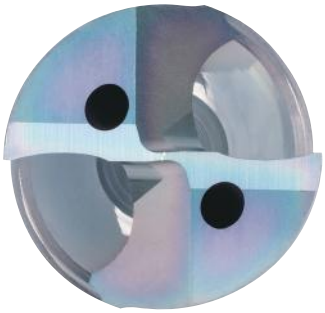
2ZDK-HP

Flat bottom drill for high precision machining in a wide range of applications

Stable machining in applications including counterboring and drilling in cylinder surfaces

Chisel edge with S-curve reduces shock during machining



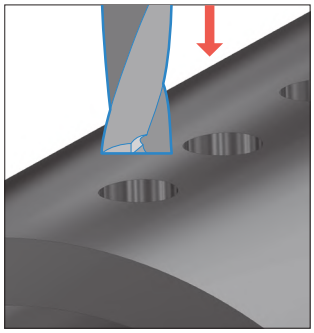
With internal coolant
2ZDK-HP-OH

Flat drill

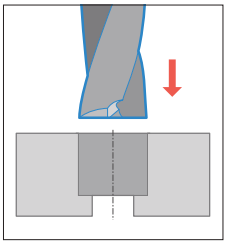
2ZDK-HP

Next generation flat bottom drill. Stable machining in a wide range of applications including counterboring and drilling in cylinder surfaces. OH type with internal coolant for stainless steel machining

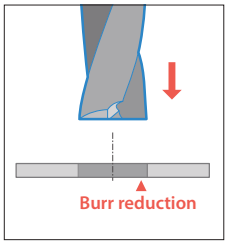
SOLUTION Great solution for a variety of machining applications



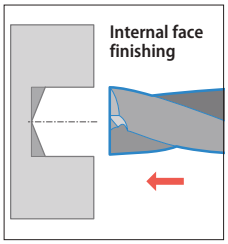
Drilling in cylinder and curved surfaces



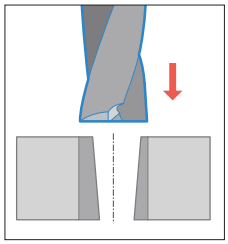
Hole counterboring



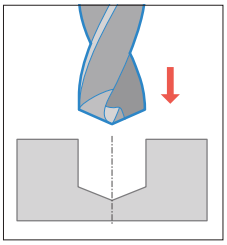
Plunging of thin plate

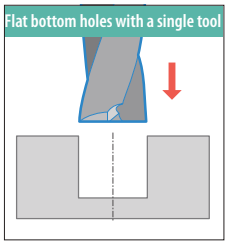


Turning in automatic lathes

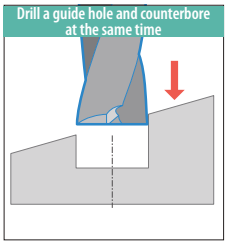


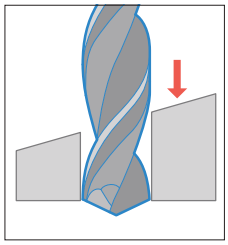
Hole expanding





Flat bottom finishing after drilling





Counterboring on slant surface/spotting for secondary process

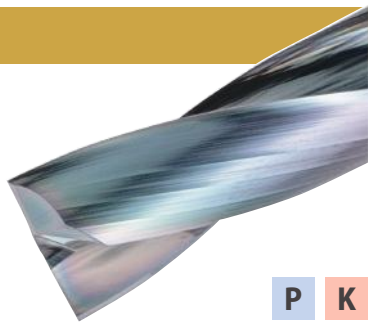
Large Lineup

Standard type

2ZDK-HP

Economical drilling

Large lineup with 2 drilling depths available



P K

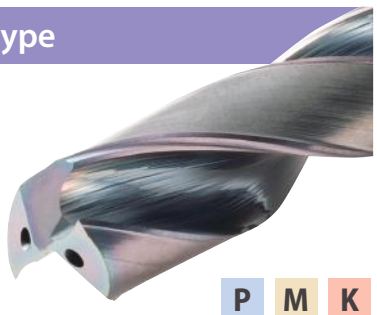
Internal coolant type

2ZDK-HP-OH

With oil holes (OH)

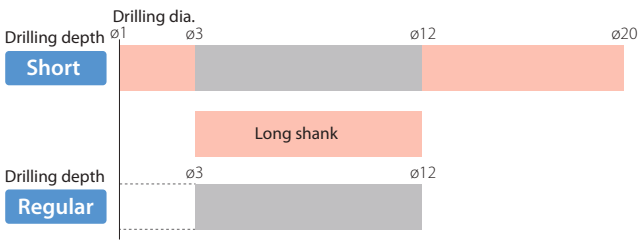
High efficiency and stable machining

For stainless steel machining

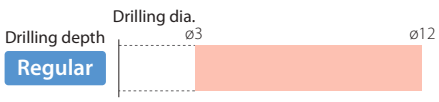


P M K

Lineup



Lineup



MEGACOAT NANO

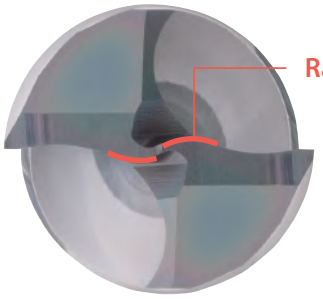
High hardness and excellent oxidation resistance with a special multilayer nano coating
Stable machining and long tool life

2ZDK-HP

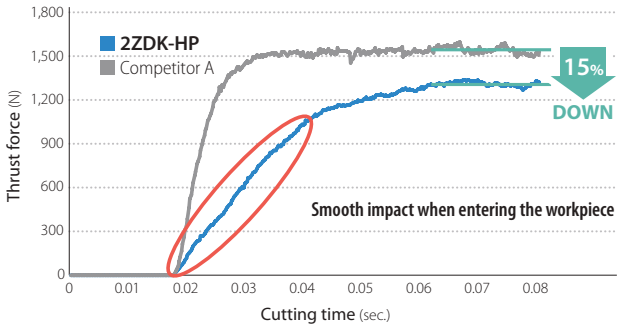
Large lineup with 2 drilling depths available

1 Chisel edge with S-curve provides high precision and stable machining results

Special chisel edge **Reduced impact forces when entering the workpiece and provides excellent vibration control for high precision drilling**



Cutting force comparison (Internal evaluation)

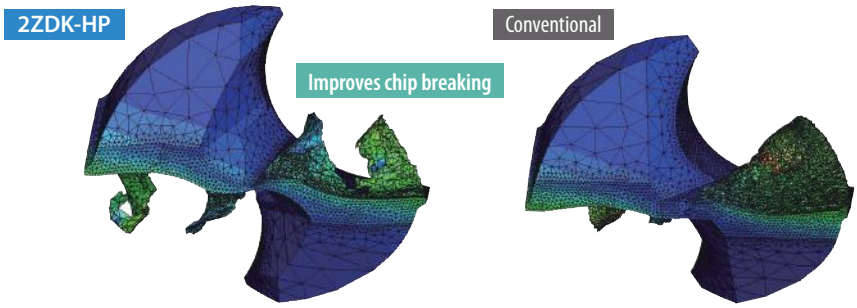


Cutting conditions: n = 1,800 min^{-1}, Vf = 400 mm/min, drilling depth 10 mm, dry, drilling dia. ø12 mm (regular), workpiece: C50

Excellent chip evacuation and finely breaks chips into small pieces

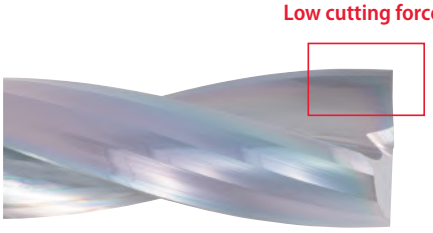
Suppress cutting edge damage with lower cutting force on the center of cutting edge

Chip generation simulation comparison (Internal evaluation)

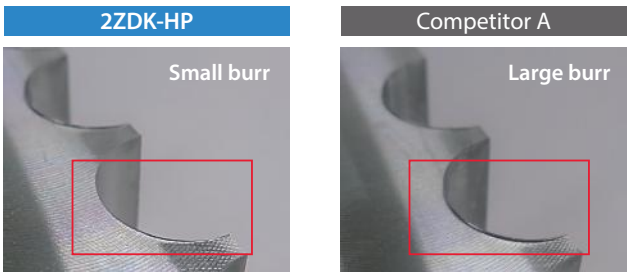


2 Low cutting force minimizes burrs

Low cutting force with flat bottom and sharp cutting edge minimizes burrs

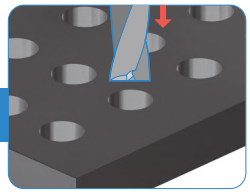


Burr formation comparison (Internal evaluation)



Cutting conditions: n = 1,800 min^{-1}, Vf = 300 mm/min, drilling depth 15 mm, wet, drilling dia. ø 12 mm (regular), workpiece: 34CrMo4

Excellent cutting performance (Internal evaluation)

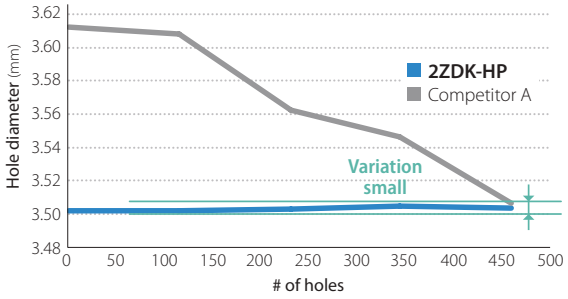


Drilling in flat surface

Drilling dia.: ø 3.5 mm

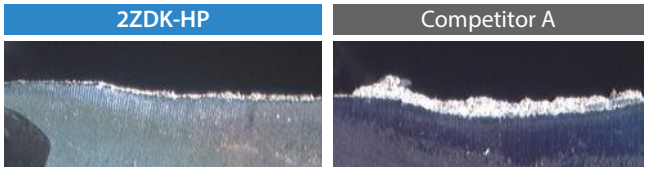
Stable and high precision machining with less variation in hole diameter, excellent cutting edge condition

Hole diameter



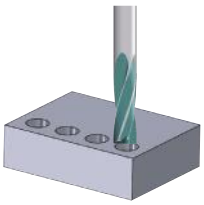
Cutting conditions: n = 6,000 min^{-1}, Vf = 360 mm/min, drilling depth 5 mm, wet, drilling dia. ø 3.5 mm (regular), workpiece: 42CrMo4

Cutting edge after machining 500 holes



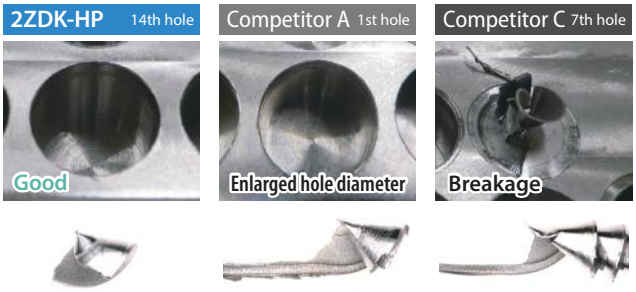
Drilling dia.: ø 12 mm

Long shank type provides improved stability

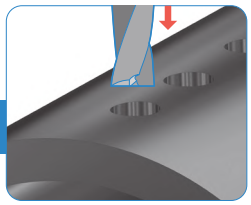


Set longer overhang amount (122 mm)
Performance comparison without pilot hole

Competitor showed chattering and breakage due to long overhang amount.
2ZDK-HP reduces impact forces when entering the workpiece and provides stable machining without pilot holes



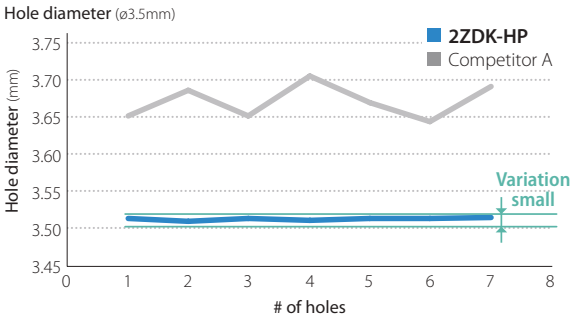
Cutting conditions: n = 2,400 min^{-1}, Vf = 600 mm/min, drilling depth 12 mm, wet, drilling dia. ø 12 mm (regular, long shank), workpiece: 42CrMo4



Drilling in cylindrical face

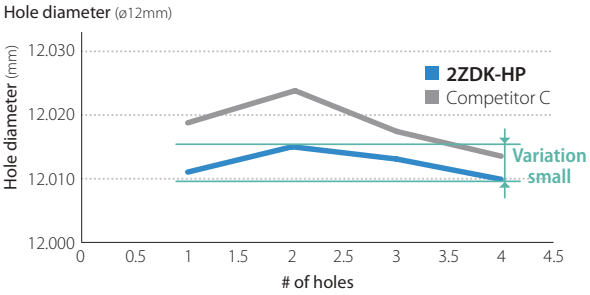
Drilling dia.: ø 3.5 mm

Stable and high precision machining with less variation in hole diameter



Drilling dia.: ø 12 mm

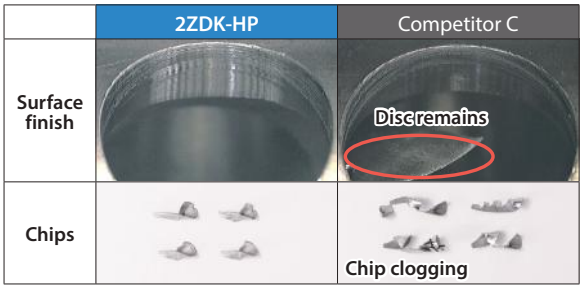
Minimizes hole diameter variation even at feed rates as high as 0.3 mm/rev. , stable machining without chip clogging



Burr comparison

Cutting conditions: n = 7,000 min^{-1}, Vf = 420 mm/min, wet, drilling dia. ø 3.5 mm (regular), workpiece: carbon steel pipe ø 17.3 mm (thickness 3.2 mm)

Surface finish and chips



Cutting conditions: n = 1,800 min^{-1}, Vf = 540 mm/min, wet, drilling dia. ø 12 mm (regular), workpiece: carbon steel pipe ø 25 mm (thickness 4 mm)

2ZDK-HP-OH

Coolant-through holes for efficient and stable machining of stainless steel machining

1 Flat bottom drill with internal coolant for stainless steel

Internal coolant can double machining efficiency. Reduces chip clogging and fractures

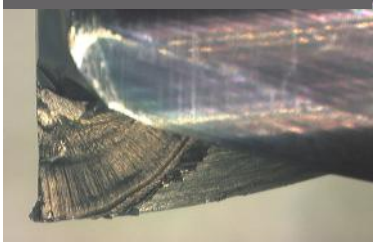
Stainless steel with internal coolant (Internal evaluation)

2ZDK-HP-OH (Internal coolant)

Cutting conditions: Vc = 100 m/min, f = 0.2 mm/rev, wet (internal coolant)

Conventional (External coolant)

Chip clogging and fracture occurred

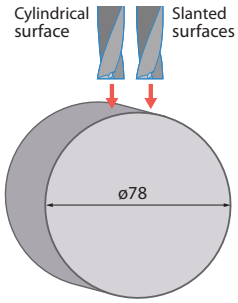


Cutting conditions: Vc = 40 m/min, f = 0.1 mm/rev, wet (external coolant)

SOLUTION 1 2ZDK-HP-OH (Internal coolant) showed 1.5 times machining efficiency. Higher machining accuracy

(User evaluation)

Machine part X5CrNi18-9



Machining efficiency

2ZDK-HP-OH (Internal coolant) **Vf=260 mm/min** f=0.15mm/rev

Competitor A (External coolant) **Vf=173 mm/min** f=0.1mm/rev

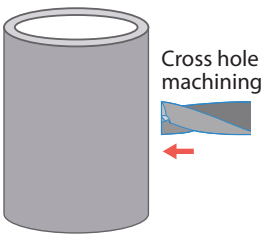
Machining efficiency × 1.5

n = 1,730 min^{-1} (Vc = 60 m/min), Vf = 260 mm/min (f = 0.15 mm/rev), drilling depth 4-5 mm, wet (external + internal coolant) , drilling dia. ø 11

SOLUTION 2 Tool life was 1.5 times longer than that of competitor A with internal coolant

(User evaluation)

Automotive part equivalent to X5CrNiCuNb16-4



Tool life

2ZDK-HP-OH (Internal coolant) **2,400 pcs/drill**

Competitor A

Internal coolant **1,600 pcs/drill**

External coolant **1,000 pcs/drill**

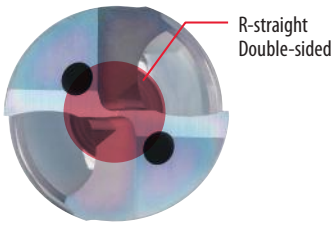
Tool life × 1.5

n = 2,500 min^{-1} (Vc = 75 m/min), Vf = ~ 320 mm/min (~ f = 0.13 mm/rev), drilling depth 16 mm, wet, drilling dia. ø 9.6

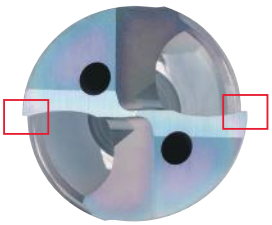
2 Fine-tuned design for advanced cutting performance

High-precision, stable machining with five advantages
Both sharpness and edge strength are difficult to achieve with conventional tools

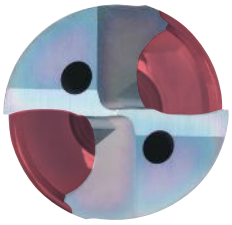
1 Special chisel edge
High rigidity and excellent chip control



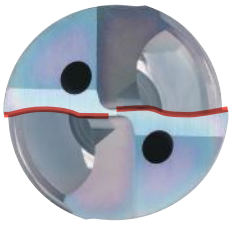
2 Corners: Flat land
Sharpness and chipping resistance



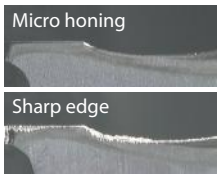
3 Unique flute shape
Optimized chip evacuation and rigidity



4 Micro honing
Maintains sharpness and improves abrasion resistance

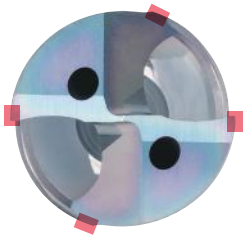


Wear resistance comparison
(Internal evaluation)

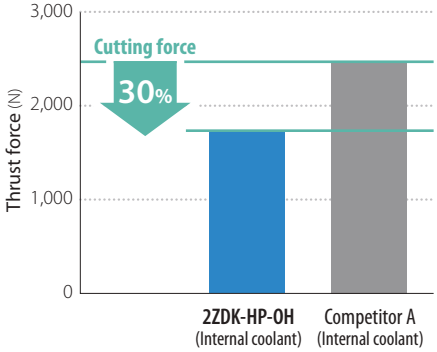


Cutting conditions: n = 3,800 min^{-1}, Vf = 950 mm/min, drilling depth 20 mm
wet (Internal coolant), drilling dia. ø 10 mm, workpiece: C45

5 Double margin
High-precision machining with guiding action

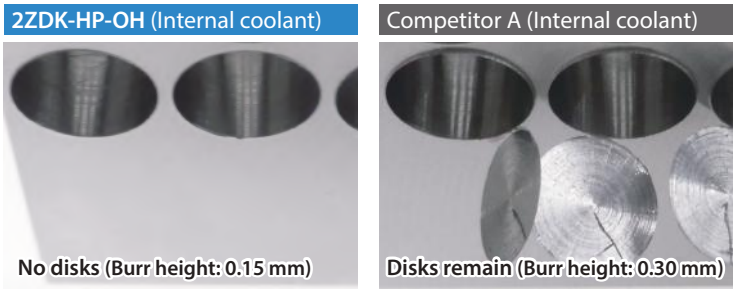


Cutting force comparison (Internal evaluation)



Cutting conditions: n = 3,180 min^{-1}, Vf = 800 mm/min, drilling depth 12 mm,
wet, drilling dia. ø 12 mm, workpiece: 42CrMo4

Burr formation comparison (Internal evaluation)



Cutting conditions: n = 3,800 min^{-1}, Vf = 950 mm/min, drilling depth 20 mm, wet,
drilling dia. ø 10 mm, workpiece: C45

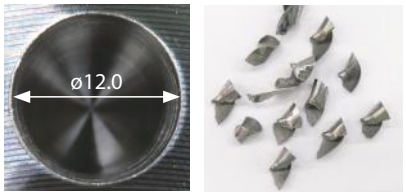
2ZDK-HP-OH is lower in cutting force. There is no remaining disk and the sharpness is good.

X5CrNi18-9 Cutting performance comparison (Internal evaluation)

2ZDK-HP-OH (Internal coolant)

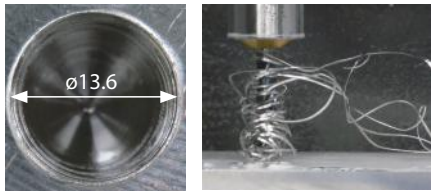
Vf=760 mm/min

Machining efficiency
×1.2



Competitor A (Internal coolant)

Vf=630 mm/min



Cutting conditions: n = 2,650 min^{-1}, drilling depth 24 mm, wet,
drilling dia. ø 12 mm

2ZDK-HP-OH showed 1.2 times machining efficiency in stainless steel machining. Also showed stable cutting diameter and good chip control.

2ZDK-HP

Short

No. of flutes (Z) = 2, helix angle: 20 °

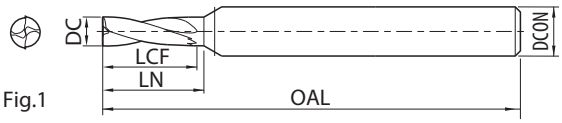


Fig.1

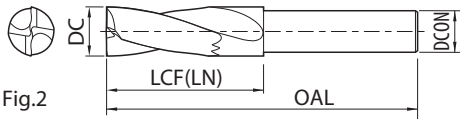


Fig.2

Description	Availability	Dimension (mm)						Shape
		DC	Outside dia. tolerance	LCF	LN	DCON	OAL	
2ZDK010HP-1.5D	●	1.0	0 -0.010	3.5	4.3	4	50	Fig.1
2ZDK011HP-1.5D	●	1.1	0 -0.010	3.9	4.7	4	50	Fig.1
2ZDK012HP-1.5D	●	1.2	0 -0.010	4.3	5.1	4	50	Fig.1
2ZDK013HP-1.5D	●	1.3	0 -0.010	4.7	5.5	4	50	Fig.1
2ZDK014HP-1.5D	●	1.4	0 -0.010	5.1	5.9	4	50	Fig.1
2ZDK015HP-1.5D	●	1.5	0 -0.010	5.5	6.3	4	50	Fig.1
2ZDK016HP-1.5D	●	1.6	0 -0.010	5.7	6.5	4	50	Fig.1
2ZDK017HP-1.5D	●	1.7	0 -0.010	5.9	6.7	4	50	Fig.1
2ZDK018HP-1.5D	●	1.8	0 -0.010	6.1	6.9	4	50	Fig.1
2ZDK019HP-1.5D	●	1.9	0 -0.010	6.3	7.1	4	50	Fig.1
2ZDK020HP-1.5D	●	2.0	0 -0.010	6.5	7.3	4	50	Fig.1
2ZDK021HP-1.5D	●	2.1	0 -0.010	6.9	7.7	4	50	Fig.1
2ZDK022HP-1.5D	●	2.2	0 -0.010	7.3	8.1	4	50	Fig.1
2ZDK023HP-1.5D	●	2.3	0 -0.010	7.7	8.5	4	50	Fig.1
2ZDK024HP-1.5D	●	2.4	0 -0.010	8.1	8.9	4	50	Fig.1
2ZDK025HP-1.5D	●	2.5	0 -0.010	8.5	9.3	4	50	Fig.1
2ZDK026HP-1.5D	●	2.6	0 -0.010	8.8	9.5	4	50	Fig.1
2ZDK027HP-1.5D	●	2.7	0 -0.010	9.1	9.8	4	50	Fig.1
2ZDK028HP-1.5D	●	2.8	0 -0.010	9.3	10.0	4	50	Fig.1
2ZDK029HP-1.5D	●	2.9	0 -0.010	9.5	10.3	4	50	Fig.1
2ZDK030HP-1.5D	●	3.0	0 -0.010	9	10	6	60	Fig.1
2ZDK031HP-1.5D	●	3.1	0 -0.012	10	11	6	60	Fig.1
2ZDK032HP-1.5D	●	3.2						
2ZDK033HP-1.5D	●	3.3						
2ZDK034HP-1.5D	●	3.4	0 -0.012	11	12	6	60	Fig.1
2ZDK035HP-1.5D	●	3.5						
2ZDK036HP-1.5D	●	3.6						
2ZDK037HP-1.5D	●	3.7	0 -0.012	12	13	6	60	Fig.1
2ZDK038HP-1.5D	●	3.8						
2ZDK039HP-1.5D	●	3.9						
2ZDK040HP-1.5D	●	4.0						
2ZDK041HP-1.5D	●	4.1	0 -0.012	13	14	6	60	Fig.1
2ZDK042HP-1.5D	●	4.2						
2ZDK043HP-1.5D	●	4.3						
2ZDK044HP-1.5D	●	4.4	0 -0.012	14	15	6	60	Fig.1
2ZDK045HP-1.5D	●	4.5						
2ZDK046HP-1.5D	●	4.6						
2ZDK047HP-1.5D	●	4.7	0 -0.012	15	16	6	60	Fig.1
2ZDK048HP-1.5D	●	4.8						
2ZDK049HP-1.5D	●	4.9						

Description	Availability	Dimension (mm)						Shape
		DC	Outside dia. tolerance	LCF	LN	DCON	OAL	
2ZDK050HP-1.5D	●	5.0	0 -0.012	16	17	6	60	Fig.1
2ZDK051HP-1.5D	●	5.1						
2ZDK052HP-1.5D	●	5.2						
2ZDK053HP-1.5D	●	5.3						
2ZDK054HP-1.5D	●	5.4	0 -0.012	17	18	6	60	Fig.1
2ZDK055HP-1.5D	●	5.5						
2ZDK056HP-1.5D	●	5.6						
2ZDK057HP-1.5D	●	5.7	0 -0.012	18	19	6	60	Fig.1
2ZDK058HP-1.5D	●	5.8						
2ZDK059HP-1.5D	●	5.9						
2ZDK060HP-1.5D	●	6.0	0 -0.012	19	21	6	60	Fig.1
2ZDK061HP-1.5D	●	6.1	0 -0.015	19	21	8	70	Fig.1
2ZDK062HP-1.5D	●	6.2						
2ZDK063HP-1.5D	●	6.3	0 -0.015	20	22	8	70	Fig.1
2ZDK064HP-1.5D	●	6.4						
2ZDK065HP-1.5D	●	6.5						
2ZDK066HP-1.5D	●	6.6						
2ZDK067HP-1.5D	●	6.7	0 -0.015	21	23	8	70	Fig.1
2ZDK068HP-1.5D	●	6.8						
2ZDK069HP-1.5D	●	6.9						
2ZDK070HP-1.5D	●	7.0	0 -0.015	22	24	8	70	Fig.1
2ZDK071HP-1.5D	●	7.1						
2ZDK072HP-1.5D	●	7.2						
2ZDK073HP-1.5D	●	7.3	0 -0.015	23	25	8	70	Fig.1
2ZDK074HP-1.5D	●	7.4						
2ZDK075HP-1.5D	●	7.5						
2ZDK076HP-1.5D	●	7.6	0 -0.015	24	25	8	70	Fig.1
2ZDK077HP-1.5D	●	7.7						
2ZDK078HP-1.5D	●	7.8						
2ZDK079HP-1.5D	●	7.9						
2ZDK080HP-1.5D	●	8.0	0 -0.015	25	27	8	70	Fig.1
2ZDK081HP-1.5D	●	8.1	0 -0.015	25	27	10	80	Fig.1
2ZDK082HP-1.5D	●	8.2						
2ZDK083HP-1.5D	●	8.3	0 -0.015	26	28	10	80	Fig.1
2ZDK084HP-1.5D	●	8.4						
2ZDK085HP-1.5D	●	8.5						
2ZDK086HP-1.5D	●	8.6	0 -0.015	27	29	10	80	Fig.1
2ZDK087HP-1.5D	●	8.7						
2ZDK088HP-1.5D	●	8.8						

The standard drilling depth is 1.5 D (1.5 x DC).

● : Available

2ZDK-HP

Short

No. of flutes (Z) = 2, helix angle: 20 °

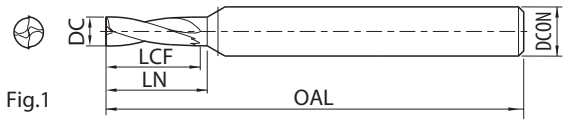


Fig.1

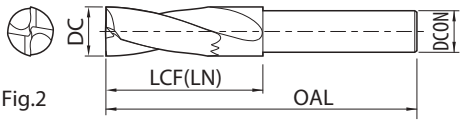


Fig.2

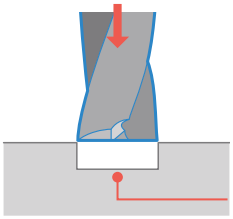
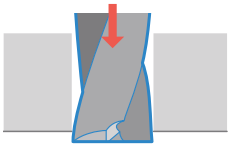
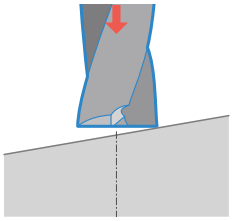
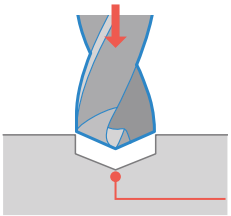
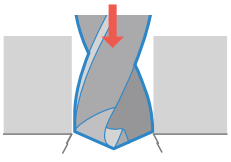
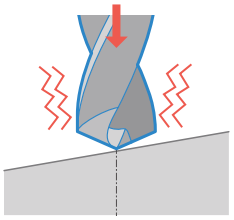
Description	Availability	Dimension (mm)						Shape
		DC	Outside dia. tolerance	LCF	LN	DCON	OAL	
2ZDK089HP-1.5D	●	8.9	0 -0.015	28	30	10	80	Fig.1
2ZDK090HP-1.5D	●	9.0						
2ZDK091HP-1.5D	●	9.1						
2ZDK092HP-1.5D	●	9.2	0 -0.015	29	31	10	80	Fig.1
2ZDK093HP-1.5D	●	9.3						
2ZDK094HP-1.5D	●	9.4						
2ZDK095HP-1.5D	●	9.5						
2ZDK096HP-1.5D	●	9.6	0 -0.015	30	32	10	80	Fig.1
2ZDK097HP-1.5D	●	9.7						
2ZDK098HP-1.5D	●	9.8						
2ZDK099HP-1.5D	●	9.9	0 -0.015	31	33	10	80	Fig.1
2ZDK100HP-1.5D	●	10.0						
2ZDK101HP-1.5D	●	10.1	0 -0.018	31	33	12	100	Fig.1
2ZDK102HP-1.5D	●	10.2	0 -0.018	32	34	12	100	Fig.1
2ZDK103HP-1.5D	●	10.3						
2ZDK104HP-1.5D	●	10.4						
2ZDK105HP-1.5D	●	10.5	0 -0.018	33	35	12	100	Fig.1
2ZDK106HP-1.5D	●	10.6						
2ZDK107HP-1.5D	●	10.7						
2ZDK108HP-1.5D	●	10.8						
2ZDK109HP-1.5D	●	10.9	0 -0.018	34	36	12	100	Fig.1
2ZDK110HP-1.5D	●	11.0						
2ZDK111HP-1.5D	●	11.1						
2ZDK112HP-1.5D	●	11.2	0 -0.018	35	37	12	100	Fig.1
2ZDK113HP-1.5D	●	11.3						
2ZDK114HP-1.5D	●	11.4						

Description	Availability	Dimension (mm)						Shape
		DC	Outside dia. tolerance	LCF	LN	DCON	OAL	
2ZDK115HP-1.5D	●	11.5	0 -0.018	36	38	12	100	Fig.1
2ZDK116HP-1.5D	●	11.6						
2ZDK117HP-1.5D	●	11.7						
2ZDK118HP-1.5D	●	11.8						
2ZDK119HP-1.5D	●	11.9						
2ZDK120HP-1.5D	●	12.0	0 -0.018	37	39	12	100	Fig.1
2ZDK125HP-1.5D	●	12.5	0 -0.018	41	41	12	100	Fig.2
2ZDK130HP-1.5D	●	13.0		43	43			
2ZDK135HP-1.5D	●	13.5		44	44			
2ZDK140HP-1.5D	●	14.0		45	45			
2ZDK145HP-1.5D	●	14.5	0 -0.018	47	47	12	115	Fig.2
2ZDK150HP-1.5D	●	15.0		48	48			
2ZDK155HP-1.5D	●	15.5		50	50			
2ZDK160HP-1.5D	●	16.0	0 -0.018	52	52	16	115	Fig.1
2ZDK165HP-1.5D	●	16.5	0 -0.018	53	53	16	115	Fig.2
2ZDK170HP-1.5D	●	17.0		54	54			
2ZDK175HP-1.5D	●	17.5		56	56			
2ZDK180HP-1.5D	●	18.0		57	57			
2ZDK185HP-1.5D	●	18.5	0 -0.021	59	59	16	125	Fig.2
2ZDK190HP-1.5D	●	19.0		60	60			
2ZDK195HP-1.5D	●	19.5		62	62			
2ZDK200HP-1.5D	●	20.0	0 -0.021	63	63	20	125	Fig.1

The standard drilling depth is 1.5 D (1.5 x DC).

● : Available

Comparison with standard drill

	Bottom shape	Burr	Drilling in slant surface
2ZDK-HP	 Almost even	 Minimizes burrs	 Stable machining (Lowered the feed)
Standard drill	 Same as bottom shape	 Burr build-up	 Unstable machining

2ZDK-HP

Short Long shank type

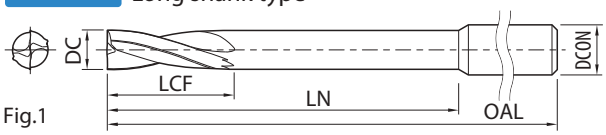


Fig.1

No. of flutes (Z) = 2, helix angle: 20 °

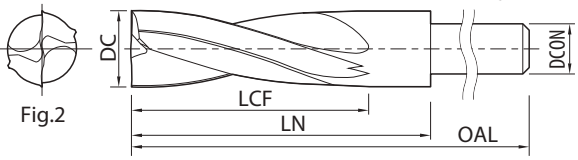


Fig.2

Description	Availability	Dimension (mm)						Shape
		DC	Outside dia. Tolerance	LCF	LN	DCON	OAL	
2ZDK030HP-1.5D-LS	●	3.0	0 -0.010	9.0	30.0	6	100	Fig.1
2ZDK031HP-1.5D-LS	MTO	3.1	0 -0.012	10.0	31.0	6	100	Fig.1
2ZDK032HP-1.5D-LS	MTO	3.2			32.0			
2ZDK033HP-1.5D-LS	MTO	3.3			33.0			
2ZDK034HP-1.5D-LS	MTO	3.4		11.0	34.0			
2ZDK035HP-1.5D-LS	●	3.5			35.0			
2ZDK036HP-1.5D-LS	MTO	3.6			36.0			
2ZDK037HP-1.5D-LS	MTO	3.7		12.0	37.0			
2ZDK038HP-1.5D-LS	MTO	3.8			38.0			
2ZDK039HP-1.5D-LS	MTO	3.9			39.0			
2ZDK040HP-1.5D-LS	●	4.0			40.0			
2ZDK041HP-1.5D-LS	MTO	4.1		13.0	41.0			
2ZDK042HP-1.5D-LS	MTO	4.2			42.0			
2ZDK043HP-1.5D-LS	MTO	4.3			43.0			
2ZDK044HP-1.5D-LS	MTO	4.4		14.0	44.0			
2ZDK045HP-1.5D-LS	●	4.5			45.0			
2ZDK046HP-1.5D-LS	MTO	4.6			46.0			
2ZDK047HP-1.5D-LS	MTO	4.7		15.0	47.0			
2ZDK048HP-1.5D-LS	MTO	4.8			48.0			
2ZDK049HP-1.5D-LS	MTO	4.9			49.0			
2ZDK050HP-1.5D-LS	●	5.0	0 -0.012	16.0	50.0	6	110	Fig.1
2ZDK051HP-1.5D-LS	MTO	5.1			51.0			
2ZDK052HP-1.5D-LS	MTO	5.2			52.0			
2ZDK053HP-1.5D-LS	MTO	5.3			53.0			
2ZDK054HP-1.5D-LS	MTO	5.4		17.0	54.0			
2ZDK055HP-1.5D-LS	●	5.5			55.0			
2ZDK056HP-1.5D-LS	MTO	5.6			56.0			
2ZDK057HP-1.5D-LS	MTO	5.7		18.0	57.0			
2ZDK058HP-1.5D-LS	MTO	5.8			58.0			
2ZDK059HP-1.5D-LS	MTO	5.9			59.0			
2ZDK060HP-1.5D-LS	●	6.0	0 -0.012	19.0	60.0	6	120	Fig.1
2ZDK061HP-1.5D-LS	MTO	6.1	0 -0.015	19.0	29.0	6	120	Fig.2
2ZDK062HP-1.5D-LS	MTO	6.2						
2ZDK063HP-1.5D-LS	MTO	6.3		20.0	29.5			
2ZDK064HP-1.5D-LS	MTO	6.4						
2ZDK065HP-1.5D-LS	●	6.5						
2ZDK066HP-1.5D-LS	MTO	6.6						
2ZDK067HP-1.5D-LS	MTO	6.7		21.0	30.0			
2ZDK068HP-1.5D-LS	MTO	6.8						
2ZDK069HP-1.5D-LS	MTO	6.9						
2ZDK070HP-1.5D-LS	●	7.0		22.0	30.0			
2ZDK071HP-1.5D-LS	MTO	7.1			30.5			
2ZDK072HP-1.5D-LS	MTO	7.2						
2ZDK073HP-1.5D-LS	MTO	7.3		23.0	30.5			
2ZDK074HP-1.5D-LS	MTO	7.4						
2ZDK075HP-1.5D-LS	●	7.5						

Description	Availability	Dimension (mm)						Shape
		DC	Outside dia. Tolerance	LCF	LN	DCON	OAL	
2ZDK076HP-1.5D-LS	MTO	7.6	0 -0.015	24.0	31.0	6	120	Fig.2
2ZDK077HP-1.5D-LS	MTO	7.7						
2ZDK078HP-1.5D-LS	MTO	7.8						
2ZDK079HP-1.5D-LS	MTO	7.9						
2ZDK080HP-1.5D-LS	●	8.0	0 -0.015	25.0	80.0	8	130	Fig.1
2ZDK081HP-1.5D-LS	MTO	8.1			31.5			Fig.2
2ZDK082HP-1.5D-LS	MTO	8.2						
2ZDK083HP-1.5D-LS	MTO	8.3		26.0	32.0			
2ZDK084HP-1.5D-LS	MTO	8.4						
2ZDK085HP-1.5D-LS	●	8.5						
2ZDK086HP-1.5D-LS	MTO	8.6	0 -0.015	27.0	32.0	8	130	Fig.2
2ZDK087HP-1.5D-LS	MTO	8.7						
2ZDK088HP-1.5D-LS	MTO	8.8		28.0	32.5			
2ZDK089HP-1.5D-LS	MTO	8.9						
2ZDK090HP-1.5D-LS	●	9.0						
2ZDK091HP-1.5D-LS	MTO	9.1						
2ZDK092HP-1.5D-LS	MTO	9.2	0 -0.015	29.0	32.5	8	130	Fig.2
2ZDK093HP-1.5D-LS	MTO	9.3						
2ZDK094HP-1.5D-LS	MTO	9.4						
2ZDK095HP-1.5D-LS	●	9.5						
2ZDK096HP-1.5D-LS	MTO	9.6	0 -0.015	30.0	33.5	8	130	Fig.2
2ZDK097HP-1.5D-LS	MTO	9.7						
2ZDK098HP-1.5D-LS	MTO	9.8						
2ZDK099HP-1.5D-LS	MTO	9.9		31.0	34.5			
2ZDK100HP-1.5D-LS	●	10.0	0 -0.015	31.0	100.0	10	150	Fig.1
2ZDK101HP-1.5D-LS	MTO	10.1	0 -0.018	31.0	35.5	10	150	Fig.2
2ZDK102HP-1.5D-LS	MTO	10.2		32.0				
2ZDK103HP-1.5D-LS	MTO	10.3			36.0			
2ZDK104HP-1.5D-LS	MTO	10.4						
2ZDK105HP-1.5D-LS	●	10.5		33.0	36.5			
2ZDK106HP-1.5D-LS	MTO	10.6						
2ZDK107HP-1.5D-LS	MTO	10.7						
2ZDK108HP-1.5D-LS	MTO	10.8						
2ZDK109HP-1.5D-LS	MTO	10.9	0 -0.018	34.0	37.5	10	150	Fig.2
2ZDK110HP-1.5D-LS	●	11.0						
2ZDK111HP-1.5D-LS	MTO	11.1		35.0	38.5			
2ZDK112HP-1.5D-LS	MTO	11.2						
2ZDK113HP-1.5D-LS	MTO	11.3						
2ZDK114HP-1.5D-LS	MTO	11.4						
2ZDK115HP-1.5D-LS	●	11.5	0 -0.018	36.0	39.5	10	150	Fig.2
2ZDK116HP-1.5D-LS	MTO	11.6						
2ZDK117HP-1.5D-LS	MTO	11.7						
2ZDK118HP-1.5D-LS	MTO	11.8						
2ZDK119HP-1.5D-LS	MTO	11.9						
2ZDK120HP-1.5D-LS	●	12.0	0 -0.018	37.0	120.0	12	170	Fig.1

The standard drilling depth is 1.5 D (1.5 x DC). ● : Available MTO : Made to order

2ZDK-HP

Regular

No. of flutes (Z) = 2, helix angle: 20 °

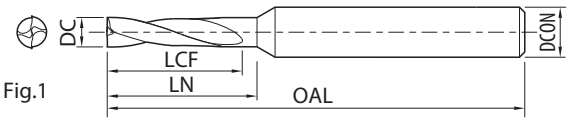


Fig.1

Description	Availability	Dimension (mm)						Shape
		DC	Outside dia. tolerance	LCF	LN	DCON	OAL	
2ZDK030HP-3D	●	3.0	0 -0.010	14	15	6	60	Fig.1
2ZDK031HP-3D	●	3.1	0 -0.012	14	15	6	60	Fig.1
2ZDK032HP-3D	●	3.2						
2ZDK033HP-3D	●	3.3	0 -0.012	15	16	6	60	Fig.1
2ZDK034HP-3D	●	3.4						
2ZDK035HP-3D	●	3.5	0 -0.012	17	18	6	60	Fig.1
2ZDK036HP-3D	●	3.6						
2ZDK037HP-3D	●	3.7						
2ZDK038HP-3D	●	3.8						
2ZDK039HP-3D	●	3.9						
2ZDK040HP-3D	●	4.0	0 -0.012	19	20	6	60	Fig.1
2ZDK041HP-3D	●	4.1						
2ZDK042HP-3D	●	4.2	0 -0.012	20	21	6	60	Fig.1
2ZDK043HP-3D	●	4.3						
2ZDK044HP-3D	●	4.4						
2ZDK045HP-3D	●	4.5	0 -0.012	21	22	6	60	Fig.1
2ZDK046HP-3D	●	4.6						
2ZDK047HP-3D	●	4.7						
2ZDK048HP-3D	●	4.8						
2ZDK049HP-3D	●	4.9						
2ZDK050HP-3D	●	5.0	0 -0.012	23	24	6	60	Fig.1
2ZDK051HP-3D	●	5.1						
2ZDK052HP-3D	●	5.2						
2ZDK053HP-3D	●	5.3	0 -0.012	24	25	6	60	Fig.1
2ZDK054HP-3D	●	5.4						
2ZDK055HP-3D	●	5.5	0 -0.012	25	26	6	60	Fig.1
2ZDK056HP-3D	●	5.6	0 -0.012	26	27	6	60	Fig.1
2ZDK057HP-3D	●	5.7						
2ZDK058HP-3D	●	5.8						
2ZDK059HP-3D	●	5.9						
2ZDK060HP-3D	●	6.0	0 -0.012	28	(28)	6	60	Fig.1
2ZDK061HP-3D	●	6.1	0 -0.015	28	29	8	70	Fig.1
2ZDK062HP-3D	●	6.2						
2ZDK063HP-3D	●	6.3						
2ZDK064HP-3D	●	6.4						
2ZDK065HP-3D	●	6.5	0 -0.015	30	31	8	70	Fig.1
2ZDK066HP-3D	●	6.6						
2ZDK067HP-3D	●	6.7						
2ZDK068HP-3D	●	6.8	0 -0.015	31	32	8	70	Fig.1
2ZDK069HP-3D	●	6.9						
2ZDK070HP-3D	●	7.0	0 -0.015	32	33	8	70	Fig.1
2ZDK071HP-3D	●	7.1						
2ZDK072HP-3D	●	7.2						
2ZDK073HP-3D	●	7.3						
2ZDK074HP-3D	●	7.4						
2ZDK075HP-3D	●	7.5	0 -0.015	34	35	8	70	Fig.1

Description	Availability	Dimension (mm)						Shape
		DC	Outside dia. tolerance	LCF	LN	DCON	OAL	
2ZDK076HP-3D	●	7.6	0 -0.015	34	35	8	70	Fig.1
2ZDK077HP-3D	●	7.7						
2ZDK078HP-3D	●	7.8						
2ZDK079HP-3D	●	7.9						
2ZDK080HP-3D	●	8.0	0 -0.015	36	(36)	8	70	Fig.1
2ZDK081HP-3D	●	8.1	0 -0.015	36	37	10	80	Fig.1
2ZDK082HP-3D	●	8.2						
2ZDK083HP-3D	●	8.3						
2ZDK084HP-3D	●	8.4						
2ZDK085HP-3D	●	8.5	0 -0.015	38	39	10	80	Fig.1
2ZDK086HP-3D	●	8.6						
2ZDK087HP-3D	●	8.7						
2ZDK088HP-3D	●	8.8	0 -0.015	39	40	10	80	Fig.1
2ZDK089HP-3D	●	8.9						
2ZDK090HP-3D	●	9.0	0 -0.015	40	41	10	80	Fig.1
2ZDK091HP-3D	●	9.1						
2ZDK092HP-3D	●	9.2						
2ZDK093HP-3D	●	9.3						
2ZDK094HP-3D	●	9.4						
2ZDK095HP-3D	●	9.5	0 -0.015	42	43	10	80	Fig.1
2ZDK096HP-3D	●	9.6						
2ZDK097HP-3D	●	9.7						
2ZDK098HP-3D	●	9.8						
2ZDK099HP-3D	●	9.9						
2ZDK100HP-3D	●	10.0	0 -0.015	45	(45)	10	80	Fig.1
2ZDK101HP-3D	●	10.1	0 -0.018	45	46	12	100	Fig.1
2ZDK102HP-3D	●	10.2						
2ZDK103HP-3D	●	10.3	0 -0.018	46	47	12	100	Fig.1
2ZDK104HP-3D	●	10.4						
2ZDK105HP-3D	●	10.5	0 -0.018	47	48	12	100	Fig.1
2ZDK106HP-3D	●	10.6						
2ZDK107HP-3D	●	10.7						
2ZDK108HP-3D	●	10.8						
2ZDK109HP-3D	●	10.9						
2ZDK110HP-3D	●	11.0	0 -0.018	51	52	12	100	Fig.1
2ZDK111HP-3D	●	11.1						
2ZDK112HP-3D	●	11.2						
2ZDK113HP-3D	●	11.3						
2ZDK114HP-3D	●	11.4						
2ZDK115HP-3D	●	11.5	0 -0.018	53	54	12	100	Fig.1
2ZDK116HP-3D	●	11.6						
2ZDK117HP-3D	●	11.7						
2ZDK118HP-3D	●	11.8						
2ZDK119HP-3D	●	11.9						
2ZDK120HP-3D	●	12.0	0 -0.018	54	(54)	12	100	Fig.1

The standard drilling depth is 3.0 D (3.0 x DC).

● : Available

2ZDK-HP-OH

Regular

No. of flutes (Z) = 2, helix angle: about 30 °

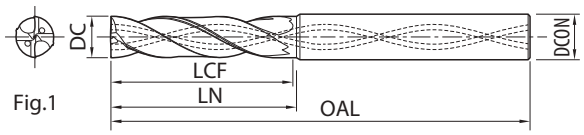


Fig.1

Description	Availability	Dimension (mm)						Shape
		DC	Outside dia. tolerance	LCF	LN	DCON	OAL	
2ZDK030HP-3D-0H	●	3.0	0 -0.010	13.5	15.5	3	68	Fig.1
2ZDK031HP-3D-0H	●	3.1		14	16			
2ZDK032HP-3D-0H	●	3.2		14.4	16.4			
2ZDK033HP-3D-0H	●	3.3		14.9	16.9			
2ZDK034HP-3D-0H	●	3.4		15.3	17.3			
2ZDK035HP-3D-0H	●	3.5	0 -0.012	15.8	17.8	4	72	Fig.1
2ZDK036HP-3D-0H	●	3.6		16.2	18.2			
2ZDK037HP-3D-0H	●	3.7		16.7	18.7			
2ZDK038HP-3D-0H	●	3.8		17.1	19.1			
2ZDK039HP-3D-0H	●	3.9		17.6	19.6			
2ZDK040HP-3D-0H	●	4.0	0 -0.012	18	20	4	72	Fig.1
2ZDK041HP-3D-0H	●	4.1		18.5	20.5			
2ZDK042HP-3D-0H	●	4.2		18.9	20.9			
2ZDK043HP-3D-0H	●	4.3		19.4	21.4			
2ZDK044HP-3D-0H	●	4.4		19.8	21.8			
2ZDK045HP-3D-0H	●	4.5	0 -0.012	20.3	22.3	5	80	Fig.1
2ZDK046HP-3D-0H	●	4.6		20.7	22.7			
2ZDK047HP-3D-0H	●	4.7		21.2	23.2			
2ZDK048HP-3D-0H	●	4.8		21.6	23.6			
2ZDK049HP-3D-0H	●	4.9		22.1	24.1			
2ZDK050HP-3D-0H	●	5.0	0 -0.012	22.5	24.5	5	80	Fig.1
2ZDK051HP-3D-0H	●	5.1		23	25			
2ZDK052HP-3D-0H	●	5.2		23.4	25.4			
2ZDK053HP-3D-0H	●	5.3		23.9	25.9			
2ZDK054HP-3D-0H	●	5.4		24.3	26.3			
2ZDK055HP-3D-0H	●	5.5	0 -0.012	24.8	26.8	6	82	Fig.1
2ZDK056HP-3D-0H	●	5.6		25.2	27.2			
2ZDK057HP-3D-0H	●	5.7		25.7	27.7			
2ZDK058HP-3D-0H	●	5.8		26.1	28.1			
2ZDK059HP-3D-0H	●	5.9		26.6	28.6			
2ZDK060HP-3D-0H	●	6.0	0 -0.012	27	29	6	82	Fig.1
2ZDK061HP-3D-0H	●	6.1		27.5	29.5			
2ZDK062HP-3D-0H	●	6.2		27.9	29.9			
2ZDK063HP-3D-0H	●	6.3		28.4	30.4			
2ZDK064HP-3D-0H	●	6.4		28.8	30.8			
2ZDK065HP-3D-0H	●	6.5	0 -0.015	29.3	31.3	7	88	Fig.1
2ZDK066HP-3D-0H	●	6.6		29.7	31.7			
2ZDK067HP-3D-0H	●	6.7		30.2	32.2			
2ZDK068HP-3D-0H	●	6.8		30.6	32.6			
2ZDK069HP-3D-0H	●	6.9		31.1	33.1			
2ZDK070HP-3D-0H	●	7.0	0 -0.015	31.5	33.5	7	88	Fig.1
2ZDK071HP-3D-0H	●	7.1		32	34			
2ZDK072HP-3D-0H	●	7.2		32.4	34.4			
2ZDK073HP-3D-0H	●	7.3	0 -0.015	32.9	34.9	8	94	Fig.1
2ZDK074HP-3D-0H	●	7.4		33.3	35.3			
2ZDK075HP-3D-0H	●	7.5		33.8	35.8			

Description	Availability	Dimension (mm)						Shape
		DC	Outside dia. tolerance	LCF	LN	DCON	OAL	
2ZDK076HP-3D-0H	●	7.6		34.2	36.2			
2ZDK077HP-3D-0H	●	7.7	0 -0.015	34.7	36.7	8	94	Fig.1
2ZDK078HP-3D-0H	●	7.8		35.1	37.1			
2ZDK079HP-3D-0H	●	7.9		35.6	37.6			
2ZDK080HP-3D-0H	●	8.0	0 -0.015	36	38	8	94	Fig.1
2ZDK081HP-3D-0H	●	8.1		36.5	38.5			
2ZDK082HP-3D-0H	●	8.2		36.9	38.9			
2ZDK083HP-3D-0H	●	8.3		37.4	39.4			
2ZDK084HP-3D-0H	●	8.4		37.8	39.8			
2ZDK085HP-3D-0H	●	8.5	0 -0.015	38.3	40.3	9	100	Fig.1
2ZDK086HP-3D-0H	●	8.6		38.7	40.7			
2ZDK087HP-3D-0H	●	8.7		39.2	41.2			
2ZDK088HP-3D-0H	●	8.8		39.6	41.6			
2ZDK089HP-3D-0H	●	8.9		40.1	42.1			
2ZDK090HP-3D-0H	●	9.0	0 -0.015	40.5	42.5	9	100	Fig.1
2ZDK091HP-3D-0H	●	9.1		41	43			
2ZDK092HP-3D-0H	●	9.2		41.4	43.4			
2ZDK093HP-3D-0H	●	9.3		41.9	43.9			
2ZDK094HP-3D-0H	●	9.4		42.3	44.3			
2ZDK095HP-3D-0H	●	9.5	0 -0.015	42.8	44.8	10	106	Fig.1
2ZDK096HP-3D-0H	●	9.6		43.2	45.2			
2ZDK097HP-3D-0H	●	9.7		43.7	45.7			
2ZDK098HP-3D-0H	●	9.8		44.1	46.1			
2ZDK099HP-3D-0H	●	9.9		44.6	46.6			
2ZDK100HP-3D-0H	●	10.0	0 -0.015	45	47	10	106	Fig.1
2ZDK101HP-3D-0H	●	10.1		45.5	47.5			
2ZDK102HP-3D-0H	●	10.2		45.9	47.9			
2ZDK103HP-3D-0H	●	10.3		46.4	48.4			
2ZDK104HP-3D-0H	●	10.4		46.8	48.8			
2ZDK105HP-3D-0H	●	10.5	0 -0.018	47.3	49.3	11	116	Fig.1
2ZDK106HP-3D-0H	●	10.6		47.7	49.7			
2ZDK107HP-3D-0H	●	10.7		48.2	50.2			
2ZDK108HP-3D-0H	●	10.8		48.6	50.6			
2ZDK109HP-3D-0H	●	10.9		49.1	51.1			
2ZDK110HP-3D-0H	●	11.0	0 -0.018	49.5	51.5	11	116	Fig.1
2ZDK111HP-3D-0H	●	11.1		50	52			
2ZDK112HP-3D-0H	●	11.2		50.4	52.4			
2ZDK113HP-3D-0H	●	11.3		50.9	52.9			
2ZDK114HP-3D-0H	●	11.4		51.3	53.3			
2ZDK115HP-3D-0H	●	11.5	0 -0.018	51.8	53.8	12	122	Fig.1
2ZDK116HP-3D-0H	●	11.6		52.2	54.2			
2ZDK117HP-3D-0H	●	11.7		52.7	54.7			
2ZDK118HP-3D-0H	●	11.8		53.1	55.1			
2ZDK119HP-3D-0H	●	11.9		53.6	55.6			
2ZDK120HP-3D-0H	●	12.0	0 -0.018	54	56	12	122	Fig.1

The standard drilling depth is 3.0 D (3.0 x DC).

● : Available

Recommended cutting conditions

2ZDK-HP Short Regular

Drilling depth Short: ap ≦ 1.5 DC Regular: ap ≦ 2DC

Workpiece	Outside diameter DC (mm)	1	1.5	2	2.5	3	3.5	4	4.5	5	6	8	10	12	14	16	18	20
Structural steel, Carbon steel	Spindle revolution (min^{-1})	20,700	13,800	11,150	9,200	9,100	7,800	6,800	6,100	5,500	4,600	3,500	2,800	2,300	1,800	1,600	1,400	1,300
	Feed rate (mm/min)	350	350	430	430	520	520	520	520	520	520	520	520	520	480	480	480	480
Alloy steel	Spindle revolution (min^{-1})	17,500	11,700	9,600	7,650	7,200	6,200	5,400	4,800	4,400	3,600	2,700	2,200	1,800	1,500	1,350	1,200	1,100
	Feed rate (mm/min)	290	290	380	380	450	450	450	450	450	450	450	450	450	420	420	420	420
Pre-hardened steel (30~45HRC)	Spindle revolution (min^{-1})	9,600	6,400	5,570	4,460	3,900	3,400	2,900	2,600	2,300	1,900	1,500	1,200	1,000	850	750	650	600
	Feed rate (mm/min)	120	120	170	170	210	210	210	210	210	210	210	210	210	200	200	200	200
Nodular cast iron	Spindle revolution (min^{-1})	15,900	10,600	10,360	8,290	7,200	6,200	5,400	4,800	4,400	3,600	2,700	2,200	1,800	1,550	1,350	1,200	1,100
	Feed rate (mm/min)	220	250	390	390	390	390	390	390	390	390	390	390	390	360	360	360	360
Aluminum alloy	Spindle revolution (min^{-1})	39,800	26,600	23,000	18,500	17,800	15,200	13,100	11,800	10,500	8,900	6,700	5,400	4,500	3,800	3,400	3,000	2,700
	Feed rate (mm/min)	900	1,000	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270
Aluminum alloy casting	Spindle revolution (min^{-1})	29,000	19,200	17,500	14,000	13,100	11,500	10,000	8,800	8,000	6,700	5,000	4,000	3,400	2,900	2,500	2,200	2,000
	Feed rate (mm/min)	550	550	820	820	820	820	820	820	820	820	820	820	820	820	820	820	820

2ZDK-HP Short Long shank type

Drilling depth: ap ≦ 1DC

Workpiece	Outside diameter DC (mm)	3	3.5	4	4.5	5	6	8	10	12
Structural steel Carbon steel	Spindle revolution (min^{-1})	10,600	9,100	8,000	7,100	6,400	5,300	4,000	3,200	2,700
	Feed rate (mm/min)	830	830	830	830	830	830	830	830	830
Alloy steel	Spindle revolution (min^{-1})	9,500	8,200	7,200	6,400	5,700	4,800	3,600	2,900	2,400
	Feed rate (mm/min)	630	630	630	630	630	630	630	630	630
Pre-hardened steel (30~45HRC)	Spindle revolution (min^{-1})	7,400	6,400	5,600	5,000	4,500	3,700	2,800	2,200	1,900
	Feed rate (mm/min)	365	365	365	365	365	365	365	365	365
Nodular cast iron	Spindle revolution (min^{-1})	9,600	8,200	7,200	6,400	5,700	4,800	3,600	2,900	2,400
	Feed rate (mm/min)	475	475	475	475	475	475	475	475	475
Aluminum alloy	Spindle revolution (min^{-1})	12,700	10,900	9,600	8,500	7,600	6,400	4,800	3,800	3,200
	Feed rate (mm/min)	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050
Aluminum alloy casting	Spindle revolution (min^{-1})	9,500	8,200	7,200	6,400	5,700	4,800	3,600	2,900	2,400
	Feed rate (mm/min)	675	675	675	675	675	675	675	675	675

2ZDK-HP-OH Regular

Drilling depth: ap ≦ 3DC

Workpiece	Outside diameter DC (mm)	3	4	5	6	8	10	12
Structural steel Carbon steel	Spindle revolution (min^{-1})	10,600	7,950	6,350	5,300	3,980	3,180	2,650
	Feed rate (mm/min)	750	750	750	750	750	750	750
Alloy steel	Spindle revolution (min^{-1})	9,550	7,160	5,730	4,770	3,580	2,860	2,390
	Feed rate (mm/min)	700	680	630	600	600	600	600
Pre-hardened steel (30~45HRC)	Spindle revolution (min^{-1})	5,300	3,980	3,180	2,650	1,990	1,590	1,330
	Feed rate (mm/min)	300	300	300	300	300	280	280
Stainless steel	Spindle revolution (min^{-1})	7,430	5,570	5,100	4,240	3,180	2,550	2,120
	Feed rate (mm/min)	400	400	400	500	500	500	500
Nodular cast iron	Spindle revolution (min^{-1})	9,550	7,160	5,730	4,770	3,580	2,860	2,390
	Feed rate (mm/min)	580	580	500	500	500	450	450
Aluminum alloy	Spindle revolution (min^{-1})	18,000	13,500	10,800	9,000	6,800	5,400	4,500
	Feed rate (mm/min)	1,270	1,270	1,270	1,270	1,270	1,270	1,270
Aluminum alloy casting	Spindle revolution (min^{-1})	13,100	10,000	8,000	6,700	5,000	4,000	3,400
	Feed rate (mm/min)	900	900	850	850	850	850	850

Precautions

- **This tool is specially designed for plunging and NOT recommended for traversing**
- Coolant is recommended
- Adjust ap to suit machine rigidity and overhang length
- Use chuck and machine with the highest rigidity possible
- Pecking is recommended when drilling depth is 2D or over
- Cutting condition modifications may be needed when cutting a slant surface, depending on the slant angle (right figure)
  When workpiece slant is 30° or less, reduce the feed rate by 50%
  When workpiece slant is 30° or more, reduce the revolution by 70% and the feed rate by 30%

2ZDK-HP-OH

- Internal coolant is recommended
- If there is insufficient chip evacuation at the specified drill depth, it is recommended to peck or change cutting conditions
- Pre-drilling is recommended if cutting is unstable
- Pre-drilling and pecking are recommended for stainless steel machining
- Pecking is recommended when drilling depth is 2D or over