Size φ1～φ20

CZS

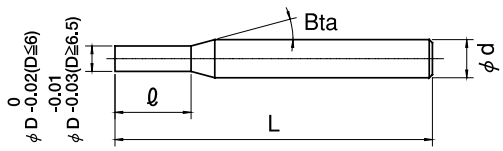
Super MG | UT COAT | 40° | Shank Dia 0/-0.005 | Variable pitch

Applicable Work Material(◎Most Suitable ○Suitable)

Work Material													Suitable Coolant ◎Recommendation
CARBON STEELS S45C S55C	ALLOY STEELS SK・SCM SUS	PREHARDENED STEELS NAK HPM	HARDENED STEELS (～55HRC)	HARDENED STEELS (～60HRC)	HARDENED STEELS (～65HRC)	CAST IRON	ALUMINIUM ALLOYS	GRAPHITE	COPPER	PLASTIC	TITANIUM	HEATPROOF STEELS	
◎	SK・SCM ◎ / SUS ◎※4	◎	○			○	◎ ※4		◎ ※3		○ ※1	○ ※1	◎Airblow/Oil Mist ◎Water Soluble Oil

※1 Most suitable to use oil for the stainless steel and the heat resisting alloy steel
※3 Recommend Oil or Water Soluble coolant for Copper milling
※4 Recommend Water Soluble cutting fluid

The new tip geometry is ideal for vertical milling of horizontal surfaces
The specific carbide grade used offers excellent resistance to chipping
The low friction characteristics of the coating offers excellent chip evacuation as well as longer tool life



The shank taper angle shown is not an exact value and to avoid contact with the workpiece, we recommend the user controls the precise value of this angle
Shank taper angle should not make contact with the work piece

(Total 48 models)

Unit (mm)

Model Number	Outside Diameter φD	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter φd
CZS 4010-0150	1	1.5	16°	50	4
CZS 4010-0250	1	2.5	16°	50	4
CZS 4015-0225	1.5	2.25	16°	50	4
CZS 4015-0400	1.5	4	16°	50	4
CZS 4020-0300	2	3	16°	50	4
CZS 4020-0600	2	6	16°	50	4
CZS 4025-0375	2.5	3.75	16°	50	4
CZS 4025-0800	2.5	8	16°	50	4
CZS 4030-0450	3	4.5	16°	60	6
CZS 4030-0800	3	8	16°	60	6
CZS 4035-1000	3.5	10	16°	60	6
CZS 4040-0600	4	6	16°	60	6

Next Page ➡

Unit (mm)

Model Number	Outside Diameter φD	Length of Cut ℓ	Shank Taper Angle Bta	Overall Length L	Shank Diameter φd
CZS 4040-1100	4	11	16°	60	6
CZS 4045-1100	4.5	11	16°	60	6
CZS 4050-0750	5	7.5	16°	60	6
CZS 4050-1300	5	13	16°	60	6
CZS 4055-1300	5.5	13	16°	60	6
CZS 4060-0900	6	9	–	60	6
CZS 4060-1300	6	13	–	60	6
CZS 4060-1800	6	18	–	60	6
CZS 4065-1600	6.5	16	16°	70	8
CZS 4070-1050	7	10.5	16°	70	8
CZS 4070-1600	7	16	16°	70	8
CZS 4070-2100	7	21	16°	70	8
CZS 4075-1600	7.5	16	16°	70	8
CZS 4080-1200	8	12	–	70	8
CZS 4080-1900	8	19	–	70	8
CZS 4080-2400	8	24	–	70	8
CZS 4085-1900	8.5	19	16°	80	10
CZS 4090-1350	9	13.5	16°	80	10
CZS 4090-1900	9	19	16°	80	10
CZS 4090-2700	9	27	16°	80	10
CZS 4095-1900	9.5	19	16°	80	10
CZS 4100-1500	10	15	–	80	10
CZS 4100-2200	10	22	–	80	10
CZS 4100-3000	10	30	–	80	10
CZS 4105-2200	10.5	22	16°	100	12
CZS 4110-1650	11	16.5	16°	100	12
CZS 4110-2200	11	22	16°	100	12
CZS 4110-3300	11	33	16°	100	12
CZS 4115-2200	11.5	22	16°	100	12
CZS 4120-1800	12	18	–	100	12
CZS 4120-2600	12	26	–	100	12
CZS 4120-3600	12	36	–	100	12
CZS 4160-2400	16	24	–	110	16
CZS 4160-3200	16	32	–	110	16
CZS 4200-3000	20	30	–	125	20
CZS 4200-4000	20	40	–	125	20

Milling Conditions for CZS

Short length of cut

WORK MATERIAL			CARBON STEELS (S45C/S50C) (～225HB)				ALLOY STEELS (SK/SCM) (225～325HB)				STRUCTUALS STEELS (SS400) Recommend using water soluble coolant. (use water soluble coolant when vertical milling)			
Model Number	Outside Diameter (mm)	Length of Cut	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING
4010-0150	1	1.5	18,000	150	200	1,200※1	14,500	50	150	900※1	18,000	100※1	400※1	1,200※1
4015-0225	1.5	2.25	16,000	200	550	1,800※1	13,000	80	400	1,200※1	16,000	100※1	600※1	1,800※1
4020-0300	2	3	12,000	200	550	1,800※1	10,000	80	400	1,200※1	12,000	200※1	600※1	1,800※1
4025-0375	2.5	3.75	10,000	300	950	2,400※1	8,000	100	650	1,800※1	10,000	300	950	2,400※1
4030-0450	3	4.5	8,500	300	950	2,400※1	6,800	100	650	1,800※1	8,500	300	950	2,400※1
4040-0600	4	6	7,200	300	950	1,350	5,700	110	650	1,000	7,200	300	950	1,350
4050-0750	5	7.5	6,000	300	1,000	1,500	4,800	110	700	1,100	6,000	300	1000	1,500
4060-0900	6	9	5,000	300	1,000	1,600	4,000	120	700	1,200	5,000	300	1000	1,600
4070-1050	7	10.5	4,200	300	1,000	1,500	3,400	110※1	700	1,150	4,200	300	900	1,500
4080-1200	8	12	3,500	300	950	1,400	2,700	110※1	700	1,050	3,500	250	850	1,400
4090-1350	9	13.5	2,900	300	950	1,300	2,300	100※1	700	1,000	2,900	250	800	1,300
4100-1500	10	15	2,300	300	900	1,200	1,900	100※1	650	900	2,300	200	750	1,200
4110-1650	11	16.5	2,050	280	900	1,150	1,700	90※1	650	850	2,050	200	750	1,150
4120-1800	12	18	1,850	260	850	1,100	1,550	80※1	600	800	1,850	180	700	1,100
4160-2400	16	24	1,380	150※1	830※1	550	1,100	150※2	400※1	440	1,380	150※2	830※2	550
4200-3000	20	30	1,000	150※1	830※1	500	880	150※2	400※1	440	1,000	150※2	830※2	500
(mm) Milling Amount				Depth:1D ※1 Depth:0.1D (a_p:Max 10mm)	a_p:1D ※1 a_p:0.5D	a_e:0.2D ※1 a_e:0.1D a_p:Length of Cut		Depth:1D ※2 Depth:0.1D (a_p:Max 10mm)	a_p:1D ※1 0.5D	a_e:0.2D ※1 a_e:0.1D a_p:Length of Cut		Depth:0.5D ※1 Depth:0.25D ※2 Depth:0.1D (a_p:Max 10mm)	a_p:1D ※1 a_p:0.25D ※2 a_p:0.5D	a_e:0.2D ※1 a_e:0.1D a_p:Length of Cut

WORK MATERIAL			STAINLESS STEELS (SUS304) use water soluble coolant				PREHARDENED STEELS (HPM/NAK) (30～45HRC)				HARDENED STEELS (SKD/SKT/STAVAX) (45～55HRC)			
Model Number	Outside Diameter (mm)	Length of Cut	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING
4010-0150	1	1.5	14,500	150	250	1,000※1	14,500	100	120	600※1	12,900	80	50※1	300※1
4015-0225	1.5	2.25	13,000	150	270	1,500※1	12,000	150	320	900※1	10,000	150	100※1	650※1
4020-0300	2	3	10,000	100	270	1,500※1	9,000	150	320	900※1	8,200	150	150※1	650※1
4025-0375	2.5	3.75	8,000	100	300	2,000※1	7,500	200	520	1,200※1	7,000	250	300	1,000※1
4030-0450	3	4.5	6,800	80	300	2,000※1	6,800	200	520	1,200※1	6,120	250	300	1,000※1
4040-0600	4	6	5,700	90	350	1,150	5,100	220	520	700	5,000	220	320	600
4050-0750	5	7.5	4,800	100	400	1,300	4,050	240	520	850	4,300	180	340	800
4060-0900	6	9	4,000	100	400	1,300	3,300	240	520	1,000	3,600	160	360	1,000
4070-1050	7	10.5	3,200	100	350	1,300	2,900	240※1	500※1	1,000	2,800	160※1	320	1,000
4080-1200	8	12	2,400	90※1	300	1,200	2,300	220※1	470※1	900	2,100	150※1	280	1,000
4090-1350	9	13.5	1,800	90※1	250	1,100	1,900	220※1	470※1	900	1,600	130※1	240	950
4100-1500	10	15	1,400	80※1	200	1,000	1,500	200※1	450※1	900	1,250	120※1	200	750
4110-1650	11	16.5	1,250	80※1	200	900	1,350	200※1	450※1	850	1,150	110※1	190	720
4120-1800	12	18	1,250	70※1	180	900	1,200	180※1	420※1	800	1,050	110※1	180	700
4160-2400	16	24	1,250	70※1	450※1	440	1,100	150※1	400※2	440※1	800	50※1	300※2	320※1
4200-3000	20	30	1,000	70※1	450※1	440	880	150※1	400※2	440※1	630	50※1	300※2	320※1
(mm) Milling Amount				Depth:0.25D ※1 MAX2mm	a_p:1D ※1 a_p:0.4D	a_e:0.1D ※1 a_e:0.05D a_p:Length of Cut		※1 Depth:0.5D (a_e:Max 3mm)	a_p:1D ※2 a_p:0.25-0.5D ※1 a_p:MAX6mm	a_e:0.1D ※1 a_e:0.05D a_p:Length of Cut		Depth:0.25D ※1 a_p:MAX1.5mm	a_p:1D ※1 a_p:0.25D ※2 a_p:0.1D	a_e:0.1D ※1 a_e:0.05D a_p:Length of Cut

Standard length of cut

WORK MATERIAL			CARBON STEELS (S45C/S50C) (～225HB)				ALLOY STEELS (SK/SCM) (225～325HB)				STRUCTUALS STEELS (SS400) Recommend using water soluble coolant. (use water soluble coolant when vertical milling)			
Model Number	Outside Diameter (mm)	Length of Cut	Speed (min-1)	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min-1)	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min-1)	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING
4010-0250	1	2.5	18,000	100	200※1	1,200※1	14,500	50	150※1	900※1	18,000	100※1	400※1	1,200※1
4020-0600	2	6	12,000	150	400※1	1,800※1	10,000	80	300※1	1,200※1	12,000	200※1	600※1	1,800※1
4030-0800	3	8	8,500	250	600	2,400※1	6,800	100	400	1,800※1	8,500	300	600	2,400※1
4040-1100	4	11	7,200	270	650	1,350	5,700	110	450	1,000	7,200	300	650	1,350
4050-1300	5	13	6,000	300	700	1,500	4,800	110	500	1,100	6,000	300	700	1,500
4060-1300	6	13	5,000	300	700	1,600	4,000	120	500	1,200	5,000	300	700	1,600
4070-1600	7	16	4,200	300	700	1,500	3,400	110※1	500	1,150	4,200	270	700	1,500
4080-1900	8	19	3,500	300	700	1,400	2,700	110※1	500	1,050	3,500	250	700	1,400
4090-1900	9	19	2,900	300	700	1,300	2,300	100※1	500	1,000	2,900	220	700	1,300
4100-2200	10	22	2,300	300	700	1,200	1,900	100※1	500	900	2,300	200	700	1,200
4110-2200	11	22	2,050	280	670	1,150	1,700	90※1	450	850	2,050	190	680	1,150
4120-2600	12	26	1,850	260	650	1,100	1,550	80※1	450	800	1,850	180	650	1,100
4160-3200	16	32	1,380	150※1	830※1	550	1,100	150※2	300※1	440	1,380	150※2	830※2	550
4200-4000	20	40	1,000	150※1	830※1	500	880	150※2	300※1	440	1,000	150※2	830※2	500
(mm) Milling Amount				Depth:1D ※1 Depth:0.1D (a_e:Max 10mm)	a_p:1D ※1 a_p:0.5D	a_p:1.5D a_e:0.2D ※1 a_e:0.1D		Depth:1D ※2 Depth:0.1D (a_e:Max 10mm)	a_p:1D ※1 a_p:0.5D	a_p:1.5D a_e:0.2D ※1 a_e:0.1D		Depth:0.5D ※1 Depth:0.25D ※2 Depth:0.1D (a_e :Max 10mm)	a_p:1D ※1 a_p:0.25D ※2 a_p:0.5D	a_p:1.5D a_e:0.2D ※1 a_e:0.1D

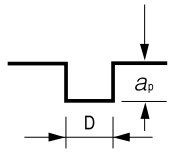
WORK MATERIAL			STAINLESS STEELS (SUS304) use water soluble coolant.				PREHARDENED STEELS (HPM/NAK) (30～45HRC)				HARDENED STEELS (SKD/SKT/STAVAX) (45～55HRC)			
Model Number	Outside Diameter (mm)	Length of Cut	Speed (min-1)	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min-1)	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min-1)	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING
4010-0250	1	2.5	14,500	150	250	1,000※1	12,900	80	140	270	12,900	80	50※1	300※1
4020-0600	2	6	10,000	100	270	1,500※1	9,350	110	230	400	8,200	150	150※1	650※1
4030-0800	3	8	6,800	80	300	2,000※1	6,120	120	270	450	6,120	250	300	1,000※1
4040-1100	4	11	5,700	90	350	1,150	5,250	130	320	500	5,000	220	320	500
4050-1300	5	13	4,800	100	400	1,300	4,460	150	360	540	4,300	180	340	520
4060-1300	6	13	4,000	100	400	1,300	3,600	160	360	540	3,600	160	360	540
4070-1600	7	16	3,200	100	350	1,300	2,850	140※1	340	540	2,800	160※1	320	520
4080-1900	8	19	2,400	90※1	300	1,200	2,320	90※1	320	480	2,100	150※1	280	500
4090-1900	9	19	1,800	90※1	250	1,100	1,700	80※1	250	410	1,600	130※1	240	470
4100-2200	10	22	1,400	80※1	200	1,000	1,250	60※1	180	340	1,250	120※1	200	450
4110-2200	11	22	1,250	80※1	200	900	1,100	55※1	170	320	1,150	110※1	190	440
4120-2600	12	26	1,250	70※1	180	900	1,050	50※1	160	320	1,050	110※1	180	420
4160-3200	16	32	1,250	70※1	450※1	440	960	40※1	350※1	380※1	800	50※2	300※2	320※1
4200-4000	20	40	1,000	70※1	450※1	440	770	40※1	350※1	380※1	630	50※2	300※2	320※1
(mm) Milling Amount				Depth:0.25D ※ a_e:Max 2mm	a_p:0.5D ※1 a_p:0.1D	a_p:1.5D a_e:0.1D ※1 a_e:0.05D		Depth:0.5D ※ a_e:Max 2mm	a_p:1D ※1 a_p:0.5D	a_p:1.5D a_e:0.2D ※1 a_e:0.1D		Depth:0.5D ※1 a_e :Max 10mm ※2 Depth:0.1D	a_p:0.5D ※1 a_p:0.25D ※2 a_p:0.1D	a_p:1.5D a_e:0.1D ※1 a_e:0.05D

3D Flute length type

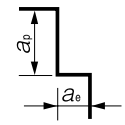
WORK MATERIAL			CARBON STEELS (S45C/S50C) (～225HB)				ALLOY STEELS (SK/SCM) (225～325HB)				STRUCTUAL STEELS (SS400) ※use water soluble coolant			
Model Number	Outside Diameter (mm)	Length of Cut (CR)	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING
4060-1800	6	18	5,000	200	500	1,600	4,000	60	350	1,200	4,000	120	300	1,300
4070-2100	7	21	4,100	200	450	1,450	3,400	60	330	1,150	3,400	110	280	1,200
4080-2400	8	24	3,200	150	400	1,300	2,700	50	300	1,050	2,700	90	250	1,150
4090-2700	9	27	2,400	140	350	1,150	2,050	50	270	1,000	2,100	80	230	1,050
4100-3000	10	30	1,850	120	320	1,000	1,500	40	240	900	1,500	70	200	1,000
4110-3300	11	33	1,650	100	300	900	1,350	40	220	850	1,350	65	190	950
4120-3600	12	36	1,500	90	300	800	1,200	30	200	750	1,200	60	190	900
(mm) Milling Amount				1D	a_p:1D	a_e:0.1D		6mm	a_p:1D	a_e:0.1D		0.5D	a_p:1D	a_e:0.1D

WORK MATERIAL			STAINLESS STEELS (SUS304) ※use water soluble coolant				PREHARDENED STEELS (HPM/NAK) (30～45HRC)				HARDENED STEELS (SKD/SKT/STAVAX) (45～55HRC)			
Model Number	Outside Diameter (mm)	Length of Cut (CR)	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING	Speed (min^{-1})	Feed (mm/min) VERTICAL	SLOTTING	SIDE MILLING
4060-1800	6	18	2,800	40	200	900	3,000	—	160	600	3,600	—	—	540
4070-2100	7	21	2,450	40	190	950	2,500	—	160	700	2,900	—	—	520
4080-2400	8	24	2,100	40	180	950	2,150	—	150	750	2,300	—	—	500
4090-2700	9	27	1,700	30	170	1,000	1,850	—	150	800	1,700	—	—	470
4100-3000	10	30	1,400	30	150	1,000	1,500	—	140	900	1,250	—	—	450
4110-3300	11	33	1,250	30	140	1,000	1,350	—	130	850	1,100	—	—	420
4120-3600	12	36	1,150	25	130	950	1,200	—	120	800	1,000	—	—	400
(mm) Milling Amount				1.5 mm	a_p:0.5D	a_e:0.05D			6mm	a_e:0.05D				a_e:0.05D

This parameter table shows standard milling. Adjust it in accordance with milling type, purpose and used instrument in actual milling
The milling parameter of diameter 16 and 20 is made based on BT50 spindle type. Please decrease 50% milling amount for BT40 spindle type
In case of chattering, clogging or other troubles occur, adjust the cutting depth amount
Remove chip to prevent heat generation and ignition by milling processing
Adjust the cutting milling amount following the indication "★"
This parameter is made based on shortest overhang length. Adjust milling parameter with your length

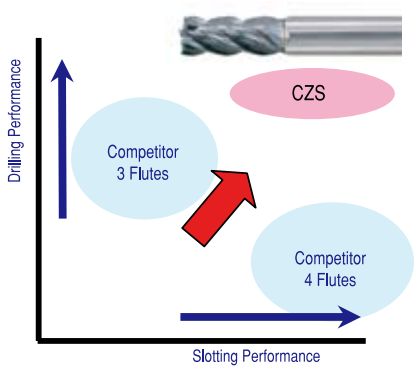


a_p: Axial Depth (mm)
D : Outside Diameter (mm)



a_p: Axial Depth (mm)
a_e: Radial Depth (mm)

Technical Data CZS Series



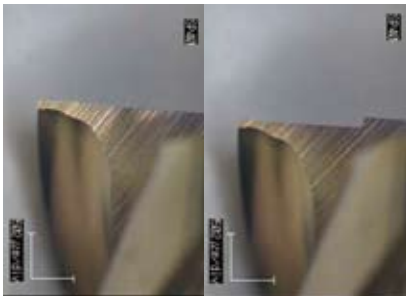
＜Characteristics＞
Special geometry can achieve drilling process with 4 Flutes End Mill
We designed original gash to get better chip evacuation

<Advantage of 4 Flutes>

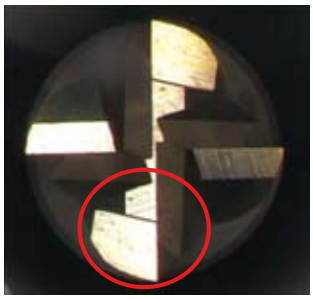
1. Good balance of milling resistance
2. Higher rigidity
3. Easy to measure diameter

◎ Geometry Information

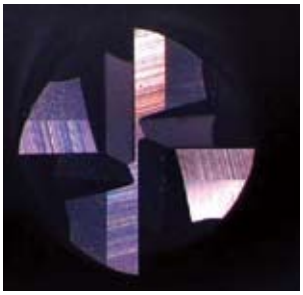
Side View



End of Flute

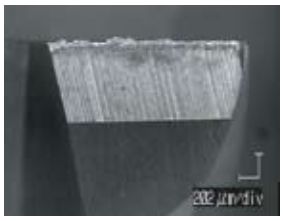


Conventional 4FL



Cutting edge Geometry
We set small step on main flute which blocked milling factor on drilling process
The conventional 4FL tool got tool breakage due to poor chip evacuation

Example:CZS4060-1300
Slit Milling



Tool Condition after 1040 Slitting

Spindle Speed	5,000min^{-1}(*Vc*94m/min)
Z Feed Rate	300mm/min(f 0.06mm/rev)
Feed Rate	710mm/min(*fz* 0.0355mm/t)
a_p	6mm （a_p1D）
Slot Size	6mm×6mm×15mm (X × Y × Z)
Coolant	Airblow (Spindle Through)