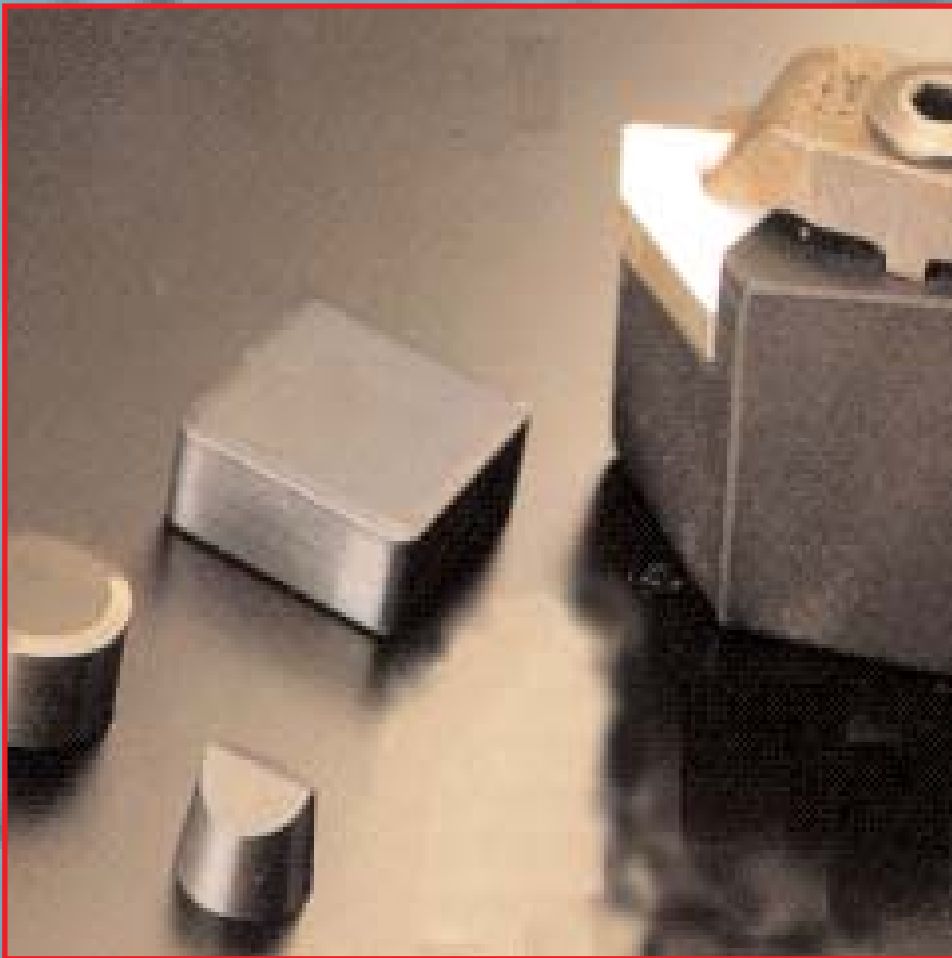


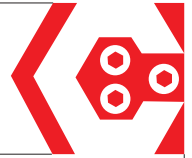


C e r a m i c s



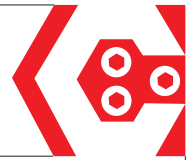
**INSERTS - PLAQUETTES
EINSÄTZE - WISSELPLATEN**

04/2015



CERAMIC

Maker	Comadex	NTK	CeramTec	Kennametal	Sandvik	Toshiba	Greenleaf	Kyocera	Mitsubishi	Nippon Tungsten	Sumitomo
Black Ceramic	CK1	HC2	SH1	K090		LX21		A65	XD202	NPCA2	NB90S
	CK3	HC5, HC4	SH2	KY1615	CC650	LX11	GEM6	A66N			
	CK5										
	CKD2	HC6									
White Ceramic	CKZ2	HC1	SN60 SN80	AC5 K060	CC620	LXA	GEM6	AZ5000 SN60		NPCHI	W80
Pink		HW2									
Silicon Nitride	CKS2	EC1	SL100	KY2000				KS500		NYCON-A	NS130
	CKS3	SX8	SL200	KY3000	CC690			KS5000			
	CKS4	SP2, SX2	SL500	KY3500	CC6090	FX105	GSN	KS6000			NS260
	CKS5	SX1						KS7000			
	CKS7	SX5		KY1310	CC680						
	CKS8			KY1540, KY2100							
Whisker	CKW4 CKW8				CC670		W300				

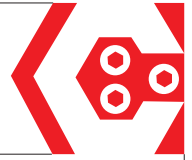


Ceramics grade information

Ceramics	4
Ceramics identification system	12

Ceramics inserts

Turning	14
Milling	31
Roll Turning	33
Grooving	37
Special inserts	40



CERAMICS

Al₂O₃-TiC system

TiC-Al₂O₃ system

Si₃N₄ system

Al₂O₃-ZrO₂ system

CK1

CKD2

CKS2

CKZ2

CK8

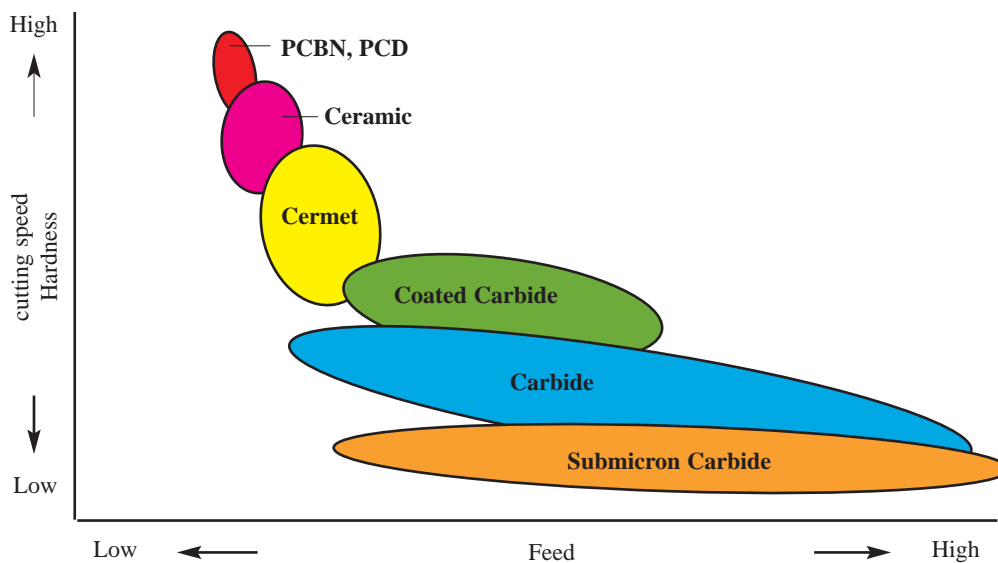
CKS3

CKS5

CKS7

CKS8

Application of cutting tool materials





CERMET

DIA

TiC-TiCN system

PVD Coating

PCBN

PCD

CXF31

CTF91

CBN1

PKD1

CXF32

CTF92

CBN2

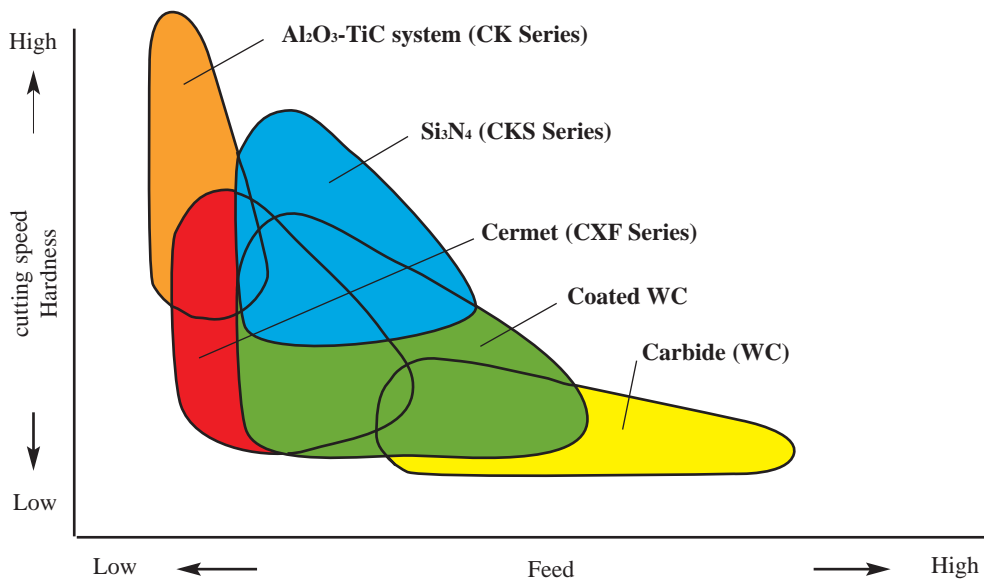
PKD2

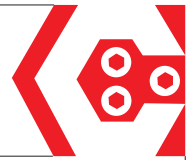
CXF33

CTF93

PKD3

Application of Ceramic Grade





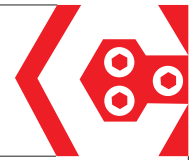
Comadex Ceramic Cutting Tool is an inorganic materials, die-pressed and sintered using very fine and pure raw materials. These are oxide, carbide and nitride with high purity and fine microstructure. Since the Comadex ceramics is prepared by HIP process to condense completely, it is highly wear resistant and very strong against the fracture.

Characteristics

- High cutting speed based on high strength at high temperature.
- Capable of difficult cutting.
- Precise cutting and superior surface roughness on workpiece due to stable thermo-chemical properties.
- Longer tool life due to excellent wear resistance.

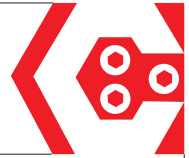
Physical Properties

Materials	Grade	Composition	Color	Density (g/cm ³)	Hardness (Hv)	Toughness (MN/m ^{2/3})	Heat Transfer (cal/cm. sec.)
CERAMIC	CK1	Al ₂ O ₃ +TiC	Black	4.2	2100	4.0	0.08
	CK8	Al ₂ O ₃ +TiCN	Black	4.6	2300	4.8	0.08
	CKD2	TiC+Al ₂ O ₃	Black	4.6	2200	4.5	0.07
	CKZ2	Al ₂ O ₃ +ZrO ₂	White	4.0	1800	4.5	0.07
	CKS2	Si ₃ N ₄	Black	3.3	1600	5.0	0.06
	CKS3	Si ₃ N ₄	Gray	3.2	1600	6.0	0.05
	CKS4	Si ₃ N ₄	Gray	3.2	1650	6.0	0.05
	CKS5	Si ₃ N ₄	Gray	3.2	1700	6.0	0.05
	CKS7	Si ₃ N ₄	Brown	3.5	1750	6.5	0.05
Materials	Grade	Composition	Color	Density (g/cm ³)	Hardness (Hv)	Toughness (MPa/m ^{2/3})	Therm. Cond. (X10 ⁴ /K)
	CKW4	Al ₂ O ₃ +SiC	Green	3.8	2100	7.0	7.8
	CKW8	Al ₂ O ₃ +SiC	Green	3.7	2100	7.0	7.6



Application and Characteristics of Ceramics (I)

Grade		Application	Characteristics
CK Series	CK1	-Hardened steel -Finish and medium cutting for steel and cast-iron	-Excellent wear resistant -High thermal shock resistance
	CK8	-Hardened steel -Heat treated hardened steel and alloy steel	-Superior wear resistant -Alternative to CBN
SKD	CKD2	-Finish and Medium cutting for ductile cast-iron -Finish for hardened steel	-High thermal shock resistant -Usable with coolant
CKZ	CKZ2	-Finish/Medium/rough cutting for cast iron -finish/Medium cutting for steel	-Toughened by ZrO2 -High chemical stability
CKS Series	CKS2	-Rough and interrupted cutting for cast iron -Rough cutting for roll turning cast iron and steel -Milling for cast iron	-High toughness and thermal shock resistant -Well balanced wear resistance and toughness
	CKS3	-High speed cutting for cast iron with heavy interruption	-High toughness and thermal shock resistant -Excellent toughness and wear resistant -High speed cutting and severe interruption
	CKS5	-High speed cutting for cast iron with interruption -High speed milling for cast iron	-Pure silicon nitride grade -Superior wear resistant at extremely high cutting speed
	CKS7	-Rough and interrupted cutting for cast iron -Cutting for Ni-base alloy -Ductile cast iron	-Good thermal shock resistance and good thermal conductivity -Excellent wear resistant against the long chip for Ni-base alloy -Needs cutting fluids
	CKW 4	- High Speed Steel, High Crom Steel in medium or low speed cutting Roughing and Medium cutting with heavy interruption	- Superior wear resistance
	CKW8	- Nickel Base Alloys, Cobalt Base Alloys in High speed cutting Roughing and Finishing with continuous or light interruption	- Superior wear resistance



Grade Applications and Characteristics (II)

CK Series ($\text{Al}_2\text{O}_3 + \text{TiC}$, TiCN)

CK1

CK1 shows excellent thermal shock resistance and wear resistance. It is general purpose machining grade for hardened steel and difficult cutting. It can be used for finish and medium cutting for soft cast iron without interruption.

CK3

CK3 was developed for extremely hardened steel and high hardness alloyed steel. It is a Al-TiCN grade with micrograin structure.

CKD Series ($\text{TiC} + \text{Al}_2\text{O}_3$)

CKD2

CKD2 is TiC major (70%) Al-TiC grade for medium and finish cut of ductile cast iron. It shows excellent wear resistance and strong edge even for finish cutting for cast iron. It is recommended using coolants.

CKS Series (Si_3N_4)

CKS2

Well known grade for general purpose machining of rough and medium cutting of cast iron with interruption. It shows excellent wear resistance during milling operation of cast iron.

CKS3

It was designed for high cutting speed of cast iron with heavy interruption.

CKS5

The edge hardness was improved for extremely high cutting speed for cast iron cutting with normal interruption.

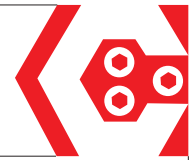
CKS7

CKS7 is a composite with addition of TiN into Si_3N_4 . It shows excellent wear resistance of edge during cutting for long chip forming work piece and Ni-Based Alloy. It can be used also for cast iron cutting but coolant recommended.

CKZ ($\text{Al}_2\text{O}_3 + \text{ZrO}_2$)

CKZ2

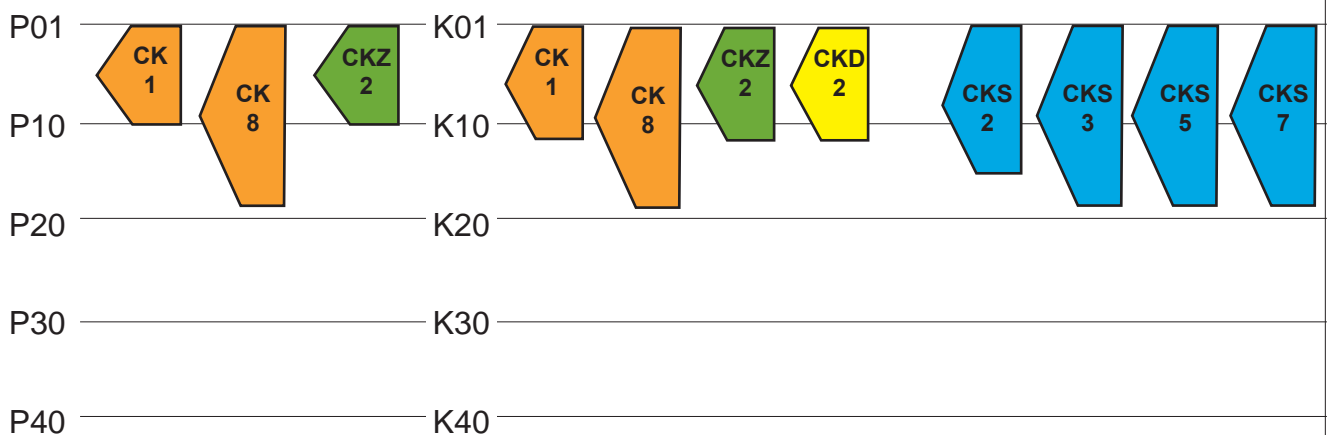
CKZ2 is a Al_2O_3 grade, which was toughened by Zirconia. This is the most stable grade and can be used for general rough, medium and finish cutting for cast iron with normal interruption.

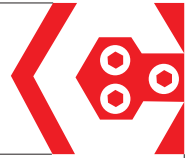


Recommended cutting condition

Machining Type	Grade	Workpiece	Cutting Style	Velocity(V) (m/min)	Feed(f) (mm/rev)	Depth(D) (mm)
Turning	CK1	GRAY CAST IRON -Gray cast Iron (FC) -Malleable (FCMB) -Ductile cast Iron (FCD)	Rough	150~800	0.2~0.5	3~6
			Finish	200~1,200	0.3~0.5	0.1~0.5
	CK8	STEEL -Carbon steel -Alloy steel -Bearing steel	Rough	30~100	0.1~0.2	0.5~1.5
			Finish	50~200	0.05~0.15	0.1~0.5
		-Hard steel (HrC 45 >)	Rough	150~400	0.2~0.5	2~5
			Finish	200~800	0.05~0.2	0.1~0.5
	CKD2	-DUCTILE CAST IRON	Rough	20~100	0.1~0.2	0.5~1.5
	CKZ2	-GRAY CAST IRON (fc) -STEEL (HrC 45 <)	Rough	40~200	0.05~0.5	0.1~0.5
			Finish	100~400	0.1~0.2	1~2
			Rough	200~700	0.2~0.4	2~5
Finish			300~1,200	0.05~0.3	0.1~0.5	
CKS2 CKS3 CKS5	GRAY CAST IRON -Gray cast iron (FC) -Malleable (FCMB) -Ductile cast iron (FCD)	Rough	200~400	0.2~0.4	2~4	
		Finish	300~1,200	0.05~0.3	0.1~0.5	
CKS7	-Ni-BASED ALLOY -NON-FERROUS METAL	Rough	150~1,100	0.3~0.8	<5	
		Finish	250~1,200	0.15~0.4	<1	
		Rough	20~100	1.0~2.0	<5	
		Finish	60~200	0.5~1.0	<1	
Milling	CKS2 CKS3 CKS5 CKS7	-GRAY CAST IRON (FC)	Rough	150~250	0.2~0.4	<5
			Finish	150~450	0.1~0.2	<1
		-DUCTILE CAST IRON -ALLOY STEEL	Rough	100~1,200	0.3~0.5	<5
			Finish	150~1,500	0.3~0.7	<3
		Rough	90~500	0.1~0.3	<5	
		Medium Finish	100~700	0.1~0.4	<3	
			Finish	200~1,500	0.1~0.5	<3

Turning





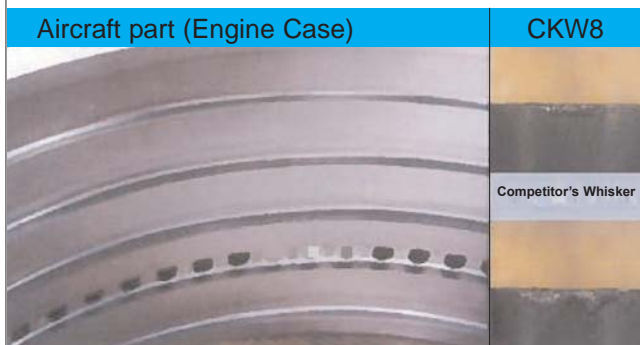
Recommended cutting condition Wisker Ceramic

Work material	Grade		Condition	Cutting speed (m/min)	Feed (mm/rev)	Ap (mm)
	CKW4	CKW8				
Ni-based Alloy (Inconel, Nimonic Rene, Hastalloy...)	○	●	Interrupted	~250	~0.3	~3.0
			Roughing	~300	~0.4	~4.0
			Continuous	~500	~0.5	~5.0
Cobalt-Base Alloy (Stelite, M203...)	●	○	Interrupted	~200	~0.2	~3.0
			Roughing	~250	~0.3	~4.0
			Continuous	~400	~0.4	~5.0
HSS	●		Roughing	~120	~0.4	~5.0
			Continuous	~150	~0.5	~3.0

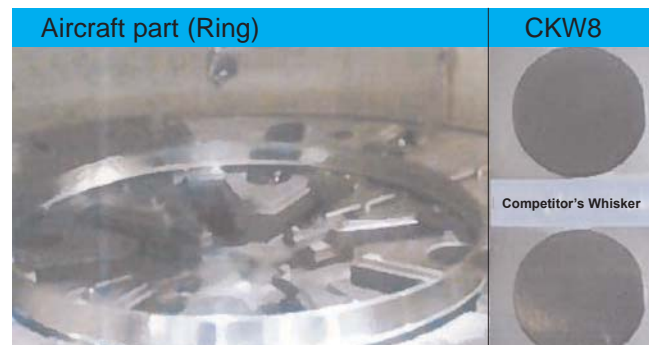
Applications

● Excelent ○ : Good

Inconel 718	
Internal turning	
Insert RNGN 120700 T151 CKW8	
V (m/min)	250
f (mm/rev)	0.15
ap (mm)	2.0
Coolant	Wet
Tool life	1 pcs / edge



Co-based high temperature alloy	
Internal turning	
Insert RPGX 090700 T05 CKW8	
V (m/min)	245
f (mm/rev)	0.18
ap (mm)	2.5
Coolant	Wet
Tool life	3 passes / edge

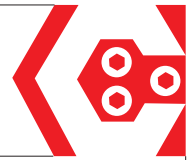


Stelite	
Roughing turning	
Insert RNGN 120700 T151 CKW4	
V (m/min)	180
f (mm/rev)	0.07
ap (mm)	3.0
Coolant	Dry
Tool life	2 pcs / edge



Co-based high temperature alloy	
External	
Insert LNJ 6688PO T754D CKW4	
V (m/min)	130
f (mm/rev)	0.3
ap (mm)	5.0
Coolant	Dry
Tool life	2 pcs / corner





Whisker Grade (CKW4 / CKW8)

CKW4 and CKW8 developed by own technology of Comadex Cutting Tools and is an advanced Silicon-Carbide (SiC) Whisker-reinforced ceramic grade.

Aluminium Oxide has been used successfully as a cutting tool material for many years in high speed machining, mainly due to it's excellent hardness and chemical stability at high temperature.

However the application of Aluminium Oxide was limited in interrupted cutting, high nickel based alloys at high cutting speed because of it's low resistance to fracture.

The important component of CKW4 and CKW8, ultra-strong whiskers makes possible increasing fracture toughness and notch wear resistance in the machining of super-alloys at high speed cutting.

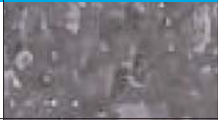

CKW4 and CKW8 shows high productivity and extended reliability in the machining of Nickel- and Cobalt-based alloys, Inconel, Stellite, HSS etc.

Features

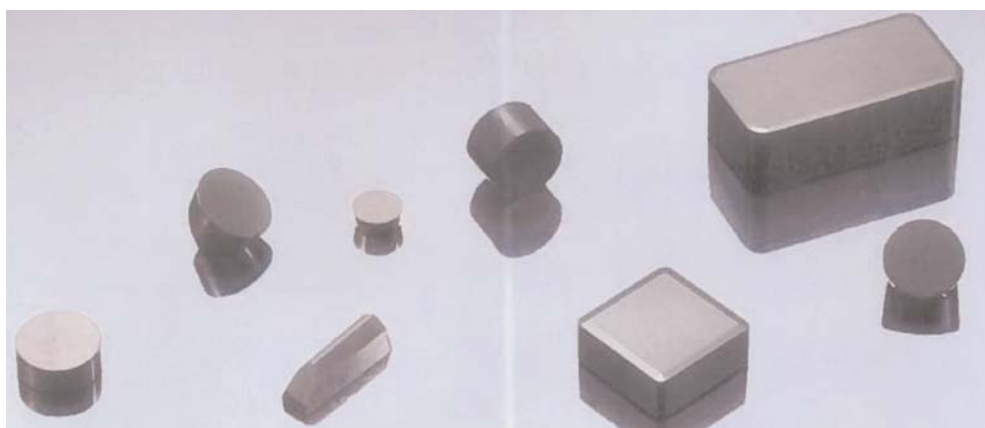
- Excellent wear and thermal shock resistance at high surface speed
- Superior notch wear resistance
- Outstanding fracture toughness

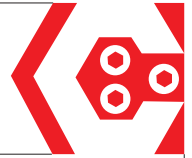
Grade Information

Application Range

Grade	Microstructure	Application Range
CKW4		High Speed Steel, High Crom Steel in medium or low speed cutting Roughing and Medium cutting with heavy interruption
CKW8		Nickel Base Alloys, Cobalt Base Alloys in High speed cutting Roughing and Finishing with continuous or light interruption

Grade	Composition	Color	Density (g/cm ³)	Hardness (Hv)	Toughness (MPa m ^{1/2})	Thermal Conductivity (X10 ⁻⁶ /K)
CKW4	Al ₂ O ₃ + SiC	Green	3.8	2,100	7.0	7.8
CKW8	Al ₂ O ₃ + SiC	Green	3.7	2,100	7.0	7.6



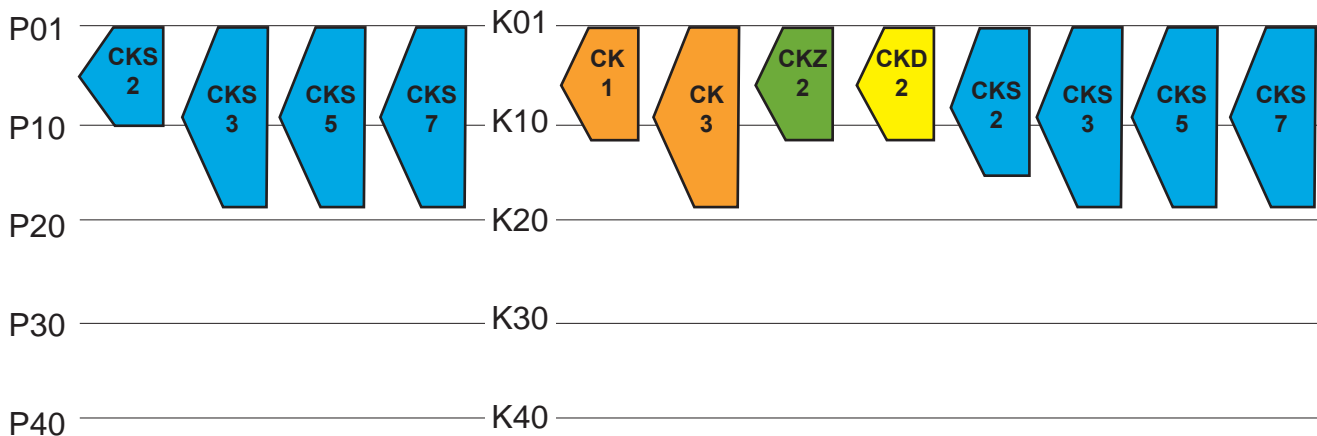


Grade Choice for Workpiece

Workpiece		Grade	CKZ2	CK1 CK3	CKD2	CKS2, CKS3 CKS5	CKS7
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			○		○	●

●: Excellent ○: Good

Milling

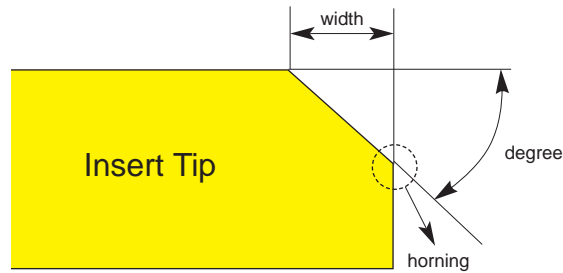




10

Chamfer specification

(1) Mono type



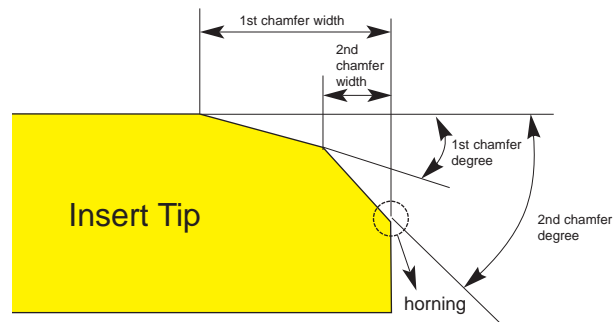
T1

Chamfer degree (°C)	Chamfer Width (mm)	Horning (μm)
20	0.10	0 No Horning

T2

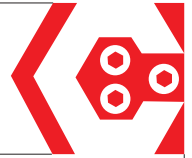
Chamfer degree (°C)	Chamfer Width (mm)	Horning (μm)
20	0.20	0 No Horning

(2) Double type



T4D

1st Chamfer degree (°C)	1st Chamfer Width (mm)	2nd Chamfer Width (mm) X degree (°C)	Horning (μm)
15	4.50	0.10 X 30	20



1 Shape	
C	80°
D	75°
E	55°
H	
L	
R	
S	
T	
V	35°
W	

3 Tolerance			
Symbol	d (mm)	m (mm)	S (mm)
A	±0.025	±0.005	±0.025
F	±0.013	±0.005	±0.025
C	±0.025	±0.013	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
J	±0.05	±0.05	±0.13
K*	±0.05~ ±0.13	±0.13	±0.025
L*	±0.05~ ±0.13	±0.025	±0.025
M*	±0.05~ ±0.13	±0.08~ ±0.18	±0.13
N*	±0.05~ ±0.13	±0.08~ ±0.18	±0.025
U*	±0.08~ ±0.25	±0.13~ ±0.38	±0.13

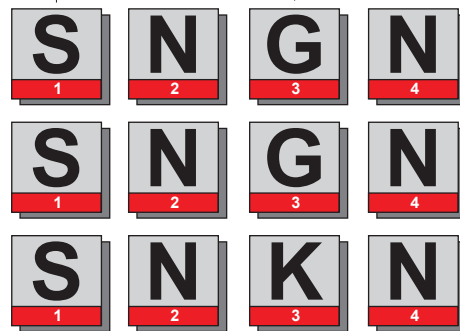
Class M		
Inscribed circle (mm)	d (mm)	m (mm)
6.350	±0.05	±0.08
9.525	±0.05	±0.08
12.700	±0.08	±0.13
15.875	±0.10	±0.15
19.050	±0.10	±0.15
25.400	±0.13	±0.18

Class M		
Inscribed circle (mm)	d (mm)	m (mm)
6.350	±0.05	±0.11
9.525	±0.05	±0.11
12.700	±0.08	±0.15
15.875	±0.10	±0.18
19.050	±0.10	±0.18

ISO
ASA

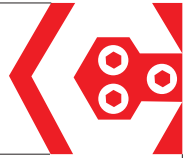
TURNING

MILLING



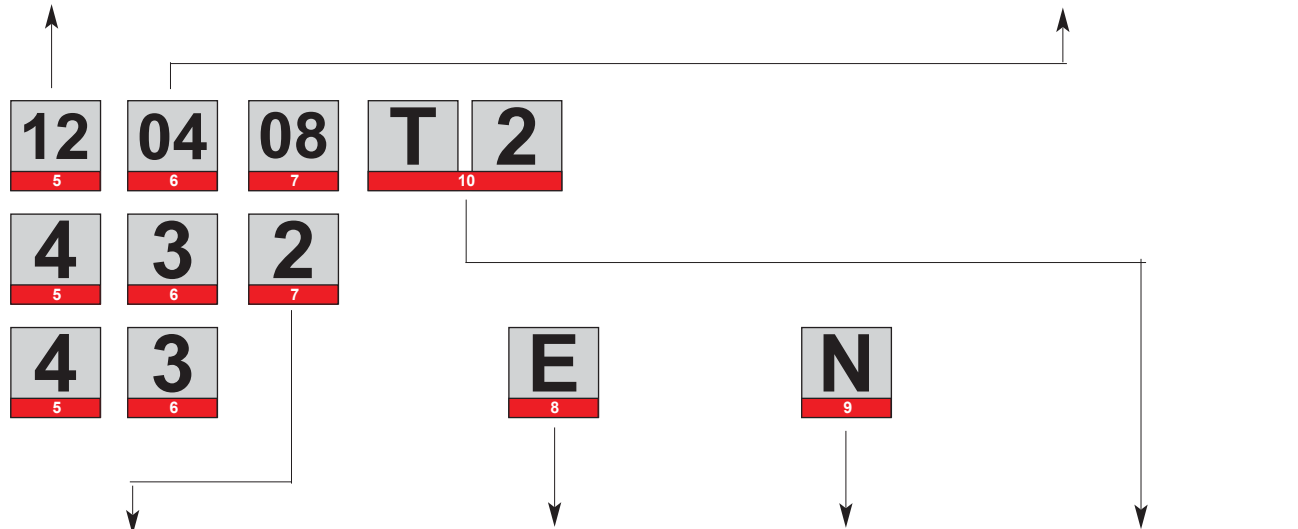
2 Relief angle	
B	5°
C	7°
D	15°
E	20°
N	0°
P	11°
O	Other normal clearance

4 Type of insert				
Type	Symbol		Type	Symbol
	Inscribed circle over 6.35	Inscribed circle (included 7.938) under 5.556		Inscribed circle over 6.35
	N	E		H
	F	L		B
	R	S		T
	A	D		W
	G	K		
	M	P		
Special design	X	X		



5 Cutting edge length									
Diameter of inscribed circle	ASA (Inch)		Metric						
	6.35 over	5.56 under							
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	
		6.35 over	5.65 under
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	-

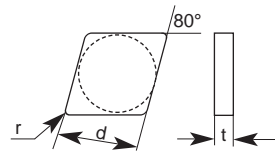
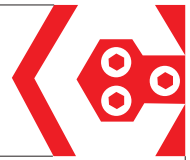


7 Nose-radius		
Corner roundness (mm)	ISO	ASA
Sharp nose	00	O
0.2	02	Y
0.4	04	1
0.8	08	2
1.2	12	3
1.6	16	4
2.0	20	5
2.4	24	6
2.8	28	7
3.2	32	8

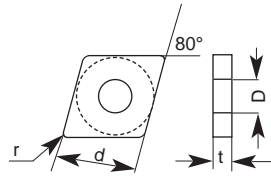
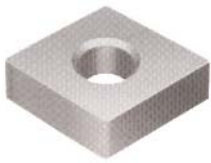
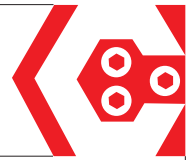
8 Land angle
A - 45°
D - 60°
E - 75°
F - 85°
P - 90°

9 Relief angle
A - 3°
B - 5°
C - 7°
D - 15°
E - 20°
F - 25°
G - 30°
N - 0°
P - 11°

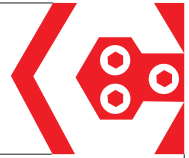
10 Chamfer spec
Detailed edge preparation is refer to page 9



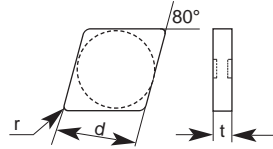
Specification		Dimension (mm)			Ceramic Stock								
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7	
CNGN 090304	CNGN 321	9.525	3.18	0.4									
CNGN 090308	CNGN 322			0.8									
CNGN 090312	CNGN 323			1.2									
CNGN 090404	CNGN 331	9.525	4.76	0.4									
CNGN 090408	CNGN 332			0.8									
CNGN 090412	CNGN 333			1.2									
CNGN 120304	CNGN 421	12.70	3.18	0.4									
CNGN 120308	CNGN 422			0.8	●								
CNGN 120312	CNGN 423			1.2									
CNGN 120404	CNGN 431	12.70	4.76	0.4	●	●	●						
CNGN 120408	CNGN 432			0.8	●	●	●	●	●	●	●		
CNGN 120408	CNGN 433			1.2	●	●	●	●	●	●	●	●	
CNGN 120416	CNGN 434			1.6	●	●	●	●	●	●	●	●	
CNGN 120420	CNGN 435			2.0									
CNGN 120424	CNGN 436			2.4						●	●		
CNGN 120432	CNGN 438			3.2									
CNGN 120604	CNGN 441			12.70	6.35	0.4							
CNGN 120608	CNGN 442	0.8	●										
CNGN 120612	CNGN 443	1.2	●										
CNGN 120616	CNGN 444	1.6											
CNGN 120704	CNGN 451	12.70	7.94	0.4									
CNGN 120708	CNGN 452			0.8						●	●		●
CNGN 120712	CNGN 453			1.2	●	●	●	●	●	●	●	●	●
CNGN 120716	CNGN 454			1.6	●	●	●	●	●	●	●	●	●
CNGN 120720	CNGN 455			2.0	●								
CNGN 160608	CNGN 542	15.875	6.35	0.8									
CNGN 160612	CNGN 543			1.2	●								
CNGN 160616	CNGN 544			1.6	●								
CNGN 160620	CNGN 545			2.0									
CNGN 160708	CNGN 552	15.875	7.94	0.8	●			●					
CNGN 160712	CNGN 553			1.2	●	●			●				
CNGN 160716	CNGN 554			1.6	●	●	●		●	●	●		
CNGN 160720	CNGN 555			2.0	●				●	●			
CNGN 190612	CNGN 643	19.05	6.35	1.2	●				●				
CNGN 190616	CNGN 644			1.6	●					●			
CNGN 190632	CNGN 648			3.2	●								
CNGN 190712	CNGN 653	19.05	7.94	1.2									
CNGN 190716	CNGN 654			1.6	●	●							
CNGN 190720	CNGN 655			2.0	●								
CNGN 190724	CNGN 656			2.4									
CNGN 250724	CNGN 856	25.40	7.94	2.4	●								
CNGN 250924	CNGN 866	25.40	9.52	2.4	●				●				



Specification		Dimension (mm)				Ceramic Stock								
ISO	ASA	d	t	r	D	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7	
CNGA 090304	CNGA 321	9.525	3.18	0.4	3.81									
CNGA 090308	CNGA 322			0.8										
CNGA 090312	CNGA 323			1.2										
CNGA 090404	CNGA 331	9.525	4.76	0.4	3.81									
CNGA 090408	CNGA 332			0.8										
CNGA 090412	CNGA 333			1.2										
CNGA 120304	CNGA 421	12.70	3.18	0.4	5.16	●	●	●		●			●	
CNGA 120308	CNGA 422			0.8		●	●	●	●	●	●	●	●	●
CNGA 120312	CNGA 423			1.2		●	●	●	●	●	●	●	●	●
CNGA 120404	CNGA 431	12.70	4.76	0.4	5.16	●	●	●		●	●		●	
CNGA 120408	CNGA 432			0.8										
CNGA 120412	CNGA 433			1.2										
CNGA 120416	CNGA 434			1.6										
CNGA 120420	CNGA 435			2.0										
CNGA 120424	CNGA 436			2.4										
CNGA 120432	CNGA 438			3.2										
CNGA 120604	CNGA 441	12.70	6.35	0.4	5.16									
CNGA 120608	CNGA 442			0.8										
CNGA 120612	CNGA 443			1.2										
CNGA 120616	CNGA 444			1.6										
CNGA 120704	CNGA 451	12.70	7.94	0.4	5.16									
CNGA 120708	CNGA 452			0.8		●	●	●	●	●				
CNGA 120712	CNGA 453			1.2		●	●	●	●	●			●	
CNGA 120716	CNGA 454			1.6		●	●	●	●	●			●	
CNGA 120720	CNGA 455			2.0										
CNGA 160608	CNGA 542	15.875	6.35	0.8	6.35					●				
CNGA 160612	CNGA 543			1.2							●	●		
CNGA 160616	CNGA 544			1.6		●								
CNGA 160620	CNGA 545			2.0										
CNGA 160708	CNGA 552	15.875	7.94	0.8	6.35	●	●							
CNGA 160712	CNGA 553			1.2		●	●					●		
CNGA 160716	CNGA 554			1.6								●		
CNGA 160720	CNGA 555			2.0										
CNGA 190608	CNGA 642	19.05	6.35	0.8	7.93	●				●	●		●	
CNGA 190612	CNGA 643			1.2							●			
CNGA 190616	CNGA 644			1.6		●								
CNGA 190712	CNGA 653	19.05	7.94	1.2	7.93									
CNGA 190716	CNGA 654			1.6		●								
CNGA 190720	CNGA 655			2.0										
CNGA 190724	CNGA 656			2.4										

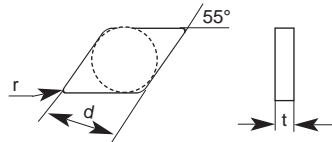


CNGX

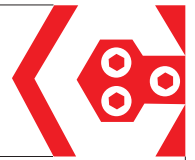


Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
CNGX 120708	CNGX 452	12.70	7.94	0.8						●		
CNGX 120712	CNGX 453			1.2						●	●	●
CNGX 120716	CNGX 454			1.6						●	●	●

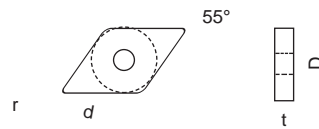
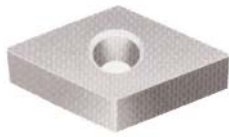
DNGN



Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
DNGN 150404	DNGN 431	12.70	4.76	0.4								
DNGN 150408	DNGN 432			0.8	●							
DNGN 150412	DNGN 433			1.2	●			●		●		
DNGN 150416	DNGN 434			1.6								
DNGN 150604	DNGN 441	12.70	6.35	0.4								
DNGN 150608	DNGN 442			0.8	●							
DNGN 150612	DNGN 443			1.2	●	●						
DNGN 150616	DNGN 444			1.6								
DNGN 150704	DNGN 451	12.70	7.94	0.4	●	●						
DNGN 150708	DNGN 452			0.8	●	●		●	●	●		●
DNGN 150712	DNGN 453			1.2	●	●		●	●	●	●	●
DNGN 150716	DNGN 454			1.6	●	●		●	●	●	●	●
DNGN 150720	DNGN 455			2.0	●							
DNGN 190608	DNGN 542	15.875	6.35	0.8								
DNGN 190608	DNGN 543			1.2								
DNGN 190608	DNGN 544			1.6								
DNGN 190708	DNGN 552	15.875	7.94	0.8								
DNGN 190712	DNGN 553			0.8								
DNGN 190716	DNGN 554			0.8								

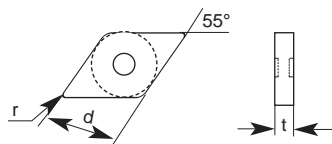


DNGA

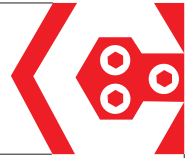


Specification		Dimension (mm)				Ceramic Stock							
ISO	ASA	d	t	r	D	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
DNGA 150404	DNGA 431	12.70	4.76	0.4	5.16	●	●						
DNGA 150408	DNGA 432			0.8		●	●			●	●		
DNGA 150412	DNGA 433			1.2		●					●		●
DNGA 150416	DNGA 434			1.6		●				●			
DNGA 150602	DNGA 4402	12.70	6.35	0.2	5.16	●							
DNGA 150604	DNGA 441			0.4		●	●	●					
DNGA 150606	DNGA 4406			0.6		●							
DNGA 150608	DNGA 442			0.8		●	●	●		●			
DNGA 150612	DNGA 443			1.2		●	●			●			
DNGA 150616	DNGA 444			1.6		●	●						
DNGA 150704	DNGA 451	12.70	7.94	0.4	5.16	●							
DNGA 150708	DNGA 452			0.8		●			●	●	●		
DNGA 150712	DNGA 453			1.2		●			●		●		
DNGA 150716	DNGA 454			1.6									
DNGA 150720	DNGA 455			2.0									
DNGA 190608	DNGA 542	15.875	6.35	0.8	5.16	●							
DNGA 190612	DNGA 543			1.2		●			●	●			●
DNGA 190616	DNGA 544			1.6		●							
DNGA 190708	DNGA 552	15.875	6.35	0.8	5.16								
DNGA 190712	DNGA 553			1.2									
DNGA 190716	DNGA 554			1.6									

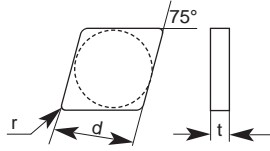
DNGX



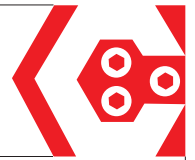
Specification		Dimension (mm)				Ceramic Stock							
ISO	ASA	d	t	r	D	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
DNGX 120708		10.00	7.94	0.8									
DNGX 120712				1.2							●	●	●
DNGX 120716				1.6							●		
DNGX 150708	DNGX 452	12.70	7.94	0.8									
DNGX 150712	DNGX 453			1.2							●	●	
DNGX 150716	DNGX 454			1.6							●	●	●



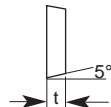
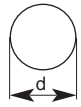
ENGN



Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
ENGN 130404	ENGN 431	12.70	4.76	0.4								
ENGN 130408	ENGN 432			0.8	●				●			
ENGN 130412	ENGN 433			1.2	●					●		
ENGN 130416	ENGN 434			1.6								
ENGN 130420	ENGN 435			2.0								
ENGN 130704	ENGN 451	12.70	7.94	0.4	●	●						
ENGN 130708	ENGN 452			0.8	●	●		●	●	●		
ENGN 130712	ENGN 453			1.2	●	●				●	●	
ENGN 130716	ENGN 454			1.6	●	●		●		●	●	
ENGN 130720	ENGN 455			2.0	●							

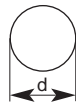


RBGN

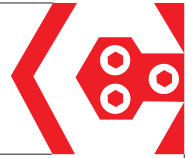


Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
RBGN 090300	RBGN 320	9.525	3.18		●							
RBGN 100700		10.00	7.94		●						●	
RBGN 120400	RBGN 430	12.70	4.76		●	●						
RBGN 120600	RBGN 440	12.70	6.35		●							
RBGN 120700	RBGN 450	12.70	7.94		●	●				●		●

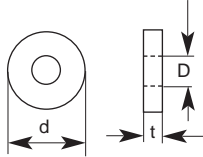
RNGN



Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
RNGN 060200	RNGN 210	6.35	2.38						●			
RNGN 060300	RNGN 220		3.18						●			
RNGN 060400	RNGN 230		3.18		●							
RNGN 080700		8.00	7.94		●							
RNGN 090300	RNGN 320	9.525	3.18		●				●	●		
RNGN 090400	RNGN 330		4.76		●	●	●		●			●
RNGN 100700		10.00	7.94		●							
RNGN 120300	RNGN 420	12.70	3.18						●			●
RNGN 120400	RNGN 430		4.76		●	●	●	●	●	●	●	●
RNGN 120600	RNGN 440		6.35						●			
RNGN 120700	RNGN 450		7.94		●	●		●	●	●		●
RNGN 12J700		12.00	7.94		●							
RNGN 150700	RNGN 550	15.875	7.94		●				●	●		
RNGN 190600	RNGN 640	19.05	6.35		●	●			●			●
RNGN 190700	RNGN 650		7.94		●	●		●		●		●
RNGN 250700	RNGN 850	25.40	7.94		●			●	●	●		
RNGN 250900	RNGN 860		9.52									

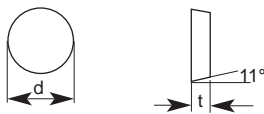


RNGA

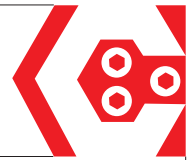


Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	D	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
RNGA 120300	RNGA 420	12.70	3.18	5.16								
RNGA 120400	RNGA 430		4.76		●							
RNGA 120600	RNGA 440		6.35									
RNGA 120700	RNGA 450		7.94		●	●						

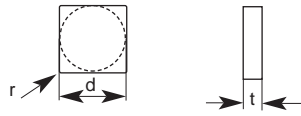
RPGN



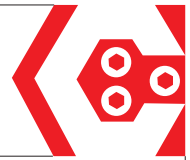
Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
RPGN 090300	RPGN 320	9.525	3.18		●							
RPGN 090400	RPGN 330		4.76		●							
RPGN 120300	RPGN 420	12.70	3.18									
RPGN 120400	RPGN 430		4.76		●				●			
RPGN 120600	RPGN 440		6.35									
RPGN 120700	RPGN 450		7.94		●							
RPGN 150700	RPGN 550	15.875	7.94									
RPGN 190700	RPGN 650	19.05	7.94									
RPGN 250900	RPGN 850	25.40	9.52									



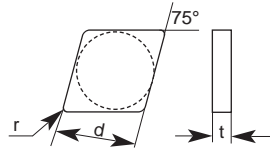
SNGN



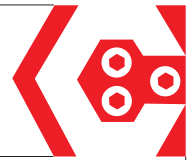
Specification		Dimension (mm)			Ceramic Stock								
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7	
SNGN 060304	SNGN 221	6.35	3.18	0.4									
SNGN 060308	SNGN 222			0.8									
SNGN 090304	SNGN 321	9.525	3.18	0.4	●								
SNGN 090308	SNGN 322			0.8	●		●		●				
SNGN 090312	SNGN 323			1.2	●								
SNGN 090404	SNGN 331	9.525	4.76	0.4									
SNGN 090408	SNGN 332			0.8	●								
SNGN 090412	SNGN 333			1.2					●				
SNGN 090416	SNGN 334			1.6									
SNGN 090420	SNGN 335			2.0	●					●			
SNGN 120304	SNGN 421	12.70	3.18	0.4									
SNGN 120308	SNGN 422			0.8	●								
SNGN 120312	SNGN 423			1.2									
SNGN 120404	SNGN 431	12.70	4.76	0.4	●				●				
SNGN 120408	SNGN 432			0.8	●		●	●	●	●	●		
SNGN 120412	SNGN 433			1.2	●	●	●	●	●	●	●	●	
SNGN 120416	SNGN 434			1.6	●	●	●	●	●	●	●	●	●
SNGN 120420	SNGN 435			2.0	●	●	●	●	●	●	●	●	●
SNGN 120424	SNGN 436			2.4	●	●	●		●	●			●
SNGN 120432	SNGN 438			3.2	●		●		●				
SNGN 120604	SNGN 441	12.70	6.35	0.4									
SNGN 120608	SNGN 442			0.8									
SNGN 120612	SNGN 443			1.2	●								
SNGN 120616	SNGN 444			1.6	●								
SNGN 120708	SNGN 452	12.70	7.94	0.8	●	●		●	●	●	●	●	
SNGN 120712	SNGN 453			1.2	●	●	●	●	●	●	●	●	●
SNGN 120716	SNGN 454			1.6	●	●	●	●	●	●	●	●	●
SNGN 120720	SNGN 455			2.0	●	●	●	●	●	●	●		
SNGN 120724	SNGN 456			2.4	●								
SNGN 120732	SNGN 458			3.2	●								
SNGN 150408	SNGN 532	15.875	4.76	0.8									
SNGN 150412	SNGN 533			1.2	●			●			●		
SNGN 150416	SNGN 534			1.6	●						●		
SNGN 150420	SNGN 535			2.0									
SNGN 150424	SNGN 536			2.4								●	●
SNGN 150708	SNGN 552	15.875	7.94	0.8	●								
SNGN 150712	SNGN 553			1.2	●	●	●	●	●	●	●		
SNGN 150716	SNGN 554			1.6	●	●	●	●	●	●	●	●	
SNGN 150720	SNGN 555			2.0	●								



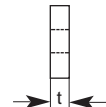
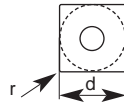
SNGN



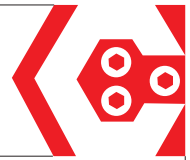
Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SNGN 190608	SNGN 642	19.05	4.76	0.8								
SNGN 190612	SNGN 643			1.2	●				●			●
SNGN 190616	SNGN 644			1.6	●					●		●
SNGN 190620	SNGN 645			2.0								
SNGN 190624	SNGN 646			2.4								
SNGN 190712	SNGN 653	19.05	7.94	1.2	●							
SNGN 190716	SNGN 654			1.6	●	●	●	●	●			●
SNGN 190720	SNGN 655			2.0	●			●	●			
SNGN 190724	SNGN 656			2.4	●					●		
SNGN 190732	SNGN 658			3.2								
SNGN 250720	SNGN 854	25.40	7.94	2.0	●				●			
SNGN 250724	SNGN 856			2.4	●	●			●	●		
SNGN 250732	SNGN 858			3.2								
SNGN 250924	SNGN 866	25.40	9.52	2.4	●			●	●	●		●
SNGN 250932	SNGN 868			3.2								
SNGN 3812R		38.10	12.70	0.4	●				●			



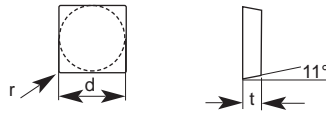
SNGN



Specification		Dimension (mm)				Ceramic Stock								
ISO	ASA	d	t	r	D	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7	
SNGA 090304	SNGA 321	9.525	3.18	0.4	3.81									
SNGA 090308	SNGA 322			0.8										
SNGA 090312	SNGA 323			1.2										
SNGA 090404	SNGA 331	9.525	4.76	0.4	3.81									
SNGA 090408	SNGA 332			0.8										
SNGA 090412	SNGA 333			1.2										
SNGA 090416	SNGA 334			1.6										
SNGA 090420	SNGA 335			2.0										
SNGA 120304	SNGA 421	12.70	3.18	0.4	5.16									
SNGA 120308	SNGA 422			0.8										
SNGA 120312	SNGA 423			1.2										
SNGA 120404	SNGA 431	12.70	4.76	0.4	5.16	●		●		●				
SNGA 120408	SNGA 432			0.8		●	●	●	●	●	●	●	●	●
SNGA 120412	SNGA 433			1.2		●	●	●	●	●	●	●	●	●
SNGA 120416	SNGA 434			1.6		●	●	●	●	●	●	●	●	●
SNGA 120420	SNGA 435			2.0										
SNGA 120424	SNGA 436			2.4										
SNGA 120432	SNGA 438			3.2										
SNGA 120604	SNGA 441	12.70	6.35	0.4	5.16									
SNGA 120608	SNGA 442			0.8										
SNGA 120612	SNGA 443			1.2										
SNGA 120616	SNGA 444			1.6										
SNGA 120708	SNGA 452	12.70	7.94	0.8	5.16	●								
SNGA 120712	SNGA 453			1.2		●	●	●	●	●	●	●	●	
SNGA 120716	SNGA 454			1.6		●	●	●	●	●	●	●	●	
SNGA 120720	SNGA 455			2.0										
SNGA 150408	SNGA 532	15.875	4.76	0.8	6.35									
SNGA 150412	SNGA 533			1.2		●								
SNGA 150416	SNGA 534			1.6										
SNGA 150420	SNGA 535			2.0										
SNGA 150424	SNGA 536			2.4		●								
SNGA 150708	SNGA 552	15.875	7.94	0.8	6.35									
SNGA 150712	SNGA 553			1.2						●	●	●	●	
SNGA 150716	SNGA 554			1.6							●	●	●	
SNGA 150720	SNGA 555			2.0									●	
SNGA 190608	SNGA 642	19.05	6.35	0.8	7.94	●				●				
SNGA 190712	SNGA 643			1.2		●	●	●	●	●	●	●	●	
SNGA 190716	SNGA 644			1.6										
SNGA 190720	SNGA 645			2.0										
SNGA 190724	SNGA 646			2.4										



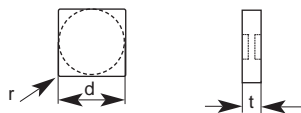
SPGN



Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SPGN 060304	SPGN 221	6.35	3.18	0.4								
SPGN 060308	SPGN 222			0.8								
SPGN 090304	SPGN 321	9.525	3.18	0.4	●				●			
SPGN 090308	SPGN 322			0.8	●	●				●		
SPGN 090312	SPGN 323			1.2	●							
SPGN 090404	SPGN 331	9.525	4.76	0.4								
SPGN 090408	SPGN 332			0.8								
SPGN 090412	SPGN 333			1.2								
SPGN 090416	SPGN 334			1.6								
SPGN 090420	SPGN 335			2.0								
SPGN 120304	SPGN 421	12.70	3.18	0.4	●							
SPGN 120308	SPGN 422			0.8	●			●	●			
SPGN 120312	SPGN 423			1.2	●			●		●		
SPGN 120404	SPGN 431	12.70	4.76	0.4								
SPGN 120408	SPGN 432			0.8	●					●		
SPGN 120412	SPGN 433			1.2	●			●		●	●	
SPGN 120416	SPGN 434			1.6	●			●			●	
SPGN 120420	SPGN 435			2.0								
SPGN 120424	SPGN 436			2.4								
SPGN 120432	SPGN 438			3.2								
SPGN 120604	SPGN 441	12.70	6.35	0.4								
SPGN 120608	SPGN 442			0.8								
SPGN 120612	SPGN 443			1.2								
SPGN 120616	SPGN 444			1.6								
SPGN 120708	SPGN 452	12.70	7.94	0.8								
SPGN 120712	SPGN 453			1.2								
SPGN 120716	SPGN 454			1.6								
SPGN 120720	SPGN 455			2.0								
SPGN 150408	SPGN 532	15.875	4.76	0.8								
SPGN 150412	SPGN 533			1.2						●		
SPGN 150416	SPGN 534			1.6								
SPGN 150420	SPGN 535			2.0								
SPGN 150424	SPGN 536			2.4								
SPGN 150708	SPGN 552	15.875	4.76	0.8								
SPGN 150712	SPGN 553			1.2								
SPGN 150716	SPGN 554			1.6								
SPGN 150720	SPGN 555			2.0								

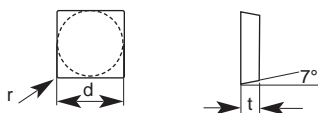


SNGX

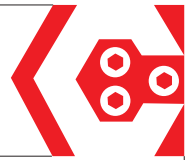


Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SNGX 120708	SNGX 452	12.70	7.94	0.8						●	●	●
SNGX 120712	SNGX 453			1.2						●	●	●
SNGX 120716	SNGX 454			1.6						●	●	●

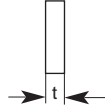
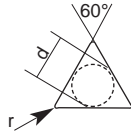
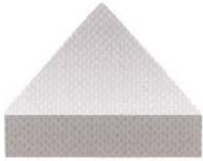
SCGN



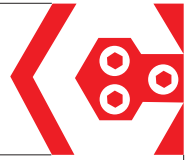
Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SCGN 120404	SCGN 431	12.70	4.76	0.4								
SCGN 120408	SCGN 432			0.8	●							
SCGN 120412	SCGN 433			1.2						●		
SCGN 120416	SCGN 434			1.6	●	●						



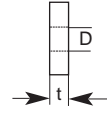
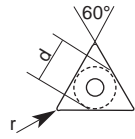
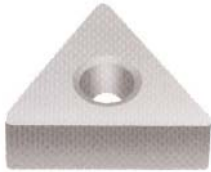
TNGN



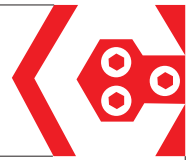
Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
TNGN 110304	TNGN 221	6.35	3.18	0.4								
TNGN 110308	TNGN 222			0.8	●	●		●	●	●		
TNGN 160304	TNGN 321	9.525	3.18	0.4	●							
TNGN 160308	TNGN 322			0.8								
TNGN 160312	TNGN 323			1.2								
TNGN 160404	TNGN 331	9.525	4.76	0.4	●		●	●				
TNGN 160408	TNGN 332			0.8	●	●	●	●	●	●		
TNGN 160412	TNGN 333			1.2	●	●		●	●	●		
TNGN 160416	TNGN 334			1.6	●	●		●		●		
TNGN 160704	TNGN 351	9.525	6.35	0.4	●							
TNGN 160708	TNGN 352			0.8	●		●				●	
TNGN 160712	TNGN 353			1.2	●				●	●	●	
TNGN 160716	TNGN 354			1.6	●							
TNGN 160720	TNGN 355			2.0								
TNGN 160724	TNGN 356			2.4								
TNGN 220404	TNGN 431	12.70	4.76	0.4	●							
TNGN 220408	TNGN 432			0.8	●					●		●
TNGN 220412	TNGN 433			1.2	●					●		
TNGN 220416	TNGN 434			1.6								
TNGN 220420	TNGN 435			2.0								
TNGN 220432	TNGN 438			3.2						●	●	
TNGN 220608	TNGN 442	12.70	6.35	0.8								
TNGN 220612	TNGN 443			1.2								
TNGN 220616	TNGN 444			1.6								
TNGN 220708	TNGN 452	12.70	7.94	0.8								
TNGN 220712	TNGN 453			1.2								
TNGN 220716	TNGN 454			1.6								
TNGN 270608	TNGN 542	15.875	6.35	0.8								
TNGN 270612	TNGN 543			1.2								
TNGN 270616	TNGN 544			1.6								
TNGN 440924	TNGN 866	25.40	9.52	2.4								
TNGN 440932	TNGN 868			3.2								
TNGN 440948	TNGN 8612			4.8								



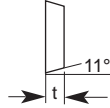
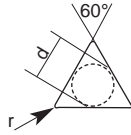
TNGA



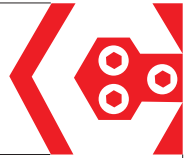
Specification		Dimension (mm)				Ceramic Stock							
ISO	ASA	d	t	r	D	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
TNGA 090304	TNGA 221	6.35	3.18	0.4	2.26								
TNGA 090308	TNGA 222			0.8									
TNGA 160304	TNGA 321	9.525	3.18	0.4	3.81	●							
TNGA 160308	TNGA 322			0.8		●	●						
TNGA 160312	TNGA 323			1.2		●							
TNGA 160404	TNGA 331	9.525	4.76	0.4	3.81	●	●	●		●	●	●	●
TNGA 160408	TNGA 332			0.8		●	●	●	●	●	●	●	●
TNGA 160412	TNGA 333			1.2		●	●	●	●	●	●	●	●
TNGA 160416	TNGA 334			1.6		●	●	●	●	●	●	●	●
TNGA 160704	TNGA 351	9.525	7.94	0.4	3.81								
TNGA 160708	TNGA 352			0.8									
TNGA 160712	TNGA 353			1.2									
TNGA 160716	TNGA 354			1.6									
TNGA 160720	TNGA 355			2.0									
TNGA 160724	TNGA 356			2.4									
TNGA 220404	TNGA 431	12.70	4.76	0.4	5.16	●				●			
TNGA 220408	TNGA 432			0.8		●	●						
TNGA 220412	TNGA 433			1.2		●							
TNGA 220416	TNGA 434			1.6		●	●	●	●				
TNGA 220420	TNGA 435			2.0									
TNGA 220432	TNGA 438			3.2									
TNGA 220404	TNGA 442	12.70	6.35	0.8	5.16								
TNGA 220408	TNGA 443			1.2									
TNGA 220408	TNGA 444			1.6									



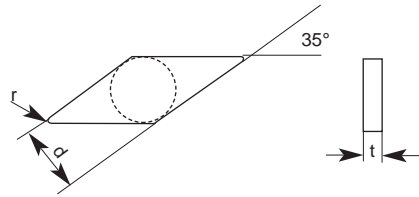
TPGN



Specification		Dimension (mm)			Ceramic Stock								
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7	
TPGN 110304	TPGN 221	6.35	3.18	0.4	●	●	●		●				
TPGN 110308	TPGN 222			0.8	●	●	●		●	●			
TPGN 160304	TPGN 321	9.525	3.18	0.4	●	●	●	●	●				
TPGN 160308	TPGN 322			0.8	●	●	●	●	●	●	●		
TPGN 160312	TPGN 323			1.2	●	●							
TPGN 160404	TPGN 331	9.525	4.76	0.4	●								
TPGN 160408	TPGN 332			0.8	●								
TPGN 160412	TPGN 333			1.2	●								
TPGN 160416	TPGN 334			1.6	●								
TPGN 160704	TPGN 351	9.525	7.94	0.4									
TPGN 160708	TPGN 352			0.8									
TPGN 160712	TPGN 353			1.2									
TPGN 160716	TPGN 354			1.6									
TPGN 160720	TPGN 355			2.0									
TPGN 160724	TPGN 356			2.4									
TPGN 220404	TPGN 431	12.70	4.76	0.4	●								
TPGN 220408	TPGN 432			0.8	●	●				●			
TPGN 220412	TPGN 433			1.2	●	●					●		
TPGN 220416	TPGN 434			1.6	●								
TPGN 220420	TPGN 435			2.0									
TPGN 220432	TPGN 438			3.2									
TPGN 220608	TPGN 442	12.70	6.35	0.8									
TPGN 220612	TPGN 443			1.2									
TPGN 220616	TPGN 444			1.6									
TPGN 220708	TPGN 452	12.70	7.94	0.8									
TPGN 220712	TPGN 453			1.2									
TPGN 220716	TPGN 454			1.6									
TPGN 270608	TPGN 542	15.875	6.35	0.8									
TPGN 270612	TPGN 543			1.2									
TPGN 270616	TPGN 544			1.6	●								

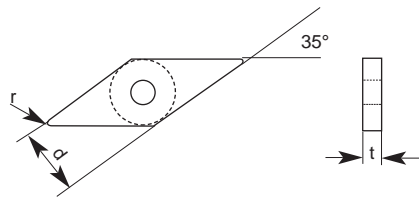


VNGN



Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
VNGN 160404	VNGN 331	9.525	4.76	0.4	●							
VNGN 160408	VNGN 332			0.8	●							
VNGN 160412	VNGN 333			1.2								
VNGN 220404	VNGN 431	9.525	4.76	0.4								
VNGN 220408	VNGN 432			0.8	●							
VNGN 220412	VNGN 433			1.2								

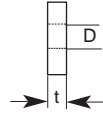
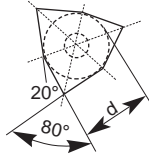
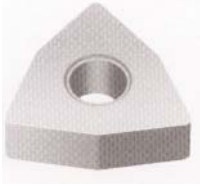
VNGA



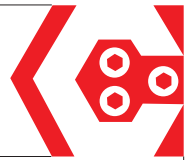
Specification		Dimension (mm)				Ceramic Stock							
ISO	ASA	d	t	r	D	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
VNGA 160404	VNGA 331	9.525	4.76	0.4	3.81	●	●			●			
VNGA 160408	VNGA 332			0.8		●	●			●	●		
VNGA 160412	VNGA 333			1.2		●						●	
VNGA 220404	VNGA 431	12.70	4.76	0.4	5.16								
VNGA 220408	VNGA 432			0.8		●	●						
VNGA 220412	VNGA 433			1.2		●							



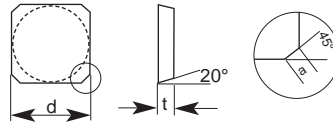
WNGA



Specification		Dimension (mm)				Ceramic Stock							
ISO	ASA	d	t	r	D	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
WNGA 080404	WNGA 431	12.70	4.76	0.4	5.16	●	●						
WNGA 080408	WNGA 432			0.8		●	●			●	●		●
WNGA 080412	WNGA 433			1.2		●				●	●	●	

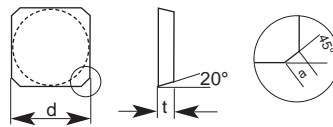


SEAN



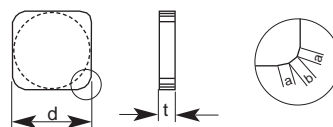
Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	a	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SEAN 1203 AFTN	SEAN 42 AFTN	12.70	3.18	2.0					●	●		

SEKN



Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	a	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SEKN 1203 AFTN	SEKN 42 AFTN	12.70	3.18	2.0					●	●		
SEKN 1504 AFTN	SEKN 53 AFTN	15.875	4.76	2.0					●	●		●

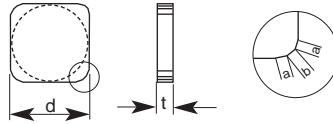
SNCN



Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	a	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SNCN 1204 ENTN	SNCN 43 ENTN	12.70	4.76	1.0					●	●		

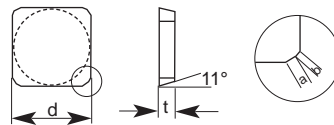


SNKN



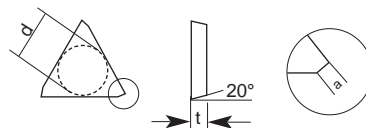
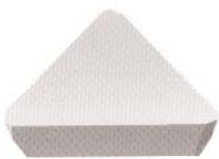
Specification		Dimension (mm)				Ceramic Stock							
ISO	ASA	d	t	a	b	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SNKN 1204 ENTN	SNKN 43 ENTN	12.70	4.76	1.4	1.0					•	•		
SNKN 1504 ENTN	SNKN 53 ENTN	15.875	4.76	1.4	1.0					•	•		

SPKN

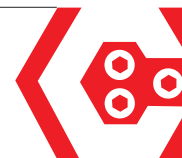


Specification		Dimension (mm)				Ceramic Stock							
ISO	ASA	d	t	a	b	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SPKN 1204 ENTN	SPKN 43 ENTN	12.70	3.18	1.4	1.0					•	•		•
SPKN 1504 ENTN	SPKN 53 ENTN	15.875	4.76	1.4	1.0					•	•		•

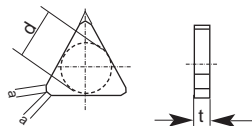
TEKN



Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	a	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
TEKN 1603 PDTR	TEKN 32 PDTR	9.525	3.18	1.75					•	•		
TEKN 2204 PDTR	TEKN 43 PDTR	12.70	4.76	1.75					•	•		

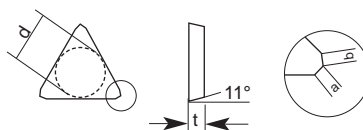


TNCN

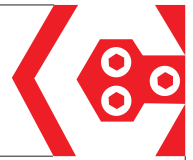


Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	a	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
TNCN 1204 ANT	TNCN 43 ANT	12.70	4.76	2.6					●	●		

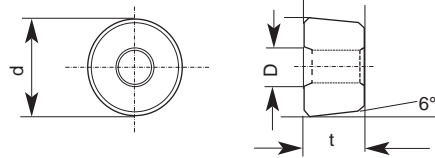
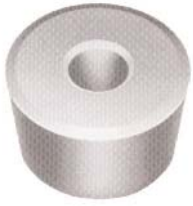
TPKN



Specification		Dimension (mm)				Ceramic Stock							
ISO	ASA	d	t	a	b	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
TPKN 1603 PDTR	TPKN 32 PDTR	9.525	3.18	0.7	1.3					●	●		
TPKN 2204 PDTR	TPKN 43 PDTR	12.70	4.76	0.7	1.3					●	●		

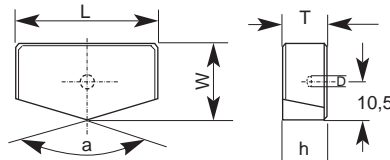


CDH

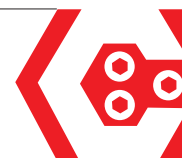


Specification		Dimension (mm)			Ceramic Stock							
ISO	ASA	d	t	D	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
CDH 120600	CDH 22	12.70	6.35	3.18	●	●						
CDH 120900	CDH 23	12.70	9.525	3.18	●							
CDH 191200	CDH 32	19.05	12.70	6.35	●							
CDH 191900	CDH 33	19.05	9.525	6.35	●							
CDH 251200	CDH 42	25.40	12.70	6.75	●	●						
CDH 251900	CDH 43	25.40	19.05	6.75	●							
CDH 320900	CDH 515	31.75	9.525	9.92	●			●	●			
CDH 321900	CDH 53	31.75	19.05	9.92	●	●		●	●	●		

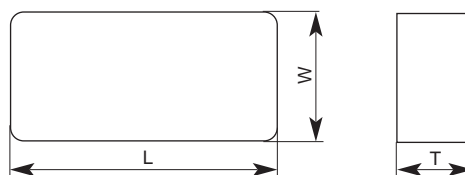
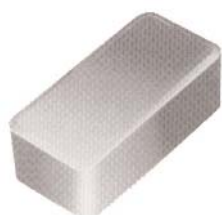
F - Series



Specification		Dimension (mm)					Ceramic Stock							
ISO	L	W	T	D	h	a	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
F 13941	32.0	19.05	12.0	6.5	6.0	120°	●			●	●			
F 10537	44.5	25.4	14.2	6.5	7.0	140°	●			●	●	●		

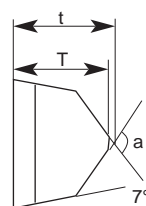
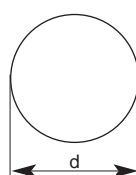


LNJ

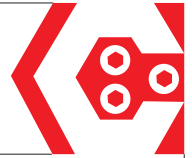


Specification	Dimension (mm)				Ceramic Stock							
	L	W	T	r	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
LNJ 5464	25.40	15.88	9.52	1.6	●				●			
LNJ 5568	31.75	15.88	9.52	3.2					●			
LNJ 6588	31.75	19.05	12.70	3.2	●	●		●	●	●		
LNJ 6688	38.10	19.05	12.70	3.2	●	●		●	●	●		

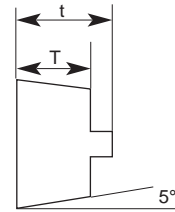
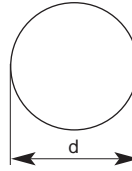
RCGX



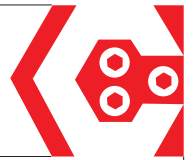
Specification	Dimension (mm)				Ceramic Stock							
	d	t	T	a	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
RCGX 060400	6.35	4.76	4.57	120°	●							
RCGX 060600		6.35	6.20			●						
RCGX 060700		7.94	7.70		●				●			
RCGX 090700	9.52	7.94	7.70	120°	●	●			●			
RCGX 120700	12.70	7.94	7.70	120°	●	●			●			
RCGX 151000	15.88	10.0	9.77	120°	●	●			●			
RCGX 191000	19.05	10.0	9.77	120°	●	●						
RCGX 251200	25.4	12.0	11.85	140°	●	●						



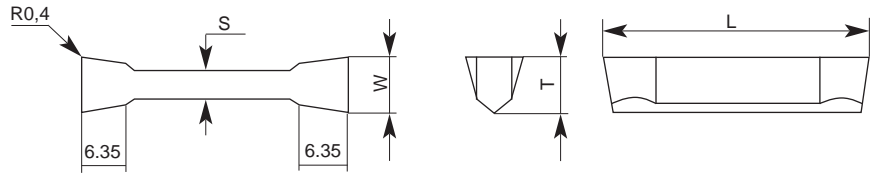
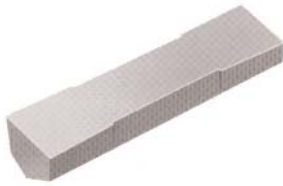
RBGX



Specification	Dimension (mm)				Ceramic Stock							
	d	D	t	T	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
RBGX 06T	6.0	3.0	5.0	3.0	●							
RBGX 12T	12.0	6.0	9.0	6.0	●							
RBGX 16T	16.0	8.0	13.0	8.0	●							
RBGX 20T	20.0	10.0	15.0	10.0	●	●						
RBGX 26T	26.0	14.0	15.0	1.0	●	●						

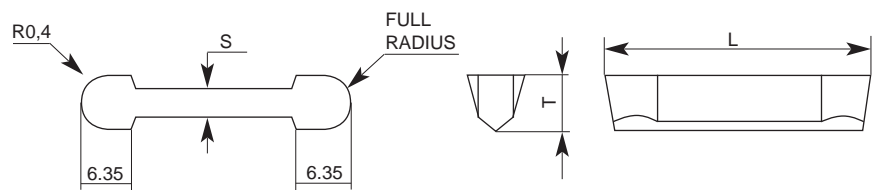


SYBF

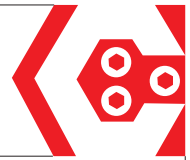


Specification	Dimension (mm)				Ceramic Stock							
	L	W	T	S	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SYBF 3228	28.58	3.175	6.350	2.692	●							
SYBF 4028		3.962	6.350	2.692	●							
SYBF 4828		4.775	6.350	3.657	●							
SYBF 5528		5.537	6.350	3.657	●							
SYBF 6428		6.350	8.559	5.130	●							
SYBF 7128		7.137	8.559	5.130	●							
SYBF 7928		7.924	8.559	5.130	●							
SYBF 8728		8.737	8.559	6.985	●							
SYBF 9528		9.525	8.559	6.985	●							

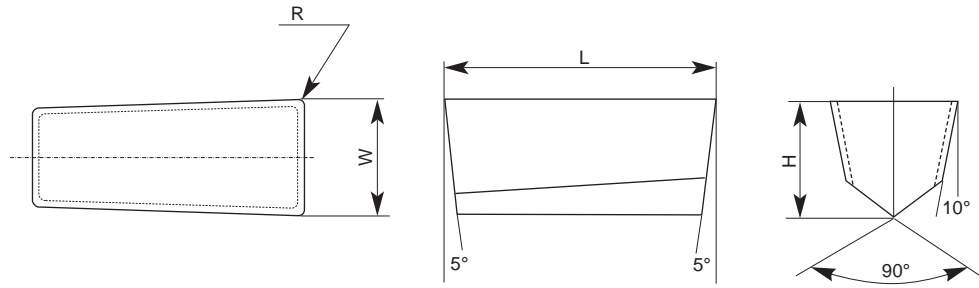
SYBR



Specification	Dimension (mm)				Ceramic Stock							
	L	W	T	S	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SYBR 3228	28.58	3.175	6.350	2.692	●							
SYBR 4028		3.962	6.350	2.692	●							
SYBR 4828		4.775	6.350	3.657	●							
SYBR 5528		5.537	6.350	3.657	●							
SYBR 6428		6.350	8.559	5.130	●							
SYBR 7128		7.137	8.559	5.130	●							
SYBR 7928		7.924	8.559	5.130	●							
SYBR 8728		8.737	8.559	6.985	●							
SYBR 9528		9.525	8.559	6.985	●							

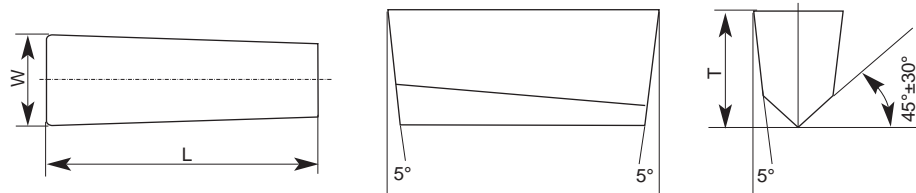


SGF

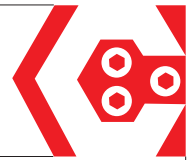


Specification	Dimension (mm)				Ceramic Stock							
	L	W	H	R	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SGF 0525	25.4	5.0	7.5	0.8	●							
SGF 0625	25.4	6.0	7.5	0.8	●							
SGF 6325	25.4	6.35	7.5	0.8	●							
SGF 1425	25.4	14.0	7.5	0.8	●				●			
SGF 0515	15.0	5.0	7.5	0.8								
SGF 6315	15.0	6.35	7.5	0.8	●							

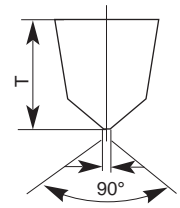
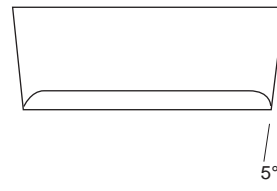
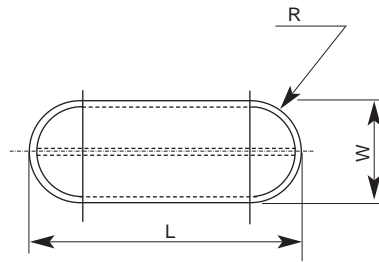
SGR



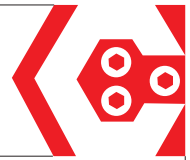
Specification	Dimension (mm)			Ceramic Stock							
	L	W	T	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SGR 4712	12.70	4.762	4.749	●							
SGR 5519	19.05	5.557	6.35	●							
SGR 6319		6.350		●							
SGR 7119		7.142		●							
SGR 7925	25.40	7.937	8.559	●							
SGR 8725		8.732		●							
SGR 9525		9.525		●							
SGR 6325		6.350		7.96	●						
SGR 0625		6.00		●							
SGR 0525		5.00		●							



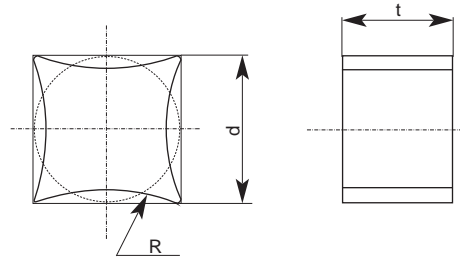
SSR



Specification	Dimension (mm)				Ceramic Stock							
	L	W	T	R	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SSR 4713	13.462	4.762	4.724	2.387	●							
SSR 3515	15.875	3.571	4.749	1.778	●							
SSR 6319	19.05	6.350	4.775	3.175	●							
SSR 9519	19.05	9.525	6.350	4.749	●							
SSR 1225	25.40	12.70	7.772	6.35	●							

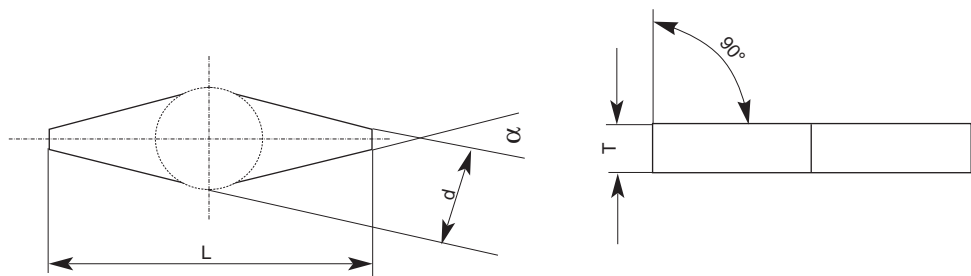


SNMX



Specification	Dimension (mm)			Ceramic Stock							
	d	t	R	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
SNMX 121006R	12.70	10.0	6				●				
SNMX 121009R			9				●				
SNMX 121012R			12				●				
SNMX 121015R			15				●				
SNMX 121020R			20				●				
SNMX 121025R			25				●				
SNMX 121030R			30				●				
SNMX 121040R			40				●				
SNMX 121050R			50				●				

GVGN



Specification	Dimension (mm)				Ceramic Stock							
	L	α	d	T	CK1	CK8	CKD2	CKZ2	CKS2	CKS3	CKS5	CKS7
GVGN 38320	32	38°	14.238	7.94				●				
GVGN 38335	33.5	38°	13.28									
GVGN 36340	34	36°	13.59									



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