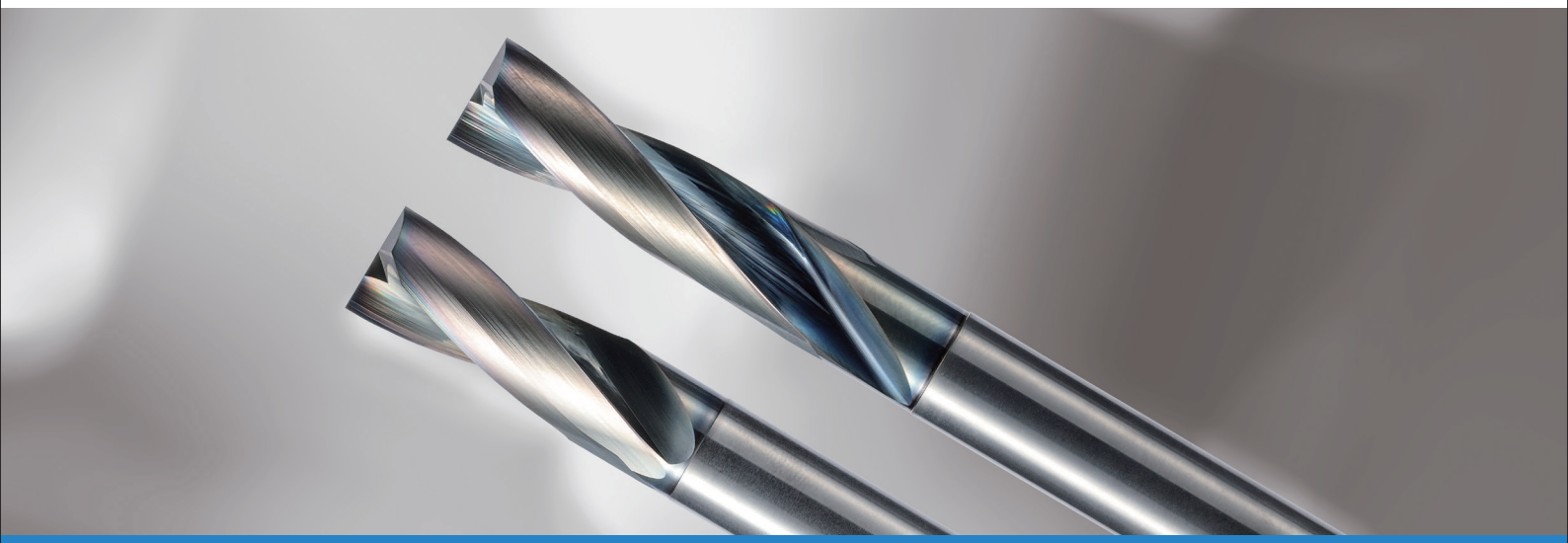
Flat Bottom Drill

2ZDK



180° Flat Bottom for a Wide Range of Applications Including Counterboring on Angled Surfaces

Smooth Chip Control and High Rigidity with Specialized Flute Design
High Precision Drilling Performance Improves True Positioning
Long Tool Life with Special Nano Coating Layer "MEGACOAT NANO"

NEW **Short type Lineup Expansion up to ø20**

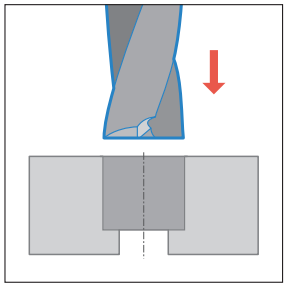
Flat Bottom Drill

2ZDK

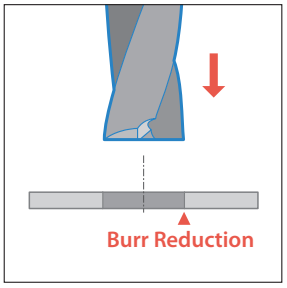
180° Flat Bottom for a Wide Range of Applications

Available for High Precision Counterboring Optimal Tool for Improving Cost Reduction During Difficult Cutting Processes

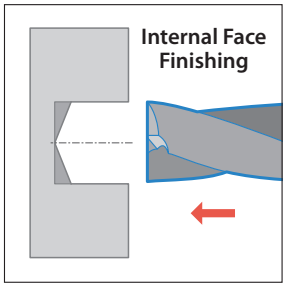
1 180° Flat Bottom for a Wide Range of Applications



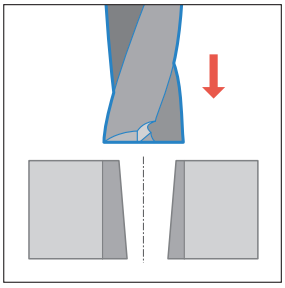
Hole Counterboring



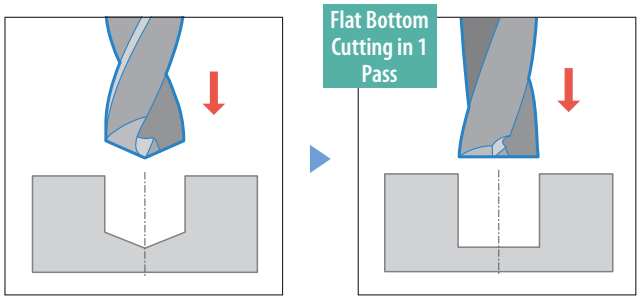
Plunging on Thin Plate



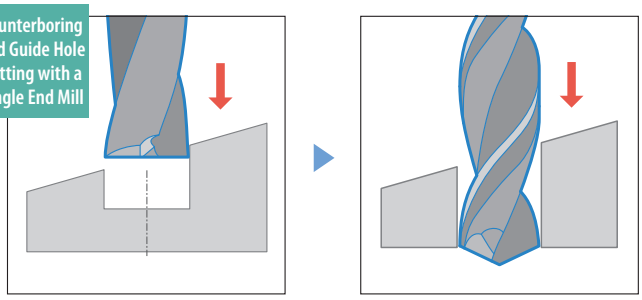
Turning in Automatic Lathes



Hole Expanding



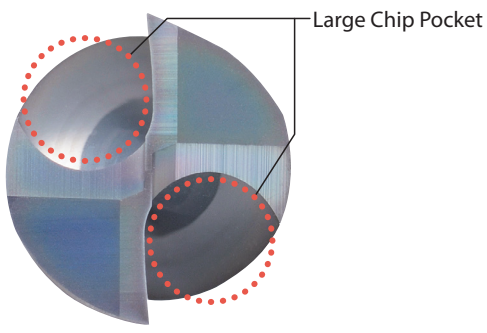
Flat Bottom Finishing after Drilling



Counterboring on Slant Surface/Spotting for Secondary Process

2 Smooth Chip Evacuation

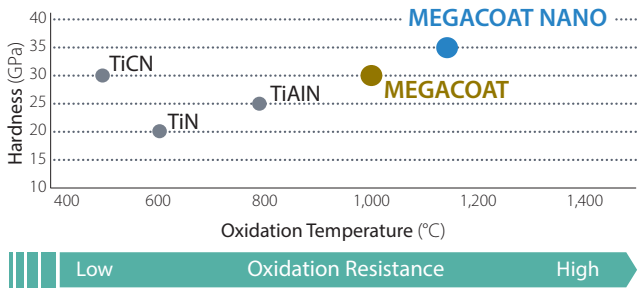
Good combination of smooth chip control and high rigidity due to the special flute shape



3 Long Tool Life with "MEGACOAT NANO"

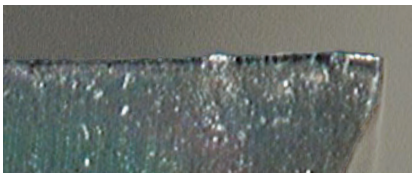
The special Multilayer Nano Coating prevents wear and chipping with high hardness (35GPa) and superior oxidation resistance (oxidation temperature: 1,150 °C)

Coating Property

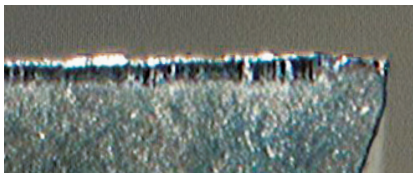


Stable Cutting with Minimum Wear

Wear Resistance Comparison (Internal Evaluation)



2ZDK



Competitor A

Cutting Conditions: n = 3,000 min^{-1}, Vf = 420 mm/min, Cutting Depth 12 mm (1.5D), Wet Holes: 200
Workpiece: S45C

Short Type is Suitable for Shallow Drilling up to 1.5D

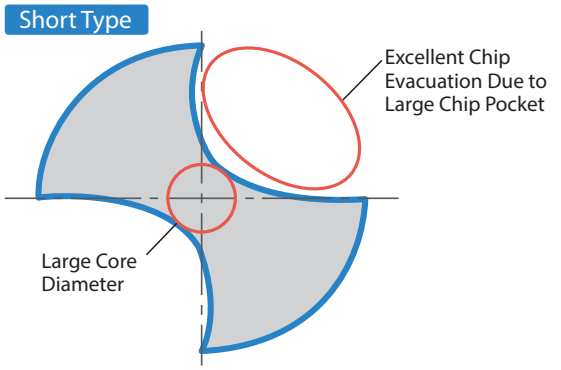
Short Type is Highly Rigid Due to Large Core Diameter

NEW **Lineup Expansion up to ø20**

Short Type

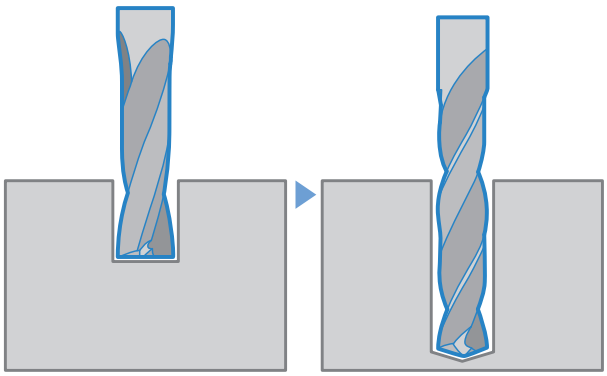
Standard

Short Type



Convenient Plus Tolerance is Available for ø6 type for Guide Hole Cutting (2ZDK060S-P)

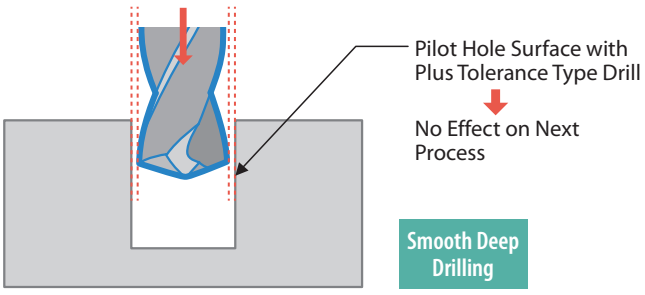
1st Process Pilot Hole 2nd Process Deep Drilling



Plus Tolerance for ø6 Type

1st Process Tool for Pilot Hole: Plus Tolerance (2ZDK060S-P)

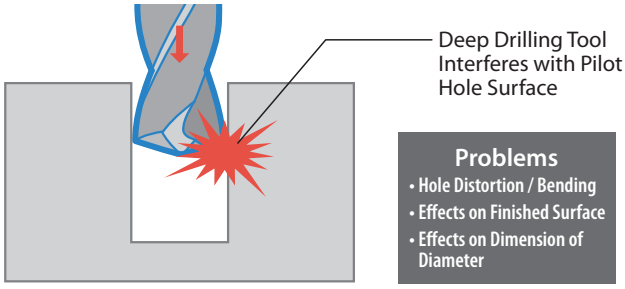
2nd Process Tool for Deep Drilling: Minus Tolerance



Interference Occurs when Both of 1st and 2nd Process Tools are Minus Tolerance

1st Process Tool for Pilot Hole: Minus Tolerance

2nd Process Tool for Deep Drilling: Minus Tolerance



Stock Items (Short Type)

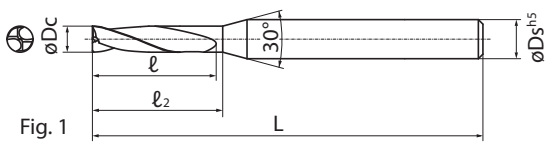


Fig. 1

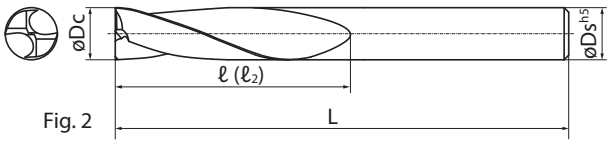


Fig. 2

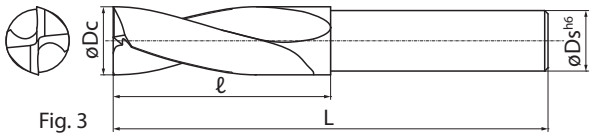


Fig. 3

Description	Stock	Dimensions (mm)						Drawing
		øDc	Outside Dia. Tolerance	ℓ	ℓ_2	øDs	L	
2ZDK010S	●	1.0	0 -0.010	3	4	4	50	Fig. 1
2ZDK011S	MTO	1.1	0 -0.010	3.5	4.5	4	50	Fig. 1
2ZDK012S	MTO	1.2	0 -0.010	3.5	4.5	4	50	Fig. 1
2ZDK013S	MTO	1.3	0 -0.010	4	5	4	50	Fig. 1
2ZDK014S	MTO	1.4	0 -0.010	4.5	5.5	4	50	Fig. 1
2ZDK015S	●	1.5	0 -0.010	5	6	4	50	Fig. 1
2ZDK016S	●	1.6	0 -0.010	5	6	4	50	Fig. 1
2ZDK017S	MTO	1.7	0 -0.010	5.5	6.5	4	50	Fig. 1
2ZDK018S	MTO	1.8	0 -0.010	6	7	4	50	Fig. 1
2ZDK019S	MTO	1.9	0 -0.010	6	7	4	50	Fig. 1
2ZDK020S	●	2.0	0 -0.010	6	7	4	50	Fig. 1
2ZDK021S	MTO	2.1	0 -0.010	7	8	4	50	Fig. 1
2ZDK022S	MTO	2.2	0 -0.010	7	8	4	50	Fig. 1
2ZDK023S	MTO	2.3	0 -0.010	7	8	4	50	Fig. 1
2ZDK024S	●	2.4	0 -0.010	8	9	4	50	Fig. 1
2ZDK025S	●	2.5	0 -0.010	8	9	4	50	Fig. 1
2ZDK026S	●	2.6	0 -0.010	8	9	4	50	Fig. 1
2ZDK027S	●	2.7	0 -0.010	9	10	4	50	Fig. 1
2ZDK028S	MTO	2.8	0 -0.010	9	10	4	50	Fig. 1
2ZDK029S	●	2.9	0 -0.010	9	10	4	50	Fig. 1
2ZDK030S	●	3.0	0 -0.010	9	10	6	60	Fig. 1
2ZDK031S	●	3.1	0 -0.012	10	11	6	60	Fig. 1
2ZDK032S	MTO	3.2	0 -0.012	10	11	6	60	Fig. 1
2ZDK033S	●	3.3	0 -0.012	10	11	6	60	Fig. 1
2ZDK034S	●	3.4	0 -0.012	11	12	6	60	Fig. 1
2ZDK035S	●	3.5	0 -0.012	11	12	6	60	Fig. 1

Description	Stock	Dimensions (mm)						Drawing
		øDc	Outside Dia. Tolerance	ℓ	ℓ_2	øDs	L	
2ZDK036S	MTO	3.6	0 -0.012	11	12	6	60	Fig. 1
2ZDK037S	●	3.7	0 -0.012	12	13	6	60	Fig. 1
2ZDK038S	MTO	3.8	0 -0.012	12	13	6	60	Fig. 1
2ZDK039S	MTO	3.9	0 -0.012	12	13	6	60	Fig. 1
2ZDK040S	●	4.0	0 -0.012	12	13	6	60	Fig. 1
2ZDK041S	●	4.1	0 -0.012	13	14	6	60	Fig. 1
2ZDK042S	●	4.2	0 -0.012	13	14	6	60	Fig. 1
2ZDK043S	●	4.3	0 -0.012	13	14	6	60	Fig. 1
2ZDK044S	MTO	4.4	0 -0.012	14	15	6	60	Fig. 1
2ZDK045S	●	4.5	0 -0.012	14	15	6	60	Fig. 1
2ZDK046S	MTO	4.6	0 -0.012	14	15	6	60	Fig. 1
2ZDK047S	MTO	4.7	0 -0.012	15	16	6	60	Fig. 1
2ZDK048S	●	4.8	0 -0.012	15	16	6	60	Fig. 1
2ZDK049S	●	4.9	0 -0.012	15	16	6	60	Fig. 1
2ZDK050S	●	5.0	0 -0.012	16	17	6	60	Fig. 1
2ZDK051S	●	5.1	0 -0.012	16	17	6	60	Fig. 1
2ZDK052S	●	5.2	0 -0.012	16	17	6	60	Fig. 1
2ZDK053S	●	5.3	0 -0.012	16	17	6	60	Fig. 1
2ZDK054S	MTO	5.4	0 -0.012	17	18	6	60	Fig. 1
2ZDK055S	●	5.5	0 -0.012	17	18	6	60	Fig. 1
2ZDK056S	●	5.6	0 -0.012	17	18	6	60	Fig. 1
2ZDK057S	MTO	5.7	0 -0.012	18	19	6	60	Fig. 1
2ZDK058S	●	5.8	0 -0.012	18	19	6	60	Fig. 1
2ZDK059S	MTO	5.9	0 -0.012	18	19	6	60	Fig. 1
2ZDK060S	●	6.0	0 -0.012	19	(21)	6	60	Fig. 2
2ZDK060S-P	●	6.0	+0.012 0	19	21	8	70	Fig. 1

- Number of Flutes (Z) = 2
- Helix Angle is 20 °
- The Cutting Depth Should be Less than 1.5D (1.5×Dc)

●: Std. Stock MTO: Made to Order

Description	Stock	Dimensions (mm)						Drawing
		øDc	Outside Dia. Tolerance	ℓ	ℓ_2	øDs	L	
2ZDK061S	●	6.1	0 -0.015	19	21	8	70	Fig. 1
2ZDK062S	●	6.2	0 -0.015	19	21	8	70	Fig. 1
2ZDK063S	●	6.3	0 -0.015	20	22	8	70	Fig. 1
2ZDK064S	●	6.4	0 -0.015	20	22	8	70	Fig. 1
2ZDK065S	●	6.5	0 -0.015	20	22	8	70	Fig. 1
2ZDK066S	●	6.6	0 -0.015	20	22	8	70	Fig. 1
2ZDK067S	MTO	6.7	0 -0.015	21	23	8	70	Fig. 1
2ZDK068S	●	6.8	0 -0.015	21	23	8	70	Fig. 1
2ZDK069S	MTO	6.9	0 -0.015	21	23	8	70	Fig. 1
2ZDK070S	●	7.0	0 -0.015	22	24	8	70	Fig. 1
2ZDK071S	MTO	7.1	0 -0.015	22	24	8	70	Fig. 1
2ZDK072S	MTO	7.2	0 -0.015	22	24	8	70	Fig. 1
2ZDK073S	●	7.3	0 -0.015	23	25	8	70	Fig. 1
2ZDK074S	MTO	7.4	0 -0.015	23	25	8	70	Fig. 1
2ZDK075S	●	7.5	0 -0.015	23	25	8	70	Fig. 1
2ZDK076S	MTO	7.6	0 -0.015	24	25	8	70	Fig. 1
2ZDK077S	●	7.7	0 -0.015	24	25	8	70	Fig. 1
2ZDK078S	●	7.8	0 -0.015	24	25	8	70	Fig. 1
2ZDK079S	MTO	7.9	0 -0.015	24	25	8	70	Fig. 1
2ZDK080S	●	8.0	0 -0.015	25	(27)	8	70	Fig. 2
2ZDK081S	MTO	8.1	0 -0.015	25	27	10	80	Fig. 1
2ZDK082S	●	8.2	0 -0.015	25	27	10	80	Fig. 1
2ZDK083S	MTO	8.3	0 -0.015	26	28	10	80	Fig. 1
2ZDK084S	MTO	8.4	0 -0.015	26	28	10	80	Fig. 1
2ZDK085S	●	8.5	0 -0.015	26	28	10	80	Fig. 1
2ZDK086S	MTO	8.6	0 -0.015	27	29	10	80	Fig. 1
2ZDK087S	●	8.7	0 -0.015	27	29	10	80	Fig. 1
2ZDK088S	●	8.8	0 -0.015	27	29	10	80	Fig. 1
2ZDK089S	MTO	8.9	0 -0.015	28	30	10	80	Fig. 1
2ZDK090S	●	9.0	0 -0.015	28	30	10	80	Fig. 1
2ZDK091S	MTO	9.1	0 -0.015	28	30	10	80	Fig. 1
2ZDK092S	MTO	9.2	0 -0.015	29	31	10	80	Fig. 1
2ZDK093S	MTO	9.3	0 -0.015	29	31	10	80	Fig. 1
2ZDK094S	MTO	9.4	0 -0.015	29	31	10	80	Fig. 1
2ZDK095S	●	9.5	0 -0.015	29	31	10	80	Fig. 1
2ZDK096S	MTO	9.6	0 -0.015	30	32	10	80	Fig. 1
2ZDK097S	MTO	9.7	0 -0.015	30	32	10	80	Fig. 1
2ZDK098S	●	9.8	0 -0.015	30	32	10	80	Fig. 1

Description	Stock	Dimensions (mm)						Drawing
		øDc	Outside Dia. Tolerance	ℓ	ℓ_2	øDs	L	
2ZDK099S	MTO	9.9	0 -0.015	31	33	10	80	Fig. 1
2ZDK100S	●	10.0	0 -0.015	31	(33)	10	80	Fig. 2
2ZDK101S	MTO	10.1	0 -0.018	31	33	12	100	Fig. 1
2ZDK102S	MTO	10.2	0 -0.018	32	34	12	100	Fig. 1
2ZDK103S	●	10.3	0 -0.018	32	34	12	100	Fig. 1
2ZDK104S	MTO	10.4	0 -0.018	32	34	12	100	Fig. 1
2ZDK105S	●	10.5	0 -0.018	33	35	12	100	Fig. 1
2ZDK106S	MTO	10.6	0 -0.018	33	35	12	100	Fig. 1
2ZDK107S	MTO	10.7	0 -0.018	33	35	12	100	Fig. 1
2ZDK108S	MTO	10.8	0 -0.018	33	35	12	100	Fig. 1
2ZDK109S	MTO	10.9	0 -0.018	34	36	12	100	Fig. 1
2ZDK110S	●	11.0	0 -0.018	34	36	12	100	Fig. 1
2ZDK111S	MTO	11.1	0 -0.018	34	36	12	100	Fig. 1
2ZDK112S	MTO	11.2	0 -0.018	35	37	12	100	Fig. 1
2ZDK113S	MTO	11.3	0 -0.018	35	37	12	100	Fig. 1
2ZDK114S	MTO	11.4	0 -0.018	35	37	12	100	Fig. 1
2ZDK115S	●	11.5	0 -0.018	36	38	12	100	Fig. 1
2ZDK116S	MTO	11.6	0 -0.018	36	38	12	100	Fig. 1
2ZDK117S	MTO	11.7	0 -0.018	36	38	12	100	Fig. 1
2ZDK118S	MTO	11.8	0 -0.018	36	38	12	100	Fig. 1
2ZDK119S	MTO	11.9	0 -0.018	36	38	12	100	Fig. 1
2ZDK120S	●	12.0	0 -0.018	37	(39)	12	100	Fig. 2
2ZDK125S	●	12.5	0 -0.018	41	—	12	100	Fig. 3
2ZDK130S	●	13.0	0 -0.018	43	—	12	100	Fig. 3
2ZDK135S	●	13.5	0 -0.018	44	—	12	100	Fig. 3
2ZDK140S	●	14.0	0 -0.018	45	—	12	100	Fig. 3
2ZDK145S	●	14.5	0 -0.018	47	—	12	115	Fig. 3
2ZDK150S	●	15.0	0 -0.018	48	—	12	115	Fig. 3
2ZDK155S	●	15.5	0 -0.018	50	—	12	115	Fig. 3
2ZDK160S	●	16.0	0 -0.018	52	(52)	16	115	Fig. 2
2ZDK165S	●	16.5	0 -0.018	53	—	16	115	Fig. 3
2ZDK170S	●	17.0	0 -0.018	54	—	16	115	Fig. 3
2ZDK175S	●	17.5	0 -0.018	56	—	16	115	Fig. 3
2ZDK180S	●	18.0	0 -0.018	57	—	16	115	Fig. 3
2ZDK185S	●	18.5	0 -0.021	59	—	16	125	Fig. 3
2ZDK190S	●	19.0	0 -0.021	60	—	16	125	Fig. 3
2ZDK195S	●	19.5	0 -0.021	62	—	16	125	Fig. 3
2ZDK200S	●	20.0	0 -0.021	63	(63)	20	125	Fig. 2

• Number of Flutes (Z) = 2
• Helix Angle is 20 °
• The Cutting Depth Should be Less than 1.5D (1.5×Dc)

• For 2ZDK160S and 2ZDK200S, the tolerance of the shank diameter is H6
● : Std. Stock MTO: Made to Order

Stock Items (Standard)

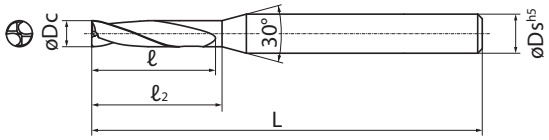


Fig. 1

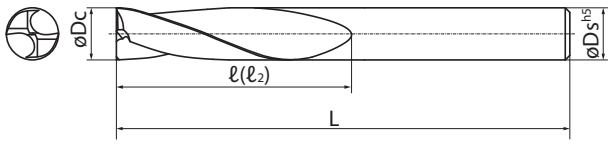


Fig. 2

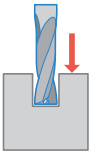
Description	Stock	Dimensions (mm)						Drawing
		øDc	Outside Dia. Tolerance	ℓ	ℓ2	øDs	L	
2ZDK030	●	3.0	0 -0.010	14	15	6	60	Fig. 1
2ZDK033	●	3.3	0 -0.012	15	16	6	60	Fig. 1
2ZDK035	●	3.5	0 -0.012	17	18	6	60	Fig. 1
2ZDK040	●	4.0	0 -0.012	19	20	6	60	Fig. 1
2ZDK042	●	4.2	0 -0.012	20	21	6	60	Fig. 1
2ZDK045	●	4.5	0 -0.012	21	22	6	60	Fig. 1
2ZDK050	●	5.0	0 -0.012	23	24	6	60	Fig. 1
2ZDK053	●	5.3	0 -0.012	24	25	6	60	Fig. 1
2ZDK055	●	5.5	0 -0.012	25	26	6	60	Fig. 1
2ZDK056	●	5.6	0 -0.012	26	27	6	60	Fig. 1
2ZDK060	●	6.0	0 -0.012	28	(28)	6	60	Fig. 2
2ZDK065	●	6.5	0 -0.015	30	31	8	70	Fig. 1
2ZDK068	●	6.8	0 -0.015	31	32	8	70	Fig. 1

Description	Stock	Dimensions (mm)						Drawing
		øDc	Outside Dia. Tolerance	ℓ	ℓ2	øDs	L	
2ZDK070	●	7.0	0 -0.015	32	33	8	70	Fig. 1
2ZDK075	●	7.5	0 -0.015	34	35	8	70	Fig. 1
2ZDK080	●	8.0	0 -0.015	36	(36)	8	70	Fig. 2
2ZDK085	●	8.5	0 -0.015	38	39	10	80	Fig. 1
2ZDK088	●	8.8	0 -0.015	39	40	10	80	Fig. 1
2ZDK090	●	9.0	0 -0.015	40	41	10	80	Fig. 1
2ZDK095	●	9.5	0 -0.015	42	43	10	80	Fig. 1
2ZDK100	●	10.0	0 -0.015	45	(45)	10	80	Fig. 2
2ZDK103	●	10.3	0 -0.018	46	47	12	100	Fig. 1
2ZDK105	●	10.5	0 -0.018	47	48	12	100	Fig. 1
2ZDK110	●	11.0	0 -0.018	51	52	12	100	Fig. 1
2ZDK115	●	11.5	0 -0.018	53	54	12	100	Fig. 1
2ZDK120	●	12.0	0 -0.018	54	(54)	12	100	Fig. 2

- Number of Flutes (Z) = 2
- Helix Angle is 20 °
- The cutting depth should be less than 2D (2×Dc)
- Step machining is recommended when cutting depth is over 2D

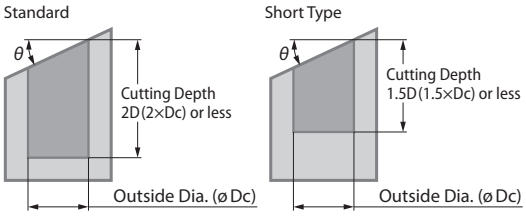
● : Std. Stock

Cutting Conditions

Material	Application	Outside Dia. Dc (mm)	ø1	ø2	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø14	ø16	ø18	ø20
Structural Steel, Carbon Steel SS400, S45C	 Plunge Milling	Spindle Revolution (min^{-1})	19,500	11,200	8,300	6,200	5,000	4,200	3,200	2,500	2,100	1,800	1,600	1,400	1,300
		Feed Rate (mm/min)	300	380	520	520	520	520	520	450	450	450	450	450	450
Alloy Steel SCM, SNCM		Spindle Revolution (min^{-1})	19,000	10,000	7,200	5,400	4,400	3,600	2,700	2,200	1,800	1,500	1,350	1,200	1,100
		Feed Rate (mm/min)	300	320	450	450	450	450	450	400	400	400	400	400	400
Pre-hardened Steel NAK (30~45HRC)		Spindle Revolution (min^{-1})	16,000	8,000	3,900	2,900	2,300	1,900	1,500	1,200	1,000	850	750	650	600
		Feed Rate (mm/min)	210	210	210	210	210	210	210	190	190	190	190	190	190
Nodular Cast Iron FCD400		Spindle Revolution (min^{-1})	16,000	10,000	7,200	5,400	4,400	3,600	2,700	2,200	1,800	1,550	1,350	1,200	1,100
		Feed Rate (mm/min)	200	300	390	390	390	390	390	340	340	340	340	340	340
Aluminum Alloy A7075		Spindle Revolution (min^{-1})	20,000	20,000	17,800	13,100	10,500	8,900	6,700	5,400	4,500	3,800	3,400	3,000	2,700
		Feed Rate (mm/min)	500	850	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 AC, ADC		Spindle Revolution (min^{-1})	20,000	20,000	13,100	10,000	8,000	6,700	5,000	4,000	3,400	2,900	2,500	2,200	2,000
		Feed Rate (mm/min)	450	750	820	820	820	820	820	820	820	820	820	820	820

Notes

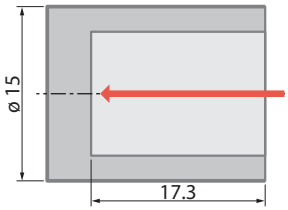
- **This tool is specially designed for plunging and NOT recommended for traversing**
- Coolant is recommended
- Adjust ap to suit machine rigidity
- Use chuck and machine with the highest rigidity possible
- Stainless steel cutting (SUS304/SUS316) is NOT recommended
- Cutting condition modifications 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%



Case Studies

Valve Parts SUM22

n = 1,800 min^{-1}
(Vc = 62 m/min)
Vf = 270 mm/min
(f = 0.15 mm/rev)
Hole Depth 17.3 mm
Wet (Oil-based)
2ZDK111S



Number of Workpieces

Tool Life

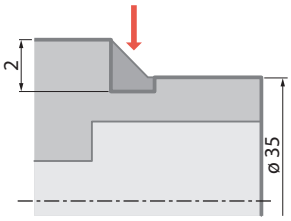
2ZDK **4,500 pcs** 1.6 Times

Competitor B **2,700 pcs**

Competitor B caused chattering and fractures to occur on the cutting edge. 2ZDK maintained stable cutting with no chattering. Tool life was extended 1.6 times that of Competitor B. (User Evaluation)

Shaft SCr420H

n = 3,600 min^{-1}
(Vc = 18 m/min)
Vf = 70 mm/min
(f = 0.02 mm/rev)
Hole Depth 2 mm
Dry
2ZDK016S



Number of Workpieces

Tool Life

2ZDK **2,700 pcs** 3 Times

Competitor C **900 pcs**

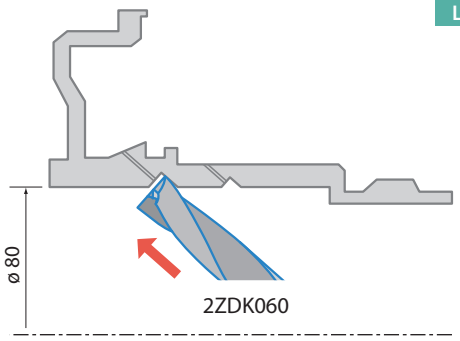
Tool life of Competitor C was unstable due to fracturing. 2ZDK maintained triple tool life with stable cutting performance.

(User Evaluation)

Transmission Parts S35C

Counterboring Before Oil Hole Drilling

Stable Cutting with Less Wear



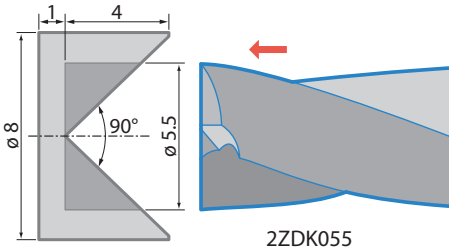
n = 2,600 min^{-1} (Vc = 49 m/min), Vf = 130 mm/min (f = 0.05 mm/rev), Wet
Number of Workpieces 100

(User Evaluation)

Valve Parts SUS440C

Hole Counterboring with Drill in Automatic Lathe

Improved Yield Rate and Stable Cutting



n = 2,000 min^{-1} (Vc = 34 m/min), Vf = 200 mm/min (f = 0.08 mm/rev), Wet
Number of Workpieces 30,000

(User Evaluation)

