29.0		WDX 290D3S32	●	172.0	91.0	112.0			1.00		
29.5	32	295D3S32	●	173.5	92.5	113.5			0.95		
30.0		300D3S32	●	178.0	94.0	118.0	60		0.90		
31.0		310D3S32	●	181.0	97.0	121.0			0.80		
32.0		320D3S32	●	184.0	100.0	124.0			0.70		
30.0		WDX 300D3S40	●	188.0	94.0	118.0			0.90	WDX 094008	
31.0		310D3S40	●	191.0	97.0	121.0			0.80		
32.0	40	320D3S40	●	194.0	100.0	124.0			0.70		
33.0		330D3S40	●	197.0	103.0	127.0	70		0.55		
34.0		340D3S40	●	200.0	106.0	130.0			0.45		
35.0		350D3S40	●	203.0	109.0	133.0			0.35		
36.0		360D3S40	●	206.0	112.0	136.0			0.20		
37.0		WDX 370D3S40	●	216.0	116.0	146.0			1.00		
38.0		380D3S40	●	219.0	119.0	149.0			1.00		
39.0		390D3S40	●	222.0	122.0	152.0			0.90		
40.0	40	400D3S40	●	225.0	125.0	155.0			0.80		
41.0		410D3S40	●	228.0	128.0	158.0	70	49.5	0.70	WDX 125012	
42.0		420D3S40	●	231.0	131.0	161.0			0.60		
43.0		430D3S40	●	234.0	134.0	164.0			0.50		
44.0		440D3S40	●	237.0	137.0	167.0			0.50		
45.0		450D3S40	●	240.0	140.0	170.0			0.40		

Diameters $\phi 30$, $\phi 31$, $\phi 32$ are available in stock with shank diameters $\phi 32$ and $\phi 40$.

Spare Parts

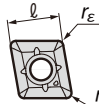
Screw	Spanner	Spanner	Recommended Tightening Torque (N·m)	Applicable Holders
BFTX01604N	TRX06		0.3	WDX130D3S20 to WDX150D3S20
BFTX0204N	TRX06		0.5	WDX155D3S20 to WDX180D3S25
BFTY02206		TRD07	1.0	WDX185D3S25 to WDX225D3S25
BFTX02506N		TRD08	1.5	WDX230D3S25 to WDX285D3S32
BFTX03584		TRD15	3.5	WDX290D3S32 to WDX360D3S40
BFTX0511N		TRD20	5.0	WDX370D3S40 to WDX450D3S40
BFTX0615N		TRD25	5.0	WDX460D3S40 to WDX680D3S40

Holder Diameter $\phi 46.0$ to $\phi 68.0$ mm (Refer to J60) (mm)

Diameter ϕD_c	Shank Diameter ϕD_s	Cat. No.	Stock	L	ℓ	ℓ_1	ℓ_2	ϕD_1	Radial Offset (Max)	Applicable Insert	Fig
46.0		WDX 460D3S40	●	243.0	143.0	173.0			1.50		
47.0		470D3S40	●	246.0	146.0	176.0			1.40		
48.0		480D3S40	●	249.0	149.0	179.0			1.30		
49.0		490D3S40	●	252.0	152.0	182.0			1.20		
50.0	40	500D3S40	●	255.0	155.0	185.0			1.10	WDX 156012	
51.0		510D3S40	●	258.0	158.0	188.0			1.00		
52.0		520D3S40	●	261.0	161.0	191.0			0.90		
53.0		530D3S40	●	264.0	164.0	194.0			0.80		
54.0		540D3S40	●	267.0	167.0	197.0			0.70		
55.0		550D3S40	●	270.0	170.0	200.0			0.60		
56.0		WDX 560D3S40	●	278.0	176.0	208.0			2.00		
57.0		570D3S40	●	281.0	179.0	211.0			1.80		
58.0		580D3S40	●	284.0	182.0	214.0			1.70		
59.0		590D3S40	●	287.0	185.0	217.0			1.60		
60.0	40	600D3S40	●	290.0	188.0	220.0			1.50		
61.0		610D3S40	●	293.0	191.0	223.0			1.40	WDX 186012	
62.0		620D3S40	●	296.0	194.0	226.0	70	60.0	1.30		
63.0		630D3S40	●	299.0	197.0	229.0			1.20		
64.0		640D3S40	●	302.0	200.0	232.0			1.00		
65.0		650D3S40	●	305.0	203.0	235.0			0.90		
66.0		660D3S40	●	308.0	206.0	238.0			0.70		
67.0		670D3S40	●	311.0	209.0	241.0			0.60		
68.0		680D3S40	●	314.0	212.0	244.0			0.50		

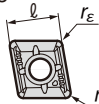
Inserts P Steel M Stainless Steel K Cast Iron N Non-Ferrous Metal S Exotic Alloy H Hardened Steel

Fig 4



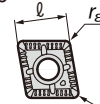
L Type Chipbreaker
(Low feed, chip management type)

Fig 5



G Type Chipbreaker
(General purpose type)

Fig 6



H Type Chipbreaker
(Strong edge type)

Grade		Coated Carbide		Fig	Dimensions (mm)			Applicable Holders
Application	High Speed/Light		N					
	General Purpose	P M						
	Roughing	P M	K					
Cat. No.		ACP300	ACK300	DL1500	ℓ	Thickness	r _E	
WDXT 042004-L		●	●	●	4	4.2	2.0	0.4
042004-G		●	●	●	5			
042004-H		●	●	●	6			
WDXT 052504-L		●	●	●	4	5.0	2.5	0.4
052504-G		●	●	●	5			
052504-H		●	●	●	6			
WDXT 063006-L		●	●	●	4	6.0	3.0	0.6
063006-G		●	●	●	5			
063006-H		●	●	●	6			
WDXT 073506-L		●	●	●	4	7.5	3.5	0.6
073506-G		●	●	●	5			
073506-H		●	●	●	6			
WDXT 094008-L		●	●	●	4	9.6	4.0	0.8
094008-G		●	●	●	5			
094008-H		●	●	●	6			
WDXT 125012-L		●	●	●	4	12.4	5.0	1.2
125012-G		●	●	●	5			
125012-H		●	●	●	6			
WDXT 156012-L		●	●	●	4	15.2	6.0	1.2
156012-G		●	●	●	5			
156012-H		●	●	●	6			
WDXT 186012-L		●	●	●	4	18.0	6.0	1.2
186012-G		●	●	●	5			
186012-H		●	●	●	6			

WDX Type (4D)

Carbon Steel, Alloy Steel	Tempered Steel	Hardened Steel	Stainless Steel	Ti-Alloy	Heat-resistant steel	Cast Iron	Ductile Cast Iron	Aluminum Alloy	Copper Alloy	Composite CFRP
Up to 0.28%	From 0.28%	Up to 49HRC	From 49HRC							

For 4D Boring Depth

Guide for machining tolerance: 0 to +0.25
Maximum depth $\ell \ 4 \times \phi D_c$

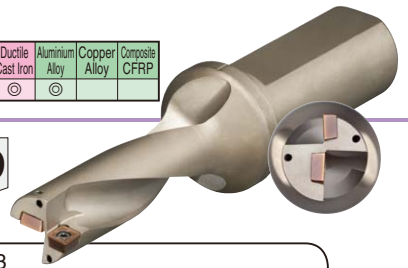
Recommended Cutting Conditions **J63**

Fig 1

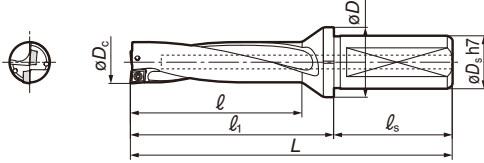


Fig 2

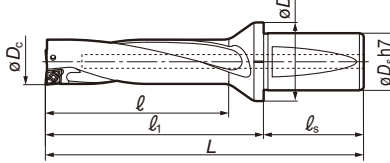
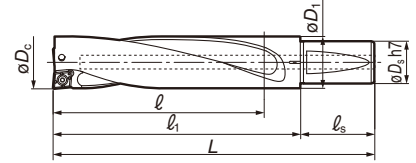


Fig 3

■ Holder Diameter $\phi 13.0$ to $\phi 45.0$ mm (Refer to J60) (mm)

Diameter ϕD_c	Shank Diameter ϕD_s	Cat. No.	Stock	L	ℓ	ℓ_1	ℓ_s	ϕD_1	Radial Offset (Max)	Applicable Insert	Fig
13.0		WDX 130D4S20	●	114	55	70			0.35		
13.5		135D4S20	●	116	57	72			0.30		
14.0	20	140D4S20	●	118	59	74	44	28.0	0.25	WDX 042004	
14.5		145D4S20	●	120	61	76			0.20		
15.0		150D4S20	●	122	63	78			0.15		
15.5		WDX 155D4S20	●	124	65	80			0.40		
16.0	20	160D4S20	●	126	67	82	44	30.0	0.40	WDX 052504	
16.5		165D4S20	●	128	69	84			0.35		
17.0		170D4S20	●	130	71	86			0.30		
17.5	25	175D4S25	●	144	73	88	56	32.0	0.25		
18.0		180D4S25	●	146	75	90			0.20		
18.5		WDX 185D4S25	●	148	77	92			0.50		
19.0	25	190D4S25	●	150	79	94	56	33.0	0.45	WDX 063006	1
19.5		195D4S25	●	152	81	96			0.40		
20.0		200D4S25	●	154	83	98			0.30		
20.5		205D4S25	●	156	85	100	56	33.0	0.30		
21.0		210D4S25	●	158	87	102			0.20		
21.5		215D4S25	●	160	89	104			0.15		
22.0		220D4S25	●	162	91	106			0.10		
22.5		225D4S25	●	164	93	108			0.05		
23.0		WDX 230D4S25	●	169	95	113			0.70		
23.5	25	235D4S25	●	171	97	115	56	37.0	0.70		
24.0		240D4S25	●	173	99	117			0.60		
24.5		245D4S25	●	175	101	119			0.50		
25.0		250D4S25	●	177	103	121			0.50		
25.5		WDX 255D4S32	●	185	105	125			0.45	WDX 073506	
26.0		260D4S32	●	187	107	127			0.40		
26.5		265D4S32	●	189	109	129			0.35		
27.0	32	270D4S32	●	191	111	131	60	41.0	0.25		
27.5		275D4S32	●	193	113	133			0.20		
28.0		280D4S32	●	195	115	135			0.15		
28.5		285D4S32	●	197	117	137			0.10		
29.0		WDX 290D4S32	●	201	120	141			1.00		
29.5	32	295D4S32	●	203	122	143	60	50.0	0.95		
30.0		300D4S32	●	208	124	148			0.90		
31.0		310D4S32	●	212	128	152			0.80		
32.0		320D4S32	●	216	132	156			0.70		
30.0		WDX 300D4S40	●	218	124	148			0.90	WDX 094008	2
31.0		310D4S40	●	222	128	152			0.80		
32.0	40	320D4S40	●	226	132	156	70	54.0	0.70		
33.0		330D4S40	●	230	136	160			0.55		
34.0		340D4S40	●	234	140	164			0.45		
35.0		350D4S40	●	238	144	168			0.35		
36.0		360D4S40	●	242	148	172			0.20		
37.0		WDX 370D4S40	●	253	153	183			1.00		
38.0		380D4S40	●	257	157	187			1.00		
39.0		390D4S40	●	261	161	191			0.90		
40.0		400D4S40	●	265	165	195			0.80		
41.0	40	410D4S40	●	269	169	199	70	49.5	0.70	WDX 125012	
42.0		420D4S40	●	273	173	203			0.60		
43.0		430D4S40	●	277	177	207			0.50		
44.0		440D4S40	●	281	181	211			0.50		
45.0		450D4S40	●	285	185	215			0.40		

Diameters $\phi 30$, $\phi 31$, $\phi 32$ are available in stock with shank diameters $\phi 32$ and $\phi 40$.

■ Spare Parts

Screw	Spanner	Spanner	Recommended Tightening Torque (N·m)	Applicable Holders
BFTX01604N	TRX06		0.3	WDX130D4S20 to WDX150D4S20
BFTX0204N	TRX06		0.5	WDX155D4S20 to WDX180D4S25
BFTY02206		TRD07	1.0	WDX185D4S25 to WDX225D4S25
BFTX02506N		TRD08	1.5	WDX230D4S25 to WDX285D4S32
BFTX03584		TRD15	3.5	WDX290D4S32 to WDX360D4S40
BFTX0511N		TRD20	5.0	WDX370D4S40 to WDX450D4S40
BFTX0615N		TRD25	5.0	WDX460D4S40 to WDX630D4S40

■ Holder Diameter $\phi 46.0$ to $\phi 63.0$ mm (Refer to J60) (mm)

Diameter ϕD_c	Shank Diameter ϕD_s	Cat. No.	Stock	L	ℓ	ℓ_1	ℓ_s	ϕD_1	Radial Offset (Max)	Applicable Insert	Fig
46.0		WDX 460D4S40	●	289	189	219			1.50		
47.0		470D4S40	●	293	193	223			1.40		
48.0		480D4S40	●	297	197	227			1.30		
49.0		490D4S40	●	301	201	231			1.20		
50.0	40	500D4S40	●	305	205	235	70	49.5	1.10	WDX 156012	2
51.0		510D4S40	●	309	209	239			1.00		
52.0		520D4S40	●	313	213	243			0.90		
53.0		530D4S40	●	317	217	247			0.80		
54.0		540D4S40	●	321	221	251			0.60		
55.0		550D4S40	●	325	225	255			0.50		
56.0		WDX 560D4S40	●	334	232	264			2.00		
57.0		570D4S40	●	338	236	268			1.80		
58.0		580D4S40	●	342	240	272			1.70		
59.0	40	590D4S40	●	346	244	276	70	54.0	1.60	WDX 186012	3
60.0		600D4S40	●	350	248	280			1.50		
61.0		610D4S40	●	354	252	284			1.40		
62.0		620D4S40	●	358	256	288			1.30		
63.0		630D4S40	●	362	260	292			1.20		

■ Inserts **P** Steel **M** Stainless Steel **K** Cast Iron **N** Non-Ferrous Metal **S** Exotic Alloy **H** Hardened Steel

Fig 4



L Type Chipbreaker
(Low feed, chip management type)

Fig 5



G Type Chipbreaker
(General purpose type)

Fig 6



H Type Chipbreaker
(Strong edge type)

Grade		Coated Carbide		Fig	Dimensions (mm)		Applicable Holders	
Application	High Speed/Light							
	General Purpose							
	Roughing							
Cat. No.		ACP300	ACK300	DL1500	Fig			
					l	Thickness	r _ε	WDX130D4S20 to WDX150D4S20
WDXT 042004-L		●	●		4	4.2	2.0	
042004-G		●	●	●	5			
042004-H		●	●		6			
WDXT 052504-L		●	●	●	4	5.0	2.5	WDX155D4S20 to WDX180D4S25
052504-G		●	●	●	5			
052504-H		●	●		6			
WDXT 063006-L		●	●		4	6.0	3.0	WDX185D4S25 to WDX225D4S25
063006-G		●	●	●	5			
063006-H		●	●		6			
WDXT 073506-L		●	●	●	4	7.5	3.5	WDX230D4S25 to WDX285D4S32
073506-G		●	●	●	5			
073506-H		●	●		6			
WDXT 094008-L		●	●		4	9.6	4.0	WDX290D4S32 to WDX360D4S40
094008-G		●	●	●	5			
094008-H		●	●		6			
WDXT 125012-L		●	●	●	4	12.4	5.0	WDX370D4S40 to WDX450D4S40
125012-G		●	●	●	5			
125012-H		●	●		6			
WDXT 156012-L		●	●		4	15.2	6.0	WDX460D4S40 to WDX550D4S40
156012-G		●	●	●	5			
156012-H		●	●		6			
WDXT 186012-L		●	●		4	18.0	6.0	WDX560D4S40 to WDX630D4S40
186012-G		●	●	●	5			
186012-H		●	●		6			

Insert Identification **J59**

Carbon Steel	Alloy Steel	Tempered Steel	Hardened Steel	Stainless Steel	Ti-Alloy	Heat-treated steels	Cast Iron	Ductile Cast Iron	Aluminum Alloy	Copper Alloy	Composite CFRP
Up to 0.28%	Up to 0.28%	Up to 0.28%	Up to 0.28%	Up to 0.28%	Up to 0.28%	Up to 0.28%	Up to 0.28%	Up to 0.28%	Up to 0.28%	Up to 0.28%	Up to 0.28%

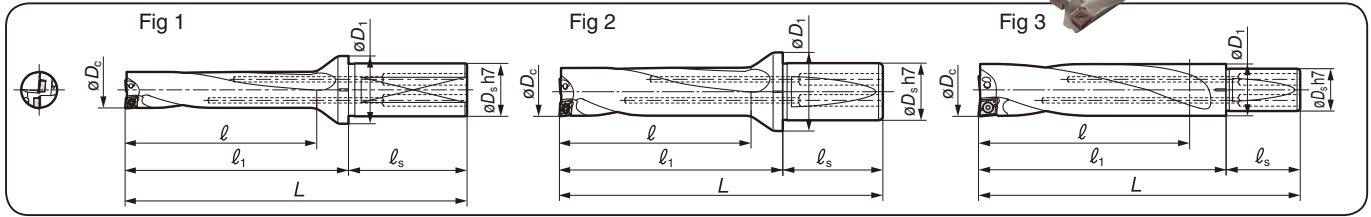
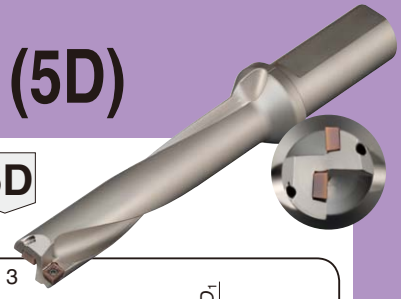
SumiDrill

WDX Type (5D)

Max.Depth: 5D

Guide for machining tolerance: 0 to +0.25
Maximum depth $\ell \times \phi D_c$

Recommended Cutting Conditions **J63**



Holder Diameter $\phi 13.0$ to $\phi 45.0$ mm (Refer to J60)

(mm)

Diameter ϕD_c	Shank Diameter ϕD_s	Cat. No.	Stock	L	ℓ	ℓ_1	ℓ_s	ϕD_1	Radial Offset (Max)	Applicable Insert	Fig
13.0		WDX 130D5S20	●	127.0	68.0	83.0			0.35		
13.5		135D5S20	●	129.5	70.5	85.5			0.30	WDX 042004	
14.0	20.0	140D5S20	●	132.0	73.0	88.0	44	28.0	0.25		
14.5		145D5S20	●	134.5	75.5	90.5			0.20		
15.0		150D5S20	●	137.0	78.0	93.0			0.15		
15.5		WDX 155D5S20	●	139.5	80.5	95.5			0.40		
16.0		160D5S20	●	142.0	83.0	98.0			0.40		
16.5	20.0	165D5S20	●	144.5	85.5	100.5	44	30.0	0.35	WDX 052504	
17.0		170D5S20	●	147.0	88.0	103.0			0.30		
17.5		175D5S25	●	161.5	90.5	105.5			0.25		
18.0	25.0	180D5S25	●	164.0	93.0	108.0	56	32.0	0.20		
18.5		WDX 185D5S25	●	166.5	95.5	110.5			0.50		
19.0		190D5S25	●	169.0	98.0	113.0			0.45		
19.5		195D5S25	●	171.5	100.5	115.5			0.40		
20.0	25.0	200D5S25	●	174.0	103.0	118.0			0.30	WDX 063006	
20.5		205D5S25	●	176.5	105.5	120.5	56	33.0	0.30		
21.0		210D5S25	●	179.0	108.0	123.0			0.20		
21.5		215D5S25	●	181.5	110.5	125.5			0.15		
22.0		220D5S25	●	184.0	113.0	128.0			0.10		
22.5		225D5S25	●	186.5	115.5	130.5			0.05		
23.0		WDX 230D5S25	●	192.0	118.0	136.0			0.70		
23.5	25.0	235D5S25	●	194.5	120.5	138.5			0.70		
24.0		240D5S25	●	197.0	123.0	141.0	56	37.0	0.60	WDX 073506	
24.5		245D5S25	●	199.5	125.5	143.5			0.50		
25.0		250D5S25	●	202.0	128.0	146.0			0.50		
26.0		WDX 260D5S32	●	213.0	133.0	153.0			0.40		
27.0		270D5S32	●	218.0	138.0	158.0	60	41.0	0.25		
28.0		280D5S32	●	223.0	143.0	163.0			0.15		
29.0	32.0	WDX 290D5S32	●	230.0	149.0	170.0		50.0	1.00		
30.0		300D5S32	●	238.0	154.0	178.0	60		0.90		
31.0		310D5S32	●	243.0	159.0	183.0			0.80		
32.0		320D5S32	●	248.0	164.0	188.0			0.70		
30.0		300D5S40	●	248.0	154.0	178.0			0.90	WDX 094008	
31.0		310D5S40	●	253.0	159.0	183.0		54.0	0.80		
32.0		320D5S40	●	258.0	164.0	188.0			0.70		
33.0	40.0	330D5S40	●	263.0	169.0	193.0	70		0.55		
34.0		340D5S40	●	268.0	174.0	198.0			0.45		
35.0		350D5S40	●	273.0	179.0	203.0			0.35		
36.0		360D5S40	●	278.0	184.0	208.0			0.20		
37.0		WDX 370D5S40	●	290.0	190.0	220.0			1.00		
38.0		380D5S40	●	295.0	195.0	225.0			1.00		
39.0		390D5S40	●	300.0	200.0	230.0			0.90		
40.0	40.0	400D5S40	●	305.0	205.0	235.0			0.80	WDX 125012	
41.0		410D5S40	●	310.0	210.0	240.0	70	49.5	0.70		
42.0		420D5S40	●	315.0	215.0	245.0			0.60		
43.0		430D5S40	●	320.0	220.0	250.0			0.50		
44.0		440D5S40	●	325.0	225.0	255.0			0.50		
45.0		450D5S40	●	330.0	230.0	260.0			0.40		

Diameters $\phi 30$, $\phi 31$, $\phi 32$ are available in stock with shank diameters $\phi 32$ and $\phi 40$.

Spare Parts

Screw	Spanner	Spanner	Recommended Tightening Torque (N·m)	Applicable Holders
BFTX01604N	TRX06		0.3	WDX130D5S20 to WDX150D5S20
BFTX0204N	TRX06		0.5	WDX155D5S20 to WDX180D5S25
BFTY02206		TRD07	1.0	WDX185D5S25 to WDX225D5S25
BFTX02506N		TRD08	1.5	WDX230D5S25 to WDX285D5S32
BFTX03584		TRD15	3.5	WDX290D5S32 to WDX360D5S40
BFTX0511N		TRD20	5.0	WDX370D5S40 to WDX450D5S40
BFTX0615N		TRD25	5.0	WDX460D5S40 to WDX550D5S40

Holder Diameter $\phi 46.0$ to $\phi 55.0$ mm (Refer to J60)

(mm)

Diameter ϕD_c	Shank Diameter ϕD_s	Cat. No.	Stock	L	ℓ	ℓ_1	ℓ_s	ϕD_1	Radial Offset (Max)	Applicable Insert	Fig
46.0		WDX 460D5S40	●	335.0	235.0	265.0			1.50		
47.0		470D5S40	●	340.0	240.0	270.0			1.40		
48.0		480D5S40	●	345.0	245.0	275.0			1.30		
49.0		490D5S40	●	350.0	250.0	280.0			1.20		
50.0	40.0	500D5S40	●	355.0	255.0	285.0			1.10	WDX 156012	
51.0		510D5S40	●	360.0	260.0	290.0			1.00		
52.0		520D5S40	●	365.0	265.0	295.0			0.90		
53.0		530D5S40	●	370.0	270.0	300.0			0.80		
54.0		540D5S40	●	375.0	275.0	305.0			0.60		
55.0		550D5S40	●	380.0	280.0	310.0			0.50		

Inserts P Steel M Stainless Steel K Cast Iron N Non-Ferrous Metal S Exotic Alloy H Hardened Steel

Fig 4

L Type Chipbreaker
(Low feed, chip management type)

Fig 5

G Type Chipbreaker
(General purpose type)

Fig 6

H Type Chipbreaker
(Strong edge type)

Grade		Coated Carbide			Fig	Dimensions (mm)			Applicable Holders
Application	High Speed/Light			N					
	General Purpose	P M							
	Roughing	P M	K						
Cat. No.		ACP300	ACK300	DL1500	Fig	ℓ	Thickness	r _E	
WDX 042004-L		●	●	●	4	4.2	2.0	0.4	WDX130D5S20 to WDX150D5S20
042004-G		●	●	●	5				
042004-H		●	●	●	6				
WDX 052504-L		●	●	●	4	5.0	2.5	0.4	WDX155D5S20 to WDX180D5S25
052504-G		●	●	●	5				
052504-H		●	●	●	6				
WDX 063006-L		●	●	●	4	6.0	3.0	0.6	WDX185D5S25 to WDX225D5S25
063006-G		●	●	●	5				
063006-H		●	●	●	6				
WDX 073506-L		●	●	●	4	7.5	3.5	0.6	WDX230D5S25 to WDX285D5S32
073506-G		●	●	●	5				
073506-H		●	●	●	6				
WDX 094008-L		●	●	●	4	9.6	4.0	0.8	WDX290D5S32 to WDX360D5S40
094008-G		●	●	●	5				
094008-H		●	●	●	6				
WDX 125012-L		●	●	●	4	12.4	5.0	1.2	WDX370D5S40 to WDX450D5S40
125012-G		●	●	●	5				
125012-H		●	●	●	6				
WDX 156012-L		●	●	●	4	15.2	6.0	1.2	WDX460D5S40 to WDX550D5S40
156012-G		●	●	●	5				
156012-H		●	●	●	6				

WDX Drill Identification

WDX 200 D5 S25

Drill Diameter ($\phi 20.0$)

Flute Length L/D (5D)

Shank Size ($\phi 25.0$)

WDX Drill Insert Identification

WDX 06 30 06 -G

Width Across Flats (6.0)

Thickness x 10 (3.0)

Breaker Type

Corner Radius x 10 (0.6)

Lathe Machining Guidelines

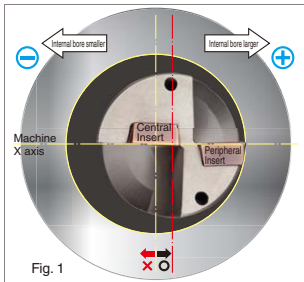


Fig. 1



Fig. 2

Drill installation

- Set the drill so that the outer insert is parallel to the machine X axis. (See Fig. 1)
- Press the end of the flanged of the drill tightly against the face of the holder when tightening the bolt.

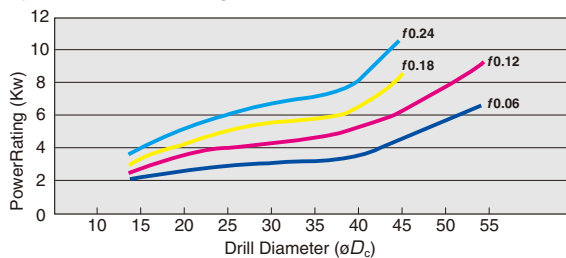
Adjusting work diameter (offset)

- The work diameter is adjustable by moving the machine X axis.
 - Make the adjustment by moving the X axis positive (enlarge the bore diameter). Moving the X axis in the negative direction (to reduce the bore diameter) is not recommended as the holder may interfere with the hole. (See Fig. 1)
 - The maximum allowable adjustment (offset) differs depending on the drill diameter.
- Refer to the **Radial Offset (Max) in the Holders charts on pages J58 to J61**.

Other notes

- When the drill is mounted on a lathe, the centre of the central insert is designed to be 0.15 to 0.2 mm below the centre of the spindle.
- If the spindle deviates off centre so far that the centre of the central insert lies above the spindle centre, the central insert will break.
- Set the depth of cut for turning or internal boring work to 1/5 or less of the drill diameter (Max 5 mm or less). (Ex: Set depth of cut to 4 mm or less for a drill diameter of $\phi 20$ mm)
- Install a cover to prevent injury from possible chip fly-out (see disc-shaped chip in Figure 2) when through boring on a lathe.

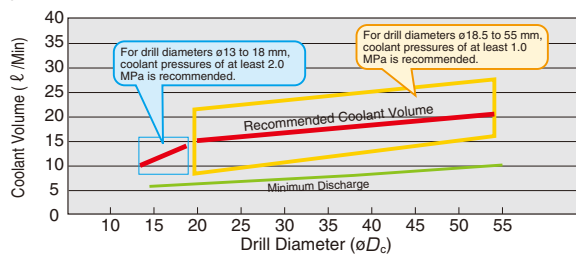
Typical Power Ratings



<CAUTIONS>

- Power ratings are subject to change based on conditions such as work material and cutting speed and should only be used for reference.
- Cutting Conditions (Reference)
Work Material: S50C (230HB)
Cutting Speed: $v_c=150$ m/min

Typical Coolant Volume



<CAUTIONS>

- Coolant volume is a factor that affects drilling performance, particularly with respect to chip evacuation and lubricity.
- Coolant pressure should be set higher for smaller diameter drills. ($\phi 18.0$ mm or smaller)
- Coolant volume is usually adjusted by changing the coolant pressure provided on most CNC machines.
- This table provides guideline values only. More coolant may be required depending on the machine, coolant, and work material.



Notes on Attaching and Removing Inserts

- Before attaching the insert, remove all traces of foreign matter on the insert seat using air or other means.
- When using the wrench, align it to the axis of the screw and press while turning. (Figure 3) If the wrench is not aligned with the screw, the insert screw will be loose and the tip of the wrench and/or the Torx hole of the screw may become deformed.
- Do not allow clearance between the insert seat and drill when attaching the insert. (Figure 4, A) Figure 4 shows a properly attached insert.

* It is normal for the outer sides of the central insert to have clearance because it is clamped at its centre, butted to the rear.

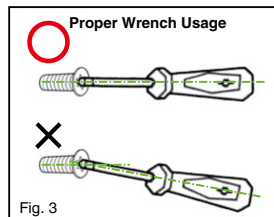


Fig. 3

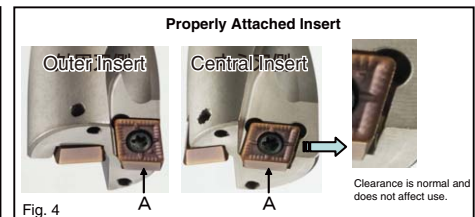


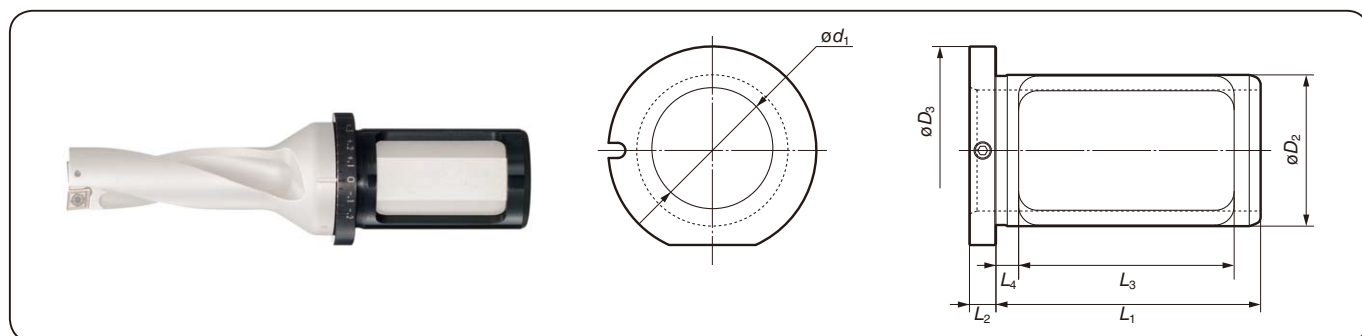
Fig. 4

Troubleshooting

Problem	Symptom	Cause	Countermeasures
Too much variation in hole diameter	Drilled hole is larger than desired	- Deflection of the holder due to high thrust force	- Decrease the feed rate to decrease the thrust force. - Make an adjustment on the X axis.
	Drilled hole is smaller than desired	- The cutting edge does not enter into the workpiece but backs off	- Increase the feed rate. - Make an adjustment on the X axis.
	Pronounced difference in hole size at entrance and bottom	- Packing of Chips	- Increase the feed rate to improve chip evacuation. - Use L type chipbreaker.
Poor or rough drilled hole surface	Poor drilled surface from entrance to bottom of hole	- High cutting resistance - Low rigidity of workpiece	- Decrease the feed rate. - Review tooling to improve rigidity.
	Poor drilled surface at bottom of hole	- Machined surfaces damaged by chips	- Increase the feed rate to improve chip evacuation. - Use L type chipbreaker.
Insert breakage	Breakage on central insert (centre)	- Improper adjustment of centre height - Insert too weak	- Adjust the height of the insert. - If the drill is being used on a lathe, try flipping the drill 180°. - Use a strong edge chipbreaker H type.
	Breakage on outer insert	- High cutting load in cutting edge	- Decrease the feed rate to decrease cutting load. - Use a strong edge chipbreaker H type.

Eccentric Sleeve WAS Type

The Eccentric Sleeve WAS Type, exclusively designed for SumiDrill WDX Type, provides ± 0.3 mm of hole size adjustment.



Body (WAS Type)

(mm)

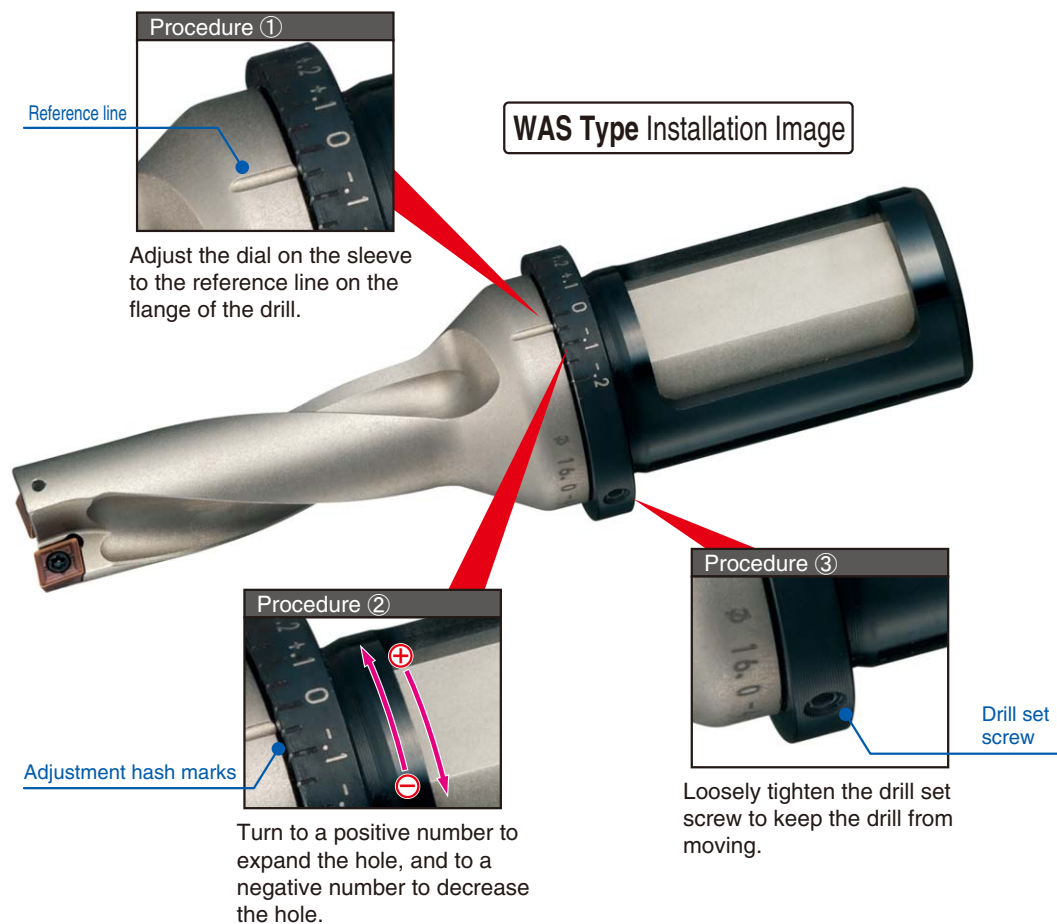
Cat. No.	Stock	ϕd_1	ϕD_2	ϕD_3	L_1	L_2	L_3	L_4	Diameter Adjustment Range
WAS 2025-48	●	20	25	33	43	5	32	5	+0.3 to -0.2
2532-60	●	25	32	42	60	7	46	6	+0.3 to -0.3
3240-70	●	32	40	55	70	7	57	6	+0.3 to -0.3
4050-85	●	40	50	60	80	7	64	6	+0.3 to -0.3

*Diameter Adjustment Range indicates the range of adjustment of the diameter.

Important Notes

1. The dial is for reference purposes. Always measure the actual drilling diameter and adjust accordingly.
2. Not usable with collet chuck type holders. Use a side-locking holder.
3. Use this product on high rigidity drilling processes .
This product is not recommended for deep hole drilling such as 5D and machining of material with low rigidity.

Uses (Diameter Adjustment Range)



■ Recommended Cutting Conditions for 2D

		Work Material	Work Hardness	Recommended Breaker	Recommended Insert Grade	v _c Cutting Speed (m/min)	f Feed Rate (mm/rev) <Min.-Optimum-Max.>				
			HB				ø13.0 to ø18.0	ø18.5 to ø29.0	ø29.5 to ø36.0	ø37.0 to ø55.0	ø56.0 to ø68.0
2D	P	Steel, Carbon Steel SS400	125	G	ACP300	120-180-240	0.05-0.08-0.10	0.05-0.08-0.10	0.05-0.08-0.11	0.05-0.08-0.12	0.06-0.09-0.13
		S15C	125	L	ACP300	130-170-220	0.04-0.08-0.12	0.04-0.08-0.12	0.04-0.08-0.13	0.05-0.10-0.15	0.06-0.11-0.17
		S45C	190	G	ACP300	100-150-200	0.08-0.13-0.24	0.08-0.13-0.24	0.08-0.14-0.26	0.09-0.16-0.29	0.10-0.17-0.32
		S45C Hardened	250	G	ACP300	80-120-160	0.06-0.11-0.18	0.06-0.11-0.18	0.06-0.12-0.19	0.07-0.13-0.22	0.08-0.14-0.24
		S75C	270	G	ACP300	100-130-160	0.08-0.13-0.22	0.08-0.13-0.22	0.08-0.14-0.23	0.09-0.16-0.26	0.10-0.17-0.29
		S75C Hardened	300	G	ACP300	70-100-140	0.06-0.11-0.17	0.06-0.11-0.17	0.06-0.12-0.18	0.07-0.13-0.20	0.08-0.14-0.22
		Low Alloy Steel SCM, SNCM	180	L	ACP300	100-140-180	0.05-0.08-0.14	0.05-0.08-0.14	0.05-0.08-0.16	0.06-0.09-0.17	0.07-0.10-0.19
		SCM, SNCM Hardened	275	G	ACP300	80-120-160	0.06-0.11-0.17	0.06-0.11-0.17	0.06-0.12-0.18	0.07-0.13-0.20	0.08-0.14-0.22
		SCM, SNCM Hardened	300	G	ACP300	75-110-140	0.06-0.11-0.17	0.06-0.11-0.17	0.06-0.12-0.18	0.07-0.13-0.20	0.08-0.14-0.22
		SCM, SNCM Hardened	350	G	ACP300	60-85-110	0.06-0.11-0.17	0.06-0.11-0.17	0.06-0.12-0.18	0.07-0.13-0.20	0.08-0.14-0.22
High Alloy Steel SKD, SKT, SKH	200	G	ACP300	100-130-160	0.08-0.13-0.24	0.08-0.13-0.24	0.08-0.14-0.26	0.09-0.16-0.29	0.10-0.17-0.32		
	SKD, SKT, SKH Hardened	325	G	ACP300	80-100-120	0.06-0.11-0.18	0.06-0.11-0.18	0.06-0.12-0.19	0.07-0.13-0.22	0.08-0.14-0.24	
M	Stainless Steel SUS403, Others (Martensite/Ferrite)	200	G	ACP300	100-140-180	0.06-0.11-0.18	0.06-0.11-0.18	0.06-0.12-0.19	0.07-0.13-0.22	0.08-0.14-0.24	
	SUS403, Others Martensitic (Hardened)	240	G	ACP300	90-120-150	0.06-0.11-0.18	0.06-0.11-0.18	0.06-0.12-0.19	0.07-0.13-0.22	0.08-0.14-0.24	
	SUS304, SUS316 Austenitic	180	G	ACP300	100-140-180	0.06-0.11-0.18	0.06-0.11-0.18	0.06-0.12-0.19	0.07-0.13-0.22	0.08-0.14-0.24	
K	Cast Iron		H	ACK300	120-160-200	0.09-0.20-0.32	0.10-0.22-0.36	0.11-0.24-0.39	0.12-0.26-0.44	0.13-0.29-0.48	
	Ductile Cast Iron		H	ACK300	90-120-150	0.09-0.20-0.32	0.10-0.22-0.36	0.11-0.24-0.39	0.12-0.26-0.44	0.13-0.29-0.48	
S	Exotic Alloy (Heat Resistant Alloy, Super Alloy, Ti Alloy, etc.)	200	G	ACP300	25-50-70	0.06-0.11-0.18	0.06-0.11-0.18	0.06-0.12-0.19	0.07-0.13-0.22	0.08-0.14-0.24	
N	Aluminium Alloy		G	DL1500	200-260-320	0.06-0.11-0.17	0.06-0.11-0.17	0.06-0.12-0.18	0.07-0.13-0.20	0.08-0.14-0.22	
	Copper Alloy		G	DL1500	180-230-280	0.06-0.11-0.17	0.06-0.11-0.17	0.06-0.12-0.18	0.07-0.13-0.20	0.08-0.14-0.22	

■ Recommended Cutting Conditions for 3D

		Work Material	Work Hardness	Recommended Breaker	Recommended Insert Grade	v _c Cutting Speed (m/min)	f Feed Rate (mm/rev) <Min.-Optimum-Max.>				
			HB				ø13.0 to ø18.0	ø18.5 to ø29.0	ø29.5 to ø36.0	ø37.0 to ø55.0	ø56.0 to ø68.0
3D	P	Steel, Carbon Steel SS400	125	G	ACP300	120-180-240	0.05-0.07-0.10	0.05-0.07-0.10	0.05-0.08-0.11	0.05-0.08-0.12	0.06-0.09-0.13
		S15C	125	L	ACP300	130-170-220	0.04-0.07-0.10	0.04-0.07-0.10	0.04-0.08-0.11	0.05-0.09-0.12	0.06-0.10-0.13
		S45C	190	G	ACP300	100-150-200	0.08-0.12-0.20	0.08-0.12-0.20	0.08-0.13-0.22	0.09-0.14-0.24	0.10-0.16-0.27
		S45C Hardened	250	G	ACP300	80-120-160	0.06-0.10-0.15	0.06-0.10-0.15	0.06-0.11-0.16	0.07-0.12-0.18	0.08-0.13-0.20
		S75C	270	G	ACP300	100-130-160	0.08-0.12-0.18	0.08-0.12-0.18	0.08-0.13-0.19	0.09-0.14-0.22	0.10-0.16-0.24
		S75C Hardened	300	G	ACP300	70-100-140	0.06-0.10-0.14	0.06-0.10-0.14	0.06-0.11-0.15	0.07-0.12-0.17	0.08-0.13-0.19
		Low Alloy Steel SCM, SNCM	180	L	ACP300	100-140-180	0.05-0.07-0.12	0.05-0.07-0.12	0.05-0.08-0.13	0.06-0.08-0.15	0.07-0.09-0.16
		SCM, SNCM Hardened	275	G	ACP300	80-120-160	0.06-0.10-0.14	0.06-0.10-0.14	0.06-0.11-0.15	0.07-0.12-0.17	0.08-0.13-0.19
		SCM, SNCM Hardened	300	G	ACP300	75-110-140	0.06-0.10-0.14	0.06-0.10-0.14	0.06-0.11-0.15	0.07-0.12-0.17	0.08-0.13-0.19
		SCM, SNCM Hardened	350	G	ACP300	60-85-110	0.06-0.10-0.14	0.06-0.10-0.14	0.06-0.11-0.15	0.07-0.12-0.17	0.08-0.13-0.19
M	High Alloy Steel SKD, SKT, SKH	SKD, SKT, SKH	200	G	ACP300	100-130-160	0.08-0.12-0.20	0.08-0.12-0.20	0.08-0.13-0.22	0.09-0.14-0.24	0.10-0.16-0.27
		SKD, SKT, SKH Hardened	325	G	ACP300	80-100-120	0.06-0.10-0.15	0.06-0.10-0.15	0.06-0.11-0.16	0.07-0.12-0.18	0.08-0.13-0.20
		Stainless Steel SUS403, Others (Martensite/Ferrite)	200	G	ACP300	100-140-180	0.06-0.10-0.15	0.06-0.10-0.15	0.06-0.11-0.16	0.07-0.12-0.18	0.08-0.13-0.20
K	SUS403, Others Martensitic (Hardened)	SUS403, Others Martensitic (Hardened)	240	G	ACP300	90-120-150	0.06-0.10-0.15	0.06-0.10-0.15	0.06-0.11-0.16	0.07-0.12-0.18	0.08-0.13-0.20
		SUS304, SUS316 Austenitic	180	G	ACP300	100-140-180	0.06-0.10-0.15	0.06-0.10-0.15	0.06-0.11-0.16	0.07-0.12-0.18	0.08-0.13-0.20
		Cast Iron		H	ACK300	120-160-200	0.09-0.18-0.27	0.10-0.20-0.30	0.11-0.22-0.32	0.12-0.24-0.36	0.13-0.26-0.40
S	Ductile Cast Iron		H	ACK300	90-120-150	0.09-0.18-0.27	0.10-0.20-0.30	0.11-0.22-0.32	0.12-0.24-0.36	0.13-0.26-0.40	
		Exotic Alloy (Heat Resistant Alloy, Super Alloy, Ti Alloy, etc.)	200	G	ACP300	25-50-70	0.06-0.10-0.15	0.06-0.10-0.15	0.06-0.11-0.16	0.07-0.12-0.18	0.08-0.13-0.20
N	Aluminium Alloy		G	DL1500	200-260-320	0.06-0.11-0.17	0.06-0.11-0.17	0.06-0.12-0.18	0.07-0.13-0.20	0.08-0.14-0.22	
		Copper Alloy		G	DL1500	180-230-280	0.06-0.11-0.17	0.06-0.11-0.17	0.06-0.12-0.18	0.07-0.13-0.20	0.08-0.14-0.22

Recommended Cutting Conditions for 4D

	Work Material	Work Hardness HB	Recommended Breaker	Recommended Insert Grade	v _c Cutting Speed (m/min)	f Feed Rate (mm/rev) <Min.-Optimum-Max.>				
						ø13.0 to ø18.0	ø18.5 to ø29.0	ø29.5 to ø36.0	ø37.0 to ø55.0	ø56.0 to ø68.0
4D	P Steel, Carbon Steel	SS400	125	G	ACP300	120-180-240	0.05-0.07-0.10	0.05-0.07-0.10	0.05-0.07-0.10	0.05-0.08-0.10
		S15C	125	L	ACP300	130-170-220	0.04-0.07-0.09	0.04-0.07-0.09	0.04-0.07-0.09	0.05-0.08-0.10
		S45C	190	G	ACP300	100-150-200	0.08-0.11-0.17	0.08-0.11-0.17	0.08-0.12-0.18	0.09-0.14-0.21
		S45C Hardened	250	G	ACP300	80-120-160	0.06-0.10-0.13	0.06-0.10-0.13	0.06-0.10-0.14	0.07-0.11-0.15
		S75C	270	G	ACP300	100-130-160	0.08-0.11-0.15	0.08-0.11-0.15	0.08-0.12-0.17	0.09-0.14-0.19
		S75C Hardened	300	G	ACP300	70-100-140	0.06-0.10-0.12	0.06-0.10-0.12	0.06-0.10-0.13	0.07-0.11-0.14
	P Low Alloy Steel	SCM, SNCM	180	L	ACP300	100-140-180	0.05-0.07-0.10	0.05-0.07-0.10	0.05-0.07-0.11	0.06-0.08-0.12
		SCM, SNCM Hardened	275	G	ACP300	80-120-160	0.06-0.10-0.12	0.06-0.10-0.12	0.06-0.10-0.13	0.07-0.11-0.14
		SCM, SNCM Hardened	300	G	ACP300	75-110-140	0.06-0.10-0.12	0.06-0.10-0.12	0.06-0.10-0.13	0.07-0.11-0.14
		SCM, SNCM Hardened	350	G	ACP300	60-85-110	0.06-0.10-0.12	0.06-0.10-0.12	0.06-0.10-0.13	0.07-0.11-0.14
	P High Alloy Steel	SKD, SKT, SKH	200	G	ACP300	100-130-160	0.08-0.11-0.17	0.08-0.11-0.17	0.08-0.12-0.18	0.09-0.14-0.21
		SKD, SKT, SKH Hardened	325	G	ACP300	80-100-120	0.06-0.10-0.13	0.06-0.10-0.13	0.06-0.10-0.14	0.07-0.11-0.15
	M Stainless Steel	SUS403, Others (Martensite/Ferrite)	200	G	ACP300	100-140-180	0.06-0.10-0.13	0.06-0.10-0.13	0.06-0.10-0.14	0.07-0.11-0.15
		SUS403, Others Martensitic (Hardened)	240	G	ACP300	90-120-150	0.06-0.10-0.13	0.06-0.10-0.13	0.06-0.10-0.14	0.07-0.11-0.15
		SUS304, SUS316 Austenitic	180	G	ACP300	100-140-180	0.06-0.10-0.13	0.06-0.10-0.13	0.06-0.10-0.14	0.07-0.11-0.15
	K Cast Iron			H	ACK300	120-160-200	0.09-0.17-0.23	0.10-0.19-0.26	0.11-0.21-0.28	0.12-0.23-0.31
		Ductile Cast Iron		H	ACK300	90-120-150	0.09-0.17-0.23	0.10-0.19-0.26	0.11-0.21-0.28	0.12-0.23-0.31
	S Exotic Alloy (Heat Resistant Alloy, Super Alloy, Ti Alloy, etc.)	200	G	ACP300	25-50-70	0.06-0.10-0.13	0.06-0.10-0.13	0.06-0.10-0.14	0.07-0.11-0.15	0.08-0.12-0.17
	N Aluminium Alloy Copper Alloy		G	DL1500	200-260-320	0.05-0.10-0.15	0.05-0.10-0.15	0.06-0.11-0.16	0.06-0.12-0.18	0.07-0.13-0.20
			G	DL1500	180-230-280	0.05-0.10-0.15	0.05-0.10-0.15	0.06-0.11-0.16	0.06-0.12-0.18	0.07-0.13-0.20

Recommended Cutting Conditions for 5D

	Work Material	Work Hardness HB	Recommended Breaker	Recommended Insert Grade	v _c Cutting Speed (m/min)	f Feed Rate (mm/rev) <Min.-Optimum-Max.>				
						ø13.0 to ø18.0	ø18.5 to ø29.0	ø29.5 to ø36.0	ø37.0 to ø55.0	ø56.0 to ø68.0
5D	P Steel, Carbon Steel	SS400	125	G	ACP300	120-180-240	0.05-0.06-0.09	0.05-0.06-0.09	0.05-0.06-0.09	0.05-0.07-0.09
		S15C	125	L	ACP300	130-170-220	0.04-0.06-0.08	0.04-0.06-0.08	0.04-0.06-0.08	0.05-0.07-0.09
		S45C	190	G	ACP300	100-150-200	0.07-0.10-0.15	0.07-0.10-0.15	0.08-0.11-0.17	0.09-0.12-0.19
		S45C Hardened	250	G	ACP300	80-120-160	0.05-0.09-0.11	0.05-0.09-0.11	0.06-0.09-0.12	0.06-0.10-0.14
		S75C	270	G	ACP300	100-130-160	0.07-0.10-0.14	0.07-0.10-0.14	0.08-0.11-0.15	0.09-0.12-0.17
		S75C Hardened	300	G	ACP300	70-100-140	0.05-0.09-0.11	0.05-0.09-0.11	0.06-0.09-0.12	0.06-0.10-0.13
	P Low Alloy Steel	SCM, SNCM	180	L	ACP300	100-140-180	0.05-0.06-0.09	0.05-0.06-0.09	0.05-0.06-0.10	0.05-0.07-0.11
		SCM, SNCM Hardened	275	G	ACP300	80-120-160	0.05-0.09-0.11	0.05-0.09-0.11	0.06-0.09-0.12	0.06-0.10-0.13
		SCM, SNCM Hardened	300	G	ACP300	75-110-140	0.05-0.09-0.11	0.05-0.09-0.11	0.06-0.09-0.12	0.06-0.10-0.13
		SCM, SNCM Hardened	350	G	ACP300	60-85-110	0.05-0.09-0.11	0.05-0.09-0.11	0.06-0.09-0.12	0.06-0.10-0.13
	P High Alloy Steel	SKD, SKT, SKH	200	G	ACP300	100-130-160	0.07-0.10-0.15	0.07-0.10-0.15	0.08-0.11-0.17	0.09-0.12-0.19
		SKD, SKT, SKH Hardened	325	G	ACP300	80-100-120	0.05-0.09-0.11	0.05-0.09-0.11	0.06-0.09-0.12	0.06-0.10-0.14
	M Stainless Steel	SUS403, Others (Martensite/Ferrite)	200	G	ACP300	100-140-180	0.05-0.09-0.11	0.05-0.09-0.11	0.06-0.09-0.12	0.06-0.10-0.14
		SUS403, Others Martensitic (Hardened)	240	G	ACP300	90-120-150	0.05-0.09-0.11	0.05-0.09-0.11	0.06-0.09-0.12	0.06-0.10-0.14
		SUS304, SUS316 Austenitic	180	G	ACP300	100-140-180	0.05-0.09-0.11	0.05-0.09-0.11	0.06-0.09-0.12	0.06-0.10-0.14
	K Cast Iron		H	ACK300	120-160-200	0.08-0.15-0.21	0.09-0.17-0.23	0.09-0.18-0.25	0.11-0.20-0.28	
		Ductile Cast Iron		H	ACK300	90-120-150	0.08-0.15-0.21	0.09-0.17-0.23	0.09-0.18-0.25	0.11-0.20-0.28
	S Exotic Alloy (Heat Resistant Alloy, Super Alloy, Ti Alloy, etc.)	200	G	ACP300	25-50-70	0.05-0.09-0.11	0.05-0.09-0.11	0.06-0.09-0.12	0.06-0.10-0.14	
	N Aluminium Alloy Copper Alloy		G	DL1500	200-260-320	0.05-0.10-0.15	0.05-0.10-0.15	0.06-0.11-0.16	0.06-0.12-0.18	
			G	DL1500	180-230-280	0.05-0.10-0.15	0.05-0.10-0.15	0.06-0.11-0.16	0.06-0.12-0.18	