

**CERABIT**

# CUTTING TOOLS

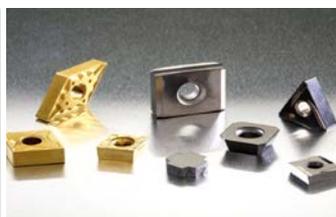
- CERAMIC
- CERMET
- PCBN/PCD
- TOOL HOLDER
- MILLING CUTTER



# SPEEDY SOLUTION!!



A22



A82



A106

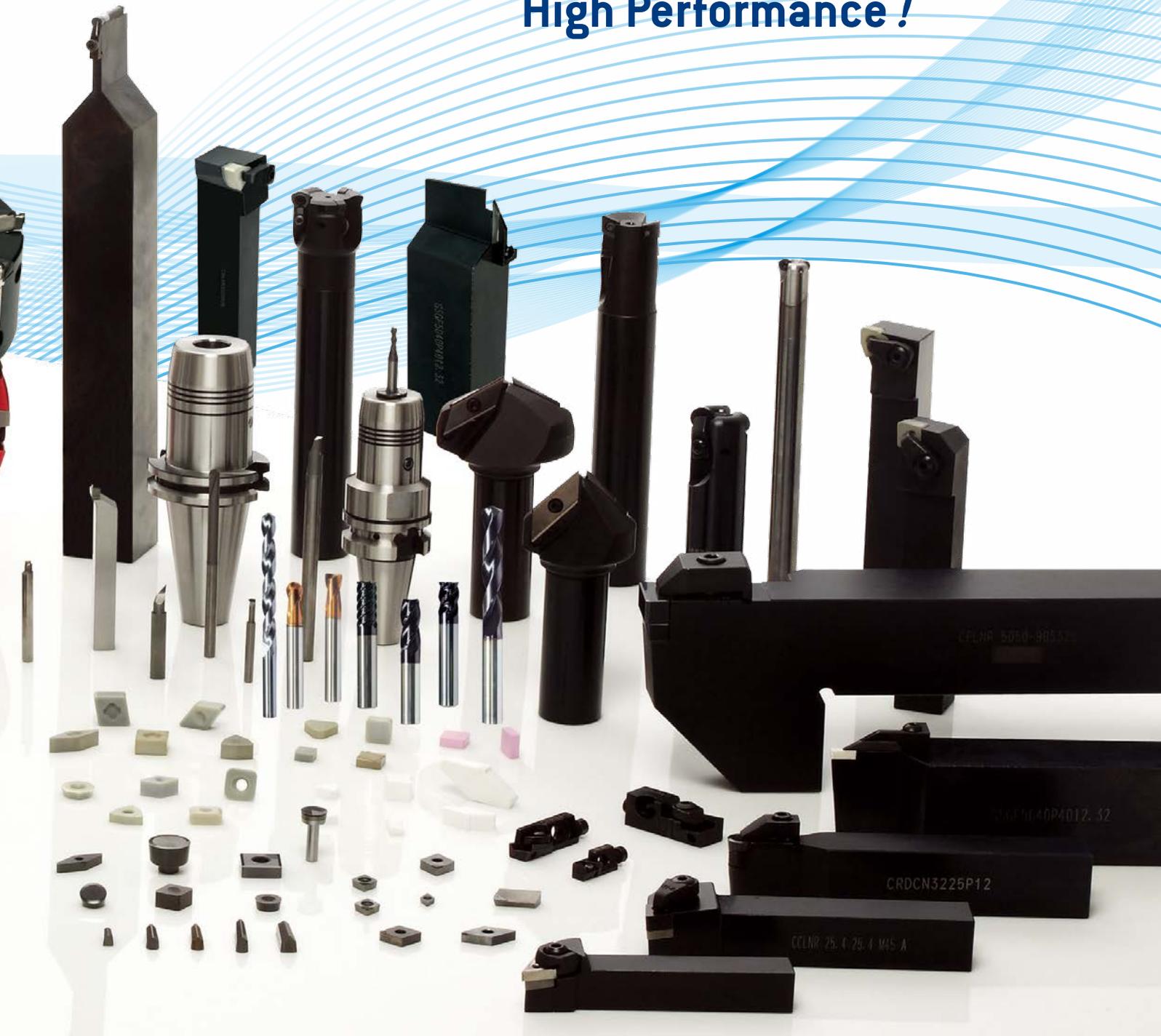


A130

**High Speed !**

**High Quality !**

**High Performance !**



**A178**



**B1**



**C1**



**D1**

## INTRODUCTION

Union Materials Corporation has accumulated technologies and experiences over 40 years through developing and manufacturing various high-tech materials. Including hard ferrite magnets which are awarded Best Supplier from Robert Bosch GmbH for seven times consecutively in last 18 years, Union Materials Corporation manufactures various ceramic-based parts, cutting tools and industrial ceramics for automotive, electrical & electronic engineering and machinery industry.

Union cutting tool products are advanced materials developed with high technologies through long-term experiences, continuous studies and applications to commercialization of new materials. We have attained many great achievements in the field of various cutting tools for automotive, steel mill, aerospace and machinery field.

As of March 14 2017, Union Corporation has been the largest shareholder of Union Materials Corporation. We started new era with new company name, Union Materials Corporation since September 28, 2017 in accordance with the change of major shareholder which was originally Ssangyong Cement to Union Corporation.

Union Materials Corporation firmly promises to engage in its current business activities and will endeavor to support our customers for satisfaction.



Seoul HQ Office



Daegu plant

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**UNION MATERIALS**

**CUTTING TOOLS**

**A**

**TURNING &**

## **INSERT**

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## **TECHNICAL DATA**

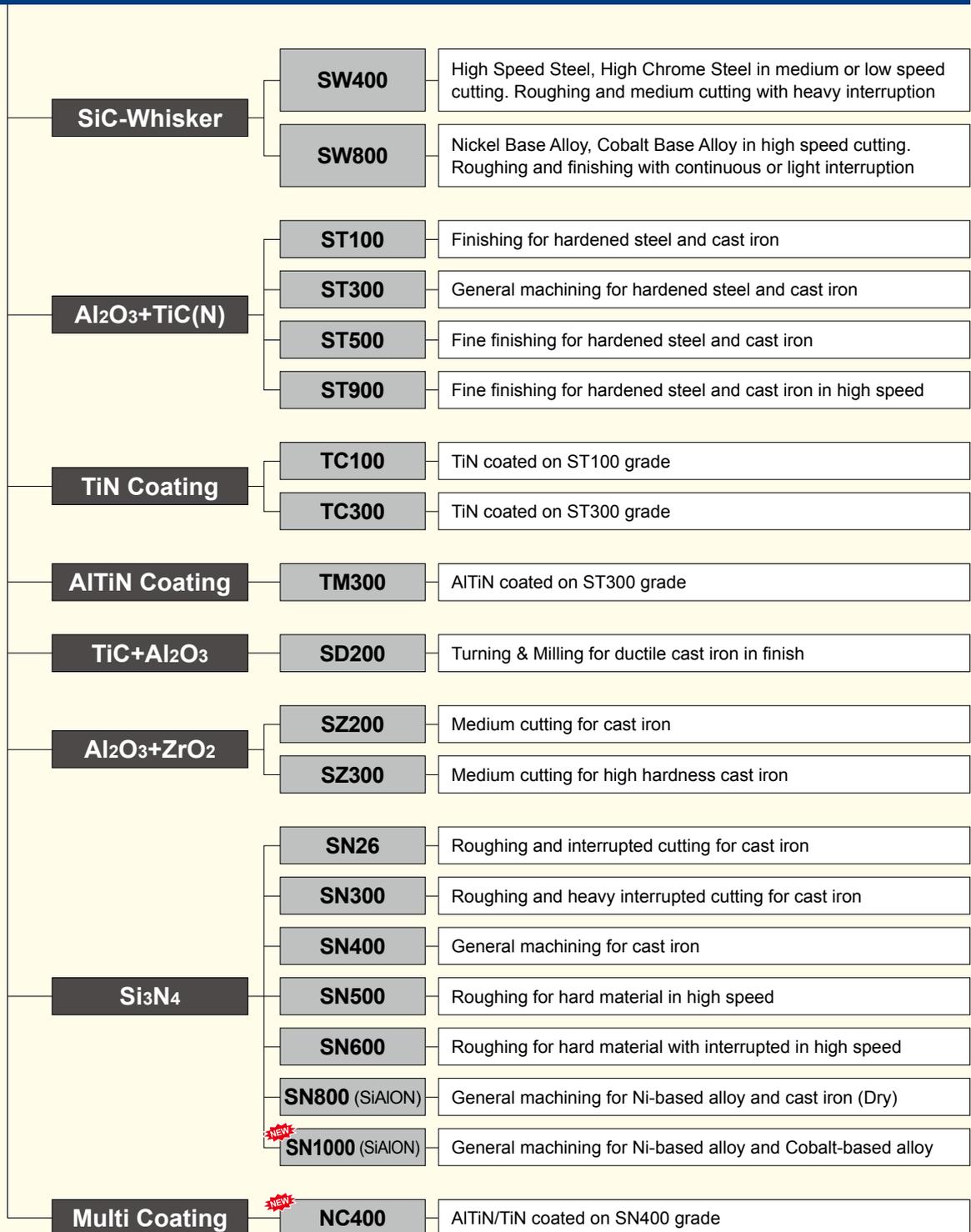
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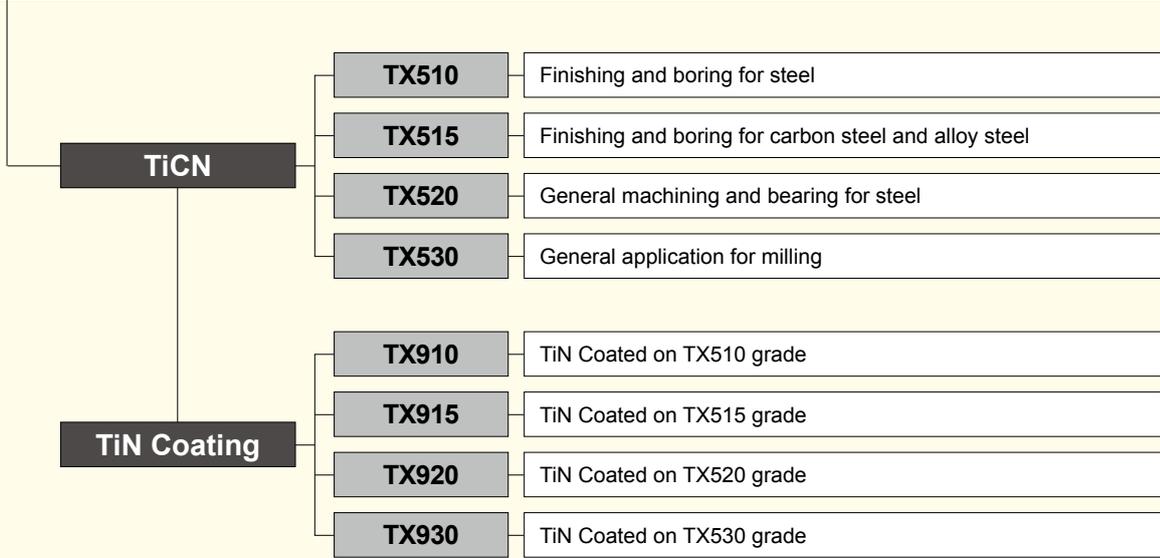
# MILLING

# GRADE INFORMATION

## CERAMIC



**CERMET**

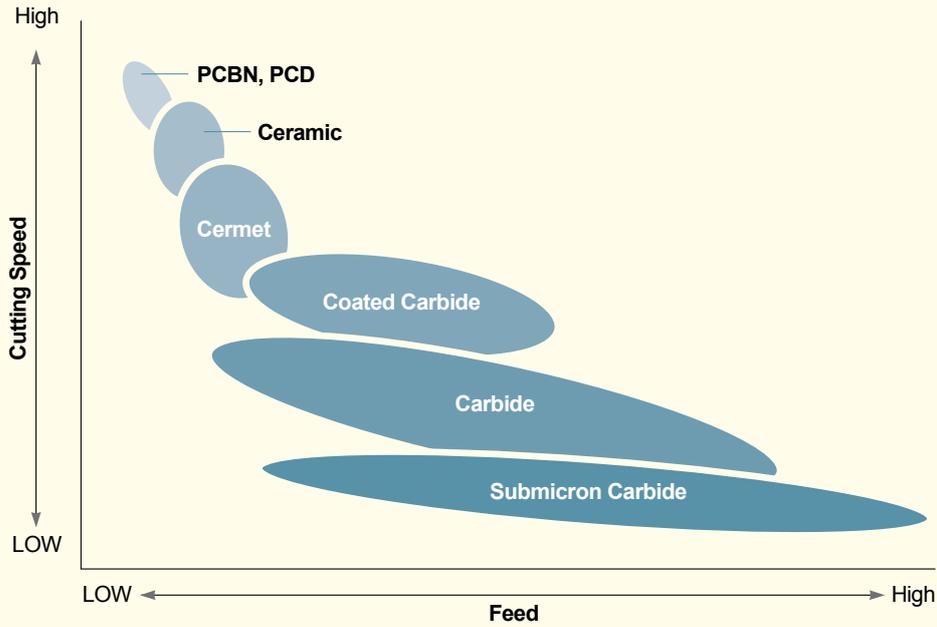


**PCBN/PCD**

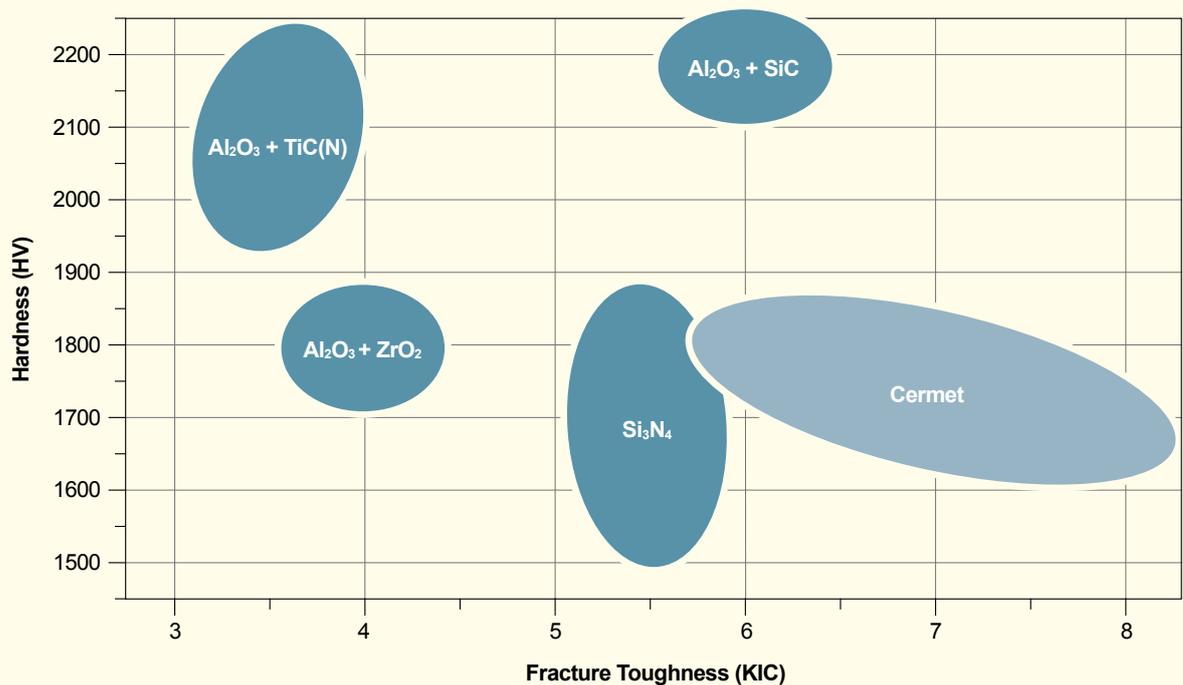


# GRADE INFORMATION

## Application Range



## Mechanical Properties



# CERAMIC

Union Ceramics take pride in its outstanding wear resistance and thermal shock resistance with high speed cutting. Pure raw materials give stability and fine microstructure to the products. Through HIP process, shaped bodies are completely condensed so that the finished goods are strong and resistant against fracture and wear.

- Improved work efficiency by increasing cutting speed on extremely higher than carbide inserts.
- Longer tool life through excellent wear resistance
- Precise cutting and superior surface roughness

	Whisker	SW400	Excellent flank & notch wear in high speed cutting Al <sub>2</sub> O <sub>3</sub> +SiC	High Speed Steel, High Chrome Steel in medium or low speed cutting Roughing and medium cutting with heavy interruption	Tougher 	
		SW800	Excellent flank & notch wear in high speed cutting Al <sub>2</sub> O <sub>3</sub> +SiC	Nickel Base Alloy, Cobalt Base Alloy in high speed cutting Roughing and finishing with continuous or light interruption	Harder	
	Al <sub>2</sub> O <sub>3</sub> Series	ST100	Tougher alternative to ST300 High thermal shock resistance Al <sub>2</sub> O <sub>3</sub> +TiC	Universal grade for machining cast iron and hardened steel	Tougher 	
		ST300	Excellent wear resistance Al <sub>2</sub> O <sub>3</sub> +TiCN	A basic choice for machining hardened steel and alloy steel		
		ST500	Alternative to PCBN fine microstructure Al <sub>2</sub> O <sub>3</sub> +TiCN	Fine finishing for hardened steel and cast iron		
		ST900	Excellent wear and thermal shock resistance Al <sub>2</sub> O <sub>3</sub> +TiCN	Fine finishing for hardened steel and cast iron in high speed		
		TC100	Wear resistance improved TiN coated	Finishing for hardened steel and cast iron		
		TC300	Excellent wear resistance TiN coated	Finishing for hardened steel and cast iron		
		TM300	Excellent wear resistance & thermal shock resistance	Finishing for hardened steel and cast iron		Harder
		SD200	High thermal shock resistance Usable with coolant TiC+Al <sub>2</sub> O <sub>3</sub>	Machining ductile cast iron Finishing for ductile cast iron and hard materials		Finishing for ductile cast iron
	ZrO <sub>2</sub> Series	SZ200	Toughened by zirconia High chemical stability Al <sub>2</sub> O <sub>3</sub> +ZrO <sub>2</sub>	Finishing, semi-finishing of cast iron and steel	Tougher 	
		SZ300	Harder alternative to SZ200 Al <sub>2</sub> O <sub>3</sub> +ZrO <sub>2</sub>	Finishing, semi-finishing of cast iron and steel	Harder	
	Si <sub>3</sub> N <sub>4</sub> Series	SN26	Good toughness and thermal shock resistance Well balanced wear resistance and toughness Si <sub>3</sub> N <sub>4</sub>	First choice for roughing with interrupted cuts Roll turning and milling of cast iron and steel	Roughing in lower speed	
		SN300	Tougher alternative to SN400 Thermal shock resistance and good toughness Si <sub>3</sub> N <sub>4</sub>	Roughing and high speed cutting with interruption	Tougher 	
		SN400	Excellent wear resistance in high speed cutting Si <sub>3</sub> N <sub>4</sub>	First choice for roughing of cast iron High speed machining with interrupted cuts		
		SN500	Harder alternative to SN400 Improved wear resistance at high cutting speed Si <sub>3</sub> N <sub>4</sub>	High speed roughing for cast iron		
		SN600	Excellent wear resistance in interrupted cutting Si <sub>3</sub> N <sub>4</sub>	Roughing for hard material with interruption and high speed	Harder	
		SN800	Advanced grade with SiAlON contained superior edge strength SiAlON	Great performance against notch wear High speed roughing of high temperature alloy and inconel	Harder 	
		SN900	Excellent thermal shock resistance and thermal conductivity SiAlON	Tough machining in Heat Resistance Super Alloy (HRSA)	Tougher	
			SN1000	Excellent thermal shock resistance and thermal conductivity SiAlON	Ni-based Alloy, Cobalt-based Alloy in medium or low speed cutting Roughing and Medium cutting with heavy interruption	
	NC400	Excellent wear resistance & thermal shock resistance	Cast Iron in roughing and semi-finishing cutting			

# GRADE INFORMATION

## Physical Properties

Grade	Composition	Color	Density (g/cm <sup>3</sup> )	Hardness (HV)	Toughness (MPa·m <sup>1/2</sup> )	Thermal Conductivity (cal/cm. sec. °C)
SW400	Al <sub>2</sub> O <sub>3</sub> +SiC	Green	3.8	2,100	7.0	-
SW800	Al <sub>2</sub> O <sub>3</sub> +SiC	Green	3.7	2,100	7.0	-
ST100	Al <sub>2</sub> O <sub>3</sub> +TiC	Black	4.20	2,100	4.00	0.08
ST300	Al <sub>2</sub> O <sub>3</sub> +TiCN	Black	4.40	2,150	4.50	0.08
ST500	Al <sub>2</sub> O <sub>3</sub> +TiCN	Black	4.30	2,200	4.50	0.08
ST900	Al <sub>2</sub> O <sub>3</sub> +TiCN	Black	4.30	2,250	4.70	0.08
TC100	ST100+TiN PVD	Gold	4.20	2,150	4.00	-
TC300	ST300+TiN PVD	Gold	4.40	2,200	4.50	-
TM300	ST300+AlTiN PVD	Black	4.40	2,250	4.50	
SD200	TiC+Al <sub>2</sub> O <sub>3</sub>	Black	4.60	2,200	4.50	0.07
SZ200	Al <sub>2</sub> O <sub>3</sub> +ZrO <sub>2</sub>	White	4.00	1,800	4.50	0.07
SZ300	Al <sub>2</sub> O <sub>3</sub> +ZrO <sub>2</sub>	Pink	4.10	1,850	4.50	0.07
SN26	Si <sub>3</sub> N <sub>4</sub>	Black	3.30	1,600	5.00	0.06
SN300	Si <sub>3</sub> N <sub>4</sub>	Gray	3.20	1,600	6.00	0.05
SN400	Si <sub>3</sub> N <sub>4</sub>	Gray	3.20	1,650	6.00	0.05
SN500	Si <sub>3</sub> N <sub>4</sub>	Gray	3.20	1,700	6.00	0.05
SN600	Si <sub>3</sub> N <sub>4</sub>	Black	3.20	1,700	6.50	0.07
SN800	Si <sub>3</sub> N <sub>4</sub>	Black	3.20	1,900	6.00	0.04
SN1000 	Si <sub>3</sub> N <sub>4</sub> +Al <sub>2</sub> O <sub>3</sub>	Black	3.3	1,800	7.00	
NC400 	SN400+PVD (AlTiN/TiN)	Gold	3.2	1,650	6.00	

## Choice of Ceramic Grade for Workpiece

	ST100/ST300 ST500/ST900 TC100/TC300 TM300	SD200	SZ200 SZ300	SN26 SN300/SN400 SN500/SN600 NC400	SN800 SN1000	SW400	SW800
Cast Iron	Gray Cast Iron	◎	○	◎	◎	○	
	Chilled Cast Iron	◎		◎	◎	◎	
	Ductile Cast Iron	○	◎		○	○	○
Steel	Mild Steel		○				
	Carbon Steel		○				
	Alloy Steel	◎		○		◎	○
	Forged Steel	◎					
	Heat Treated Steel	◎					
	High Speed Steel	◎				◎	
	High Manganese Steel	○			○	◎	○
	Stainless Steel						
	Heat Resistant Steel	○			○	○	○
	Super Alloy Steel	○			○	◎	◎
Inconel					◎	◎	

◎ : Excellent ○ : Good

## Choice of Ceramic Grade for Workpiece

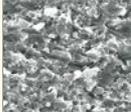
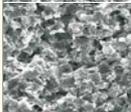
Application	Grade	Workpiece	Machining Type	Speed (V) (m/min)	Feed (f) (mm/rev)	Depth (DOC) (mm)		
Turning	ST100 ST300 ST500 ST900 TC100 TC300 TM300	Gray Cast Iron	Gray Cast Iron (FC)	Rough	150 ~ 800	0.2 ~ 0.5	3 ~ 6	
			Malleable (FCMB)	Finish	200 ~ 1,200	0.3 ~ 0.5	0.1 ~ 0.5	
			Chilled Cast Iron	Rough	30 ~ 100	0.1 ~ 0.2	0.5 ~ 1.5	
				Finish	50 ~ 200	0.05 ~ 0.15	0.1 ~ 0.5	
		Steel	Carbon Steel Alloy Steel Bearing Steel	Rough	150 ~ 400	0.2 ~ 0.5	2 ~ 5	
				Finish	200 ~ 800	0.05 ~ 0.2	0.1 ~ 0.5	
		Hard Steel (HRC 45≥)	Rough	20 ~ 100	0.1 ~ 0.2	0.5 ~ 1.5		
			Finish	40 ~ 200	0.05 ~ 0.5	0.1 ~ 0.5		
	SD200	Ductile Cast Iron Nodular Cast Iron	Rough	100 ~ 400	0.1 ~ 0.2	1 ~ 2		
			Finish	200 ~ 800	0.05 ~ 0.25	0.1 ~ 0.5		
	SZ200 SZ300	Gray Cast Iron (FC) Steel (HRC 45≤)	Rough	200 ~ 700	0.2 ~ 0.4	2 ~ 5		
			Finish	300 ~ 1,200	0.05 ~ 0.3	0.1 ~ 0.5		
	NEW	SN26 SN300 SN400 SN500 SN600 NC400	Gray Cast Iron	Gray Cast Iron (FC)	Rough	150 ~ 1,100	0.3 ~ 0.8	< 5
				Malleable (FCMB)	Finish	250 ~ 1,200	0.15 ~ 0.4	< 1
Chilled Cast Iron			Rough	20 ~ 100	1.0 ~ 2.0	< 5		
		Finish	60 ~ 200	0.5 ~ 1.0	< 1			
NEW		SN800 SN1000	Ni-Based Alloy	Rough	150 ~ 250	0.2 ~ 0.4	< 5	
			Non-Ferrous Metal Inconel	Finish	150 ~ 450	0.1 ~ 0.2	< 1	
SW400 SW800	High temperature alloys Inconel Stellite	Rough	180 ~ 360	0.1 ~ 0.25	1 ~ 3			
		Finish	180 ~ 450	0.1 ~ 0.30	0.5 ~ 2.0			
Milling	SN26 SN300 SN400	Gray Cast Iron (FC)	Rough	100 ~ 1,200	0.3 ~ 0.5	< 5		
			Finish	150 ~ 1,500	0.3 ~ 0.7	< 3		
	NEW	SN500 SN600 NC400	Ductile Cast Iron Alloy Steel	Rough	90 ~ 500	0.1 ~ 0.3	< 5	
				Finish	100 ~ 700	0.1 ~ 0.4	< 3	
	NEW	SN800 SN1000	High temperature alloys Inconel Stellite	Finish	700 ~ 1,000	0.05 ~ 0.15 / tooth	0.5 ~ 2.5	
				Rough	150 ~ 400	0.05 ~ 0.1 / tooth	1 ~ 3	

# GRADE INFORMATION

## CERMET

A matrix of TiCN with carbide as a metal binder, Union Cermets are tougher than ceramics and harder than tungsten carbides. It shows greater wear resistance than carbide and its cutting speed is also much higher than carbide. Cermet inserts give excellent surface finish and high-speed machining.

- Four different grades for different workpiece and cutting condition.
- Ideal for high-speed finishing and milling of mild steel, carbon steel and alloy steel.
- Excellent performance in turning, grooving, boring, bearing and milling.

	TX510	Excellent wear resistance Outstanding surface finish TiCN	Fine-finishing and boring for steel	Harder ↑ ↓ Tougher
	TX910	TiN coating		
	TX515	Wear resistance and high mechanical strength TiCN	Finishing and boring for carbon steel and alloy steel	
	TX915	TiN coating		
	TX520	Excellent thermal conductivity and wear resistance TiCN	The first choice for machining steel Turning, grooving, boring and bearing for steel	
	TX920	TiN coating		
	TX530	The toughest cermet grade TiCN		
	TX930	TiN coating		
			Wide range of milling for steel materials	

### Physical Properties

Grade	Composition	Color	Density (g/cm <sup>3</sup> )	Hardness (HRA)	Toughness (MPa·m <sup>1/2</sup> )	Thermal Conductivity (cal/cm. sec. °C)
TX510	TiCN	Silver	6.50	93.50	7.00	0.08
TX515	TiCN	Silver	6.48	93.00	7.50	0.08
TX520	TiCN	Silver	6.53	92.50	8.00	0.09
TX530	TiCN	Silver	6.35	91.00	8.40	0.09
TX910	TX510+TiN PVD	Gold	6.50	98.50	7.00	-
TX915	TX515+TiN PVD	Gold	6.48	98.00	7.50	-
TX920	TX520+TiN PVD	Gold	6.53	97.50	8.00	-
TX930	TX530+TiN PVD	Gold	6.35	96.00	8.40	-

### Choice of Ceramic Grade for Workpiece

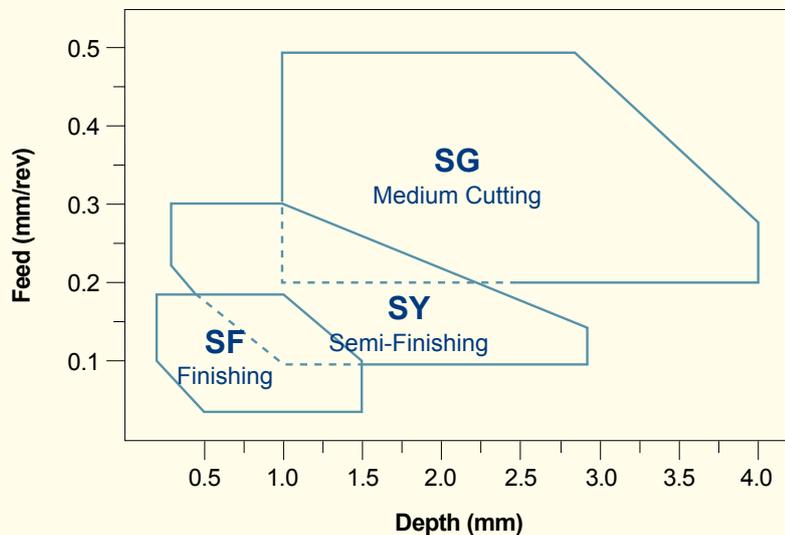
	TX510/TX910	TX515/TX915	TX520/TX920	TX530/TX930
MILD STEEL	◎	◎	◎	○
CARBON STEEL	◎	◎	◎	◎
ALLOY STEEL	○	○	○	○
FORGED STEEL	◎			
HEAT TREATED STEEL	◎			
HEAT RESISTANT STEEL		◎	◎	◎

◎ : Excellent ○ : Good

### Choice of Ceramic Grade for Workpiece

Application	Grade	Workpiece	Machining Type	Speed (V) (m/min)	Feed (f) (mm/rev)	Depth (DOC) (mm)
Turning	TX510/TX910	Mild Steel, Carbon Steel, Alloy Steel	Finishing	100 ~ 600	0.03 ~ 0.3	0.1 ~ 1.5
	TX515/TX915	Mild Steel, Carbon Steel, Alloy Steel	Finishing Medium	100 ~ 500	0.03 ~ 0.3	0.1 ~ 2.0
	TX520/TX920	Bearing Steel, General Steel	Finishing Medium	100 ~ 400	0.03 ~ 0.3	0.1 ~ 2.0
Milling	TX530/TX930	Mild Steel, Carbon Steel, Alloy Steel	Medium	100 ~ 400	0.1 ~ 0.3	< 5
			Roughing	100 ~ 500	0.1 ~ 0.5	< 3

### Choice of Chipbreaker



Chipbreaker Type	Shape	Machining Type	Characteristics
SF		Finishing	Sharp and narrow C/B Optimum for D=0.10~1.50, f=0.05~0.20 Specialized for shaft machining
SY		Semi-finishing	General performing C/B Optimum for D=0.30~2.50, f=0.10~0.30 Low carbon steel, pipe (STKM) machining
SG		Medium cutting	Wider C/B design Optimum for D=1.00~5.00, f=0.20~0.50 Low carbon steel



## Recommended Cutting Conditions

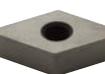
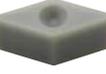
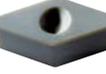
Application	Grade	Workpiece	Speed (V) (m/min)	Feed (f) (mm/rev)	Depth (DOC) (mm)	
Turning	PCBN	SBN1000	Cast iron	400 ~ 1,000	0.15 ~ 0.45	0.10 ~ 2.00
			High hardened cast iron	75 ~ 150	0.15 ~ 0.30	0.10 ~ 1.80
			Nodular cast iron roll	45 ~ 60	0.60 ~ 0.80	2.00 ~ 3.50
			Carbide roll	10 ~ 15	0.15 ~ 0.25	0.50 ~ 2.50
		SBN2000	High hardened steel (roughing)	60 ~ 140	0.15 ~ 0.40	0.70 ~ 2.30
	SBN2000	High hardened steel (finishing, >H <sub>R</sub> C 45)	100 ~ 140	0.10 ~ 0.20	0.10 ~ 0.75	
		Hardened alloy steel (>H <sub>R</sub> C 35)	100 ~ 240	0.05 ~ 0.30	0.10 ~ 2.50	
	SBN3000	Hardened steel	80 ~ 160	0.02 ~ 0.20	<0.5	
		Heat resistance sintered steel	50 ~ 100	0.05 ~ 0.20	<0.5	
	SBN4000	Hardened steel	120 ~ 250	0.025 ~ 0.50	0.05 ~ 0.30	
		Powder metal & Sintered irons	200 ~ 400	0.025 ~ 0.20	0.05 ~ 0.20	
		superalloys	200 ~ 400	0.10 ~ 0.30	0.20 ~ 2.00	
	SBN5000	Cast iron	500 ~ 2,000	0.10 ~ 0.50	<0.5	
		Ductile cast iron	200 ~ 600	0.10 ~ 0.40	<0.5	
Hard cast iron (H <sub>R</sub> C 59)		50 ~ 150	0.10 ~ 1.00	<0.5		
PCD	SPD1000	Plastic alloy	300 ~ 1,000	0.05 ~ 0.25	0.05 ~ 3.00	
		Wood	1,000 ~ 2,500	0.10 ~ 0.50	0.20 ~ 4.50	
	SPD2000	Aluminum / Zinc / Copper	600 ~ 1,000	0.05 ~ 0.25	0.05 ~ 0.30	
	SPD2000	Aluminum alloy (Si 4~8%)	800 ~ 2,500	0.10 ~ 0.30	0.05 ~ 3.00	
		(Si 9~14%)	500 ~ 1,290	0.10 ~ 0.30	0.05 ~ 3.00	
	SPD3000	(Si 16~18%)	300 ~ 600	0.10 ~ 0.30	0.05 ~ 3.00	
SPD3000	Powdered Carbide Piece	50 ~ 250	0.10 ~ 0.40	0.10 ~ 4.00		
	Sintered Carbide	20 ~ 40	0.05 ~ 0.20	0.02 ~ 0.45		
Milling	PCBN	SBN1000	Cast iron (H <sub>B</sub> 180~230)	400 ~ 1,000	0.12 ~ 0.30	0.20 ~ 2.00
			Hardened cast iron (>H <sub>B</sub> 400)	120 ~ 240	0.12 ~ 0.30	0.20 ~ 2.00
		SBN2000	Hardened steel (>H <sub>R</sub> C 45)	120 ~ 240	0.10 ~ 0.25	0.12 ~ 1.00
			Hardened alloy steel (>H <sub>R</sub> C 35)	120 ~ 240	0.10 ~ 0.35	0.10 ~ 1.00
	SBN3000	Hardened steel (>H <sub>R</sub> C 45)	100 ~ 200	0.10 ~ 0.15	<0.5	
	SBN4000	Hardened steel	150 ~ 250	0.025 ~ 0.30	0.05 ~ 0.20	
	PCD	SPD3000	Aluminum alloy (<Si 14%)	300 ~ 3,000	0.10 ~ 0.25	0.12 ~ 1.00
(>Si 15%)			100 ~ 240	0.10 ~ 0.35	0.10 ~ 1.00	

## Physical Properties

Grade	Contents of pCBN (%)	Particle size (μm)	Hardness (HV)
SBN1000	95	3	3,900
SBN2000	50	1	2,700
SBN3000	60	2	2,700
SBN4000	65	5	2,900
SBN5000	93	10	3,900

Grade	Particle size (μm)	Hardness (HV)
SPD1000	4 ~ 5	6,000 ~ 8,000
SPD2000	8 ~ 9	7,000 ~ 9,000
SPD3000	15 ~ 22	8,000 ~ 10,000

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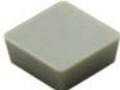
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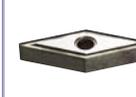
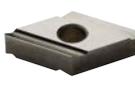
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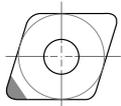
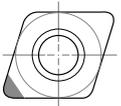
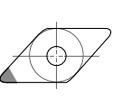
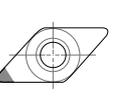
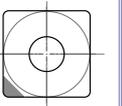
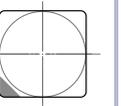
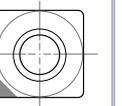
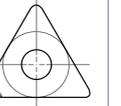
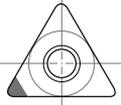
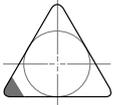
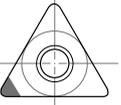
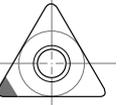
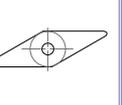
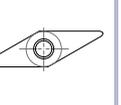
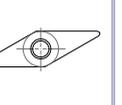
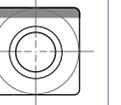
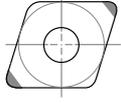
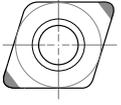
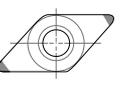
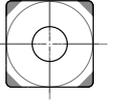
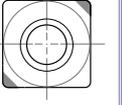
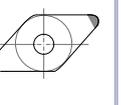
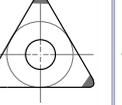
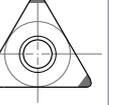
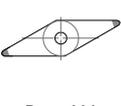
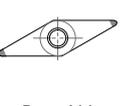
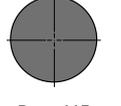
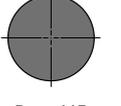
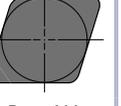
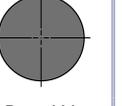
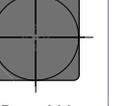
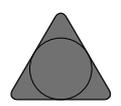
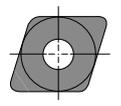
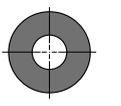
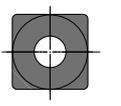
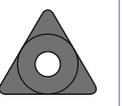
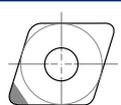
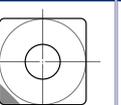
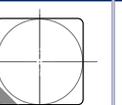
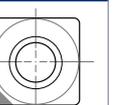
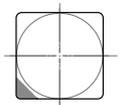
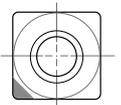
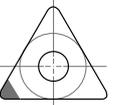
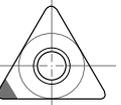
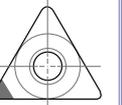
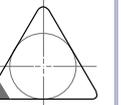
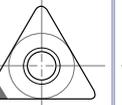
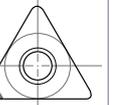
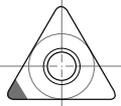
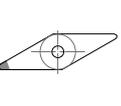
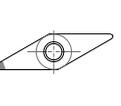
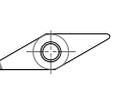
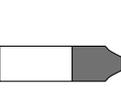
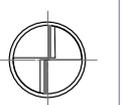
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PCBN·PCD

PART.

A

TURNING  
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MILLING

PCBN	<b>CNGA</b>	<b>CCGW</b>	<b>DNGA</b>	<b>DCGW</b>	<b>SNGA</b>	<b>SNGN</b>	<b>SCGW</b>	<b>TNGA</b>
								
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	<b>TCGW</b>	<b>TPGN</b>	<b>TPGB</b>	<b>TPGW</b>	<b>VNGA</b>	<b>VBGW</b>	<b>VCGW</b>	<b>SCGW .. FS</b>
								
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	<b>CNGA</b>	<b>CCGW</b>	<b>DCGW</b>	<b>SNGA</b>	<b>SCGW</b>	<b>DNGA</b>	<b>TNGA</b>	<b>TPGW</b>
								
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<b>TNGN</b>	<b>CNGA</b>	<b>RNGA</b>	<b>SNGA</b>	<b>TNGA</b>				
								
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PCD	<b>CNGA</b>	<b>CCGW</b>	<b>CPGW</b>	<b>DNGA</b>	<b>DCGW</b>	<b>SNGA</b>	<b>SNGN</b>	<b>SCGW</b>
								
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	<b>SPGN</b>	<b>SPGW</b>	<b>TNGA</b>	<b>TBGW</b>	<b>TCGW</b>	<b>TPGN</b>	<b>TPGB</b>	<b>TPGW</b>
								
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	<b>TPGT</b>	<b>VNGA</b>	<b>VBGW</b>	<b>VCGW</b>				
								
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# IDENTIFICATION SYSTEM

ISO  
ASA

**TURNING**

S	N	G	N
S	N	G	N
S	P	K	N
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>

**MILLING**

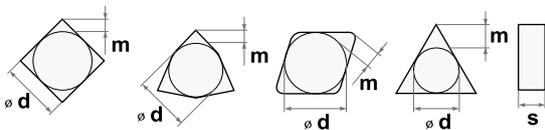
**1 Shape**

C D E H L  
R S T V W

**2 Clearance Angle**

B C D E  
N P O

**3 Tolerance**



\*See tables below

Symbol	d(mm)	m(mm)	s(mm)
A	±0.025	±0.005	±0.025
C	±0.025	±0.013	±0.025
E	±0.025	±0.025	±0.025
F	±0.013	±0.005	±0.025
G	±0.025	±0.025	±0.130
H	±0.013	±0.013	±0.025
J	*	±0.005	±0.025
K	*	±0.013	±0.025
L	*	±0.025	±0.025
M	*	*	±0.127
U	*	*	±0.127
N	*	*	±0.025

IC (mm)	D		C, E, H, O, S, T, R, W			
	d(mm)	m(mm)	d(mm)		m(mm)	
	M, N	M, N	J, K, L, M, N	U	M, N	U
5.56	±0.05	±0.11	±0.05	±0.08	±0.08	±0.13
6.35	±0.05	±0.11	±0.05	±0.08	±0.08	±0.13
7.94	±0.05	±0.11	±0.05	±0.08	±0.08	±0.13
9.52	±0.05	±0.11	±0.05	±0.08	±0.08	±0.13
12.70	±0.08	±0.15	±0.08	±0.13	±0.13	±0.20
15.87	±0.10	±0.18	±0.10	±0.18	±0.15	±0.27
19.05	±0.10	±0.18	±0.10	±0.18	±0.15	±0.27
25.40	-	-	±0.13	±0.25	±0.18	±0.38

**4 Type**

A B C F G H J M  
N Q R T U W X

12 04 08 E040

4 3 2

4 3 E D T R  
5 6 7 8 9 10 11 12

Diameter of inscribed circle	5 Cutting Edge Length								
	ASA		ISO						
	over 6.35 (IC)	over 5.56 (IC)	R	W	V	D	C	S	T
3.969	-	5	03	02	-	04	03	03	06
4.762	-	6	04	03	-	05	04	04	08
5.556	-	7	05	03	09	06	05	05	09
6.350	2	(8)	06	04	11	07	06	06	11
7.938	-	0	07	05	13	09	08	07	13
9.525	3	-	09	06	16	11	09	09	16
12.700	4	-	12	08	22	15	12	12	22
15.875	5	-	15	10	27	19	16	15	27
19.050	6	-	19	13	33	23	19	19	33
22.225	7	-	22	-	38	27	22	22	38
25.400	8	-	25	-	44	31	25	25	44
31.750	0	-	31	-	54	38	32	31	55

6 Thickness			
Thickness(mm)	ISO	ASA	
		Over 6.35(IC)	Over 5.56(IC)
1.59	01	-	2
2.38	02	-	3
3.18	03	2	4
3.97	T3	-	5
4.76	04	3	6
5.56	05	-	-
6.35	06	4	-
7.94	07	5	-
9.52	09	6	-
12.70	12	8	-

7 Nose-Radius		
(mm)	ISO	ASA
Sharp	00	O
0.2	02	Y
0.4	04	1
0.8	08	2
1.2	12	3
1.6	16	4
2.0	20	5
2.4	24	6
2.8	28	7
3.2	32	8

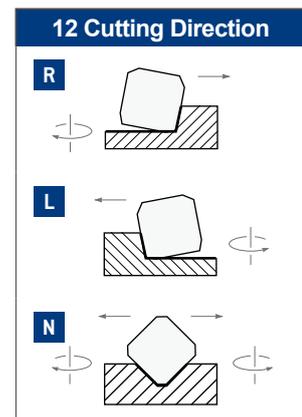
8 Shape and Corner

Detailed edge preparations refer to the next page.

9 Land Angle	
A	45°
D	60°
E	75°
F	85°
P	90°

10 Relief Angle for Land	
A	3°
B	5°
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°

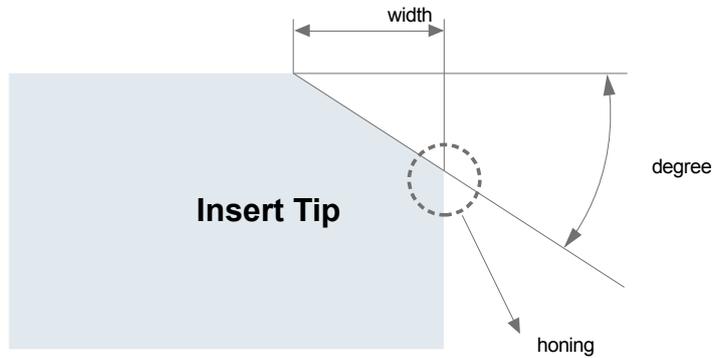
11 Edge	
F	Sharp
E	Honed
T	Chamfered
S	Chamfered + Honed



# IDENTIFICATION SYSTEM

## 8 Chamfer Specification

### 1 Mono chamfer

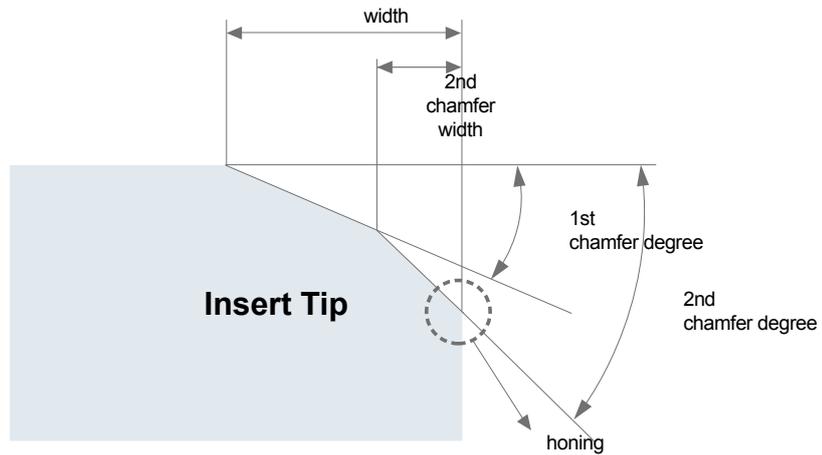


ISO

S N G N 1 2 0 4 0 8 E 0 4 0

Chamfer Degree (°)	Chamfer Width (mm)		Honing (μm)
E : 20	01 : 0.05	10 : 0.50	0 : No Honing
F : 25	02 : 0.10	20 : 1.00	1 : 10
G : 30	03 : 0.15	40 : 2.00	2 : 20
	04 : 0.20		3 : 30

### 2 Double chamfer



ISO

S N G N 1 9 0 7 1 6 X 5 4 2

1st Chamfer Degree (°)	1st Chamfer Width (mm)		2nd Chamfer Width(mm)×Degree		Honing (μm)
W : 10 X : 15	3 : 1.00	A : 0.75	3 : 0.20×25	A : 0.15×30	0 : No Honing
	4 : 1.20	B : 1.25	4 : 0.10×30	B : 0.45×25	1 : 10
	5 : 1.50	D : 2.30	5 : 0.20×30		2 : 20
	6 : 2.00				3 : 30
					5 : 50

## CERAMIC INSERT

Union Ceramic Cutting Tool is an inorganic material, die-pressed and sintered using very fine and pure raw materials with fine microstructure.

Since the Union ceramic inserts are prepared by HIP process to condense completely, it has high thermal shock resistance, excellent fracture toughness and distinguished wear resistance through HIP.

## CERMET INSERT

Union Cermet Cutting Tool is a composite between titanium carbide or titanium nitride with carbide-metal binder. Since the toughness of the cermet is higher than that of ceramic and the hardness of the cermet is harder than that of the tungsten carbide, cermet cutting tool shows high wear resistance and excellent surface finish under high speed cutting.

## PCBN/PCD INSERT

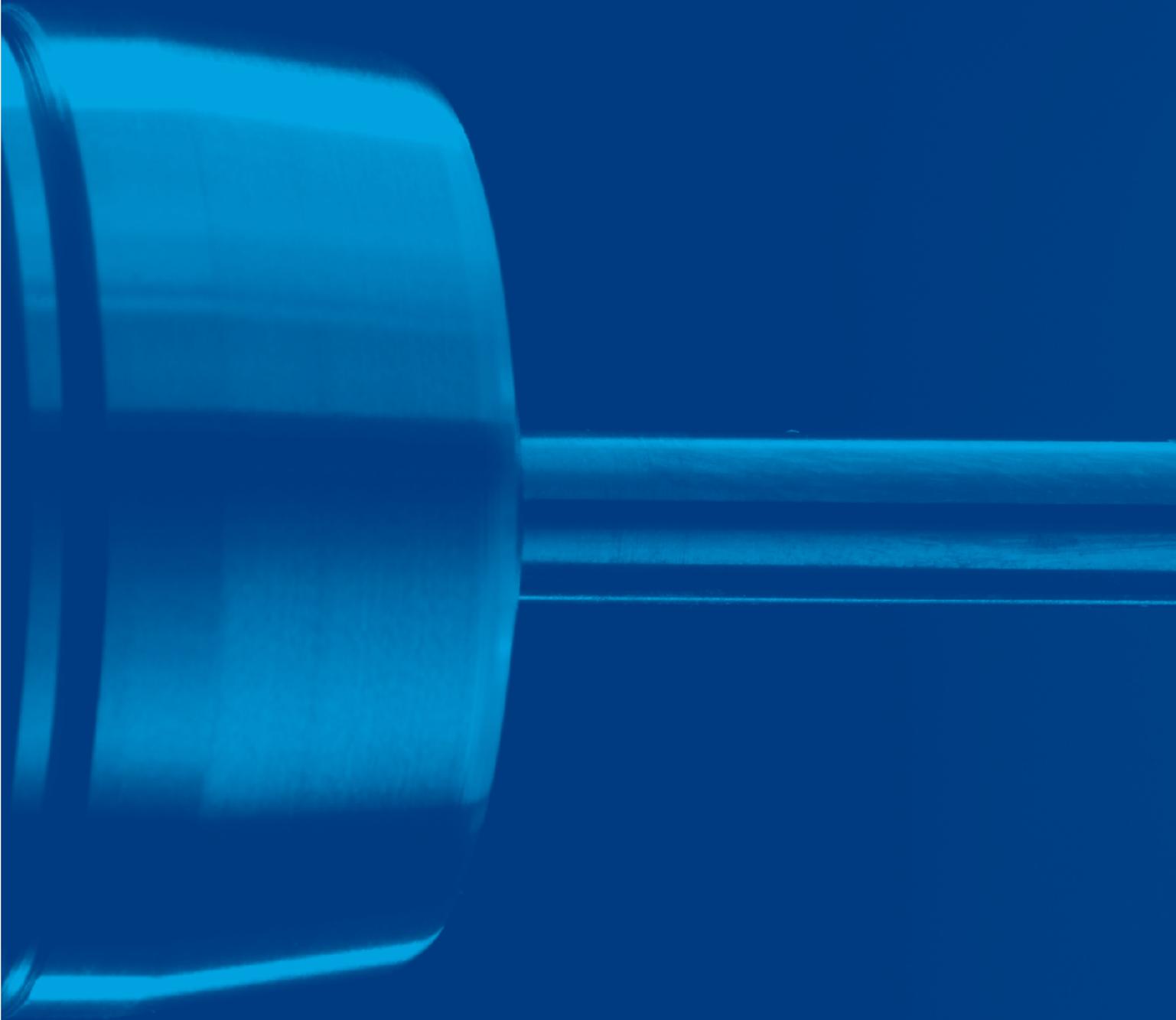
Union PCBN is an ultra hard cutting tool material consisting of polycrystalline cubicboron nitride with metallic or ceramic binder.

It is available both tip brazed and solid PCBN. Primarily used to machine hardened ferrous materials.

Union PCD is an ultra hard cutting tool material consisting of polycrystalline diamond which is tip brazed to a carbide insert according to the various applications.

It is used for non-ferrous material, wood, aluminum and copper alloys at extremely high speed.

**PCBN / PCD**



PCBN A 108

- STANDARD A 108

- Mini Tip A 112

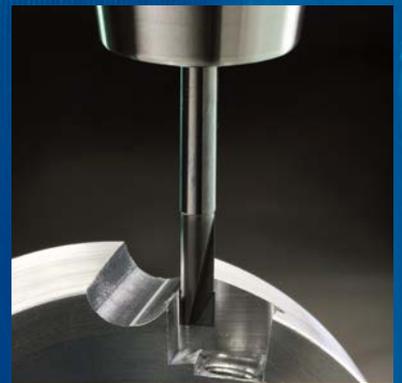
- Full Face A 115

- Solid A 116

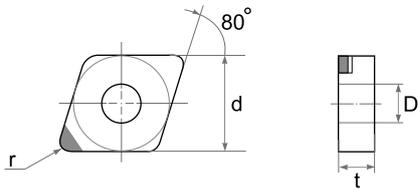
PCD A 118

- STANDARD A 118

Special A 124

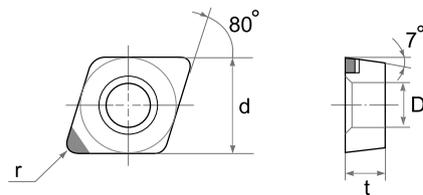


**CNGA**



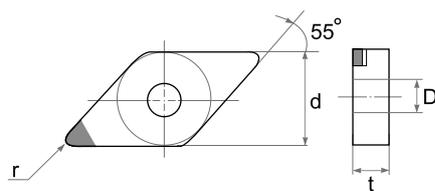
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
CNGA 120402 R1	CNGA 4302 R1	12.70	4.76	0.2	5.16				
CNGA 120404 R1	CNGA 431 R1	12.70	4.76	0.4	5.16	•	•		
CNGA 120408 R1	CNGA 432 R1	12.70	4.76	0.8	5.16	•	•	•	•
CNGA 120412 R1	CNGA 433 R1	12.70	4.76	1.2	5.16	•	•	•	•

**CCGW**



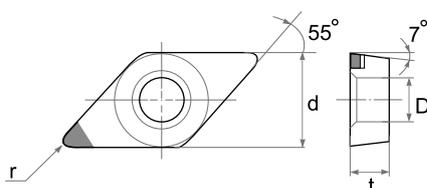
Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
CCGW 060202 R1		6.35	2.38	0.2	2.80		•		
CCGW 060204 R1		6.35	2.38	0.4	2.80	•	•		
CCGW 060208 R1		6.35	2.38	0.8	2.80				
CCGW 09T304 R1		9.52	3.97	0.4	4.40	•	•	•	•
CCGW 09T308 R1		9.52	3.97	0.8	4.40	•	•	•	•

**DNGA**



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
DNGA 150404 R1	DNGA 431 R1	12.70	4.76	0.4	5.16	•	•	•	
DNGA 150408 R1	DNGA 432 R1	12.70	4.76	0.8	5.16	•	•	•	•
DNGA 150412 R1	DNGA 433 R1	12.70	4.76	1.2	5.16	•	•	•	•
DNGA 150604 R1	DNGA 441 R1	12.70	6.35	0.4	5.16	•	•	•	
DNGA 150608 R1	DNGA 442 R1	12.70	6.35	0.8	5.16	•	•	•	•
DNGA 150612 R1	DNGA 443 R1	12.70	6.35	1.2	5.16	•	•	•	•

**DCGW**



Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
DCGW 070202 R1		6.35	2.38	0.2	2.80		•		
DCGW 070204 R1		6.35	2.38	0.4	2.80	•	•	•	
DCGW 070208 R1		6.35	2.38	0.8	2.80	•	•	•	•
DCGW 11T302 R1		9.52	3.97	0.2	4.40		•		
DCGW 11T304 R1		9.52	3.97	0.4	4.40	•	•	•	
DCGW 11T308 R1		9.52	3.97	0.8	4.40	•	•	•	•

CERAMIC

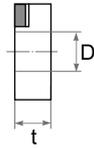
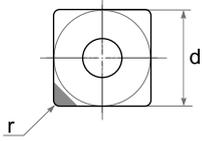
CERMET

PCBN  
/  
PCD

TOOL  
HOLDER

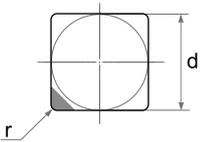
MILLING  
CUTTER

### SNGA



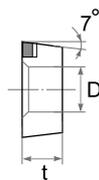
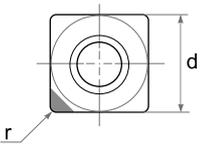
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>SNGA 090304 R1</b>	<b>SNGA 321 R1</b>	9.52	3.18	0.4	3.81				
<b>SNGA 120404 R1</b>	<b>SNGA 431 R1</b>	12.70	4.76	0.4	5.16	•	•		
<b>SNGA 120408 R1</b>	<b>SNGA 432 R1</b>	12.70	4.76	0.8	5.16	•	•	•	•
<b>SNGA 120412 R1</b>	<b>SNGA 433 R1</b>	12.70	4.76	1.2	5.16	•	•	•	•

### SNGN



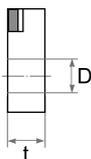
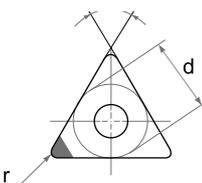
Type		Dimensions (mm)						
ISO	ASA	d	t	r	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>SNGN 090304 R1</b>	<b>SNGN 321 R1</b>	9.52	3.18	0.4				
<b>SNGN 090308 R1</b>	<b>SNGN 322 R1</b>	9.52	3.18	0.8				
<b>SNGN 090312 R1</b>	<b>SNGN 323 R1</b>	9.52	3.18	1.2				
<b>SNGN 120404 R1</b>	<b>SNGN 431 R1</b>	12.70	4.76	0.4	•	•		
<b>SNGN 120408 R1</b>	<b>SNGN 432 R1</b>	12.70	4.76	0.8	•	•	•	•
<b>SNGN 120412 R1</b>	<b>SNGN 433 R1</b>	12.70	4.76	1.2	•	•	•	•

### SCGW



Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>SCGW 09T304 R1</b>		9.52	3.97	0.4	4.40	•	•		
<b>SCGW 09T308 R1</b>		9.52	3.97	0.8	4.40	•	•	•	•

### TNGA



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>TNGA 160402 R1</b>	<b>TNGA 3302 R1</b>	9.52	4.76	0.2	3.81	•	•		
<b>TNGA 160404 R1</b>	<b>TNGA 331 R1</b>	9.52	4.76	0.4	3.81	•	•		
<b>TNGA 160408 R1</b>	<b>TNGA 332 R1</b>	9.52	4.76	0.8	3.81	•	•	•	•
<b>TNGA 160412 R1</b>	<b>TNGA 333 R1</b>	9.52	4.76	1.2	3.81	•	•		

CERAMIC

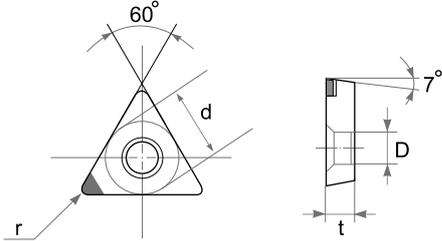
CERMET

PCBN  
/  
PCD

TOOL  
HOLDER

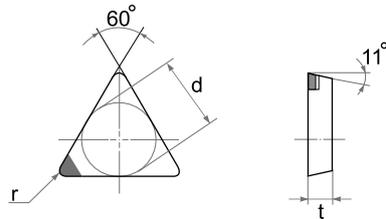
MILLING  
CUTTER

**TCGW**



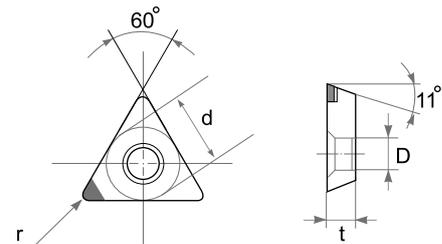
Type	Dimensions (mm)							
ISO	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>TCGW 090204 R1</b>	5.56	2.38	0.4	2.50	•	•		
<b>TCGW 090208 R1</b>	5.56	2.38	0.8	2.50	•	•	•	•
<b>TCGW 110202 R1</b>	6.35	2.38	0.2	2.80		•		
<b>TCGW 110204 R1</b>	6.35	2.38	0.4	2.80	•	•		
<b>TCGW 110208 R1</b>	6.35	2.38	0.8	2.80	•	•	•	•
<b>TCGW 16T304 R1</b>	9.52	3.97	0.4	4.40	•	•		
<b>TCGW 16T308 R1</b>	9.52	3.97	0.8	4.40	•	•	•	•

**TPGN**



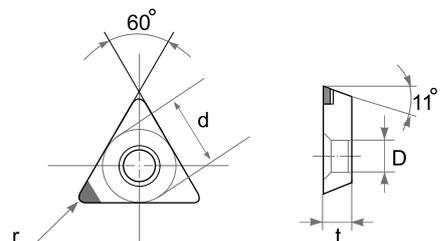
Type		Dimensions (mm)						
ISO	ASA	d	t	r	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>TPGN 110304 R1</b>	<b>TPGN 221 R1</b>	6.35	3.18	0.4	•	•		
<b>TPGN 110308 R1</b>	<b>TPGN 222 R1</b>	6.35	3.18	0.8	•	•	•	•
<b>TPGN 110312 R1</b>	<b>TPGN 223 R1</b>	6.35	3.18	1.2				
<b>TPGN 160304 R1</b>	<b>TPGN 321 R1</b>	9.52	3.18	0.4	•	•		
<b>TPGN 160308 R1</b>	<b>TPGN 322 R1</b>	9.52	3.18	0.8	•	•	•	•
<b>TPGN 160312 R1</b>	<b>TPGN 323 R1</b>	9.52	3.18	1.2				

**TPGB**



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>TPGB 080202 R1</b>	<b>TPGB 6302 R1</b>	4.76	2.38	0.2	2.40				
<b>TPGB 090204 R1</b>	<b>TPGB 731 R1</b>	5.56	2.38	0.4	2.50	•	•		
<b>TPGB 110302 R1</b>	<b>TPGB 2202 R1</b>	6.35	3.18	0.2	3.30				
<b>TPGB 110304 R1</b>	<b>TPGB 221 R1</b>	6.35	3.18	0.4	3.30				
<b>TPGB 110308 R1</b>	<b>TPGB 222 R1</b>	6.35	3.18	0.8	3.30				

**TPGW**



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>TPGW 160304 R1</b>	<b>TPGW 321 R1</b>	9.52	3.18	0.4	4.40				
<b>TPGW 160308 R1</b>	<b>TPGW 322 R1</b>	9.52	3.18	0.8	4.40				

CERAMIC

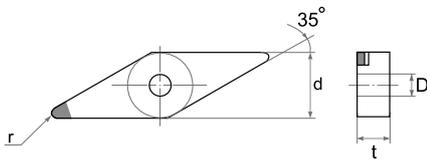
CERMET

PCBN  
/  
PCD

TOOL  
HOLDER

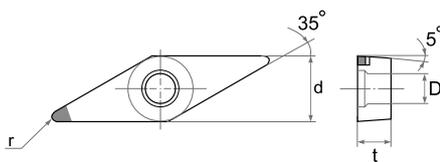
MILLING  
CUTTER

## VNGA



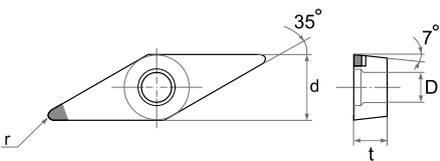
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
VNGA 160404 R1	VNGA 331 R1	9.52	4.76	0.4	3.18	•	•		
VNGA 160408 R1	VNGA 332 R1	9.52	4.76	0.8	3.18	•	•	•	•

## VBGW



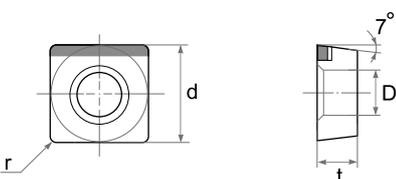
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
VBGW 110302 R1	VBGW 2202 R1	6.35	3.18	0.2	2.80				
VBGW 110304 R1	VBGW 221 R1	6.35	3.18	0.4	2.80				
VBGW 160404 R1	VBGW 331 R1	9.52	4.76	0.4	4.40	•	•		
VBGW 160408 R1	VBGW 332 R1	9.52	4.76	0.8	4.40	•	•	•	•

## VCGW



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
VCGW 110302 R1	VCGW 2202 R1	6.35	3.18	0.2	2.80				
VCGW 110304 R1	VCGW 221 R1	6.35	3.18	0.4	2.80				
VCGW 160404 R1	VCGW 331 R1	9.52	4.76	0.4	4.40	•	•		
VCGW 160408 R1	VCGW 332 R1	9.52	4.76	0.8	4.40	•	•	•	•

## SCGW .. FS



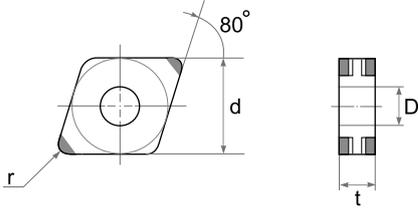
Type	Dimensions (mm)							
ISO	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
SCGW 09T304 FS	9.52	3.97	0.4	4.40	•			
SCGW 09T308 FS	9.52	3.97	0.8	4.40				
SCGW 120404 FS	12.70	4.76	0.4	5.60				
SCGW 120408 FS	12.70	4.76	0.8	5.60	•			

CERAMIC

CERMET

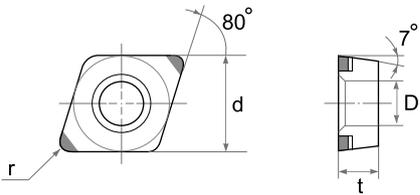
PCBN  
/  
PCDTOOL  
HOLDERMILLING  
CUTTER

### CNGA



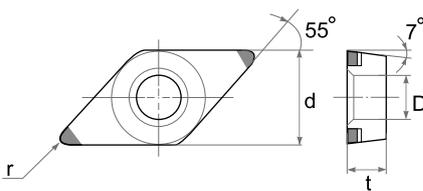
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
CNGA 120404 M1	CNGA 431 M1	12.70	4.76	0.4	5.16				
CNGA 120404 M2	CNGA 431 M2	12.70	4.76	0.4	5.16			•	•
CNGA 120404 M4	CNGA 431 M4	12.70	4.76	0.4	5.16				
CNGA 120408 M1	CNGA 432 M1	12.70	4.76	0.8	5.16				
CNGA 120408 M2	CNGA 432 M2	12.70	4.76	0.8	5.16			•	•
CNGA 120408 M4	CNGA 432 M4	12.70	4.76	0.8	5.16				

### CCGW



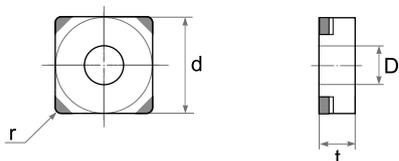
Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
CCGW 09T304 M1		9.52	3.97	0.4	4.40				
CCGW 09T304 M2		9.52	3.97	0.4	4.40			•	•
CCGW 09T308 M1		9.52	3.97	0.8	4.40				
CCGW 09T308 M2		9.52	3.97	0.8	4.40			•	•

### DCGW



Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
DCGW 11T302 M1		9.52	3.97	0.2	4.40				
DCGW 11T302 M2		9.52	3.97	0.2	4.40				
DCGW 11T304 M1		9.52	3.97	0.4	4.40				
DCGW 11T304 M2		9.52	3.97	0.4	4.40			•	•
DCGW 11T308 M1		9.52	3.97	0.8	4.40				
DCGW 11T308 M2		9.52	3.97	0.8	4.40			•	•

### SNGA



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
SNGA 120404 M1	SNGA 431 M1	12.70	4.76	0.4	5.16				
SNGA 120404 M2	SNGA 431 M2	12.70	4.76	0.4	5.16				
SNGA 120404 M4	SNGA 431 M4	12.70	4.76	0.4	5.16				
SNGA 120408 M1	SNGA 432 M1	12.70	4.76	0.8	5.16				
SNGA 120408 M2	SNGA 432 M2	12.70	4.76	0.8	5.16			•	•
SNGA 120408 M4	SNGA 432 M4	12.70	4.76	0.8	5.16			•	•

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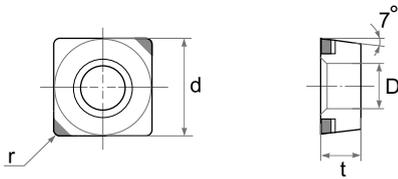
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PCBN  
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TOOL  
HOLDER

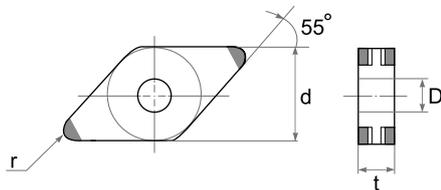
MILLING  
CUTTER

**SCGW**



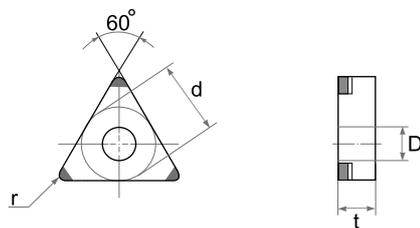
Type		Dimensions (mm)							
ISO		d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>SCGW 09T304 M1</b>		9.52	3.97	0.4	4.40				
<b>SCGW 09T304 M2</b>		9.52	3.97	0.4	4.40				
<b>SCGW 09T308 M1</b>		9.52	3.97	0.8	4.40				
<b>SCGW 09T308 M2</b>		9.52	3.97	0.8	4.40				

**DNGA**



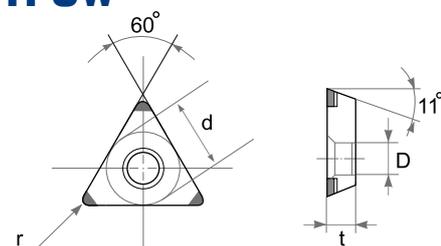
Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>DNGA 150404 M1</b>	<b>DNGA 431 M1</b>	12.70	4.76	0.4	5.16				
<b>DNGA 150404 M2</b>	<b>DNGA 431 M2</b>	12.70	4.76	0.4	5.16				
<b>DNGA 150404 M4</b>	<b>DNGA 431 M4</b>	12.70	4.76	0.4	5.16				
<b>DNGA 150408 M1</b>	<b>DNGA 432 M1</b>	12.70	4.76	0.8	5.16				
<b>DNGA 150408 M2</b>	<b>DNGA 432 M2</b>	12.70	4.76	0.8	5.16			•	•
<b>DNGA 150408 M4</b>	<b>DNGA 432 M4</b>	12.70	4.76	0.8	5.16			•	•
<b>DNGA 150604 M1</b>	<b>DNGA 441 M1</b>	12.70	6.35	0.4	5.16				
<b>DNGA 150604 M2</b>	<b>DNGA 441 M2</b>	12.70	6.35	0.4	5.16				
<b>DNGA 150604 M4</b>	<b>DNGA 441 M4</b>	12.70	6.35	0.4	5.16				
<b>DNGA 150608 M1</b>	<b>DNGA 442 M1</b>	12.70	6.35	0.8	5.16				
<b>DNGA 150608 M2</b>	<b>DNGA 442 M2</b>	12.70	6.35	0.8	5.16				
<b>DNGA 150608 M4</b>	<b>DNGA 442 M4</b>	12.70	6.35	0.8	5.16				

**TNGA**



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>TNGA 160404 M1</b>	<b>TNGA 331 M1</b>	9.52	4.76	0.4	3.81				
<b>TNGA 160404 M3</b>	<b>TNGA 331 M3</b>	9.52	4.76	0.4	3.81				
<b>TNGA 160408 M1</b>	<b>TNGA 332 M1</b>	9.52	4.76	0.8	3.81				
<b>TNGA 160408 M3</b>	<b>TNGA 332 M3</b>	9.52	4.76	0.8	3.81			•	•

**TPGW**



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>TPGW 160304 M1</b>	<b>TPGW 321 M1</b>	9.52	3.18	0.4	4.40				
<b>TPGW 160304 M3</b>	<b>TPGW 321 M3</b>	9.52	3.18	0.4	4.40				
<b>TPGW 160308 M1</b>	<b>TPGW 322 M1</b>	9.52	3.18	0.8	4.40				
<b>TPGW 160308 M3</b>	<b>TPGW 322 M3</b>	9.52	3.18	0.8	4.40			•	•

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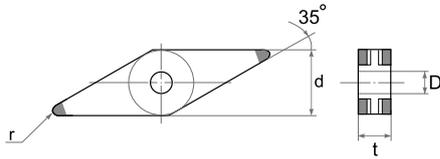
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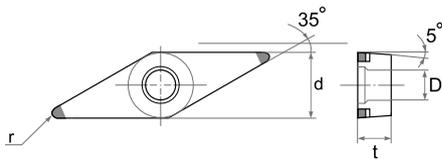
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**VNGA**



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
VNGA 160404 M1	VNGA 331 M1	9.52	4.76	0.4	3.18				
VNGA 160404 M2	VNGA 331 M2	9.52	4.76	0.4	3.18				
VNGA 160404 M4	VNGA 331 M4	9.52	4.76	0.4	3.18				
VNGA 160408 M1	VNGA 332 M1	9.52	4.76	0.8	3.18				
VNGA 160408 M2	VNGA 332 M2	9.52	4.76	0.8	3.18			•	•
VNGA 160408 M4	VNGA 332 M4	9.52	4.76	0.8	3.18			•	•

**VBGW**



Type		Dimensions (mm)							
ISO	ASA	d	t	r	D	SBN 1000	SBN 2000	SBN 3000	SBN 4000
VBGW 160404 M1	VBGW 331 M1	9.52	4.76	0.4	4.40				
VBGW 160404 M2	VBGW 331 M2	9.52	4.76	0.4	4.40			•	•
VBGW 160408 M1	VBGW 332 M1	9.52	4.76	0.8	4.40				
VBGW 160408 M2	VBGW 332 M2	9.52	4.76	0.8	4.40			•	•

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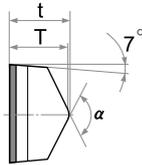
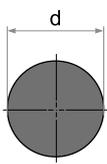
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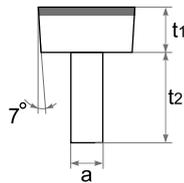
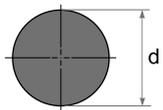
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**RCGX**



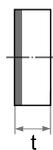
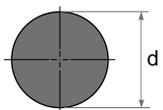
Type		Dimensions (mm)							
ISO	ASA	d	t	T	$\alpha$	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>RCGX 060600 F</b>	<b>RCGX 102 F</b>	6.35	6.35	6.20	120°	•			
<b>RCGX 090700 F</b>	<b>RCGX 103 F</b>	9.52	7.94	7.70	120°	•			
<b>RCGX 120700 F</b>	<b>RCGX 104 F</b>	12.70	7.94	7.70	120°	•			

**RCGX**



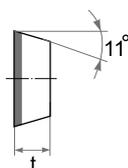
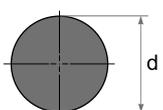
Type		Dimensions (mm)							
ISO		d	t <sub>1</sub>	t <sub>2</sub>	a	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>RCGX 060D F</b>		6.35	5.00	8.35	3.00	•			
<b>RCGX 090D F</b>		9.52	6.00	20.00	4.00	•			
<b>RCGX 120D F</b>		12.70	6.00	20.00	5.88	•			

**RNGN**



Type		Dimensions (mm)					
ISO	ASA	d	t	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>RNGN 090300 F</b>	<b>RNGN 320 F</b>	9.52	3.18	•			
<b>RNGN 120400 F</b>	<b>RNGN 430 F</b>	12.70	4.76	•			

**RPGN**



Type		Dimensions (mm)					
ISO	ASA	d	t	SBN 1000	SBN 2000	SBN 3000	SBN 4000
<b>RPGN 090300 F</b>	<b>RPGN 320 F</b>	9.52	3.18	•			
<b>RPGN 120300 F</b>	<b>RPGN 420 F</b>	12.70	3.18	•			
<b>RPGN 120400 F</b>	<b>RPGN 430 F</b>	12.70	4.76	•			

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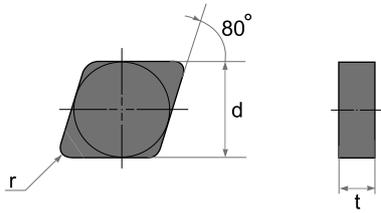
CERMET

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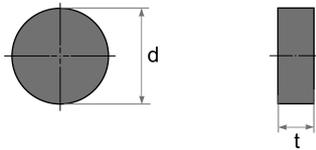
MILLING  
CUTTER

**CNGN**



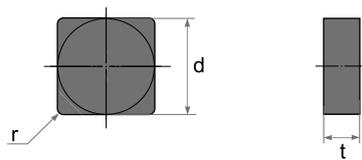
Type		Dimensions (mm)			SBN 5000
ISO	ASA	d	t	r	
CNGN 090308S	CNGN 322S	9.52	3.18	0.8	
CNGN 090312S	CNGN 323S	9.52	3.18	1.2	
CNGN 090316S	CNGN 324S	9.52	3.18	1.6	
CNGN 120408S	CNGN 432S	12.70	4.76	0.8	•
CNGN 120412S	CNGN 433S	12.70	4.76	1.2	•
CNGN 120416S	CNGN 434S	12.70	4.76	1.6	•

**RNGN**



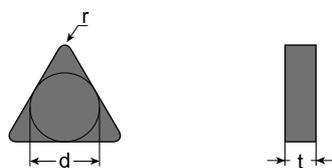
Type		Dimensions (mm)		SBN 5000
ISO	ASA	d	t	
RNGN 090300S	RNGN 320S	9.52	3.18	•
RNGN 120300S	RNGN 420S	12.70	3.18	•
RNGN 120400S	RNGN 430S	12.70	4.76	•

**SNGN**



Type		Dimensions (mm)			SBN 5000
ISO	ASA	d	t	r	
SNGN 090308S	SNGN 322S	9.52	3.18	0.8	•
SNGN 090312S	SNGN 323S	9.52	3.18	1.2	•
SNGN 090316S	SNGN 324S	9.52	3.18	1.6	
SNGN 120308S	SNGN 422S	12.70	3.18	0.8	
SNGN 120312S	SNGN 423S	12.70	3.18	1.2	
SNGN 120316S	SNGN 424S	12.70	3.18	1.6	
SNGN 120408S	SNGN 432S	12.70	4.76	0.8	•
SNGN 120412S	SNGN 433S	12.70	4.76	1.2	•
SNGN 120416S	SNGN 434S	12.70	4.76	1.6	•

**TNGN**



Type		Dimensions (mm)			SBN 5000
ISO	ASA	d	t	r	
TNGN 110308S	TNGN 222S	6.35	3.18	0.8	•
TNGN 110312S	TNGN 223S	6.35	3.18	1.2	•
TNGN 160408S	TNGN 332S	9.52	4.76	0.8	•
TNGN 160412S	TNGN 333S	9.52	4.76	1.2	•
TNGN 160416S	TNGN 334S	9.52	4.76	1.6	

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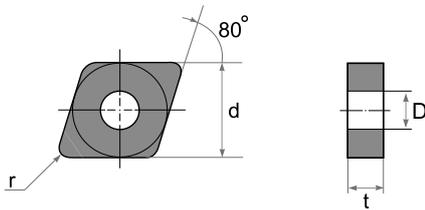
CERMET

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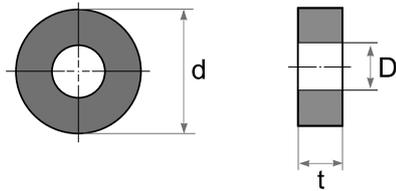
MILLING  
CUTTER

## CNGA



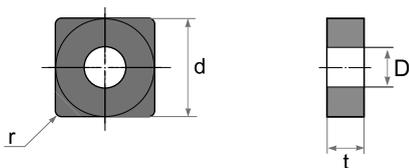
Type		Dimensions (mm)				SBN 5000
ISO	ASA	d	t	r	D	
CNGA 090308	CNGA 322	9.52	3.18	0.8	3.81	
CNGA 090312	CNGA 323	9.52	3.18	1.2	3.81	
CNGA 090316	CNGA 324	9.52	3.18	1.6	3.81	
CNGA 120408	CNGA 432	12.7	4.76	0.8	5.16	•
CNGA 120412	CNGA 433	12.7	4.76	1.2	5.16	•
CNGA 120416	CNGA 434	12.7	4.76	1.6	5.16	•

## RNGA



Type		Dimensions (mm)				SBN 5000
ISO	ASA	d	t	r	D	
RNGA 060300	RNGA 060300	6.35	3.18	-	2.26	
RNGA 060400	RNGA 060400	6.35	4.76	-	2.26	
RNGA 090300	RNGA 090300	9.52	3.18	-	3.81	
RNGA 120300	RNGA 120300	12.7	3.18	-	5.16	
RNGA 120400	RNGA 120400	12.7	4.76	-	5.16	•

## SNGA



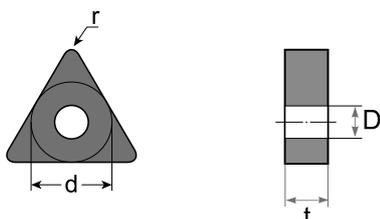
Type		Dimensions (mm)				SBN 5000
ISO	ASA	d	t	r	D	
SNGA 090308	SNGA 322	9.52	3.18	0.8	3.81	
SNGA 090312	SNGA 323	9.52	3.18	1.2	3.81	
SNGA 090316	SNGA 324	9.52	3.18	1.6	3.81	
SNGA 120308	SNGA 422	9.52	3.18	0.8	5.16	
SNGA 120312	SNGA 423	9.52	3.18	1.2	5.16	
SNGA 120316	SNGA 424	9.52	3.18	1.6	5.16	
SNGA 120408	SNGA 432	12.7	4.76	0.8	5.16	•
SNGA 120412	SNGA 433	12.7	4.76	1.2	5.16	•
SNGA 120416	SNGA 434	12.7	4.76	1.6	5.16	•

CERAMIC

CERMET

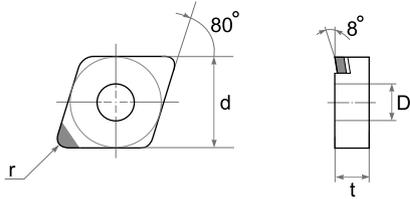
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PCDTOOL  
HOLDERMILLING  
CUTTER

## TNGA



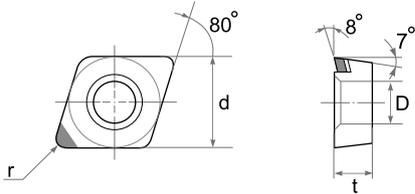
Type		Dimensions (mm)				SBN 5000
ISO	ASA	d	t	r	D	
TNGA 110308	TNGA 222	6.35	3.18	0.8	2.26	
TNGA 110312	TNGA 223	6.35	3.18	1.2	2.26	
TNGA 110316	TNGA 224	6.35	3.18	1.6	2.26	
TNGA 160408	TNGA 332	9.52	4.76	0.8	3.81	•
TNGA 160412	TNGA 333	9.52	4.76	1.2	3.81	•
TNGA 160416	TNGA 334	9.52	4.76	1.6	3.81	•

**CNGA**



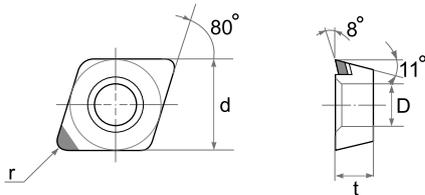
Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>CNGA 120404 R1</b>	<b>CNGA 431 R1</b>	12.70	4.76	0.4	5.16		•	
<b>CNGA 120408 R1</b>	<b>CNGA 432 R1</b>	12.70	4.76	0.8	5.16	•	•	
<b>CNGA 120412 R1</b>	<b>CNGA 433 R1</b>	12.70	4.76	1.2	5.16			

**CCGW**



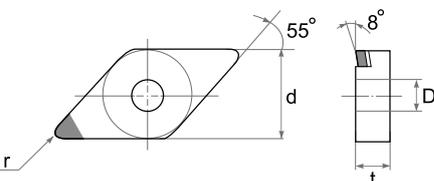
Type		Dimensions (mm)						
ISO		d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>CCGW 060202 R1</b>		6.35	2.38	0.2	2.80			
<b>CCGW 060204 R1</b>		6.35	2.38	0.4	2.80		•	
<b>CCGW 060208 R1</b>		6.35	2.38	0.8	2.80		•	
<b>CCGW 09T302 R1</b>		9.52	3.97	0.2	4.40			
<b>CCGW 09T304 R1</b>		9.52	3.97	0.4	4.40	•	•	
<b>CCGW 09T308 R1</b>		9.52	3.97	0.8	4.40		•	
<b>CCGW 120404 R1</b>		12.70	4.76	0.4	5.50		•	
<b>CCGW 120408 R1</b>		12.70	4.76	0.8	5.50		•	
<b>CCGW 120412 R1</b>		12.70	4.76	1.2	5.50			

**CPGW**



Type		Dimensions (mm)						
ISO		d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>CPGW 080204 R1</b>		7.94	2.38	0.4	3.40			
<b>CPGW 080208 R1</b>		7.94	2.38	0.8	3.40			
<b>CPGW 080212 R1</b>		7.94	2.38	1.2	3.40			
<b>CPGW 090304 R1</b>		9.525	3.18	0.4	4.40			
<b>CPGW 090308 R1</b>		9.525	3.18	0.8	4.40			
<b>CPGW 090312 R1</b>		9.525	3.18	1.2	4.40			

**DNGA**



Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>DNGA 150404 R1</b>	<b>DNGA 431 R1</b>	12.70	4.76	0.4	5.16	•	•	
<b>DNGA 150408 R1</b>	<b>DNGA 432 R1</b>	12.70	4.76	0.8	5.16	•	•	
<b>DNGA 150412 R1</b>	<b>DNGA 433 R1</b>	12.70	4.76	1.2	5.16		•	
<b>DNGA 150604 R1</b>	<b>DNGA 441 R1</b>	12.70	6.35	0.4	5.16	•	•	
<b>DNGA 150608 R1</b>	<b>DNGA 442 R1</b>	12.70	6.35	0.8	5.16	•	•	
<b>DNGA 150612 R1</b>	<b>DNGA 443 R1</b>	12.70	6.35	1.2	5.16		•	

CERAMIC

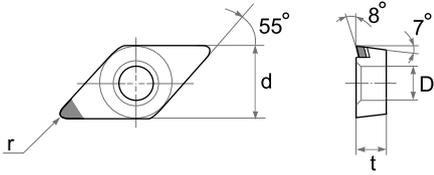
CERMET

PCBN  
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TOOL  
HOLDER

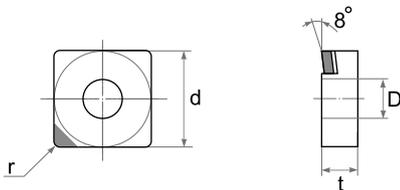
MILLING  
CUTTER

**DCGW**



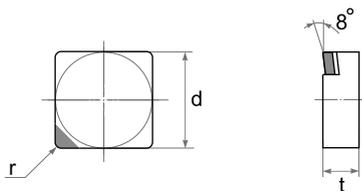
Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>DCGW 070202 R1</b>	6.35	2.38	0.2	2.80			
<b>DCGW 070204 R1</b>	6.35	2.38	0.4	2.80	•	•	
<b>DCGW 070208 R1</b>	6.35	2.38	0.8	2.80		•	
<b>DCGW 11T302 R1</b>	9.52	3.97	0.2	4.40			
<b>DCGW 11T304 R1</b>	9.52	3.97	0.4	4.40	•	•	
<b>DCGW 11T308 R1</b>	9.52	3.97	0.8	4.40		•	

**SNGA**



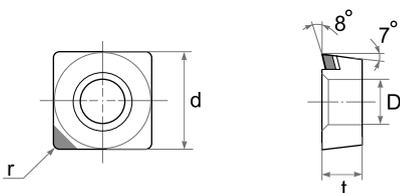
Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>SNGA 120404 R1</b>	<b>SNGA 431 R1</b>	12.70	4.76	0.4	5.16	•	•	
<b>SNGA 120408 R1</b>	<b>SNGA 432 R1</b>	12.70	4.76	0.8	5.16		•	
<b>SNGA 120412 R1</b>	<b>SNGA 433 R1</b>	12.70	4.76	1.2	5.16			

**SNGN**



Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>SNGN 120404 R1</b>	<b>SNGN 431 R1</b>	12.70	4.76	0.4	5.16	•	•	
<b>SNGN 120408 R1</b>	<b>SNGN 432 R1</b>	12.70	4.76	0.8	5.16		•	
<b>SNGN 120412 R1</b>	<b>SNGN 433 R1</b>	12.70	4.76	1.2	5.16			

**SCGW**



Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>SCGW 09T304 R1</b>	9.52	3.97	0.4	4.40	•	•	
<b>SCGW 09T308 R1</b>	9.52	3.97	0.8	4.40		•	
<b>SCGW 09T312 R1</b>	9.52	3.97	1.2	4.40			
<b>SCGW 120402 R1</b>	12.70	4.76	0.2	5.50			
<b>SCGW 120404 R1</b>	12.70	4.76	0.4	5.50	•	•	
<b>SCGW 120408 R1</b>	12.70	4.76	0.8	5.50		•	

CERAMIC

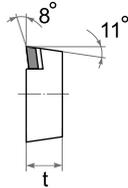
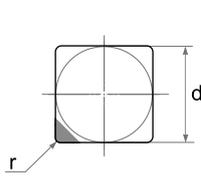
CERMET

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TOOL  
HOLDER

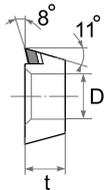
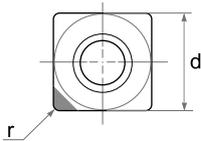
MILLING  
CUTTER

**SPGN**



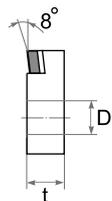
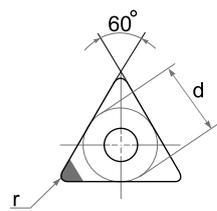
Type		Dimensions (mm)					
ISO	ASA	d	t	r	SPD 1000	SPD 2000	SPD 3000
SPGN 090304 R1	SPGN 321 R1	9.52	3.18	0.4			
SPGN 090308 R1	SPGN 322 R1	9.52	3.18	0.8		•	
SPGN 120304 R1	SPGN 421 R1	12.70	3.18	0.4			
SPGN 120308 R1	SPGN 422 R1	12.70	3.18	0.8		•	

**SPGW**



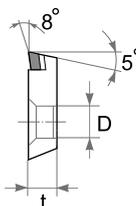
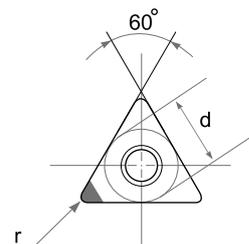
Type		Dimensions (mm)					
ISO	ASA	d	t	r	SPD 1000	SPD 2000	SPD 3000
SPGW 090302 R1	SPGW 3202 R1	9.52	3.18	0.2			
SPGW 090304 R1	SPGW 321 R1	9.52	3.18	0.4			
SPGW 090308 R1	SPGW 322 R1	9.52	3.18	0.8			

**TNGA**



Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
TNGA 160402 R1	TNGA 3302 R1	9.52	4.76	0.2	3.81		•	
TNGA 160404 R1	TNGA 331 R1	9.52	4.76	0.4	3.81	•	•	
TNGA 160408 R1	TNGA 332 R1	9.52	4.76	0.8	3.81		•	
TNGA 160412 R1	TNGA 333 R1	9.52	4.76	1.2	3.81			

**TBGW**



Type		Dimensions (mm)						
ISO		d	t	r	D	SPD 1000	SPD 2000	SPD 3000
TBGW 060102 R1		3.97	1.59	0.2	2.80			
TBGW 060104 R1		3.97	1.59	0.4	2.80			

CERAMIC

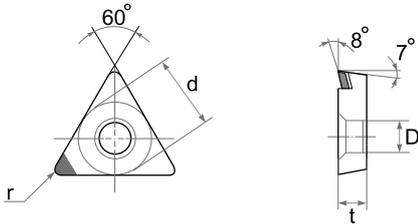
CERMET

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HOLDER

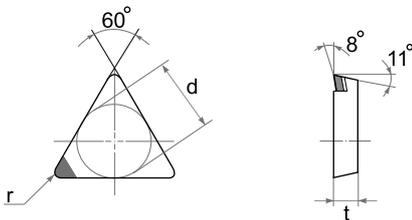
MILLING  
CUTTER

**TCGW**



Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>TCGW 090202 R1</b>	5.56	2.38	0.2	2.5			
<b>TCGW 090204 R1</b>	5.56	2.38	0.4	2.5	•	•	
<b>TCGW 090208 R1</b>	5.56	2.38	0.8	2.5		•	
<b>TCGW 110202 R1</b>	6.35	2.38	0.2	2.8			
<b>TCGW 110204 R1</b>	6.35	2.38	0.4	2.8	•	•	
<b>TCGW 110208 R1</b>	6.35	2.38	0.8	2.8		•	
<b>TCGW 16T302 R1</b>	9.52	3.97	0.2	4.4			
<b>TCGW 16T304 R1</b>	9.52	3.97	0.4	4.4	•	•	
<b>TCGW 16T308 R1</b>	9.52	3.97	0.8	4.4		•	

**TPGN**



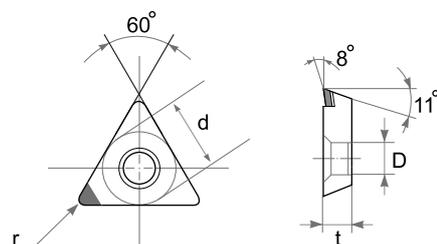
Type		Dimensions (mm)					
ISO	ASA	d	t	r	SPD 1000	SPD 2000	SPD 3000
<b>TPGN 090204 R1</b>	<b>TPGN 721 R1</b>	5.56	2.38	0.4			
<b>TPGN 090208 R1</b>	<b>TPGN 732 R1</b>	5.56	2.38	0.8			
<b>TPGN 110302 R1</b>	<b>TPGN 2202 R1</b>	6.35	3.18	0.2	•	•	•
<b>TPGN 110304 R1</b>	<b>TPGN 221 R1</b>	6.35	3.18	0.4	•	•	•
<b>TPGN 110308 R1</b>	<b>TPGN 222 R1</b>	6.35	3.18	0.8	•	•	•
<b>TPGN 160302 R1</b>	<b>TPGN 3202 R1</b>	9.52	3.18	0.2	•	•	•
<b>TPGN 160304 R1</b>	<b>TPGN 321 R1</b>	9.52	3.18	0.4	•	•	•
<b>TPGN 160308 R1</b>	<b>TPGN 322 R1</b>	9.52	3.18	0.8	•	•	•

CERAMIC

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**TPGB**

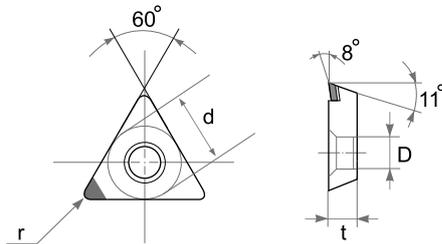


Type	Dimensions (mm)						
ISO	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>TPGB 080204 R1</b>	4.76	2.38	0.4	2.40			
<b>TPGB 080208 R1</b>	4.76	2.38	0.8	2.40			
<b>TPGB 090204 R1</b>	5.56	2.38	0.4	2.50			
<b>TPGB 090208 R1</b>	5.56	2.38	0.8	2.50			
<b>TPGB 110304 R1</b>	6.35	3.18	0.4	3.30		•	
<b>TPGB 110308 R1</b>	6.35	3.18	0.8	3.30		•	

TOOL  
HOLDER

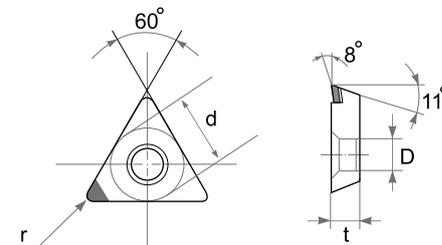
MILLING  
CUTTER

**TPGW**



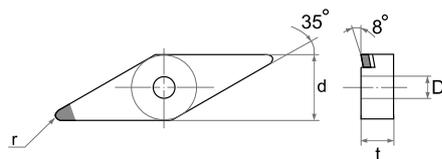
Type	Dimensions (mm)						
	ISO	d	t	r	D	SPD 1000	SPD 2000
<b>TPGW 080202 R1</b>	4.76	2.38	0.2	2.40		•	
<b>TPGW 080204 R1</b>	4.76	2.38	0.4	2.40		•	
<b>TPGW 110302 R1</b>	6.35	3.18	0.2	3.30			
<b>TPGW 110304 R1</b>	6.35	3.18	0.4	3.30		•	
<b>TPGW 110308 R1</b>	6.35	3.18	0.8	3.30			
<b>TPGW 160404 R1</b>	9.52	4.76	0.4	3.81			
<b>TPGW 160408 R1</b>	9.52	4.76	0.8	3.81			

**TPGT**



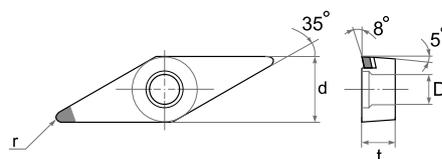
Type	Dimensions (mm)						
	ISO	d	t	r	D	SPD 1000	SPD 2000
<b>TPGT 110302 R1</b>	6.35	3.18	0.2	3.40			
<b>TPGT 110304 R1</b>	6.35	3.18	0.4	3.40			

**VNGA**



Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>VNGA 160404 R1</b>	<b>VNGA 331 R1</b>	9.52	4.76	0.4	3.18	•	•	
<b>VNGA 160408 R1</b>	<b>VNGA 332 R1</b>	9.52	4.76	0.8	3.18		•	

**VBGW**



Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
<b>VBGW 110302 R1</b>	<b>VBGW 2202 R1</b>	6.35	3.18	0.2	3.40			
<b>VBGW 110304 R1</b>	<b>VBGW 221 R1</b>	6.35	3.18	0.4	3.40			
<b>VBGW 110308 R1</b>	<b>VBGW 222 R1</b>	6.35	3.18	0.8	3.40			
<b>VBGW 160402 R1</b>	<b>VBGW 3302 R1</b>	9.52	4.76	0.2	4.40			
<b>VBGW 160404 R1</b>	<b>VBGW 331 R1</b>	9.52	4.76	0.4	4.40	•	•	
<b>VBGW 160408 R1</b>	<b>VBGW 332 R1</b>	9.52	4.76	0.8	4.40		•	
<b>VBGW 160412 R1</b>	<b>VBGW 333 R1</b>	9.52	4.76	1.2	4.40			

CERAMIC

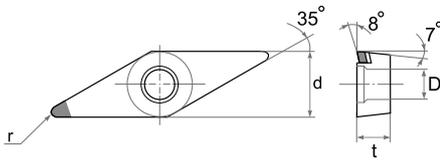
CERMET

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## VCGW



Type		Dimensions (mm)						
ISO	ASA	d	t	r	D	SPD 1000	SPD 2000	SPD 3000
VCGW 110302 R1	VCGW 2202 R1	6.35	3.18	0.2	2.80	•		
VCGW 110304 R1	VCGW 221 R1	6.35	3.18	0.4	3.40	•		
VCGW 110308 R1	VCGW 222 R1	6.35	3.18	0.8	3.40			
VCGW 160404 R1	VCGW 331 R1	9.52	4.76	0.4	4.40			
VCGW 160408 R1	VCGW 332 R1	9.52	4.76	0.8	4.40			
VCGW 160412 R1	VCGW 333 R1	9.52	4.76	1.2	4.40			

CERAMIC

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**NOTCH BITE**

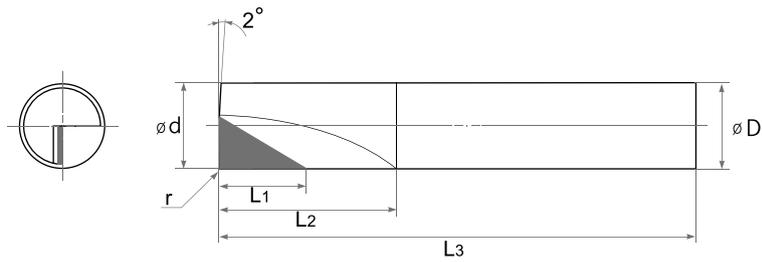
Type	Dimensions (mm)					SBN1000	SPD3000
	A	B	C	D	L		
<b>BITE SD-10</b>	0.80	3.0	2.50	4.0	8.6		
<b>BITE SD-13</b>	0.80	3.5	3.50	4.5	11.5		
<b>BITE SD-16</b>	1.00	5.0	4.00	6.0	14.4		
<b>BITE SD-19</b>	1.00	6.0	4.50	8.0	16.5		
<b>BITE SD-22</b>	1.20	10.0	6.00	10.0	21.0		
<b>BITE SD-25</b>	1.60	10.0	6.00	10.0	24.0		
<b>BITE SD-29</b>	1.70	11.3	6.00	10.0	28.5		
<b>BITE SD-32</b>	1.70	11.3	6.00	10.0	30.0		
<b>BITE SD-35</b>	2.02	12.5	6.00	10.0	33.0		
<b>BITE SD-38</b>	2.39	15.0	6.50	10.0	36.0		
<b>BITE SD-51</b>	4.28	20.0	8.00	10.0	49.0		
<b>BITE SD-57</b>	2.92	22.0	8.00	10.0	56.0		

CERAMIC

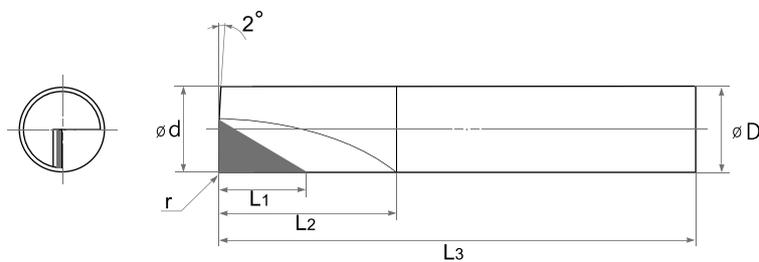
CERMET

PCBN  
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PCDTOOL  
HOLDERMILLING  
CUTTER

**SFE .. 1C**



**SFE .. 2C**



Type	Dimensions (mm)						PCBN				PCD		
	ISO	d	D	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	r	SBN 1000	SBN 2000	SBN 3000	SBN 4000	SPD 1000	SPD 2000
SFE 650-2C	6.0	6.0	4.0	12.0	50.0	0.20						•	
SFE 680-2C	6.0	6.0	6.0	16.0	80.0	0.20						•	
SFE 860-2C	8.0	8.0	7.0	16.0	60.0	0.20						•	
SFE 8120-2C	8.0	8.0	9.0	20.0	120.0	0.40						•	
SFE 1070-2C	10.0	10.0	9.0	20.0	70.0	0.40						•	
SFE 10120-2C	10.0	10.0	12.0	25.0	120.0	0.80						•	
SFE 1270-2C	12.0	12.0	12.0	25.0	70.0	0.80						•	
SFE 12120-2C	12.0	12.0	16.0	30.0	120.0	1.00						•	
SFE 16100-2C	16.0	16.0	16.0	25.0	100.0	0.80						•	
SFE 16150-2C	16.0	16.0	20.0	30.0	150.0	1.00						•	
SFE 18100-2C	18.0	18.0	20.0	30.0	100.0	0.80						•	
SFE 18200-2C	18.0	18.0	24.0	35.0	200.0	1.20						•	
SFE 20100-2C	20.0	20.0	24.0	35.0	100.0	0.80						•	
SFE 20200-2C	20.0	20.0	28.0	40.0	200.0	1.20						•	

CERAMIC

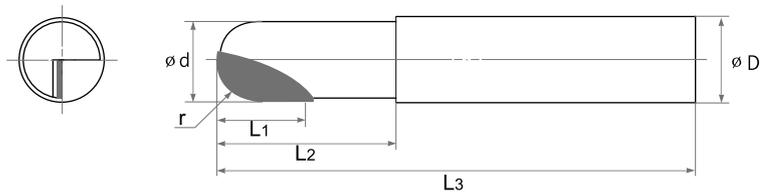
CERMET

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**SBE .. 1C**



Type	Dimensions (mm)						PCBN				PCD			
	ISO	d	D	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	r	SBN 1000	SBN 2000	SBN 3000	SBN 4000	SPD 1000	SPD 2000	SPD 3000
SBE 250-1C	2.0	4.0	4.0	12.0	50.0	1.0								
SBE 280-1C	2.0	4.0	4.0	16.0	80.0	1.0								
SBE 350-1C	3.0	4.0	4.0	16.0	50.0	1.5						•		
SBE 380-1C	3.0	4.0	6.0	30.0	80.0	1.5							•	
SBE 450-1C	4.0	4.0	4.0	16.0	50.0	2.0							•	
SBE 480-1C	4.0	4.0	6.0	40.0	80.0	2.0								•
SBE 650-1C	6.0	6.0	6.0	20.0	50.0	3.0							•	
SBE 6100-1C	6.0	6.0	8.0	50.0	100.0	3.0								
SBE 860-1C	8.0	8.0	8.0	30.0	60.0	4.0							•	
SBE 8120-1C	8.0	8.0	10.0	60.0	120.0	4.0								
SBE 1080-1C	10.0	10.0	10.0	30.0	80.0	5.0							•	
SBE 10160-1C	10.0	10.0	12.0	60.0	160.0	5.0								
SBE 12100-1C	12.0	12.0	12.0	40.0	100.0	6.0								
SBE 12200-1C	12.0	12.0	16.0	80.0	200.0	6.0								
SBE 16160-1C	16.0	16.0	16.0	60.0	160.0	8.0								
SBE 16250-1C	16.0	16.0	20.0	100.0	250.0	8.0								

CERAMIC

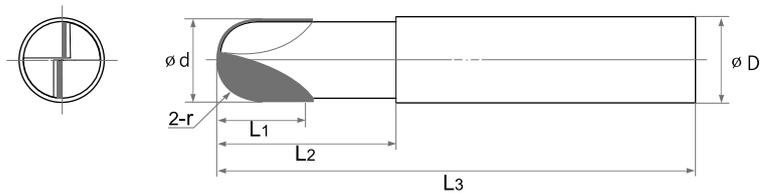
CERMET

PCBN  
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PCD

TOOL  
HOLDER

MILLING  
CUTTER

**SBE .. 2C**



Type	Dimensions (mm)						PCBN				PCD			
	ISO	d	D	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	r	SBN 1000	SBN 2000	SBN 3000	SBN 4000	SPD 1000	SPD 2000	SPD 3000
SBE 650-2C	6.0	6.0	6.0	20.0	50.0	3.0								
SBE 6100-2C	6.0	6.0	8.0	50.0	100.0	3.0								
SBE 860-2C	8.0	8.0	8.0	30.0	60.0	4.0							•	
SBE 8120-2C	8.0	8.0	10.0	60.0	120.0	4.0								
SBE 1080-2C	10.0	10.0	10.0	30.0	80.0	5.0							•	
SBE 10160-2C	10.0	10.0	12.0	60.0	160.0	5.0								
SBE 12100-2C	12.0	12.0	12.0	40.0	100.0	6.0								
SBE 12200-2C	12.0	12.0	16.0	80.0	200.0	6.0								

SPECIAL

HSK - TOOL

PART.  
**A**

TURNING  
&  
MILLING



CERAMIC

CERMET

PCBN  
/  
PCD

TOOL  
HOLDER

MILLING  
CUTTER

# SPECIAL

PCD ENDMILL



CERAMIC

CERMET

PCBN  
/  
PCD

TOOL  
HOLDER

MILLING  
CUTTER



# SPECIAL

PCD DRILL / GUN REAMER

PART.  
**A**

TURNING  
&  
MILLING



CERAMIC

CERMET

PCBN  
/  
PCD

TOOL  
HOLDER

MILLING  
CUTTER