



Size $\phi 6 \sim \phi 12$

CNRS



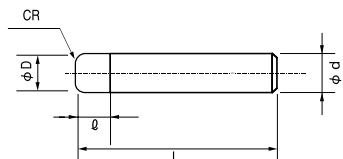
$\phi 6$ $\phi 8 \sim \phi 12$

Material Applications (☆ Highly Recommended ○ Recommended ○ Suggested)

Work Material															
Carbon Steels S45C S55C	Alloy Steels SK / SCM SUS	Prehardened Steels NAK HPM	Hardened Steels			Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide	Hard Brittle (Non-Metallic) Materials
			~55HRC	~60HRC	~70HRC										
○	○	○	○			○	○		○			☆	☆		

Features

4 flute high efficient corner radius designed for Titanium Alloys and Heat Resistant Alloys. UTCOAT is recommended for heat-resistant hard materials to achieve longer tool life. Variable pitch, high helix and positive rake angle offer stable milling. Reduced cutting force when using a helical approach or inclined planes.



Total 8 models

Unit (mm)

Model Number	Outside Diameter ϕD	Corner Radius CR	Length of Cut ℓ	Overall Length L	Shank Diameter ϕd	Price (¥)
CNRS 4060-10-16	6	R1	16	90	6	15,000
CNRS 4080-10-16	8	R1	16	100	8	17,800
CNRS 4100-10-26	10	R1	26	110	10	21,800
CNRS 4100-15-26		R1.5		110	10	21,800
CNRS 4100-20-26		R2		110	10	21,800
CNRS 4120-10-26		R1		120	12	27,700
CNRS 4120-15-26	12	R1.5	26	120	12	27,700
CNRS 4120-20-26		R2		120	12	27,700

Milling Conditions for CNRS

◆ Side milling

WORK MATERIAL			ALLOY STEELS SK / SCM				STAINLESS STEELS SUS			
Model Number	Outside Diameter (mm)	Corner Radius (CR)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
4060-10-16	6	R1	5,180	1,330	7.2(1.2D)	0.6(0.1D)	3,700	740	4.8(0.8D)	0.3(0.05D)
4080-10-16	8	R1	3,920	1,260	9.6(1.2D)	0.8(0.1D)	2,800	700	6.4(0.8D)	0.4(0.05D)
4100-10-26	10	R1	2,770	1,225	12.0(1.2D)	1.0(0.1D)	1,980	680	8.0(0.8D)	0.5(0.05D)
4100-15-26		R1.5	2,930	1,225	12.0(1.2D)	1.0(0.1D)	2,090	680	8.0(0.8D)	0.5(0.05D)
4100-20-26		R2	3,080	1,225	12.0(1.2D)	1.0(0.1D)	2,200	680	8.0(0.8D)	0.5(0.05D)
4120-10-26	12	R1	2,330	1,170	14.4(1.2D)	1.2(0.1D)	1,665	650	9.6(0.8D)	0.6(0.05D)
4120-15-26		R1.5	2,465	1,170	14.4(1.2D)	1.2(0.1D)	1,760	650	9.6(0.8D)	0.6(0.05D)
4120-20-26		R2	2,590	1,170	14.4(1.2D)	1.2(0.1D)	1,850	650	9.6(0.8D)	0.6(0.05D)

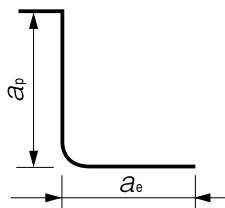
WORK MATERIAL			TITANIUM / TITANIUM ALLOYS Ti-6AL-4V				HEAT RESISTANT ALLOYS Inconel718			
Model Number	Outside Diameter (mm)	Corner Radius (CR)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
4060-10-16	6	R1	3,700	740	4.8(0.8D)	0.3(0.05D)	1,800	300	4.8(0.8D)	0.3(0.05D)
4080-10-16	8	R1	2,800	700	6.4(0.8D)	0.4(0.05D)	1,650	280	6.4(0.8D)	0.4(0.05D)
4100-10-26	10	R1	1,980	680	8.0(0.8D)	0.5(0.05D)	1,170	250	8.0(0.8D)	0.5(0.05D)
4100-15-26		R1.5	2,090	680	8.0(0.8D)	0.5(0.05D)	1,235	250	8.0(0.8D)	0.5(0.05D)
4100-20-26		R2	2,200	680	8.0(0.8D)	0.5(0.05D)	1,300	250	8.0(0.8D)	0.5(0.05D)
4120-10-26	12	R1	1,665	650	9.6(0.8D)	0.6(0.05D)	990	220	9.6(0.8D)	0.6(0.05D)
4120-15-26		R1.5	1,760	650	9.6(0.8D)	0.6(0.05D)	1,045	220	9.6(0.8D)	0.6(0.05D)
4120-20-26		R2	1,850	650	9.6(0.8D)	0.6(0.05D)	1,100	220	9.6(0.8D)	0.6(0.05D)

Please adjust milling parameters referring following table.

D : ϕ 6 ~ ϕ 12

Overhang Length	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
~D×4	×1	×1	×1	×1
~D×5	×0.7	×0.7	×0.7	×0.8
~D×6	×0.5	×0.5	×0.6	×0.7

Side Milling



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

Square

Square
Long Neck
Square

Radius

Radius
Long Neck
RadiusBall / Long
Shank BallBall
Long Neck
BallTaper Neck
Ball

Taper

Spiral
V CutterDrill
Thread Mill

EURO Series

Technical Data

Milling Conditions for CNRS

◆Slotting

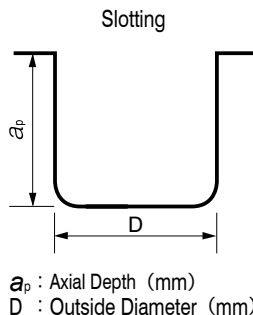
WORK MATERIAL			ALLOY STEELS SK / SCM			STAINLESS STEELS SUS		
Model Number	Outside Diameter (mm)	Corner Radius (CR)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)
4060-10-16	6	R1	2,035	365	3.0(0.5D)	1,850	330	1.5(0.25D)
4080-10-16	8	R1	1,550	305	4.0(0.5D)	1,410	275	2.0(0.25D)
4100-10-26	10	R1	1,260	305	5.0(0.5D)	1,145	275	2.5(0.25D)
4100-15-26		R1.5	1,330	305	5.0(0.5D)	1,210	275	2.5(0.25D)
4100-20-26		R2	1,400	305	5.0(0.5D)	1,270	275	2.5(0.25D)
4120-10-26	12	R1	1,020	290	6.0(0.5D)	925	265	3.0(0.25D)
4120-15-26		R1.5	1,080	290	6.0(0.5D)	980	265	3.0(0.25D)
4120-20-26		R2	1,135	290	6.0(0.5D)	1,030	265	3.0(0.25D)

WORK MATERIAL			TITANIUM / TITANIUM ALLOYS Ti-6AL-4V			HEAT RESISTANT ALLOYS Inconel718		
Model Number	Outside Diameter (mm)	Corner Radius (CR)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)
4060-10-16	6	R1	1,680	300	0.6(0.1D)	850	100	0.6(0.1D)
4080-10-16	8	R1	1,280	250	0.8(0.1D)	650	90	0.8(0.1D)
4100-10-26	10	R1	1,040	250	1.0(0.1D)	485	80	1.0(0.1D)
4100-15-26		R1.5	1,100	250	1.0(0.1D)	515	80	1.0(0.1D)
4100-20-26		R2	1,155	250	1.0(0.1D)	540	80	1.0(0.1D)
4120-10-26	12	R1	840	240	1.2(0.1D)	405	70	1.2(0.1D)
4120-15-26		R1.5	890	240	1.2(0.1D)	425	70	1.2(0.1D)
4120-20-26		R2	935	240	1.2(0.1D)	450	70	1.2(0.1D)

Please adjust milling parameters referring following table.

D : φ 6 ~ φ 12

Overhang Lengh	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p Axial Depth (mm)	a _e Radial Depth (mm)
~D×4	×1	×1	×1	×1
~D×5	×0.7	×0.7	×0.7	×0.8
~D×6	×0.5	×0.5	×0.6	×0.7



Note:

- Decrease both spindle speed and feed rate proportionally when the milling parameters exceed the machine's maximum spindle speed.
- Recommend water soluble or oil coolant.

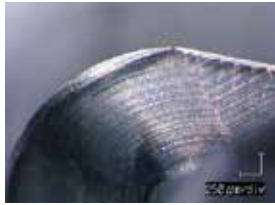
Milling Example: Ti6Al-4V (30HRC) milled with CNRS $\phi 10 \times CR2$

Spindle Speed	1.820min ⁻¹ ($V_c=57$ m/min)
Feed Rate	700mm/min ($f_z=0.096$ mm/t)
Axial Depth a_p	0.5mm
Radial Depth a_e	5mm
Overhang Length	45mm (4.5D)
Coolant	Water Soluble (Through Spindle)
Pocket Size (Cycle Time)	70×44×13 (30 minutes)



CNRS

Continuous cutting is possible after 60 minutes milling.

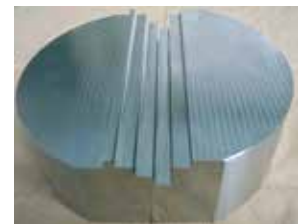


Competitor's tool

Corner radius is broken after 30min (one pocket) milling.

Milling Example: Inconel 718 (40HRC) milled with CNRS $\phi 8 \times CR2$

Milling Process	Roughing		Finishing
	Slotting	Side Milling	
Spindle Speed	576min ⁻¹ ($V_c=14.5$ m/min)	1650min ⁻¹ ($V_c=41.5$ m/min)	
Feed Rate	72mm/min ($f_z=0.03$ mm/t)	280mm/min ($f_z=0.04$ mm/t)	200mm/min ($f_z=0.03$ mm/t)
Axial Depth a_p	0.8mm	6.4mm	0.1mm
Radial Depth a_e	—	0.4mm	0.1mm
Overhang Length	30mm (3.75D)		
Coolant	Water Soluble (Nozzle)		
Cycle Time	105 minutes		10 minutes



Reduces burrs in step milling process.
Offers better surface finish with unique cutting edge.

Square

Square
Long Neck
Square

Radius

Radius
Long Neck
RadiusBall / Long
Shank BallBall
Long Neck
BallTaper Neck
BallTaper
TaperSpiral
V CutterDrill
Thread Mill

EURO Series

Technical Data