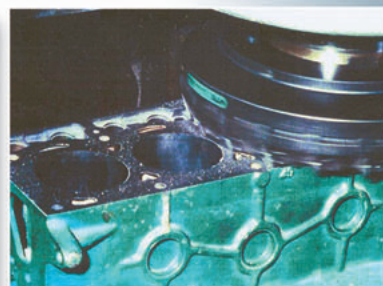
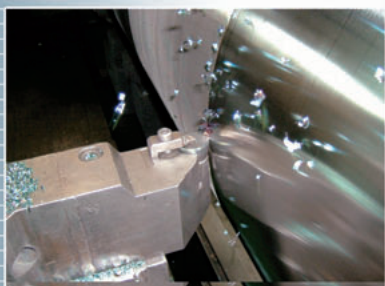


2007-2008



<http://www.ngkntk.de/>
<http://www.ntkcuttingtools.co.uk/>
<http://www.ngkntk.co.jp/>

NTK CUTTING --- TOOLS



NGK | **NTK**
SPARK PLUGS | TECHNICAL CERAMICS

NGK SPARK PLUG EUROPE GMBH
NGK SPARK PLUGS(U.K.), LTD

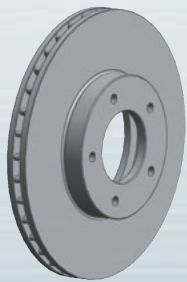
2007
2008



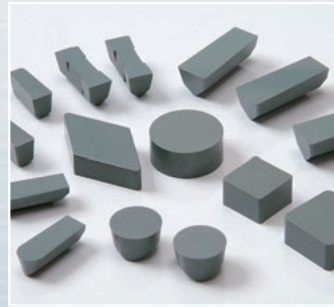
NTK
CUTTING TOOLS

NTK TECHNOLOGY

Disc Brake



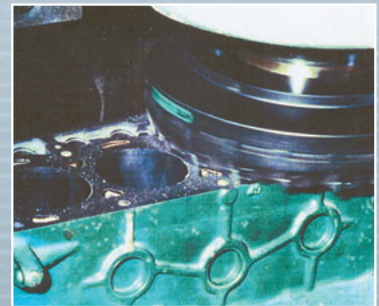
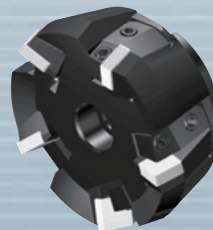
Aerospace



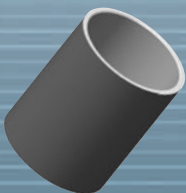
Roll



Milling



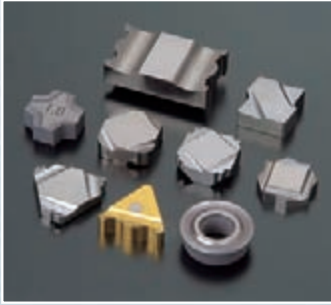
Cylinder Liner



Hardened Steel



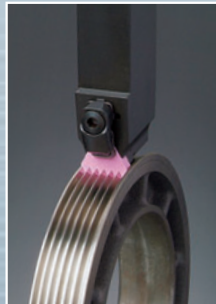
Bearing



Grooving



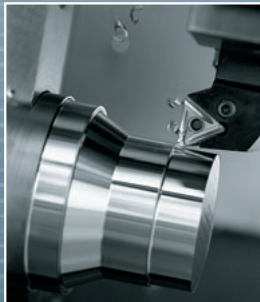
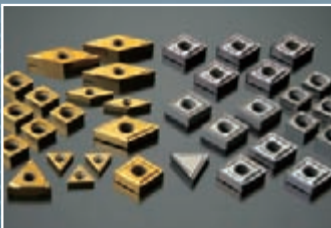
Poly-V



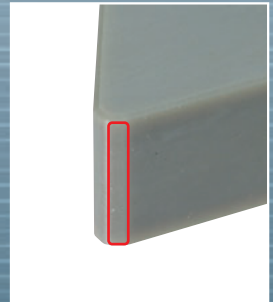
Diamond Coating



Steel Turning



Wiper Insert



Guide to This Catalogue

This catalogue lists products as of March 2007.

Inventory status symbols:

- : Service stock for left- and right- handed products and neutral products.
- R : Service stock for right-handed product and left-handed product with L mark.
- : Special service stock. (Please contact us for stock.)
- ▲ : Custom made product.
- : Product to be custom made in the future.

Safety Notice

We make a particular effort to manufacture safe products. However, NTK cutting tools may be broken due to a sudden increase of the cutting load or excessive tool wear, which could possibly cause injuries to operators. To protect the operators from such accidents, please note the following when operating a cutting tool:



WARNING

- ◎ Install shielding plates or wear protective clothes and glasses.
- ◎ Do not touch the cutting edge with bare hand because it is sharp.
- ◎ Use genuine NTK parts for parts and drivers, etc.
- ◎ Check sharpness and replace the tool early if necessary.
- ◎ Check the sharpness of tools and exchange them at an early stage.

We do not recommend you to grind cutting tools because grinding may cause cracks and improper finishing, possibly resulting in breakage of the tool.



NTK CUTTING TOOLS



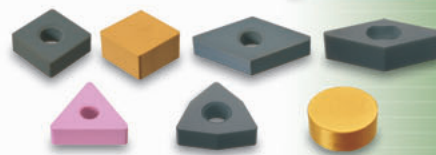
Page
Insert 6



**Milling
Cutter** 47



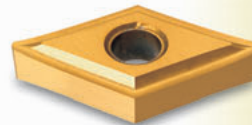
**Tool
Holder** 53



**NTK
Insert Code** 92



Cermet 95



PVD Coated 111



Grooving 119



Threading 143

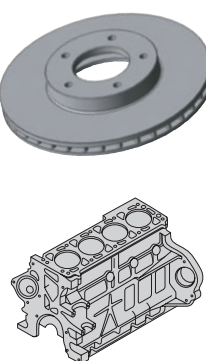


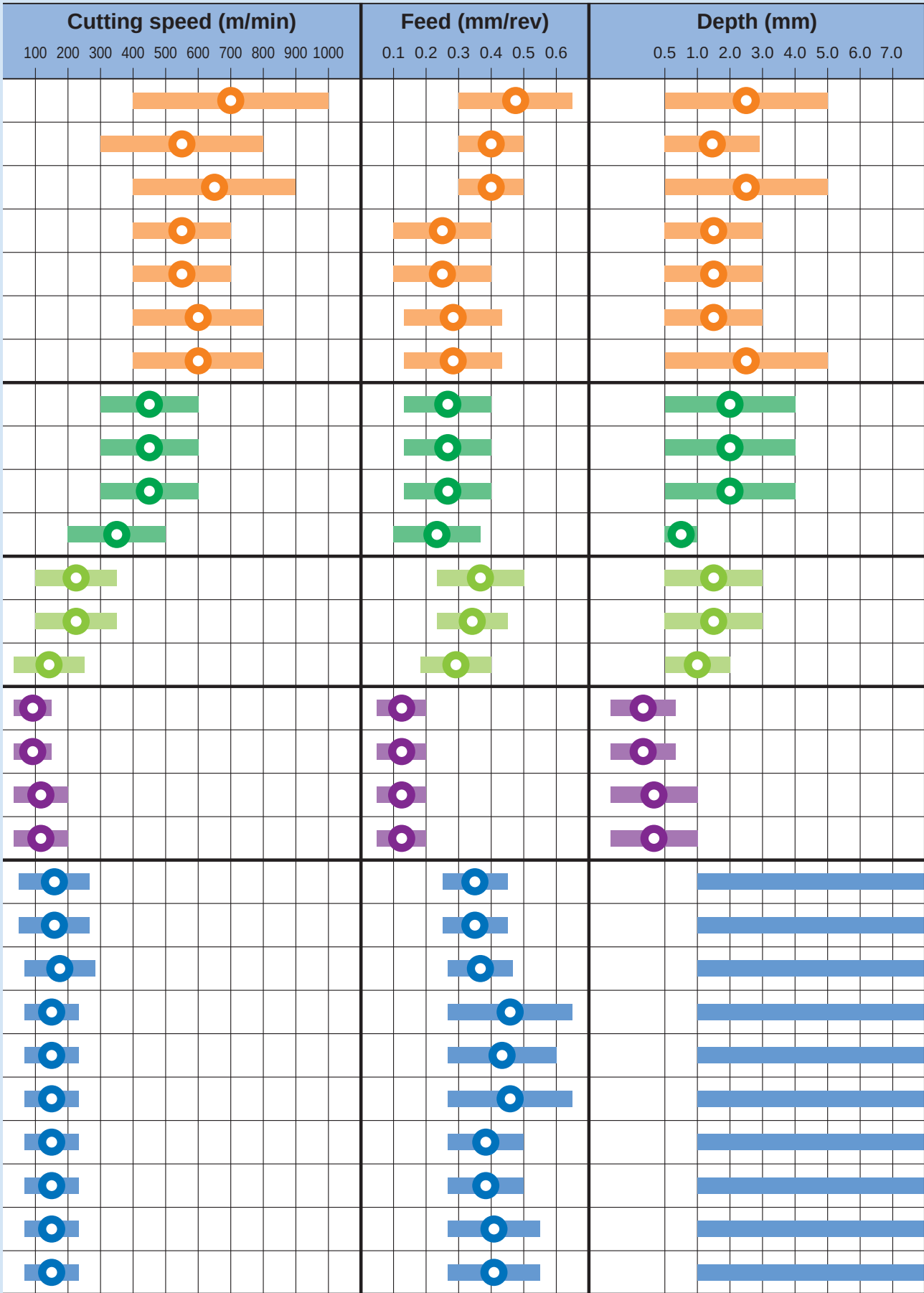
**Original
Tool** 149

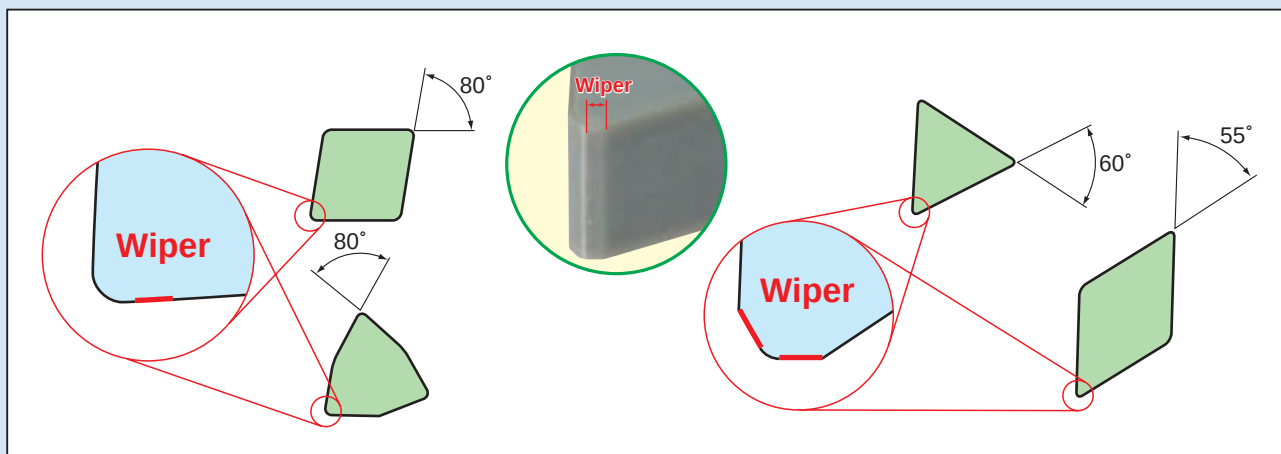
**Technical
Information** 211

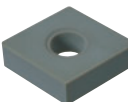
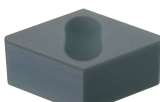
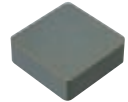
**Product
Index** 233

How to select Ceramic and CBN Recommended cutting condition

Work		Grade	Rough	Semi-Finish	Finish				Dry	Wet
Cast iron 	Ceramic	SX1	●				●	○	●	○
		SP2		●			●		●	○
		SX9	●					●	●	
		HW2 / HC1			●	●			●	
		HC2		○	●	●			●	○
	CBN	B20	●					●		●
		B16	●					●		●
Ductile Cast iron 	Ceramic	SP2	●				●			●
		SX9	●				●			●
		SX8	●					●		●
		HC6			●	●				●
Heat resistant Alloy 	Ceramic	SX9	●	○				●	○	●
		WA1	●	○				●	○	●
		HC7			●	●			○	●
Hardened steel 	Ceramic	ZC7			●	●				●
		ZC4			●	●				●
	CBN	B24	●		●		●			●
		B36	●		●			●	●	○
Mill Rolls 	HSS	Ceramic	WA1	●	●	●		●	●	○
			HC2 / HC7	○	○	○	●		●	○
	Cast iron	CBN	B22	○	○	○		●	●	○
		Ceramic	WA1	○	○	○		●	●	○
			HC2 / HC7	●	●	●	●		●	○
		CBN	B22	○	○	○		●	●	○
	Ductile	Ceramic	WA1	○	○	○		●	●	○
			HC2 / HC7	●	●	●	●		●	○
		CBN	SP2	○	○	○		●	●	○
			B22	○	○	○		●		○

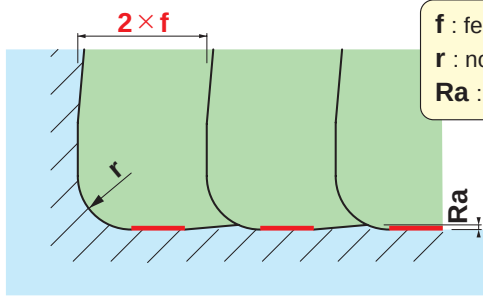




Shape	Item-No. IC T R	Wiper (mm)	IC	SX1	ZC7	Holder
	CNGA 120404 WL 120408 WL 120412 WL 120416 WL	0.35 0.65 0.85 1.05	12.7	▲ ▲ ▲ ▲	▲ ▲ ▲ ▲	CCLN ^{R/L} CCBN ^{R/L} MCLN ^{R/L}
	CNGX 120708 WL TN DP5 120712 WL TN DP5 120716 WL TN DP5 120720 WL TN DP5	0.35 0.65 0.85 1.05		▲ ▲ ▲ ▲	— — — —	
	DNGA 150408 WJ 150412 WJ 150616 WJ	0.4 0.55 0.75		▲ ▲ ▲	△ △ △	CDJN ^{R/L} MDJN ^{R/L}
	DNGX 120708 WJ TN DP5 120712 WJ TN DP5 120716 WJ TN DP5 150708 WJ TN DP5 150712 WJ TN DP5 150716 WJ TN DP5	0.4 0.55 0.75 0.4 0.55 0.75		▲ ▲ ▲ ▲ ▲ ▲	— — — — — —	
	SNGN 120408 WH 120412 WH 120416 WH	0.65 0.85 1.05		▲ ▲ ▲	▲ ▲ ▲	CSHN ^{R/L}
	SNGX 120708 WH TN DP5 120712 WH TN DP5 120716 WH TN DP5	0.65 0.85 1.05		▲ ▲ ▲	— — —	
	TNGA 160408 WG 160412 WG 160416 WG	0.4 0.55 0.75	9.525	▲ ▲ ▲	▲ ▲ ▲	CTGN ^{R/L} MTGN ^{R/L}
	TNGN 160408 WG 160412 WG 160416 WG	0.4 0.55 0.75		▲ ▲ ▲	▲ ▲ ▲	
	WNGA 080408 WL 080412 WL 080416 WL	0.65 0.85 1.05		▲ ▲ ▲	▲ ▲ ▲	MWLN ^{R/L}
	WNGX 080408 WL TNF DP5 080412 WL TNF DP5 080416 WL TNF DP5	0.65 0.85 1.05	12.7	▲ ▲ ▲	— — —	MWLN ^{R/L}

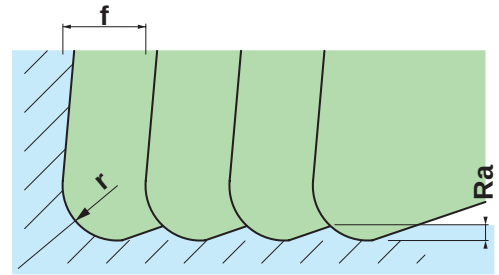
What is Wiper ?

Wiper inserts



f : feed rate
 r : nose-R
 Ra : surface roughness

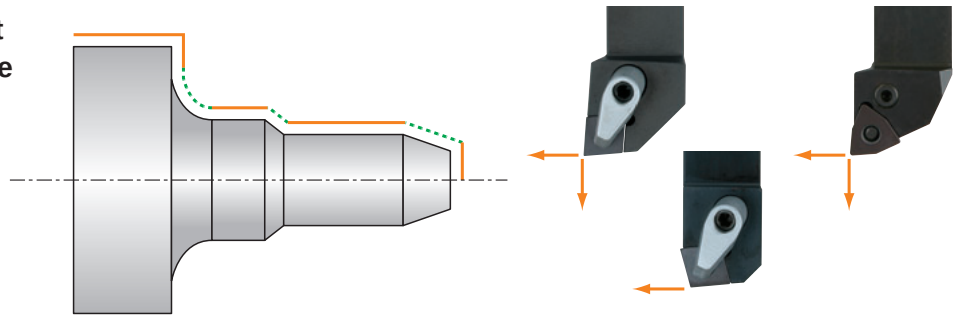
Normal radius inserts



Wiper inserts will bring high quality of surface with high feed rate.

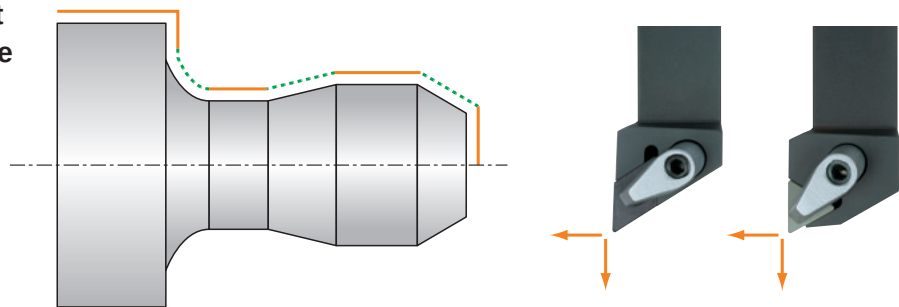
CNG / WNG inserts

— Wiper effect
- - - Normal nose radius



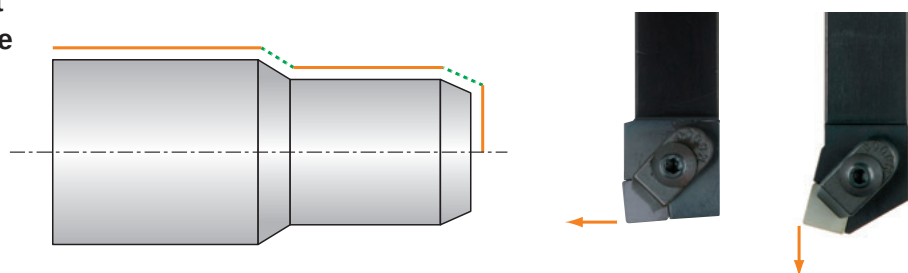
DNG / TNG inserts

— Wiper effect
- - - Normal nose radius



SNG inserts

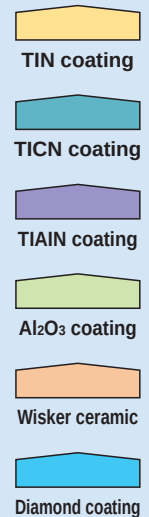
— Wiper effect
- - - Normal nose radius



Turning-Use Insert Grade Selection Guide

Recommended Types of Grade and Application Areas

	ISO	Ceramic / CBN	Cermet Coated Cermet	Coated carbide		
P Carbon steel Alloy steel	01					
	10		T3N	Q15	TA1	TAS
	20		T15	C7Z		
	30		N20	C7X	QM3	TA3
	40		N40			
M Stainless Steel Cast steel	01					
	10		Q15		TAS	
	20					QM3
	30			ZM3		
	40					
K Gray Cast Iron Ductile Cast iron	01	HC1, HW2				
	10	WA1				
	20	HC7				
	30	SP2				
N Aluminum Non-Ferrous						
					UC1	UC2
S Inconel Hasteloy Waspaloy Rene						
		QM1				
H Hardened Material Roll Turning						
		ZC4 ZC7				
		HC4 HC7				
		B24 / B26				
		B36				



NOTK

High Speed Cutting for Cast Iron

SX1

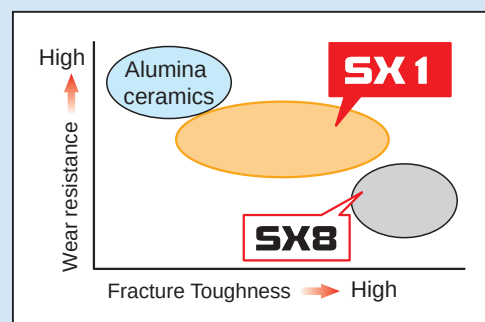
Feature

- Outstanding wear resistance by reducing binder.
- Improved fracture toughness
- Available high-speed cutting (**up to 1000 m/min**)



Recommended Cutting Conditions

Material	Work piece	Applications	Cutting speed (m/min)	Feed (mm/rev)	Coolant
SX1	Cast Iron	Turning	~1,000	~0.7	DRY (WET)
		Milling	~800	~0.3	

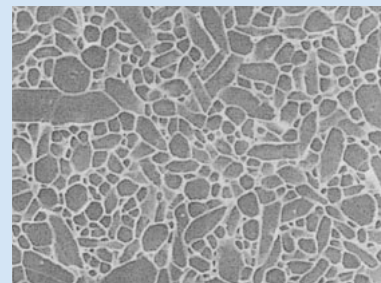


Data

Physical Characteristics

Material	Density (g/m³)	Hardness (HRA)	Bending strength (M Pa)	Young's modulus (GPa)	Thermal expansion coefficient (X10⁻⁶/K)
SX1	3.2	93.5	1,200	320	3.0
SX8	3.2	93	1,200	320	3.0

Micro structure of **SX1**

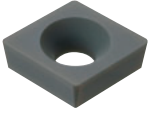
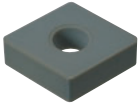
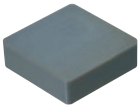
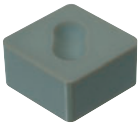
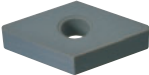
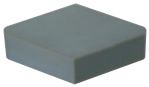
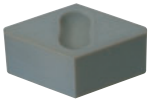
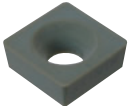


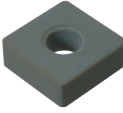
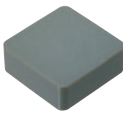
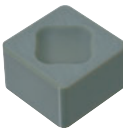
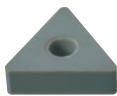
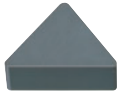
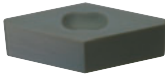
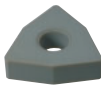
Case Study

Disc brake		250 (Gray Cast Iron)
Insert: SNGN 120420 TNF (T02025)		
Cutting speed (m/min)	800	
Feed (mm/rev)	0.65	
Depth of cut (mm)	2	
Coolant	WET	
SX1	150 pcs	
Competitor's Ceramic	100 pcs	

Disc rotor		250 (Gray Cast Iron)
Insert: CNGA 120412 TNF (T02025)		
Cutting speed (m/min)	188~374	
Feed (mm/rev)	0.3	
Depth of cut (mm)	2.5	
Coolant	Dry	
SX1	200 pcs	
Competitor's CBN	120 pcs	

SX1

Shape	Item-No. IC T R	SX 1
	CCGW 120404 TNCE 120408 TNCE 120412 TNCE 120416 TNCE	● ● ● ●
	CNGA 120408 TNF 120412 TNF 120416 TNF 120716 TN 160608 SNF 160612 TN 160616 TN 190616 TN	● ● ● ● ● ● ● ●
	CNGN 120408 TNF 120412 TNF 120416 TNF 120708 TNF 120712 TNF 120716 TNF	● ● ● ● ● ●
	CNGX 120708 TN DP5 120712 TN DP5 120716 TN DP5 120720 TN DP5 160708 TN DP5 160712 TN DP5 160716 TN DP5 160720 TN DP5 160732 TN DP5	● ● ● ● ● ● ● ● ●
	DNGA 150408 TNF 150412 TNF 150416 TNF 150608 SNF 150612 SNF	● ● ● ● ●
	DNGN 150408 TNF 150412 TNF	● ●
	DNGX 120708 TN DP5 120712 TN DP5 120716 TN DP5 120720 TN DP5 150708 TN DP5 150712 TN DP5 150716 TN DP5 150720 TN DP5	● ● ● ● ● ● ● ●
	RNGN 120400 TN 120700 TN	● ●
	SCGW 120404 TNCE 120408 TNCE 120412 TNCE 120416 TNCE	● ● ● ●

Shape	Item-No. IC T R	SX 1
	SNGA 120408 TNF 120412 TNF 120416 TNF 120420 TN	● ● ● ●
	SNGN 120408 TNF 120412 TNF 120416 TNF 120420 TNF 120424 TNF 120708 TNF 120712 TNF 120716 TNF 120720 TNF	● ● ● ● ● ● ● ● ●
	SNGX 120708 TN DP5 120712 TN DP5 120716 TN DP5 120720 TN DP5 150708 TN DP5 150712 TN DP5 150716 TN DP5 150720 TN DP5	● ● ● ● ● ● ● ●
	TNGA 160408 TNF 160412 TNF 160416 TNF 160420 TNF	● ● ● ●
	TNGN 160408 TNF 160412 TNF 160416 TNF 160420 TNF	● ● ● ●
	VNGX 160704 TN DP5 160708 TN DP5 160712 TN DP5 160716 TN DP5	● ● ● ●
	WNGA 080408 TNF 080412 TNF 080416 TNF	● ● ●

Edge-Preparation

Description	ISO	T
TN	T01025	04
	T02025	06 , 07
TNCE	T01020	—
TNF	T02025	—
SNF	S02025	—

Improved Flank Wear Resistance

SP2

Feature

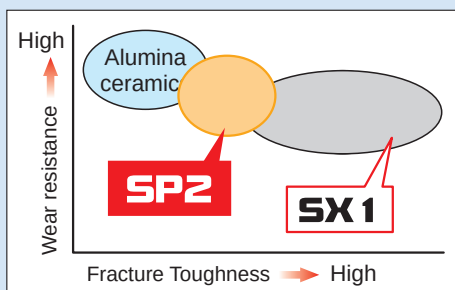
- Greatly improved flank wear resistance
- Excellent heat resistance
- High-speed rough turning of gray cast iron



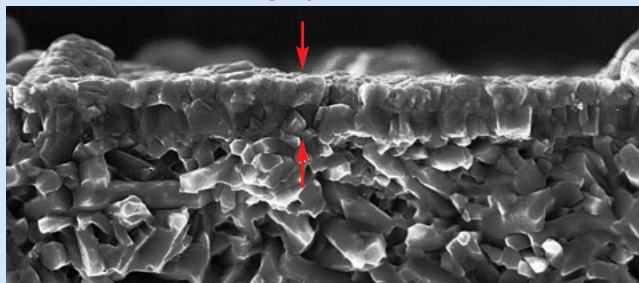
Recommended Cutting Conditions

Material	Work piece	Applications	Cutting speed (m/min)	Feed (mm/rev)	Coolant
SP2	Gray Cast Iron	Turning	~1000	~0.5	DRY (WET)

Data

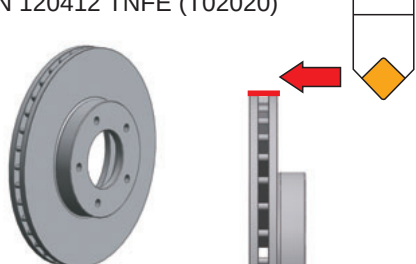


Coating layer of SP2

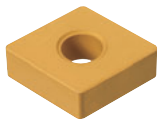


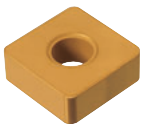
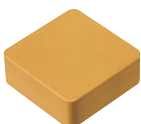
Case Study

Brake drum	250 (Gray Cast Iron)
Insert: SNGN 120420 TNF (T02025)	
	
Cutting speed (m/min)	200
Feed (mm/rev)	0.4
Depth of cut (mm)	2
Coolant	WET
SP2	200 pcs
Cermet	100 pcs

Disc brake	250 (Gray Cast Iron)
Insert: SNGN 120412 TNFE (T02020)	
	
Cutting speed (m/min)	600
Feed (mm/rev)	0.32
Depth of cut (mm)	3.0
Coolant	Dry
SP2	75 pcs
Competitor's CBN	30 pcs

SP2

Shape	Item-No. IC, T, R	SP2
	CNGA 120408 TNF	●
	120412 TNF	●
	120712 TN	
	120716 TN	●
	CNGN 120408 TNF	
	120412 TNF	
	120416 TNF	●
	120704 TN	●
	120708 TN	●
	120712 TN	●
	160708 TN	●
	160712 TN	●
	DNGA 150608 TN	●
	150612 TN	●
	150416 TNF	
	RNGN 090400 TNF	●
	120400 TN	●
	120400 TNF	●
	250700 PN	●

Shape	Item-No. IC, T, R	SP2
	SNGA 120412 TNF	●
	120412 TNFE	●
	SNGN 120412 TNF	●
	120416 TNF	●
	120708 TN	●
	120712 TN	●
	120716 TN	●
	150716 TN	●
	TNGA 160404 TN	●
	160404 TNF	
	160408 TNF	●
	160412 TNF	●
	TNGN 160408 TNF	●
	160412 TNF	
	160416 TNF	●
	WNGA 080408 TNF	●
	080412 TNF	●

Edge-Preparation

Description	ISO	T
TN	T01025	04
	T02025	06, 07
TNCE	T01020	—
TNF	T02025	—
TNFE	T02020	—
PN	Double T-land with R-horn	—

Specialist for Milling and Interrupted Cutting of Cast Iron

SX8

Feature

- Good performance in rough milling with coolant
- Good heat-resistance in interrupted cutting with coolant



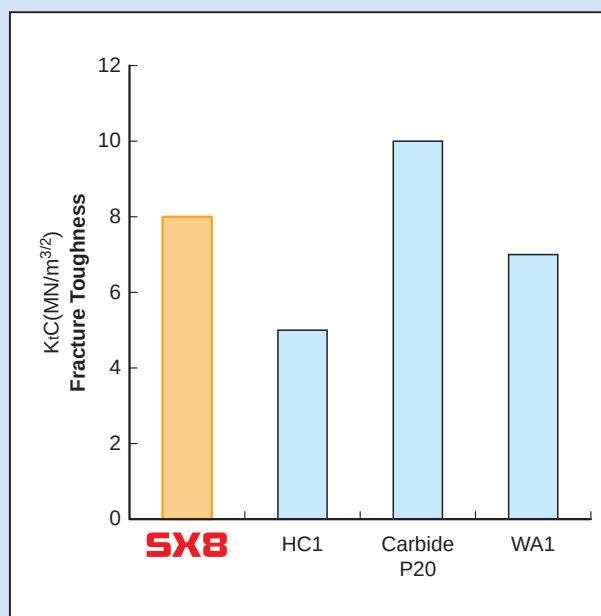
Recommended Cutting Conditions

Material	Work	Machining method	Cutting speed (m/min)	Feed (mm/rev)
SX8	Cast Iron	Milling and Interrupted cutting	~600	~0.5

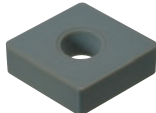
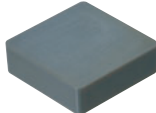
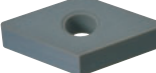
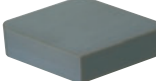
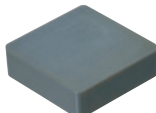
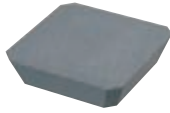
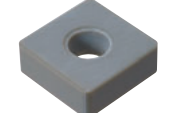
• Case Study

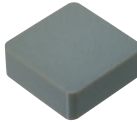
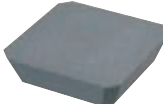
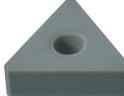
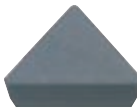
Cylinder block	250 (Gray Cast Iron)
Insert: SPGN 120432 TN (T01025)	
	
Cutting speed (m/min)	150
Feed (mm/rev)	0.15
Depth of cut (mm)	5.0
Coolant	Wet
SX8	630 pcs
Cermet	180 pcs

Fracture Toughness



SX8

Shape	Item-No. IC T R	SX8
	CNGA 120404 TN	●
	120408 TN	●
	120408 TNF	●
	120412 TN	●
	120412 TNF	●
	120416 TN	●
	120708 TN	●
	120712 TN	●
	120716 TN	●
	CNGN 120408 TN	●
	120408 TNF	●
	120412 TN	●
	120412 TNF	●
	120416 TN	●
	120708 TN	●
	120712 TN	●
	120716 TN	●
	DNGA 150412 TN	●
	150608 TN	●
	150612 TN	●
	150708 TN	●
	150716 TN	●
	DNGN 150612 TN	●
	150708 TN	●
	150712 TN	●
	150716 TN	●
	ENG N 130408 TN	●
	130412 TN	●
	130708 TN	●
	130712 TN	●
	130716 TN	●
	130720 TN	●
	130724 TN	●
	RNGN 120400 TN	●
	120400 TNF	●
	120700 TN	●
	SCGN 1204ZZ FNX08	
	120412 TNFE	
	120416 TNFE	
	SDCA 1204 AETN	●
	120408 TN	●
	SECN 1203 AFTN	●
	SNGA 120408 TNF	●
	120412 TN	●
	120416 TN	●

Shape	Item-No. IC T R	SX8
	SNGN 120408 TN	●
	120412 TN	●
	120412 TNF	●
	120416 TNF	●
	120420 TN	●
	120424 TN	●
	120432 TN	●
	120708 TN	●
	120712 TN	●
	120716 TN	●
	120720 TN	●
	SPCN 1203 EDTR	●
	1204 EDTR	●
	1504 EDTR	●
	SPGN 120308 TN	●
	120312 TN	●
	120408 TN	●
	120412 TNCE	●
	TNGA 160408 TN	●
	160412 TN	●
	160416 TN	●
	160420 TN	●
	160708 TN	●
	160712 TN	●
	160716 TN	●
	160720 TN	●
	190712 TN	●
	TPGN 110302 TN	●
	110304 TN	●
	160308 TN	●
	220412 TN	●
	220416 TN	●

Edge-Preparation

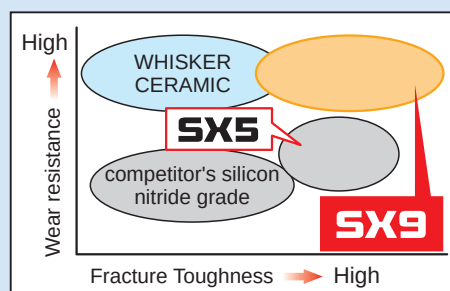
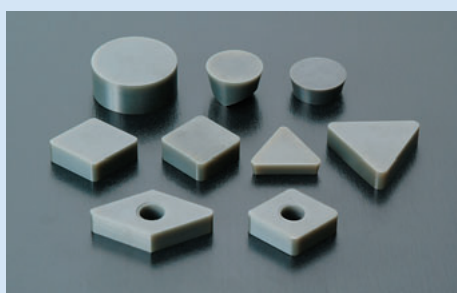
Description	ISO	T
TN	T01025	04
	T02025	06. 07
TNCE	T01020	—
TNF	T02025	—
TNFE	T02020	—
TR	T01025	—
FNX08	Without E.P	—

For Machining Nickel Based Alloys

SX9

Feature

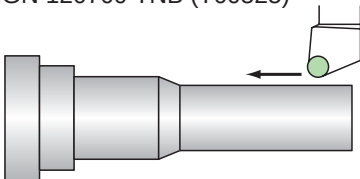
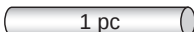
- Our special manufacturing process dramatically increases heat resistance and fracture toughness
- Excellent wear resistance is achieved by optimizing binding compound
- Designed for high speed machining of Inconel, Waspaloy, Hasteloy and Stellite
- Drastic cost reduction compared to whisker reinforced ceramics

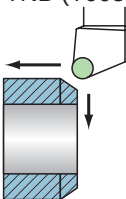


Recommended Cutting Conditions

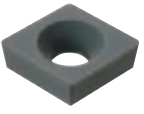
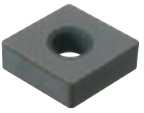
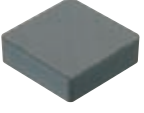
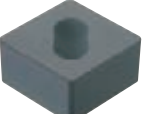
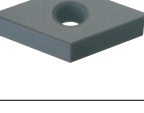
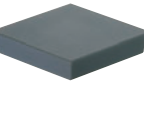
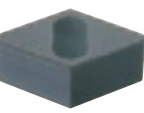
Material	Work piece	Applications	Cutting speed (m/min)	Feed (mm/rev)
SX9	Nickel Based Alloys (Inconel, etc.)	Turning	Continuous	~300
			Scale Cut (roughing)	~230
			Lightly Interrupted	~200
	Cobalt Based Alloys (Stellite, etc.)	Milling	~1000	~0.2

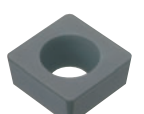
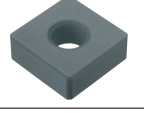
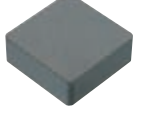
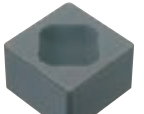
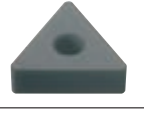
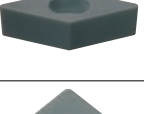
• Case Study

Aircraft part		Inconel 718	
Insert: RNGN 120700 TNB (T00525)			
			
Cutting speed (m/min)		180	
Feed (mm/rev)		0.2	
Depth of cut (mm)		0.6	
Coolant		WET	
SX9			
Whisker ceramics			
SX9 After 2 pcs		Whisker ceramics After 1 pc	
			
		Competitor's tool chipped frequently due to notch wear SX9 excelled in notch wear resistance and obtained double tool life	

Aircraft part		Inconel 600
Insert: RNGN 120700 TNB (T00525)		
		
Cutting speed (m/min)	250	
Feed (mm/rev)	0.2	
Depth of cut (mm)	2.0	
Coolant	WET	
SX9		
Competitor's ceramics		
 SX9 After 2 pcs	 Competitor's ceramics After 2 pcs	Competitor's ceramic tool showed inconsistent tool life SX9 showed better wear resistance compared to the competition

SX9

Shape	Item-No. IC T R	SX9
	CCGW 120404 TNCE 120408 TNCE 120412 TNCE 120416 TNCE	● ● ● ●
	CNGA 120408 TNF 120412 TNF 120416 TNF 120716 TN 160608 SNF 160612 TN 160616 TN 190616 TN	● ● ● ● ● ● ● ●
	CNGN 120408 TNF 120412 TNF 120416 TNF 120708 TNF 120712 TNF 120716 TNF 160712 TN 160716 TN	● ● ● ● ● ● ● ●
	CNGX 120708 TN DP5 120712 TN DP5 120716 TN DP5 120720 TN DP5 160708 TN DP5 160712 TN DP5 160716 TN DP5 160720 TN DP5 160732 TN DP5	● ● ● ● ● ● ● ● ●
	DNKA 150408 TNF 150412 TNF 150416 TNF 150608 SNF 150612 TNFE	● ● ● ● ●
	DNGN 150408 TNF 150412 TNF 150408 TN 150412 TN 150416 TN	● ● ● ● ●
	DNGX 120708 TN DP5 120712 TN DP5 120716 TN DP5 120720 TN DP5 150708 TN DP5 150712 TN DP5 150716 TN DP5 150720 TN DP5	● ● ● ● ● ● ● ●
	RCGX 0908 TNB 1208 TNB	● ●
	RNGN 120400 TN 120700 TNB 120700 TN 190700 TNB	● ● ● ●

Shape	Item-No. IC T R	SX9
	SCGW 09T308 TNCE 120404 TNCE 120408 TNCE 120412 TNCE 120416 TNCE	● ● ● ● ●
	SNGA 120408 TNF 120412 TNF 120416 TNF 120420 TN	● ● ● ●
	SNGN 120408 TNF 120412 TNF 120416 TNF 120420 TNF 120424 TNF 120708 TNF 120712 TNF 120716 TNF 120720 TNF 150712 TN 150716 TN	● ● ● ● ● ● ● ● ● ● ●
	SNGX 120708 TN DP5 120712 TN DP5 120716 TN DP5 120720 TN DP5 150708 TN DP5 150712 TN DP5 150716 TN DP5 150720 TN DP5	● ● ● ● ● ● ● ●
	TNGA 160408 TNF 160412 TNF 160416 TNF	● ● ●
	TNGN 160408 TNF 160412 TNF 160416 TNF 160420 TNF	● ● ● ●
	VNGX 160704 TN DP5 160708 TN DP5 160712 TN DP5 160716 TN DP5	● ● ● ●
	WNGA 080408 TNF 080412 TNF 080416 TNF	● ● ●

Edge-Preparation

Description	ISO	T
TN	T01025	04
	T02025	06 , 07
TNB	T00525	—
TNCE	T01020	—
TNF	T02025	—
TNFE	T02020	—
SNF	S02025	—

Cast Iron for High-Speed Finishing

HC1, HW2

Feature

Alumina/zirconia-based ceramic material

This new type of Alumina ceramics improves the reliability of the cutting edge.

- Outstanding fracture toughness
- Excellent wear resistance
- Stable machining performance at high-speed machining ranges

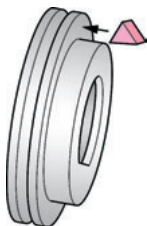


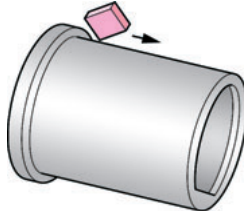
Recommended Cutting Conditions

Material	Work material	Purpose	Cutting speed (m/min)	Feed (mm/rev)
HC1 HW2	Cast Iron	Finish turning	~1,000	~0.4



• Case Study

Disc brake		250 (Gray Cast Iron)
Insert: TNGN 160412 TNF (T02025)		
		
Cutting speed (m/min)	360	
Feed (mm/rev)	0.3	
Depth of cut (mm)	0.5	
Coolant	DRY	
HW2	 130 pcs	
Ceramic	 65 pcs	

Cylinder liner		250 (Gray Cast Iron)
Insert: SNGN 120716 SNC (S01025)		
		
Cutting speed (m/min)	260 - 600	
Feed (mm/rev)	0.32	
Depth of cut (mm)	2	
Coolant	DRY	
HW2	 70 pcs	
Ceramic	 30 pcs	

Standard insert

Shape	Item-No. IC, T, R	HC1	HW2
	CNGA 120404 TN		●
	120408 TN	●	●
	120412 TN		
	120416 TN	●	●
	CNGN 120404 TN	●	●
	120408 TN	●	●
	120412 TN		
	120416 TN	●	●
	120704 TN		●
	120708 TN		●
	120712 TN	●	●
	CNGX 120708 TN DP5		●
	120712 TN DP5		●
	120716 TN DP5		●
	120720 TN DP5		●
	120724 TN DP5		●
	CNMX 120708 TN DP5		●
	DNGA 150404 TN	●	●
	150408 TN	●	●
	150412 TN	●	●
	150416 TN		●
	DNGN 150708 TNFE		●
	150712 TNFE		●
	150716 TN	●	●
	150716 TNFE		●
	DNGX 120704 TNB DP5		●
	120708 TN DP5		
	120712 TN DP5		
	120716 TN DP5		
	120720 TN DP5		
	150704 TN DP5		●
	150708 TN DP5		
	150712 TN DP5		
	150716 TN DP5		
	150720 TN DP5		
	DNMX 120708 TN DP5		●
	120712 TN DP5		●
	RNGN 120400 TN	●	●
	120700 TN	●	●
	190700 TN		
	SNGA 120404 TN		●
	120408 TN	●	●
	120412 TN		●
	120416 TN	●	●

Shape	Item-No. IC, T, R	HC1	HW2
	SNGN 120404 TN	●	
	120408 TN	●	●
	120412 TN	●	●
	120416 TN	●	●
	120704 TN	●	●
	120708 TN	●	●
	120712 TN	●	●
	120716 TN	●	●
	120730 TN	●	●
	SNGX 120704 TN DP5		
	120708 TN DP5		●
	120712 TN DP5		●
	120716 TN DP5		●
	120720 TN DP5		●
	120724 TN DP5		●
	SNMX 120712 TN DP5		●
	TNGA 160404 TN		●
	160408 TN	●	●
	160412 TN		●
	160416 TN		●
	TNGN 160408 TN	●	
	160412 TN	●	
	160416 TN		
	160708 TN	●	●
	160712 TNFE		●
	VNGA 160404 TN	●	●
	160408 TN		●
	WNGA 080404 TN		●
	080408 TN		●
	080412 TN		●

※ Pictures are **HW2**

Edge-Preparation

Description	ISO	T
TN	T01025	04
	T02025	07
TNB	T00525	—
TNFE	T02020	—

For Heat Resistant Aerospace Alloys

WA1

Feature

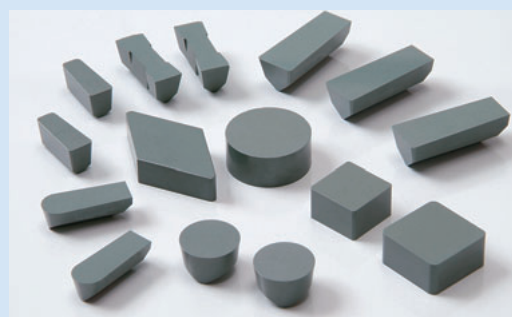
- Excellent wear resistance with high toughness
Excellent crack resistance
- Whisker-reinforcing technology for
Heat-resistant alloys
High-hardened mill rolls

WA1 is a whisker-reinforced composite ceramic material with silicon-carbide whisker added to alumina, the main component.



Recommended Cutting Conditions

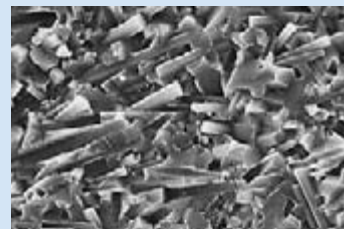
Cutting	Work material	Heat resistant alloys
Cutting speed V	(m / min)	200~500
Feed f	(mm / rev)	0.1~0.3
Depth of cut d	(mm)	~3.0
Coolant		WET



Characteristics of WA1

	WA1	Al ₂ O ₃ -based
Density (g/cm ³)	3.7	4.0
Hardness (HRA)	94.5	94.0
Fracture toughness (MPa · m ^{1/2})	7.0	4.0

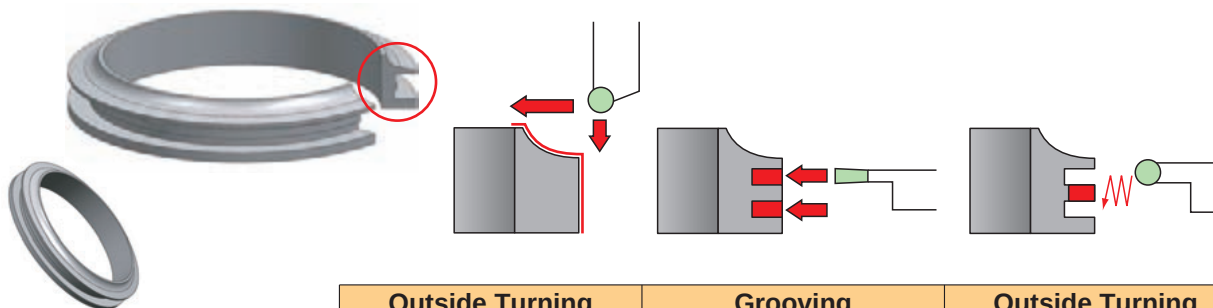
Structure



Case Study

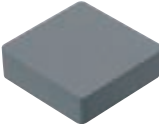
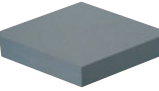
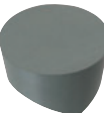
Ring for bearing housing

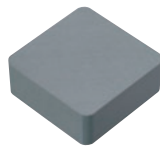
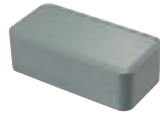
Inconel 718 (Aircraft parts)



	Outside Turning	Grooving	Outside Turning
Insert	RNGN 120700 TNB (T00525)	VGW-375-2ENA (R-horn)	RPGX 0908 TNB (T00525)
Cutting speed (m/min)	300	300	300
Feed (mm/rev)	0.15	0.1	0.06
Depth of cut (mm)	3 - 4	—	2 - 3
Coolant	WET	WET	WET

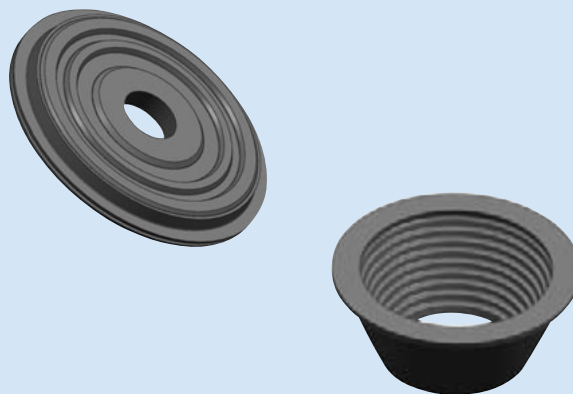
WA1

Shape	Item-No.	WA1
	CNGN 120404 TN	●
	120408 TN	●
	120408 TNB	●
	120412 TN	●
	120412 TNB	●
	120416 TNB	●
	120708 TNB	●
	120712 TNB	●
	160712 TNB	●
	160716 TNB	●
	DNGN 150412 TNB	●
	150708 TN	●
	150708 TNB	●
	150712 TN	●
	150712 TNB	●
	150716 PN9	●
	190612 TNB	●
	RBGX 16S SN2 26S SN3	
	RCGX 0608 TNB	●
	0908 TNB	●
	0908 PN	●
	1208 TNB	●
	1510 PN	●
	1910 PN	●
	RCGY 090603 TNB	
	120603 TNB	
	RNGN 090300 TNB	●
	120400 TN	●
	120400 TNB	●
	120700 PN9	●
	120700 TN	●
	120700 TNB	●
	150700 TN	●
	190700 TN	●

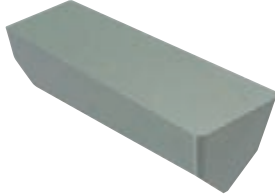
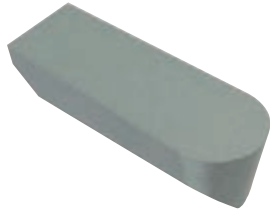
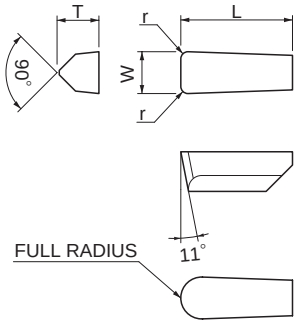
Shape	Item-No.	WA1
	RPGX 0604 TNB	●
	0908 TNB	●
	1208 TNB	●
	SNGN 120408 TNB	●
	120412 TNB	●
	120416 TNB	●
	120708 TNB	●
	120712 TNB	●
	120716 TNB	●
	150712 TN	●
	150716 TN	●
	190712 TN	●
	190716 TN	●
	TNGN 160404 TN	●
	160408 TN	●
	160412 TN	●
	LNMN 6688 PN	

Edge-Preparation

Description	ISO	T
TN	T01025	04
	T02025	07
TNB	T00525	—
PN	Double T-land with R-horn	—
PN9	Double T-land with R-horn	—



WA1

Shape	Item-No.	Dimensions (mm)				WR 1
		W	r	L	T	
	VGW4-1 25-R ENA	3.175	FULL-R	12.7	4.75	▲
	125-1 TNCE		0.4			▲
	125-2 T014		0.8			▲
	156-R ENA	3.962	FULL-R			▲
	156-1 ENA		0.4			○
	156-2 ENA		0.8			○
	187-R ENA	4.75	FULL-R			▲
	187-1 ENA		0.4			▲
	187-2 TNCE		0.8			●
	VGW6- 250-R ENA	6.35	FULL-R	19.05	6.35	●
	250-1 ENA		0.4			▲
	250-2 ENA		0.8			●
	250-3 ENA	7.14	1			▲
	281-R ENA		1.2			●
	281-1 ENA		0.4			○
	281-2 ENA		0.8			○
	281-3 ENA		1.2			○
	VGW8- 312-R ENA	7.93	FULL-R	25.4	8.56	○
	312-1 ENA		0.4			○
	312-2 ENA		0.8			○
	312-3 ENA		1.2			○
	312-4 ENA		1.6			○
	344-R ENA	8.74	FULL-R			●
	344-1 ENA		0.4			○
	344-2 ENA		0.8			○
	344-3 ENA		1.2			○
	344-4 ENA		1.6			○
	375-R ENA	9.53	FULL-R			●
	375-1 ENA		0.4			○
	375-2 ENA		0.8			○
	375-3 ENA		1.2			○
	375-4 ENA		1.6			○

Edge-Preparation

Description	ISO
ENA	R-horn
TNCE	T01020
T014	T02220

NIKE

Continuous Cutting for High-Hardness Materials

HC7,ZC7

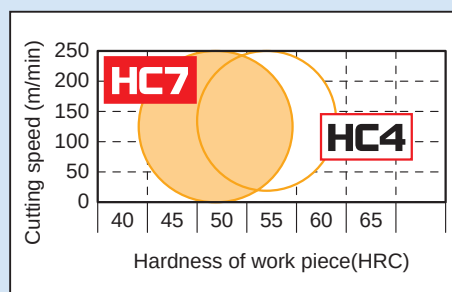
Feature

- Excellent wear resistance in wide hardness range of operations such as removing carburized layer.
- High quality surface with wiper facet inserts.
- Excellent chip control with AG chip form.



Recommended Cutting Conditions

Material	Work material	Purpose	Cutting speed (m/min)	Feed (mm/rev)
HC7 HC4	Carburized steel Hardened steel Die steel	Turning (Continuous)	~150	0.2

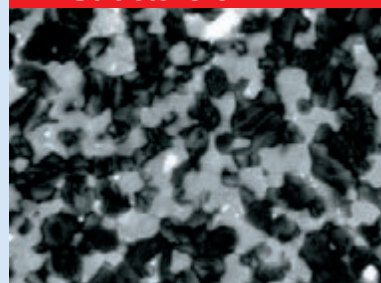


Data

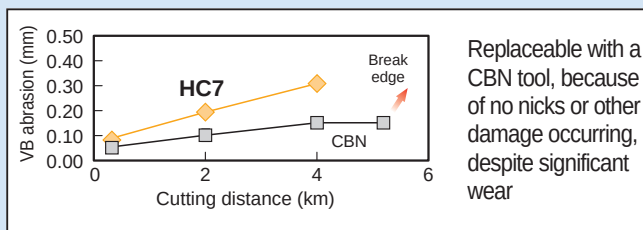
Physical Characteristics

Material	Density (g/m³)	Hardness (HRA)	Bending strength (M Pa)	Thermal expansion coefficient
HC7	4.6	95.0	1,100	7.9
HC4	4.6	95.5	1,000	7.8

Structure of HC7



Cutting Performance



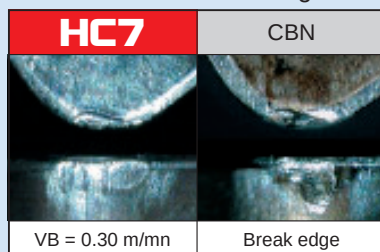
Cutting Conditions

(18CrMo4, HRC60-50)

- V = 100 m/min
- f = 0.1 mm/rev
- d = 0.2 mm
- Coolant: Not used
- Cutting insert

SNGN 120408

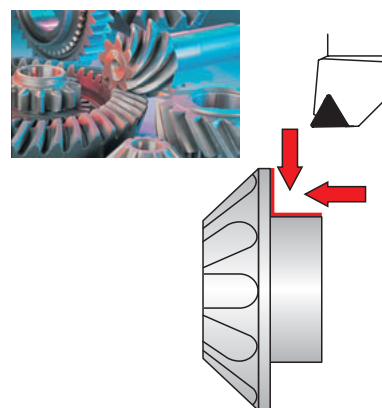
Photos of tool damage



Case Study

Gear

- Work material: Carburized and hardened steel
- Insert: TNGN 160412
- V=100m/min
- f=0.12mm/rev
- d=0.15mm (max.)
- Coolant: Used



HC7

80 pcs

CBN

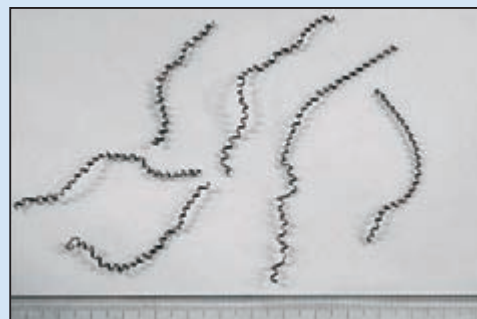
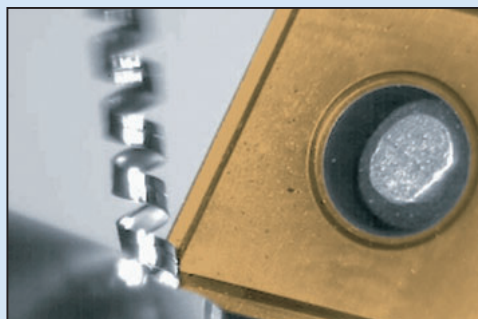
80 pcs

Highly cost-effective because of tool life equivalent to CBN's

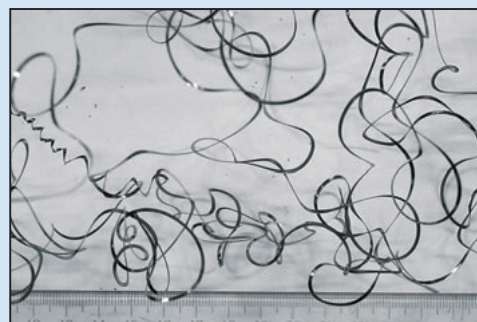
Hardened-Steel Chip Control

Ceramic "ZC7" AG Chipbreaker

With AG
chipbreaker



Without AG
chipbreaker

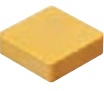
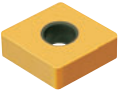
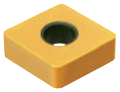
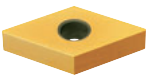
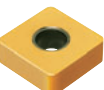
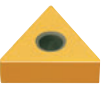


"AG chipbreaker", when added to any **"ZC7"** ceramic tool develops excellent wear resistance in a wide hardness range, during machining operations such as carburized-layer removal, improves surface-machining defects and machine stoppage due to poor formation of chips, thus allowing extended operation.

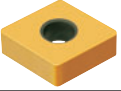
Recommended Cutting Conditions

Work material	Hardness	Cutting speed (m/min)	Feed (mm/rev)	Cutting depth (mm)
Carburized hardened steel Induction hardened steel	30~62	~150	0.1~0.2	0.25~0.6

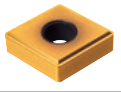
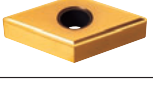
Standard Insert

Shape	Item-No. IC, T, R	ZC7
	CNGN 120408 SNF 120412 SNF	●
	DNGN 150408 SNF	●
	RNGN 120400 SNF 120700 SNF	●
	SNGN 120408 SNF 120412 SNF 120416 SNF	
	TNGN 160408 SNF 160412 SNF	
	TPGN 110304 TNC 110304 TNC 160304 TN 160308 TN	● ● ● ●
	CNGA 120404 TN 120404 SNF 120408 TN 120408 SNF 120412 SNF	● ● ● ● ●
	DNKA 150404 TN 150404 SNF 150408 TN 150408 SNF 150412 SNF	● ● ● ●
	SNGA 120408 SNF 120412 SNF	
	TNGA 160404 TN 160404 SNF 160408 SNF 160412 SNF	● ● ● ●
	VNGA 160404 TN 160404 SNF 160408 SNF 160412 SNF	● ● ● ●

Wiper Insert

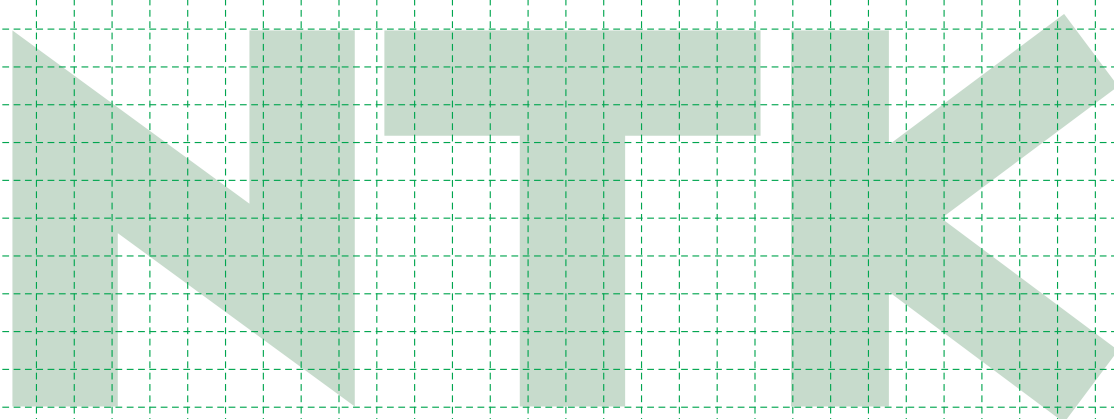
Shape	Item-No. IC, T, R	ZC7
	CNGA 120408 WL TN 120412 WL TN	●

Chipbreaker

Shape	Item-No. IC, T, R	ZC7
	CNGG 120408 ZNC GAG 120412 ZNC GAG	● ●
	DNGG 150408 ZNC GAG 150412 ZNC GAG	● ●
	TNGG 160408 ZNC GAG 160412 ZNC GAG	● ●

Edge-Preparation

Description	ISO	T
TN	T01025 T02025	04 07
TNC	T01025	—
SNF	S02025	—
ZNC	S01025	—



Continuous Cutting for High-Hardness Materials

HC2, HC4, ZC4

HC2

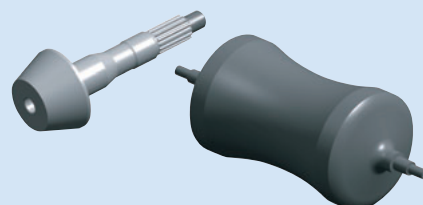
This grade is used for finishing operations of cast iron and hardened steel.

Excellent wear resistance in a wide hardness range

This grade is our general black ceramic.

HC4 and ZC4

The finest grain size particle, with high melting point, is composited HC4 improves in both hardness and strength, and it shows superior performance as a special material for machining high-hardness materials. ZC4 coated with TiN to further improve wear resistance is also included in the NTK ceramic product line up.



Recommended Cutting Conditions (For turning)

Work material	Status and others	Machining processes	Cutting speed (m/min)	Recommendation
Gray cast iron	After cast-metal	High-speed semi-finishing and finishing	100~500	HC2 / HC7
	Surface removal			
High-hardened materials	Less than HRC60	Finishing	~150	HC7 HC4
	HRC65 or less			
Mill Rolls	HS85 or less	Semi-finishing and finishing	~100	HC2 / HC7

• Case Study

Roll	210Cr12 (Alloy Steel)
Insert: RCGX 1208 PN HC2 (Double T with R)	
Cutting speed (m/min)	80
Feed (mm/rev)	0.2
Depth of cut (mm)	0.5~3.0
Coolant	WET
HC2	20 pcs
Competitor's Ceramic	10 pcs

Differential drive	C45 (Carbon Steel)
Insert: TNGA 160412 ZNF HC4 (S02025)	
Cutting speed (m/min)	100
Feed (mm/rev)	0.06
Depth of cut (mm)	0.2
Coolant	WET
HC4	150 pcs
Competitor's CBN	150 pcs

HC2

Shape	Item-No.	HC2
IC, T, R		
	CNGA 120402 TN	●
	120404 TN	●
	120408 TN	●
	120412 TN	●
	120416 TN	●
	120708 TN	●
	120712 TN	●
	160612 TN	●
	160616 TN	●
	190612 TN	●
	190616 TN	●
	CNGN 120408 TN	●
	120412 TN	●
	120416 TN	●
	120708 TN	●
	120712 TN	●
	120716 TN	●
	120720 TN	●
	160704 TN	●
	160708 TN	●
	160712 TN	●
	160716 TN	●
	CNGX 120704 TN DP5	●
	120708 TN DP5	●
	120712 TN DP5	●
	120716 TN DP5	●
	DNGA 150404 TN	●
	150408 TN	●
	150412 TN	●
	150416 TN	●
	150608 TN	●
	150612 TN	●
	150616 TN	●
	150704 TN	●
	150708 TN	●
	150712 TN	●
	150716 TN	●
		●
	DNGN 150404 TN	●
	150408 TN	●
	150412 TN	●
	150608 TN	●
	150612 TN	●
	150616 TN	●
	150704 TN	●
	150708 TN	●
	150712 TN	●
	150716 TN	●
	150720 TN	●
	150724 TN	●
	DNGX 120704 TN DP5	●
	120708 TN DP5	●
	120712 TN DP5	●
	120716 TN DP5	●
	150708 TN DP5	●
	150712 TN DP5	●
	150716 TN DP5	●
	150720 TN	●
		●

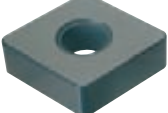
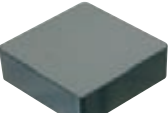
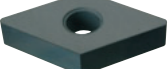
Shape	Item-No.	HC2
IC, T, R		
	ENG 130704 TN	●
	130708 TN	●
	130712 TN	●
	130716 TN	●
	130720 TN	●
	130724 TN	●
	130732 TN	●
		●
	RNG 060400 TN	●
	090400 TN	●
	120400 TN	●
	120700 TN	●
	150700 TN	●
	190700 TN	●
	SNG 120404 TN	●
	120408 TN	●
	120412 TN	●
	120416 TN	●
	120420 TN	●
	SNGN 120404 TN	●
	120408 TN	●
	120412 TN	●
	120416 TN	●
	120420 TN	●
	120424 TN	●
	120430 TN	●
	120704 TN	●
	120708 TN	●
	120712 TN	●
	120716 TN	●
	120720 TN	●
	120724 TN	●
	120730 TN	●
	120732 TN	●
	TNG 150408 TN	●
	150412 TN	●
	150416 TN	●
	150708 TN	●
	150712 TN	●
	150716 TN	●
	150720 TN	●
	190712 PN	●
	190716 PN	●
	190720 PN	●
	TNGA 160404 TN	●
	160408 TN	●
	160412 TN	●
	160416 TN	●
	160420 TN	●
	220408 TN	●
	220412 TN	●
	220416 TN	●
	220420 TN	●

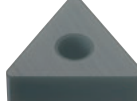
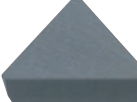
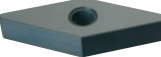
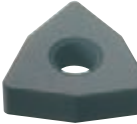
Shape	Item-No.	HC2
IC, T, R		
	TNG 110304 TN	●
	110308 TN	●
	110312 TN	●
	220404 TN	●
	220408 TN	●
	220412 TN	●
	220416 TN	●
	220708 TN	●
	220712 TN	●
	220716 TN	●
	TPG 060102 TN	●
	060104 TN	●
	090202 TN	●
	090204 TN	●
	090208 TN	●
	110302 TN	●
	110304 TN	●
	110308 TN	●
	110312 TN	●
	160302 TN	●
	VNG 160404 TN	●
	160408 TN	●
	160412 TN	●
	160416 TN	●
		●

Edge-Preparation

Description	ISO	T
TN	T01025	04
	T02025	06. 07
PN	W-T land with R-horn	—
		—

■ HC4, ZC4

Shape	Item-No. IC, T, R	HC4	ZC4
	CNGA 120404 ZNF	●	●
	120408 ZNF	●	●
	120412 ZNF	●	●
	120416 ZNF	●	●
	CNGN 120408 ZNF	●	●
	120412 ZNF	●	●
	120708 ZNF	●	●
	120712 ZNF	●	●
	DNKA 150404 ZNF	●	●
	150408 ZNF	●	●
	150604 ZNF	●	●
	150608 ZNF	●	●
	150612 ZNF	●	●
	RNGN 120400 ZNF	●	●
	120700 ZNF	●	●

Shape	Item-No. IC, T, R	HC4	ZC4
	TNGA 160404 ZNF	●	●
	160408 ZNF	●	●
	160412 ZNF	●	●
	TNGN 160404 ZNF	●	●
	160408 ZNF	●	●
	160412 ZNF	●	●
	TPGN 090204 ZNC	●	●
	110304 ZNC	●	●
	110308 ZNC	●	●
	160304 ZNC	●	●
	VNGA 160404 ZNF	●	●
	160408 ZNF	●	●
	160412 ZNF	●	●
	WNGA 080408 ZNF	●	●

※Pictures are **HC4**

■ Edge-Preparation

Description	ISO	T
ZNC	S01025	—
ZNF	S02025	—

Continuous Cutting for Ductile Cast Iron

HC6

Feature

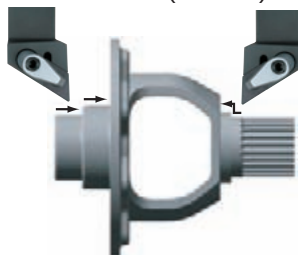
- Excellent wear-resistance for Ductile cast iron
- TiC-based ceramic



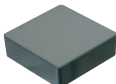
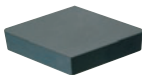
Recommended Cutting Conditions

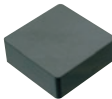
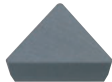
Work material	Purpose	Cutting speed (m/min)	Feed (mm/rev)
Ductile cast iron	Finishing	100~500	~0.4

Case Study

Case	Ductile cast iron
Insert: DNGN 120412 TN (T01025)	
	
Cutting speed (m/min)	300
Feed (mm/rev)	0.2
Depth of cut (mm)	0.5
Coolant	WET
HC6	 300 pcs
Coated carbide	 150 pcs

HC6

Shape	Item-No. IC T R	HC6
	CNGN 120404 TN 120408 TN	●
	DNGN 120412 TN 120416 TN 120704 TN 120708 TN 120712 TN 120716 TN 120708 TN 120712 TN 150704 TN 150708 TN 150712 TN	● ● ● ● ● ● ● ● ● ● ●
	RNGN 120400 TN 120700 TN	● ●

Shape	Item-No. IC T R	HC6
	SNGN 120408 TN 120412 TN 120416 TN 120420 TN 120712 TN 120716 TN	● ● ● ● ● ●
	TNGN 160408 TN 160412 TN 160416 TN	● ● ●
	TPGN 110308 TN 110312 TN 160308 TN 160312 TN 220404 TN 220408 TN 220412 TN	● ● ● ● ● ● ●

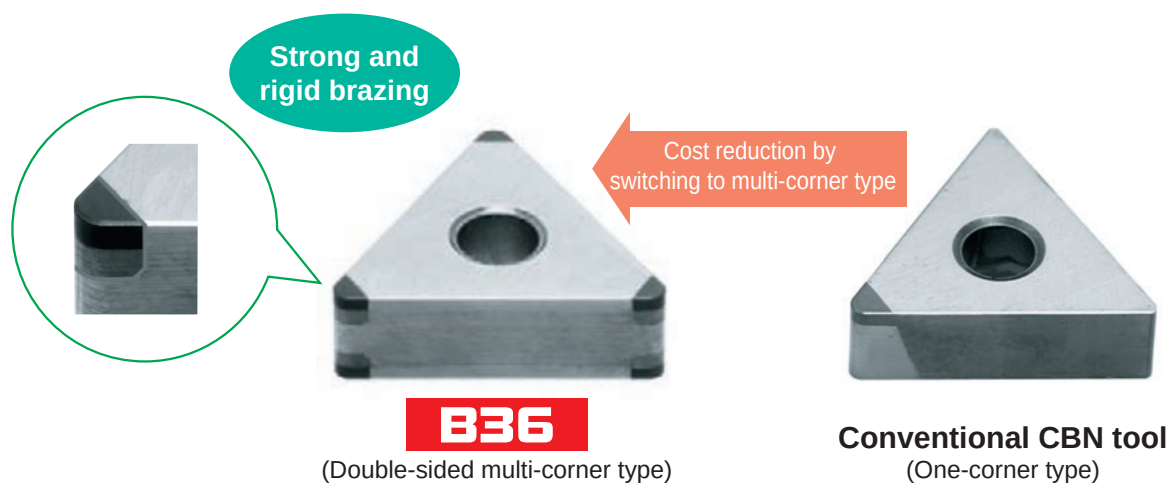
Edge-Preparation

Description	ISO	T
TN	T01025	04
	T02025	07

Interrupted Cutting of High-Hardness Materials

B36**Feature**

- Optimized in CBN content with a special ceramic binder and based on strong and rigid brazing technology
- Improved damage resistance and thermal shock resistance for interrupted cutting
- Double-sided multi-corner piece excellent in cost performance
- Combination with the NTK ceramic ZC7 for continuous cutting

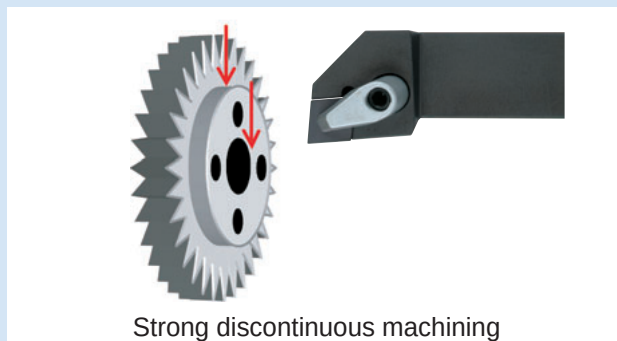
**Recommended Cutting Conditions**

Work material	Hardness	Cutting speed (m/min)	Feed (mm/rev)	Cutting depth (mm)
Hardened steel	45~62	50~200	~0.2	~0.5

Carburized-layer Removal Cutting

Material	Competitor's CBN tool	B36
Part number	CNGA 120408 (2-corner type)	← (4-corner type)
Cutting speed	130 (m/min)	←
Feed rate	0.14 (mm/rev)	←
Cutting depth	0.1 (mm)	←
Coolant	Dry	←
Tool life	20~50 (pcs/corner)	50 (pcs/corner)

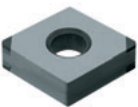
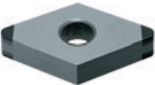
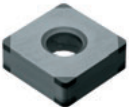
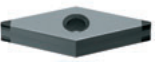
Machined part name	Gear
Material	20Cr4(H) (HRC 61~65)



Compared to a competitor's CBN tool, **B36** does not suffer from abrupt notching or other damage, is stable in life, and leads to the improvement of productivity.

B36

NEW

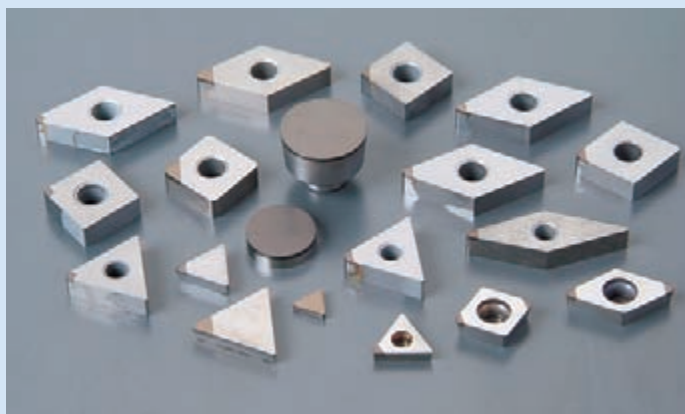
Shape	Item-No. IC T R	B36	CBN dimension a
 4-corner specs.	CNGA 120404 PQ	●	2.0
	120408 PQ	●	2.0
	CNMA 120412 PQ	●	2.4
 4-corner specs.	DNGA 150404 PQ	●	1.8
	150408 PQ	●	1.5
	DNMA 150412 PQ	●	2.2
 8-corner specs.	SNGA 120408 PE	●	2.0
	SNMA 120412 PE	●	2.5
 6-corner specs.	TNGA 160404 PH	●	1.7
	160408 PH	●	1.4
	TNMA 160412 PH	●	2.0
 4-corner specs.	VNGA 160404 PQ	●	2.0
	160408 PQ	●	1.1

※The product with a nose radius of R1.2 is an M-grade product.

NTK CBN series

B20, B22, B24 and B26**Feature**

- B20**
High-speed finishing for gray cast iron
- B22**
For high-hardend mill rolls
- B24 / B26 multi corner**
For hardened steel after sintering

● **Features and Applications**

Grade	Size of CBN		Number of corner(s)	Features and applications	Application of NTK CBN Series for each purpose			
	Normal Size	QT-One			Quenched steel	Interrupted cutting	Gray cast iron	Mill Rolls
B20	●	●	1	High-speed finishing	◎		○	
B22	●		1	Hardened Mill rolls			○	◎
B24 / B26		●	1 / multi	sintered steel	◎	○		
B36	●		multi			◎		

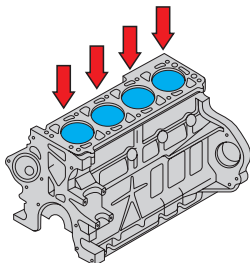
Recommended Cutting Conditions

Work piece		Grade	Recommended conditions			
Material and others	Hardness		Cutting speed (m/min)	Feed (mm/rev)	Cutting depth (mm)	Coolant
Sintered steel	HRC 50~68	B20	60~150	~0.2	~0.4	Wet and dry
		B24 / B26	70~170	~0.3	~0.5	
	Interrupted	B36	60~150	~0.2	~0.4	Dry
Gray cast iron	HB ~250	B22	Turning 300~1000	~0.2	~0.5	Wet
			Milling 300~500			Wet and Dry
Mill Rolls	HS 50~80	B22	40~140	~0.5	~3.0	Wet and Dry
		B20	80~150	~0.5	~2.0	

• Case Study

Cylinder block for automobile

Work material: 250 (Gray Cast Iron)
Insert: SNMA 120408 PTR



Cutting speed (m/min)	500
Feed (mm/rev)	0.2
Depth of cut (mm)	0.2
Coolant	WET

B20

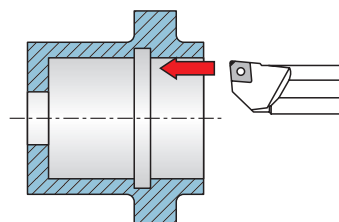
2300 pcs

Competitor's CBN

1000 pcs

Housing for automobile

Work material: 15CrMo4 (HRC 62)
Insert: CNMA 120404 PTR



Cutting speed (m/min)	70~80
Feed (mm/rev)	0.15
Depth of cut (mm)	0.15
Coolant	DRY

B20

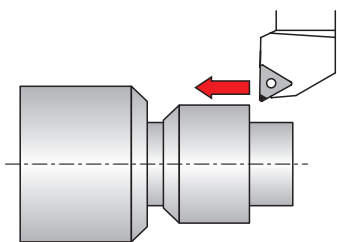
85 pcs

Competitor's CBN

70 pcs

Shaft for automobile

Work material: 20CrS4 (HRC 63)
Insert: TNMA 160408 P



Cutting speed (m/min)	160
Feed (mm/rev)	0.13
Depth of cut (mm)	0.25
Coolant	DRY

B24

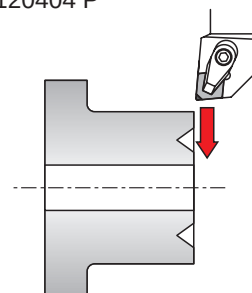
500 pcs

Competitor's CBN

300 pcs

Gear for automobile

Work material: 15CrMo4 (Hv720~860)
Insert: CNMA 120404 P



Cutting speed (m/min)	140
Feed (mm/rev)	0.18
Depth of cut (mm)	0.15
Coolant	WET

B24

800 pcs

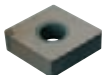
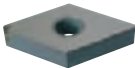
Competitor's CBN

500 pcs

- QT-One

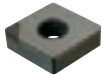
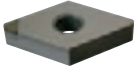
QT-One has a minimized CBN size for improving cost performance.

■ B20 QT-One

Shape	Item-No. IC T R	B20	CBN dimension a
	CNMA 120404 PTR	●	1.9
	120408 PTR	●	1.8
	DNMA 150404 PTR	●	1.9
	150408 PTR	●	1.6
	SNMA 120404 PTR	●	1.9
	120408 PTR	●	1.9
	TNMA 160404 PTR	●	1.9
	160408 PTR	●	1.6



■ B20

Shape	Item-No. IC T R	B20	CBN dimension a
	CNGA 120404	●	4.7
	120408	●	4.6
	120412	●	4.5
	DNGA 150404	●	4.1
	150408	●	3.8
	150412	●	3.4
	SNGA 120408	●	4.7
	TNGA 160404	●	4.3
	160408	●	4.0
	TPGN 160304	●	4.3
	160308	●	4.0
	TBGN 060104S	●	



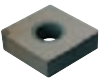
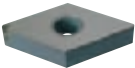
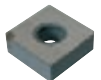
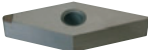
■ B22

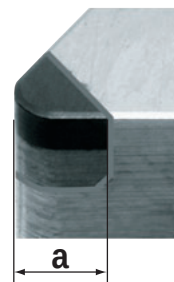
Shape	Item-No. IC T R	B22
	RBGX 16S	
	20S	
	RNGN 120300S	
	120400S	

• QT-One

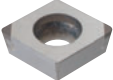
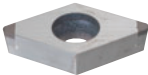
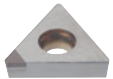
QT-One has a minimized CBN size for improving cost performance.

■ B24

Shape	Item-No. IC ₁ T ₁ R	B24	CBN dimension a
	CNMA 120404 P	●	2.5
	120408 P	●	2.4
	120412 P	●	2.3
	DNMA 150404 P	●	2.5
	150408 P	●	2.1
	SNMA 120408 P	●	2.5
	120412 P	●	2.5
	TNMA 160404 P	●	2.3
	160408 P	●	2.0
	160412 P	●	2.0
	VNMA 160404 P	●	2.8
	160408 P	●	2.0
	TPGN 110304 P	●	2.3
	160304 P	●	2.3
	160308 P	●	2.0



■ B26

Shape	Item-No. IC ₁ T ₁ R	Corner	B26	CBN dimension a
	CCGW 09T304 PD	2	●	2.5
	09T308 PD	2		2.4
	CPGW 09T304 PD	2		2.3
	09T308 PD	2		2.5
	090304 PD	2		2.1
	090308 PD	2		2.5
	DCGW 11T301 PD	2	●	2.5
	11T304 PD	2		2.3
	11T308 PD	2		2.0
	TCGW 110202 P	1	●	2.0
	110204 P	1		2.8
	110208 P	1		2.0
	16T302 PT	3		2.3
	16T304 PT	3		2.3
	16T308 PT	3		2.0



Solid CBN for Gray Cast Iron

B16**Feature**

- Multi-corner specification
- Easy to find a used corner in gold color
- Long cutting edge

**Recommended Cutting**

Work piece			Recommended conditions			
Material	Hardness (HB)	Use	Cutting speed (m/min)	Feed (mm/rev)	Cutting depth (mm)	Coolant
Gray cast iron	230	Roughing	150~1000	~0.7	~3.0	Wet type (*)
		Finishing	300~1500	~0.6	~0.5	Dry type

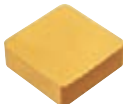
※A dry type can also be used for parts short in cutting distance (about 10 mm).

● **Case Study**

Cylinder bore		250 (Gray Cast Iron)
Insert: SNMN 090312S TN (T01025)		
Cutting speed (m/min)		560
Feed (mm/rev)		0.6
Depth of cut (mm)		0.7
Coolant		WET
B16	800 pcs	
Competitor's CBN	600 pcs	

Disc brake		250 (Gray Cast Iron)
Insert: SNMN 120420S TN (T01025)		
Cutting speed (m/min)		1000
Feed (mm/rev)		0.7
Depth of cut (mm)		1.0
Coolant		WET
B16	800 pcs	
Competitor's CBN	65 pcs	

B16

Shape	Item-No. IC, T, R	B16
	SNMN 090308S TNB	●
	090312S TN	●
	120308S TN	
	120312S TN	
	120408S TN	
	120412S TNF	●
	120416S TNF	
	TNMN 110308S TN	
	110312S TNC	
	160308S TN	
	160312S TN	
	160408S TN	
	160412S TNF	
	RNMN 120300S TN	
	120400STN	

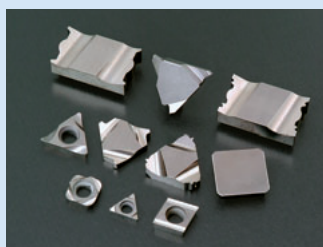
Edge-Preparation

Description	ISO	T
TN	T01025	03, 04
	T02025	07
TNB	T00525	—
TNC	T01025	—
TNF	T02025	—

High Performance Cermet Grade **C7X, C7Z**

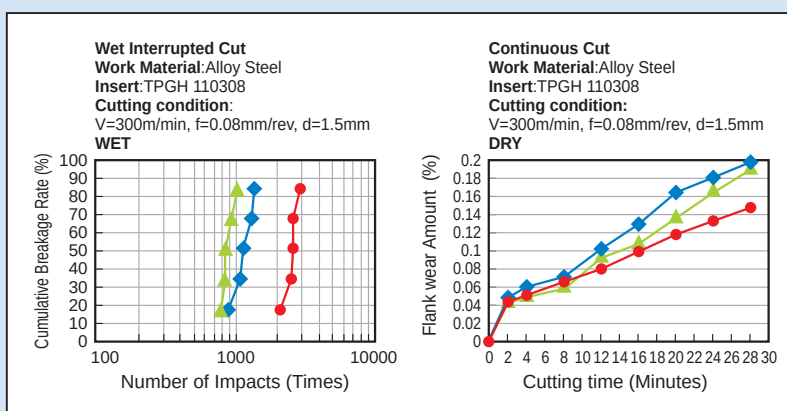
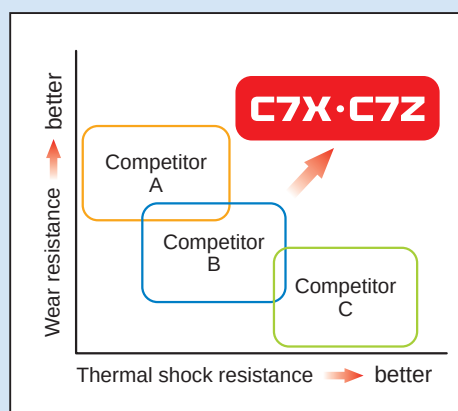
Applications

- Semi-finishing and finishing steel
- Formed tools for bearing industry
- Grooving (interrupted or non-interrupted)



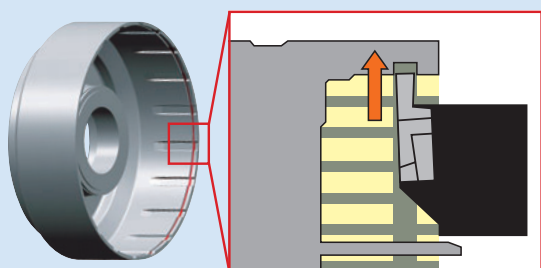
Greatly improved thermal shock resistance compared to conventional cermet

Grade Comparison Chart



• Case Study

ID Interrupted Grooving on Automatic Transmission Clutch Drum



Cutting speed (m/min)	270
Feed (mm/rev)	0.04
Depth of cut (mm)	1.5
Coolant	WET
C7X	200 pcs
Competitor's	100 pcs

Double the tool life compared to competitor
Dramatically reduced edge wear

Diamond-Coated UC1, UC2

Best Performance for

Al alloy (High Si Al alloy), MMC(FRM)
Ceramics, Reinforced ceramics, Carbon

Feature

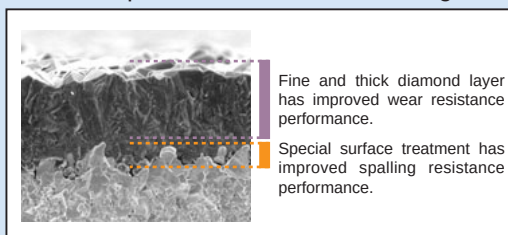
Improvement in Wear Resistance

Superior wear resistance especially for hard-to cut aluminum material I.e. High Si Al alloy and MMC material.

Physical Performance

	UC1·UC2	Natural diamond	DLC	PCD
Crystal structure	Diamond	Diamond	Amorphous	Diamond
Bonded phase	None	None	None	Co, Ni, etc
Density(g/cm3)	3.5	3.5	1.7~2.2	4.1
Young's modulus(GPa)	1000	280~300	280~300	800
Hardness(GPa)	100	90~120	10~50	10~50

Composition of Diamond Coating



Variety in Shape

- Moulded chipbreaker ensures better chip control.
- Deeper cutting edge is obtained with coating on all the surface (edge) of insert.

Types of shapes



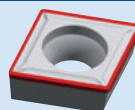
Lower Cost

Multi-corner availability and less re-grinding cost.

Effective cutting-edge area

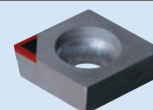
Note: The red line indicates an effective cutting-edge area.

Single-sided chipbreaker



UC1 / UC2

Without chipbreaker



PCD(Brazed with sintered diamond)

Cost reduction by switching to multi-corner type

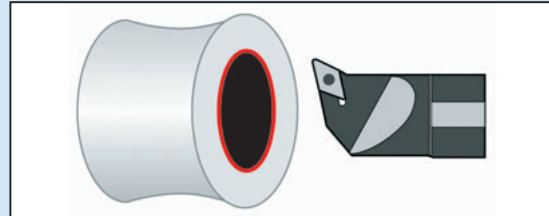
Characteristics of Material

- UC1 has better wear resistance with thick coating layer.
- UC2 has well-balanced durability against spalling and abrasion.

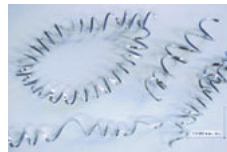
Boring of Al Alloy

Material	Competitor's PCD (Sintered diamond)	UC2
Part number	Brazed cutter	SPMW090312 (4-corner type)
Cutting speed	600m/min	←
Feed rate	0.4mm/rev	←
Cutting depth	4.0 mm (Total)	←
Coolant	WET	←
Tool life	3,000 pcs/corner	6,000 pcs/corner

Part name	Hub of Motor-bike
Material	Aluminum alloy



- **UC2** with a molded chipbreaker raises chip-processing performance and improves brief machine stoppage due to chip-processing defects during competitor's PCD usage.



Chips by PCD

Scale: 10 mm



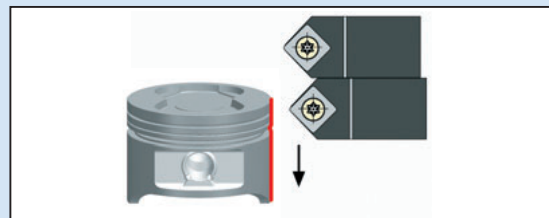
Chips by UC2

Scale: 10 mm

Outer Roughing of Al Alloys

Material	Competitor's PCD (Sintered diamond)	UC2
Part number	Brazed cutter	SPMW090312 (4-corner type)
Cutting speed	600m/min	←
Feed rate	0.4mm/rev	←
Cutting depth	4.0 mm (Total)	←
Coolant	WET	←
Tool life	3,000 pcs/corner	6,000 pcs/corner

Part name	Piston
Material	Aluminum alloy(Al+13vol%Si)

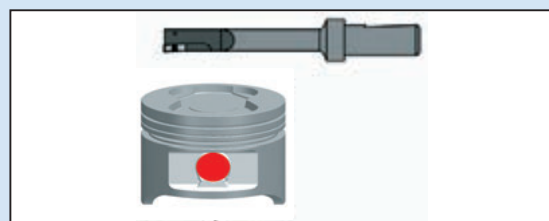


- **UC1** can have its life extended to twice that of the competitor's PCD and allows productivity to be correspondingly improved.
- Although the competitor's PCD tool needs re-grinding eight times, **UC1** allows cost reduction by extending the life of the tool and adopting a four-corner piece.

Rough Boring of Al Alloys

Material	Competitor's PCD (Sintered diamond)	UC2
Part number	TPGW110304 (1 cutting edge)	Special shape (2 cutting edges)
Cutting speed	8000m/min ⁻¹	←
Feed rate	0.15mm/rev	←
Cutting depth	3.0mm	←
Coolant	WET	←
Tool life	1 pc/corner	8,000 pcs/corner

Part name	Piston
Material	Aluminum alloy(Al+13vol%Si)

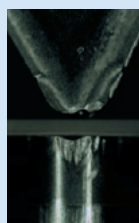


- Because of chatter and peeling-off of a brazed section, competitor's PCD tool cannot machine even a single piece.
- The long effective cutting-edge area of the **UC2** can conduct deeper cutting, and its twin cutting-edge structure suppresses chatter.

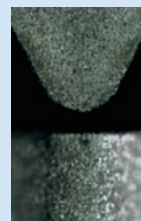
C/C Composite Outer Surface

Material	Competitor's PCD (Sintered diamond)	UC1
Part number	TNMA160408 (1-corner, w/out chipbreaker)	TNMM160408-ZP (3-corner, w/molded chipbreaker)
Cutting speed	280m/min	←
Feed rate	0.10mm/rev	←
Cutting depth	2.0mm	4.0mm
Coolant	DRY	←
Tool life	50 pcs/corner	100 pcs/corner

Part name	Sintering-furnace parts
Material	Carbon fiber



Competitor's PCD



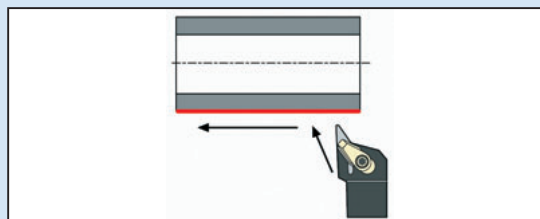
UC1

- The life of **UC1** can be extended to twice that of a competitor's PCD tool.
- Compared with the competitor's PCD tool, **UC1** can achieve deeper cutting and thus reduce a cycle time.
- Because of its extended life and cycle time reduction, **UC1** allows the improvement of productivity.

Ceramics Outer Diameter Finishing

Material	Competitor's PCD (Sintered diamond)	UC2
Part number	Brazed cutter (w/out chipbreaker)	VNMM160404-ZP (2-corner, w/molded chipbreaker)
Cutting speed	150m/min	←
Feed rate	0.2mm/rev	←
Cutting depth	8.0mm	←
Coolant	DRY	←
Tool life	300 pcs/corner	400 pcs/corner

Part name	Vacuum switch parts
Material	Ceramic calcined body



- The life of **UC2** can be extended to 1.3 times that of a competitor's PCD tool, thus allowing productivity to be correspondingly improved.
- Since it can cut work materials to greater depths, **UC2** allows indexing difficult in conventional PCD tools, and hence, the improvement of insert-changing frequency.

Aluminum Alloy Plunge Cutting

Material	Competitor's PCD (Sintered diamond)	UC2
Part number	Special shape	BSMN3207Z24 (Formed insert)
Cutting speed	148m/min	←
Feed rate	0.06mm/rev	←
Cutting depth	3.0mm	←
Coolant	WET	←
Tool life	5,000 pcs/corner	50,000 pcs/corner

Part name	Two-wheel cylinder, mouth-chamfered
Material	Aluminum alloy(Al+12vol%Si)



- The formed PCD insert is high in cost, and because of machined-surface deterioration due to fusion, the cemented carbide type is found to be short in life.
- The life of **UC2** excellent in fusion resistance and in the diversity of shapes can be extended to 10 times the life of the cemented carbide tool.

Standard Stock

Shape	Item-No. IC, T, R	UC1	UC2	Screw	Wrench
 Single-sided chipbreaker	CNMM 120404 ZP		○	—	—
 Single-sided chipbreaker	TNMM 160404 ZP		○	—	—
 Single-sided chipbreaker	VNMM 160404 ZP		○	—	—
NEW  Single-sided chipbreaker	CCMT 060204 AM3		○	LRIS - 2.5×7	RLR - 15S
	CCMT 09T304 AM3		○	LRIS - 4×6 LRIS - 4×8	LLR - 25S
NEW  Single-sided chipbreaker	CCMT 090308 AF1		○		
 Single-sided chipbreaker	DCMT 11T304 AM3		○		
 Without chipbreaker	SPMN 120304		○	—	—
NEW  Single-sided chipbreaker	SPMR 120304 AF1		○	—	—
NEW  Single-sided chipbreaker for left-handed use	TCMT 110204L AP		○	LRIS - 2.5×7	RLR - 15S
	TCMT 110208L AP		○		
NEW  Wiper Single-sided chipbreaker for left-handed use	TCMT 110204 WL AP		○		
NEW  Single-sided chipbreaker for left-handed use	TPMT 110304 L AP		○		
	TPMT 110308L AP		○		
NEW  Single-sided chipbreaker for left-handed use	TPMR 110304L AP		○		
 Single-sided chipbreaker for left-handed use	TPMR 160304 AF1		○	—	—
NEW  Single-sided chipbreaker for left-handed use	TPMH 080204L AP		○	LR - S - 2×4.4 LR - S - 2×5.5	RLR-13S
	TPMT 080204L AP		○	—	
	TPMH 090204L AP		○	LR - S - 2.5×4.8 LR - S - 2.5×6	RLR - 15S
	TPMH 110304L AP		○	LR - S - 3×6.2 LR - S - 3×7.8	RLR - 20S
	TPMH 160304LAP		○	LR - S - 4×5.8 LR - S - 4×9	RLR - 20S
NEW  Wiper Single-sided chipbreaker for left-handed use	TPMT 080204WL AP		○	—	—
 Single-sided chipbreaker	RPMX 1203 MO GB		○	—	—
 Single-sided chipbreaker	VCMT 110304 AM3		○	LRIS - 2.5×7	RLR - 15S
 W/out chipbreaker	VCMW 110308		○	LRIS - 2.5×7	RLR - 15S

Milling Cutter



Milling Cutter for Ceramic Inserts

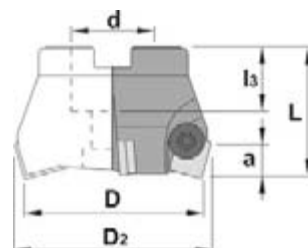
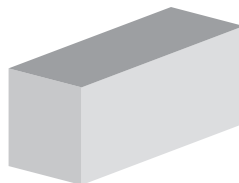
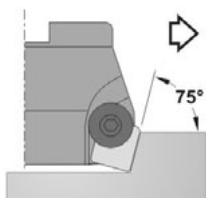
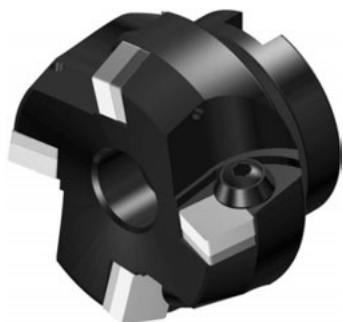
Characteristics

Negative milling cutter with 75° approach angle.

Its strong insert shape allows high depth of cut and heavy feed.

Applications

Cast iron milling

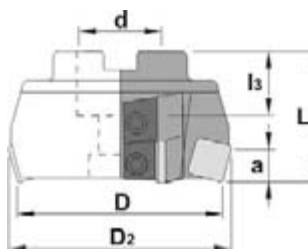
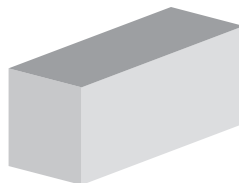
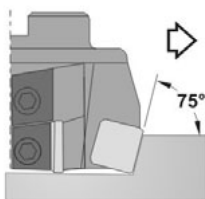


● 0442 90 75°

Item-No.	D	Teeth	D2	L	d	l3	a	Insert	Weight
044290050-C	50	3	56	40	22	20	9	SN..1204	0.38
044290063-C	63	4	69	50	27	22	9		0.75

● Parts

Item-No.						
044290050-C	1006	LW-4	2066	3212	4012	912.10
044290063-C						912.12



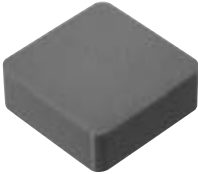
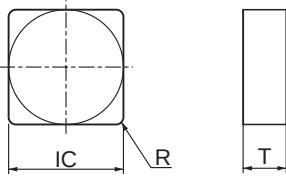
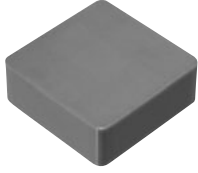
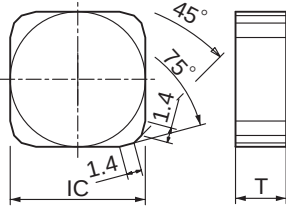
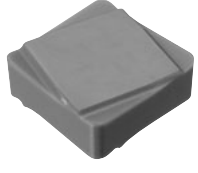
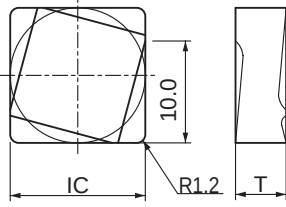
● 0442 99 75°

Item-No.	D	Teeth	D2	L	d	l3	a	Insert	Weight
044299080-C	80	5	86	50	27	22	9	SN..1204	1.2
044299100-C	100	7	106	50	32	25	9		1.95
044299125-C	125	8	131	63	40	30	9		3.25

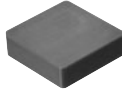
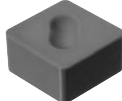
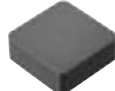
● Parts

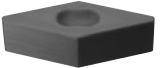
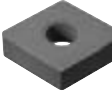
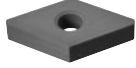
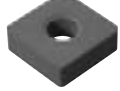
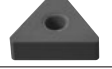
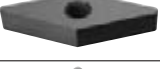
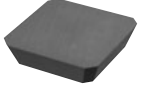
Item-No.							
044299080-C	1077	6432	6438	6912	1460	912.12	5620
044299100-C						912.17	
044299125-C							

Inserts for Milling Cutter

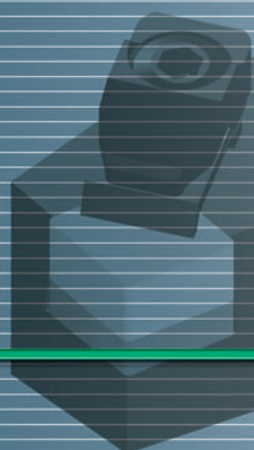
Shape	Dimension	IC	T	Item-No. IC T R	SX1
		12.7	4.76	SNGN 120408 TNF (T02025) 120412 TNF (T02025) 120416 TNF (T02025) 120420 TNF (T02025) 120424 TNF (T02025)	● ● ●
		12.7	4.76	Wiper SNGN 1204 ENTN (T01025)	●
		12.7	4.76	SNGF 120412 TRCC413 (T01025)	●

● NTK ceramic inserts

Shape	Item-No.	Dimenstions			Ceramics										
		IC	T	R	Silicon-nitride				Alumina				Whisker		
					SX1	SX9	SX8	SP2	HC1/HW2	HC2	HC4/ZC4	HC6	HC7/ZC7	WA1	
	IC, T, R														
	CNGN 120408 120412 120416 120708 120712 120716	12.7	4.76	0.8	●	●	●		●	●	●	●	●	●	
				1.2	●	●	●		●	●	●	●		●	
				1.6	●	●		●	●	●	●				
			7.94	0.8	●	●	●	●	●	●	●				
				1.2	●	●	●	●	●	●	●			●	
				1.6	●	●	●	●	●	●	●	●			
	CNGX 120708--DP5 120712--DP5 120716--DP5 120720--DP5 160708--DP5 160712--DP5 160716--DP5 160720--DP5 160732--DP5	12.7	7.94	0.8	●	●			●						
				1.2	●	●			●						
				1.6	●	●			●						
				2.0	●	●									
		15.875	7.94	0.8	●	●									
				1.2	●	●									
				1.6		●									
				2.0	●	●									
				3.2	●	●									
	DNGN 150408 150412	12.7	4.76	0.8					●		●			●	
				1.2					●					●	
	DNGX 120708--DP5 120712--DP5 120716--DP5 120720--DP5 150708--DP5 150712--DP5 150716--DP5 150720--DP5	9.525	7.94	0.8	●	●				●					
				1.2	●	●				●					
				1.6	●	●				●					
				2.0	●	●									
		12.7	7.94	0.8	●	●				●					
				1.2	●	●				●					
				1.6	●	●				●					
				2.0	●	●				●					
	ENGX 130708 130712 130716	12.7	7.94	0.8			●		●	●					
				1.2			●		●	●					
				1.6			●		●	●					
	RNGN 120400 120700 150700 190700 250700	12.7	4.76		●	●		●	●	●		●		●	
					●	●	●	●	●	●		●	●	●	
		7.94						●	●	●					
					●			●	●	●				●	
							●	●	●	●				●	
	SNGN 090308 090316 090404 090408 090412 120404 120408 120412 120416 120420 120424 120432 150716 190716 190720 190724 250720 250724	9.525	3.18	0.8					●	●					
				1.6			●								
				0.4											
				0.8											
		12.7	4.76	1.2		●				●					
				0.4					●	●					
				0.8	●	●			●	●		●		●	
				1.2	●	●	●	●	●	●				●	
				1.6	●	●	●	●	●	●				●	
				2.0		●			●		●				
				2.4		●									
				3.2			●		●						
		15.875	7.94	1.6	●	●	●	●		●				●	
		19.05		1.6					●	●			●		
				2.0					●	●			●		
				2.4	●				●	●			●		
		25.4		2.0					●	●					
				2.4				●		●			●		
	SNGX 120708--DP5 120712--DP5 120716--DP5 120720--DP5	12.7	7.94	0.8	●	●									
				1.2	●	●									
				1.6	●	●									
				2.0	●	●									

Shape	Item-No.	Dimenstions			Ceramics									
		IC	T	R	Silicon-nitride				Alumina				Whisker	
					SX1	SX9	SX8	SP2	HC1/HW2	HC2	HC4/ZC4	HC6	HC7/ZC7	WA1
	TNGN 110308 160304 160404 160408 160412 160416 160420 160708 160712 160720 220408 220412	6.35	3.18	0.8						●				
		9.525	4.76	0.4										
				0.4					●	●			●	●
				0.8	●	●		●	●	●		●		●
				1.2	●	●	●		●	●		●		
				1.6	●	●		●	●	●		●		
				2.0		●			●	●	●			
		9.525	7.94	0.8			●		●	●				
				1.2			●		●	●				
				2.0										
		12.7	4.76	0.8						●		●		
				1.2										●
 	VNGN 160404 160408 160412 160416	9.525	4.76	0.4										
				0.8					●	●				
				1.2										
				1.6										
	VNGX 160704--DP5 160708--DP5 160712--DP5 160716--DP5	9.525	4.76	0.4	●	●								
				0.8	●	●								
				1.2	●	●								
				1.6	●	●								
	CNGA 120404 120408 120412 120416	12.7	4.76	0.4						●	●		●	
				0.8	●	●	●	●	●	●	●		●	
				1.2	●	●	●	●	●	●	●		●	
				1.6	●	●		●	●	●	●		●	
	DNGA 150404 150408 150412	12.7	4.76	0.4					●	●	●		●	
				0.8	●	●			●	●			●	
				1.2	●	●			●	●				
	SNGA 120404 120408 120412 120416	12.7	4.76	0.4						●				
				0.8	●	●	●		●	●	●			
				1.2	●	●		●	●	●				
				1.6	●	●			●	●				
	TNGA 160404 160408 160412	9.525	4.76	0.4				●		●	●		●	
				0.8	●	●	●	●	●	●	●		●	
				1.2	●	●		●	●	●				
	VNGA 160404 160408 160412	9.525	4.76	0.4					●	●	●		●	
				0.8			●			●	●	●	●	
				1.2						●				
	WNGA 080408 080412 080416	12.7	4.76	0.8		●		●			●	●		
				1.2	●	●	●	●						
				1.6	●	●								
	SPGN 090308 120308 120312 120408 120412 120416	9.525		0.8						●				
		12.7	3.18	0.8			●			●		●		
				1.2			●		●	●				
				0.8						●				
			4.76	1.2					●	●				
				1.6										
	TBGN 060104 060108	3.97	1.59	0.4							●			
				0.8										
	TPGN 090204 090208 110304 110308 160304 160308 220408	9.525	2.36	0.4						●				
		6.35	3.18	0.8			●		●	●		●	●	
				0.4					●	●	●			
				0.8					●	●	●		●	
		9.525	4.76	0.4					●	●	●		●	
				0.8					●	●	●		●	
		12.7	4.76	0.8								●		
				0.8										

NTK



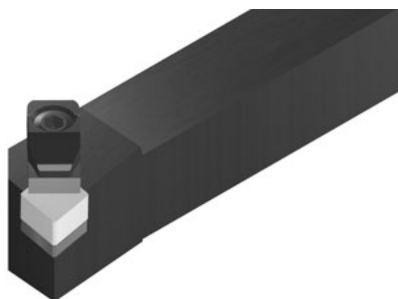
Tool Holders for Ceramic



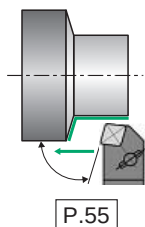
External Holder **P.54**

Boring Bars **P.73**

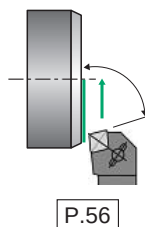
Clamp-On Type



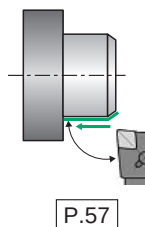
CCBN 75°



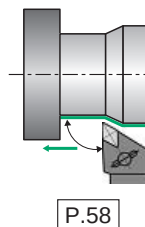
CCKN 75°



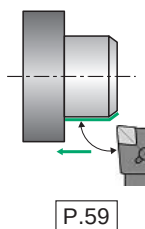
CCLN 95°



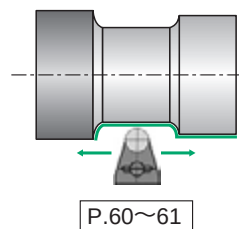
CDJN 93°



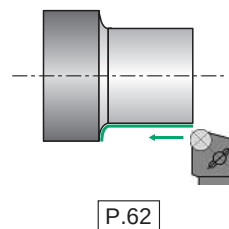
CELN 97.5°



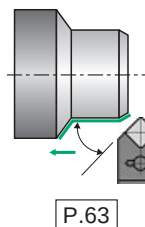
CRDC / CRDN



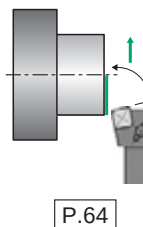
CRGN



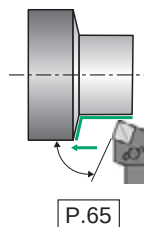
CSDN 45°



CSKN 75°



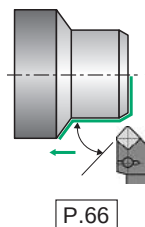
CSRN 75°



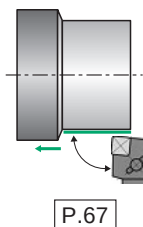
Notch Type



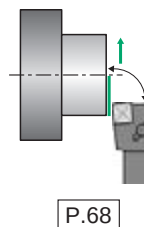
CSSN 45°



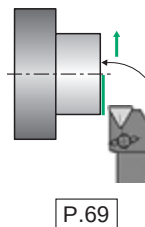
CSXN 85°



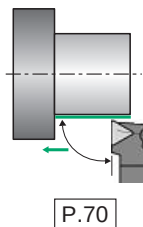
CSYN 85°



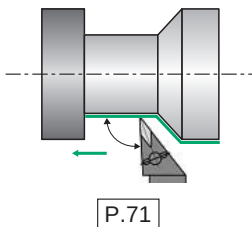
CTFN 90°



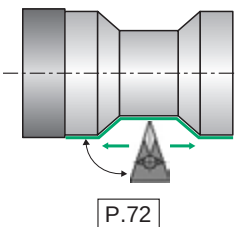
CTGN 90°



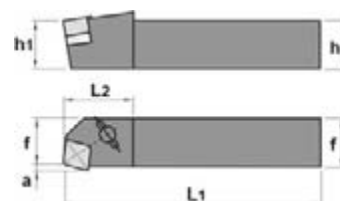
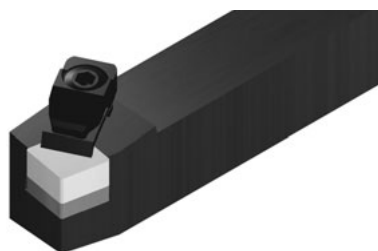
CVJN 93°



CVVN 62.5°

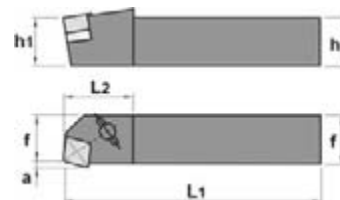
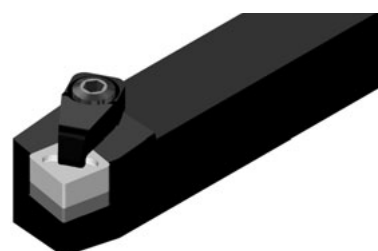


Tool Holders for Ceramic Insert



● CCBN - 75°

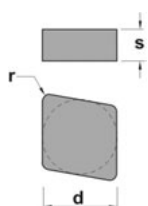
		h=h1	b	L1	L2	f	a	Insert		
Ref.	CCBN ^{R/L} 2020 K12	20	20	125	33	17	3.1	CNGN 1204	CNGN 1207	
	2520 M12	25	20	150	32	17	3.1			
	2525 M12	25	25	150	32	22	3.1			
	3225 P12	32	25	170	32	22	3.1			
	2525 M16 - CD	25	25	150	35	27	3.82	CNGN 1607	CNGN 1607	
	3225 P16 - CD	32	25	170	35	27	3.82			
										
		Clamp	Clamping screw							
Parts	CCBN ^{R/L} 2020 K12	CC08M	BS0829W	-	ASN423 ASN433	M3×12	LW-4	SR08		
	2520 M12		BS0835W							
	2525 M12									
	3225 P12									
	2525 M16 - CD	2417			9414	ISSN 533	1180	-		
	3225 P16 - CD									



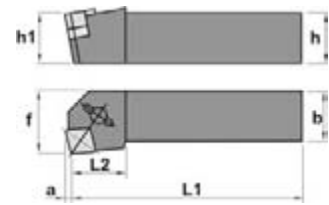
● CCBN - CX 75°

		h=h1	b	L1	L2	f	a	Insert
Ref.	CCBN ^{R/L} 2525 M12 - 7CX	25	25	150	32	22	3.1	CNGX 1207
	3225 P12 - 7CX	32	25	170	32	22	3.1	
	2525 M16 - CX	25	25	150	35	27	3.82	CNGX 1607
	3225 P16 - CX	32	25	170	35	27	3.82	
								
Parts	CCBN ^{R/L} 2525 M12 - 7CX	2471			ICSN 432		1180	LW-4
	3225 P12 - 7CX							
	2525 M16 - CX	2415			ICSN 533			
	3225 P16 - CX					ICSN 533		

Ref.	CNG.	d	s	CNGN	CNGX
	CNG..1204	12.7	4.76		
	CNG..1207	12.7	7.94		
	CNG..1607	15.875	7.94		

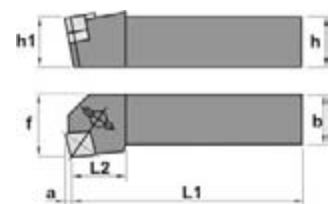


Tool Holders for Ceramic Insert



● CCKN - 75°

		h=h1	b	L1	L2	f	a	Insert	
Ref.	CCKN ^{R/L} 2020 K12	20	20	125	30	25	3.1	CNGN 1204	CNGN 1207
	2520 M12	25	20	150	30	25	3.1		
	2525 M12	25	25	150	30	32	3.1		
	3225 P12	32	25	170	30	32	3.1		
									
		Clamp	Clamping screw						
Parts	CCKN ^{R/L} 2020 K12	CC08M	BS0829W		-	ASN423 ASN433	M3×12	LW-4	SR08
	BS0835W								



● CCKN - CX 75°

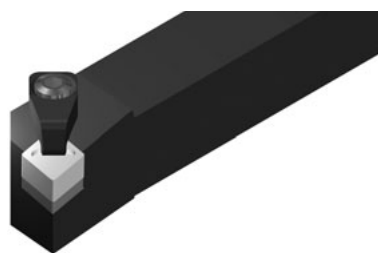
		h=h1	b	L1	L2	f	a	Insert
Ref.	CCKN ^{R/L} 2525 M12 - 7CX	25	25	150	32	22	3.1	CNGX 1207
	3225 P12 - 7CX	32	25	170	32	22	3.1	CNGX 1207
								
Parts	CCKN ^{R/L} 2525 M12 - 7CX	2471			ICSN 432		1160	LW-4
	3225 P12 - 7CX				ICSN 432			

		CNG.	d	s	CNGN	CNGX
	Ref.	CNG..1204	12.7	4.76		
		CNG..1207	12.7	7.94		



● CCLN - 95°

		h=h1	b	L1	L2	f	Insert		
Ref.	CCLN ^{R/L} 2020 K12	20	20	125	32	25	CNGN 1204	CNGN 1207	
	2520 M12	25	20	150	32	25			
	2525 M12	25	25	150	32	32			
	3225 P12	32	25	170	32	32			
	2525 M16 - CD	25	25	150	35	35	CNGN 1607		
	3225 P16 - CD	32	25	170	35	35			
	 Clamp	 Clamping screw							
Parts	CCLN ^{R/L} 2020 K12	CC08M	BS0829W	-	ACN422	M3×12	LW-4	SR08	
	2520 M12		BS0835W						
	2525 M12								
	3225 P12								
	2525 M16 - CD	2417			9414	ICSN 533	1160	-	
	3225 P16 - CD								

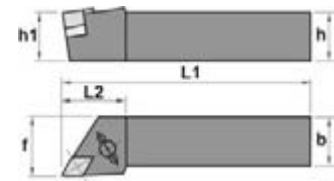
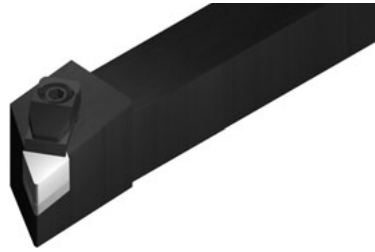


● CCLN - CX 95°

		h=h1	b	L1	L2	f	Insert
Ref.	CCLN ^{R/L} 2525 M12 - 7CX	25	25	150	35	32	CNGX 1207
	3225 P12 - 7CX	32	25	170	35	32	
	2525 M16 - CX	25	25	150	35	35	CNGX 1607
	3225 P16 - CX	32	25	170	35	35	
							
Parts	CCLN ^{R/L} 2525 M12 - 7CX	2471		ICSN 432		1160	LW-4
	ICSN 432						
	ICSN 533						

Ref.	CNG.		d	s	CNGN	CNGX
		CNG..1204	12.7	4.76		
		CNG..1207	12.7	7.94		
		CNG..1607	15.875	7.94		

Tool Holders for Ceramic Insert



● CDJN - 93°

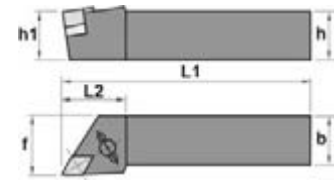
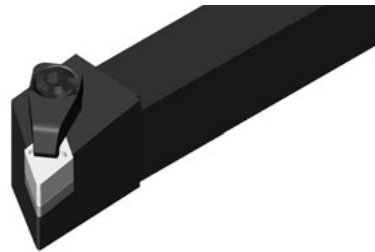
Ref.		h=h1	b	L1	L2	f	Insert			
	CDJN ^{R/L} 2525 M15	25	25	150	32	32	DNGN 1504	DNGN 1507		
	3225 P15	32	25	170	32	32				
	2525 M15 - CD	25	25	150	38	32				
	3225 P15 - CD	32	25	170	38	32				
	 Clamp	 Clamping screw								
Parts	CDJN ^{R/L} 2525 M15	CC08M	BS0835W	–	ADN422	M3×12	LW-4	SR08		
	3225 P15									
	2525 M15 - CD	2417		9416	IDSN432	1160				
	3225 P15 - CD									



Clamp



Clamping screw

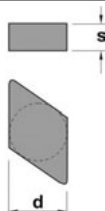


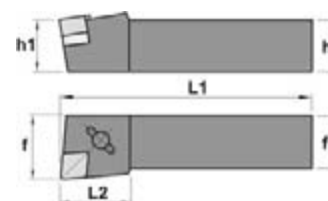
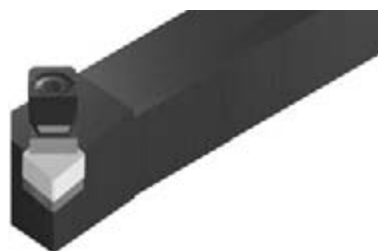
● CDJN - CX 93°

		h=h1	b	L1	L2	f	Insert
Ref.	CDJN ^{R/L} 2525 M12 - 7CX	25	25	150	38	32	DNGX 1207..
	3225 P12 - 7CX	32	25	170	38	32	DNGX 1207..
	2525 M15 - CX	25	25	150	38	32	DNGX 1507..
	3225 P15 - CX	32	25	170	38	32	
							
Parts	CDJN ^{R/L} 2525 M12 - 7CX	2415		3710		1230	LW-4
	3710						
	3225 P12 - 7CX	2432		IDSN 432		1160	
	2525 M15 - CX						
3225 P15 - CX							



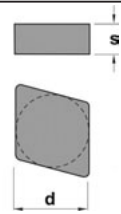
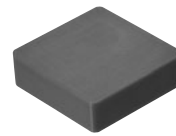
Ref.	DNG.		d	s	DNGN		DNGX	
		DNG..1204	10.7	4.76				
		DNG..1207	10.7	7.94				
		DNG..1507	12.7	7.94				



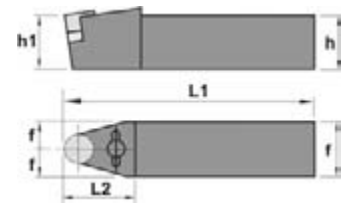
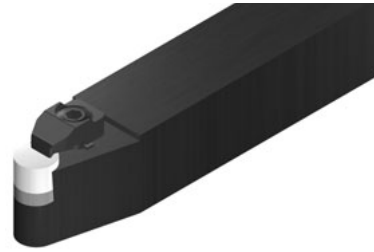


● CELN - 97.5°

		h=h1	b	L1	L2	f	Insert		
Ref.	CELN ^{R/L} 2020 K13 - CD	20	20	125	32	25	ENGN 1307..		
	2525 M13 - CD	25	25	150	32	32			
	3225 P13 - CD	32	25	170	32	32			
									
Parts	CELN ^{R/L} 2020 K13 - CD	2413		9414		IESN 432		1160	LW-4
	2525 M13 - CD								
	3225 P13 - CD								

	ENG.		d	s	ENGN
	Ref.	ENG..1307	12.7	7.94	

Tool Holders for Ceramic Insert



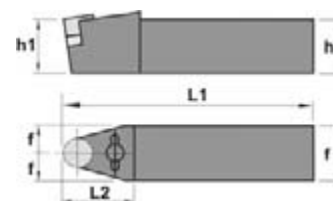
● CRDC

			h=h1	b	L1	L2	f	Insert		
Ref.	CRDCN	2525 M06	25	25	150	20	12.5	RCGX 0608	RCGN 0607	
		2525 M09	25	25	150	20	12.5	RCGX 0908	RCGN 0907	
		2525 M12	25	25	150	25	12.5	RCGX 1208	RCGN 1207	
		3225 P06	32	25	170	20	12.5	RCGX 0608	RCGN 0607	
		3225 P09	32	25	170	20	12.5	RCGX 0908	RCGN 0907	
		3225 P12	32	25	170	25	12.5	RCGX 1208	RCGN 1207	
		3232 P15	32	32	170	30	16	RCGX 1510		
		3232 P19	32	32	170	42	16	RCGX 1910		
		3232 P25	32	32	170	45	16	RCGX 2512		
										
			Clamp	Clamping screw		Shim	Wrench	Pin	Washer	
Parts	CRDCN	2525 M06	HC35KR-4099		BS0520	HARCGX06		LW-3		WS-5
		2525 M09	HC35KR-6075		BS0625	HARCGX0908V		LW-4	2 × 8AW	WS-6
		2525 M12	HC35KR-6076		BS0625	HARCGX1208V			2.5 × 8AW	WS-6
		3225 P06	HC35KR-4099		BS0520	HARCGX06				WS-5
		3225 P09	HC35KR-6075		BS0625	HARCGX0908V			2 × 8AW	WS-6
		3225 P12	HC35KR-6076		BS0625	HARCGX1208V			2.5 × 8AW	WS-6
		3232 P15	CC08M		BS0835W	HARCGX1510V		LW-6	2.5 × 8AW	SR08
		3232 P19	CC08M		BS0835W	HARCGX1910V			2.5 × 8AW	SR08
		3232 P25	AMS-10		AOB-10S	HARCGX2512V		LW-6	2.5 × 8AW	

※To use RCGN insert, please change shim as follows.

INSERT	SHIM	RCGN
RCGN 060700	HARCGN 0607-15	
RCGN 090700	HARCGN 0907-15	
RCGN 120400	HARCGN 1204-15	
RCGN120700	HARCGN 1207-15	

	RCGX.		a	s	d	RCGX
	Ref.	RCGX 0608	120°	7.86	6.35	
		RCGX 0908	120°	7.86	9.525	
		RCGX 1208	120°	7.86	12.7	
		RCGX 1510	120°	9.86	15.875	
		RCGX 1910	120°	9.86	19.05	
		RCGX 2512	120°	11.91	25.4	

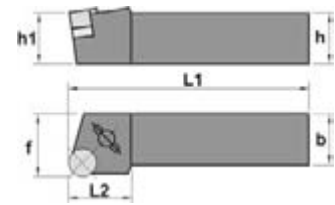
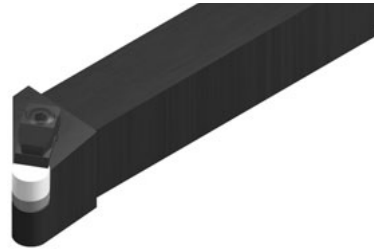


● CRDNN

			h=h1	b	L1	L2	f	Insert			
Ref.	CRDNN	2525 M09	25	25	150	25	12.5	RNGN 0904	RNGN 0907	     	
		3225 P09	32	25	170	30	12.5				
		2020 K12	20	20	125	34	10				
		2520 M12	25	20	150	34	10	RNGN 1204	RNGN 1207		
		2525 M12	25	25	150	34	12.5				
		3225 P12	32	25	170	34	12.5				
		3232 P12	32	32	170	34	16				
		2525 M15	25	25	150	40	12.5	RNGN 1504	RNGN 1507		
		3225 P15	32	25	170	40	12.5				
		3225 P19	32	25	170	40	12.5	RNGN 1904	RNGN 1907		
Parts	CRDNN	2525 M09	CC08MS		BS0835W		ARN32		M3×12		LW-4
		3225 P09			BS0829W		ARN42				
		2020 K12	CC08M		BS0835W		ARN42		M3×12		
		2520 M12									
		2525 M12									
		3225 P12									
		3232 P12			HARN52		M4×12				
		2525 M15									
		3225 P15									
		3225 P19									

		RNG..	d	s	RNGN
Ref.		RNGN 0904	9.525	4.76	
		RNGN 0907	9.525	7.94	
		RNGN 1204	12.7	4.76	
		RNGN 1207	12.7	7.94	
		RNGN 1507	15.875	7.94	
		RNGN 1907	19.05	7.94	

Tool Holders for Ceramic Insert



● CRGN

		h=h1	b	L1	L2	f	Insert	
Ref.	CRGN ^{R/L} 2020 K12	20	20	125	30	25	RNGN 1204	
	2520 M12	25	20	150	30	25	RNGN 1204	RNGN 1207
	2525 M12	25	25	150	30	32		
	3225 P12	32	25	170	30	32		
	3225 P15	32	25	170	32	32	RNGN 1504	RNGN 1507
	3225 P19	32	25	170	33	32	RNGN 1904	RNGN 1907
								
		Clamp	Clamping screw					
Parts	CRGN ^{R/L} 2020 K12	CC08M	BS0829W		ARN42	M3×12	LW-4	SR08
	2520 M12		BS0835W					
	2525 M12							
	3225 P12		HARN52		M4×8			
	3225 P15							
	3225 P19				HARN62			



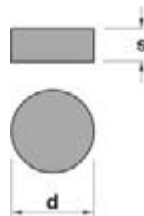
Clamp

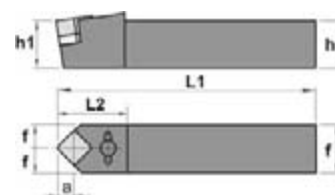
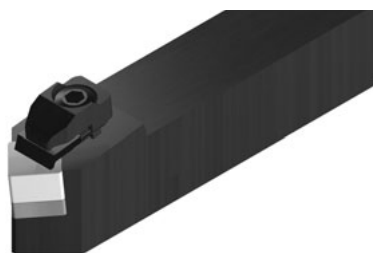


Clamping screw



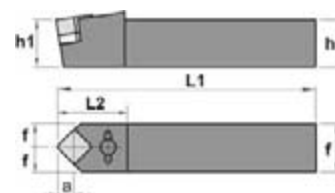
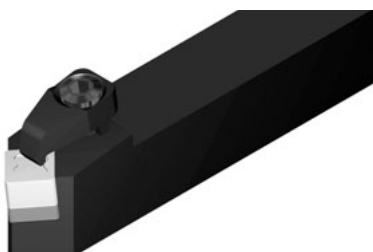
		RNG..	d	s	RNGN
Ref.		RNGN 0904	9.525	4.76	
		RNGN 0907	9.525	7.94	
		RNGN 1204	12.7	4.76	
		RNGN 1207	12.7	7.94	
		RNGN 1507	15.875	7.94	
		RNGN 1907	19.05	7.94	





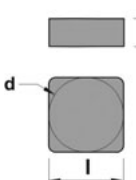
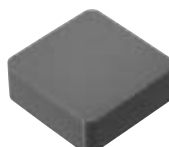
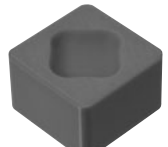
● CSDN - 45°

			h=h1	b	L1	L2	f	a	Insert	
Ref.	CSDNN	2020 K12	20	20	125	35	10	8.32	SNGN 1204	
		2520 M12	25	20	150	35	10	8.32	SNGN 1204	SNGN 1207
		2525 M12	25	25	150	35	12.5	8.32		
		3225 P12	32	25	170	35	12.5	8.32		
		3232 P12	32	32	170	35	16	8.32		
		3225 P15	25	25	150	38	12.5	10.23	SNGN 1504	SNGN 1507
		3232 P15	32	25	170	38	12.5	10.23	SNGN 1504	SNGN 1507
		3232 P19	32	32	170	55	16	13.47	SNGN 1904	SNGN 1907
										
			Clamp	Clamping screw						
Parts	CSDNN	2020 K12	CC08M	BS0829W		ASN423 ASN433	M3 × 12	LW-4	SR08	
		2520 M12		BS0835W						
		2525 M12								
		3225 P12					ASN523			M4 × 10
		3232 P12								
		3225 P15								
		3232 P15								
		3232 P19								

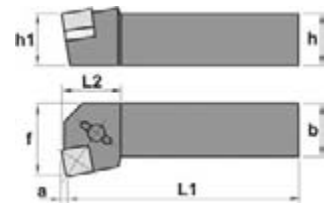


● CSDN - CX 45°

		h=h1	b	L1	L2	f	a	Insert
Ref.	CSDNN 2525 M12 - 7CX	25	25	150	35	12.5	8.32	SNGX 1207
	3225 P12 - 7CX	32	25	170	35	12.5	8.32	SNGX 1207
	2525 M15 -CX	25	25	150	38	12.5	10.23	SNGX 1507
	3225 P15 - CX	32	25	170	38	12.5	10.23	
								
Parts	CSDNN 2525 M12 - 7CX	2415			ISSN 432	1160	LW-4	
	3225 P12 - 7CX				ISSN 432			
	2525 M15 -CX				ISSN 533	1180		
	3225 P15 - CX							

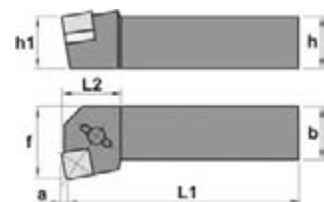
		SNG.	d / l	s	SNGN	SNGX
	Ref.	SNG..1204	12.7	4.76		
		SNG..1207	12.7	7.94		
		SNG..1504	15.875	4.76		
		SNG..1507	15.875	7.94		
		SNG..1904	19.05	4.76		
		SNG..1907	19.05	7.94		

Tool Holders for Ceramic Insert



● CSKN - 75°

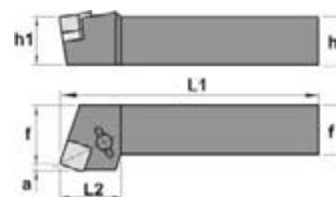
		h=h1	b	L1	L2	f	a	Insert		
Ref.	CSKN ^{R/L} 2020 K12	20	20	125	29	25	3.06	SNGN 1204		
	2520 M12	25	20	150	29	25	3.06	SNGN 1204	SNGN 1207	
	2525 M12	25	25	150	28	32	3.06			
	3225 P12	32	25	170	28	32	3.06			
	2525 M15 - CD	25	25	150	28	32	3.77	SNGN 1507		
	3225 P15 - CD	32	25	170	28	32	3.77	SNGN 1507		
										
		Clamp	Clamping screw							
Parts	CSKN ^{R/L} 2020 K12	CC08M	BS0829W		-	ASN423 ASN433		M3×12	LW-4	SR08
	2520 M12		BS0835W							
	2525 M12									
	3225 P12									
	2525 M15 - CD	2417			9414	ISSN 533	1180			
	3225 P15 - CD									



● CSKN - CX 75°

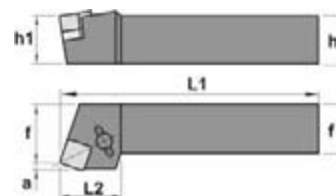
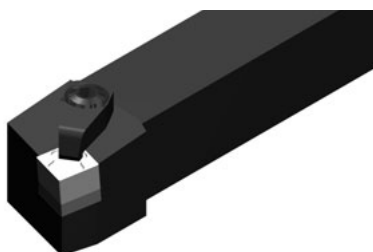
		h=h1	b	L1	L2	f	a	Insert
Ref.	CSKN ^{R/L} 2525 M12 - 7CX	25	25	150	27	32	3.06	SNGX 1207..
	3225 P12 - 7CX	32	25	170	27	32	3.06	
	2525 M15 - CX	25	25	150	28	32	3.77	SNGX 1507..
	3225 P15 - CX	32	25	170	28	32	3.77	
	4040 P15 - CX	32	40	170	28	32	3.77	
								
Parts	CSKN ^{R/L} 2525 M12 - 7CX	2415			ISSN 432	1160	LW-4	
	3225 P12 - 7CX				ISSN 432			
	2525 M15 - CX				ISSN 533	1180		
	3225 P15 - CX							
	4040 P15 - CX							

SNG.		d / l	s	SNGN	SNGX
	Ref.	SNG..1204	12.7	4.76	
		SNG..1207	12.7	7.94	
		SNG..1507	15.875	7.94	



● CSRN - 75°

		h=h1	b	L1	L2	f	a	Insert	
Ref.	CSRN ^{R/L} 2020 K12	20	20	125	32	22	3.06	SNGN 1207	SNGN 1207
	2520 M12	25	20	150	32	22	3.06		
	2525 M12	25	25	150	28	27	3.06		
	3225 P12	32	25	170	28	27	3.06		
	2525 M15 - CD	25	25	150	34	27	3.77	SNGN 1507	
	3225 P15 - CD	32	25	170	34	27	3.77		
	3232 P19 - CD	32	32			27		SNGN 1907	
	4040 P19 - CD	40	40			27			
									
Parts	CSRN ^{R/L} 2020 K12	CC08M	BS0829W	-	ASN423 ASN433	M3×12	LW-4	SR08	
	2520 M12		BS0835W						
	2525 M12	2417		9414	ISSN 533	9414			
	3225 P12								
	2525 M15 - CD								
	3225 P15 - CD								
	3232 P19 - CD								
	4040 P19 - CD								

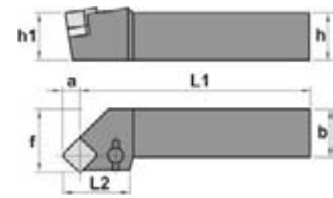


● CSRN - CX 75°

		h=h1	b	L1	L2	f	a	Insert
Ref.	CSRN ^{R/L} 2525 M12 - 7CX	25	25	150	32	22	3.06	SNGN 1207
	3225 P12 - 7CX	32	25	170	28	27	3.06	SNGN 1207
	2525 M15 - CX	25	25	150	34	27	3.77	SNGN 1507
	3225 P15 - CX	32	25	170	34	27	3.77	
		   						
Parts	CSRN ^{R/L} 2525 M12 - 7CX	2415			ISSN 432		1160	LW-4
	ISSN 432							
	3225 P12 - 7CX				ISSN 533		1180	
	2525 M15 - CX							
3225 P15 - CX								

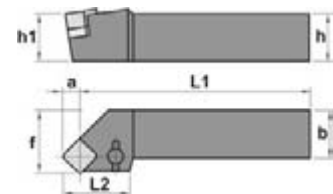
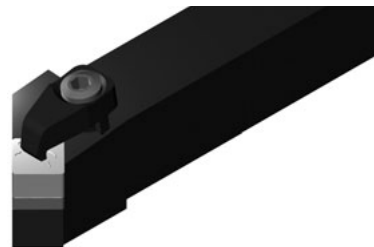
	SNG.		d / l	s	SNGN	SNGX
	Ref.	SNG..1204	12.7	4.76		
		SNG..1207	12.7	7.94		
		SNG..1507	15.875	7.94		

Tool Holders for Ceramic Insert



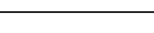
● CSSN - 45°

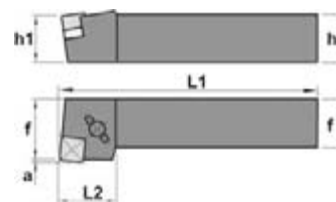
			h	b	L1	L2	f	h1	Insert	
Ref.	CSSN ^{R/L} 2020 M09		20	20	125	25	25	20	SNGN 0904	
	2020 K12		20	20	125	31	25	20	SNGN 1204	SNGN 1207
	2520 M12		25	20	150	31	25	25		
	2525 M12		25	25	150	31	32	25		
	3225 P12		32	25	170	31	32	32		
	2525 M15 - CD		25	25	150	37	32	25	SNGN 1507	
	3225 P15 - CD		32	25	170	37	32	32		
	3232 P19		32	32	170	37	40	32	SNGN 1904	SNGN 1907
4040 P19 - CD		40	40	170		32	40	SNGN 1907		
										
			Clamp	Clamping screw						
Parts	CSSN ^{R/L} 2020 M09		CC08MS	BS0829W	-	ASN323	M2×6	LW-4	SR08	
	2020 K12			BS0829W		ASN423 ASN433	M3×12			
	2520 M12	CC08M		BS0835W						
	2525 M12			BS0829W						
	3225 P12			2417		9414	ISSN 533	9414		
	2525 M15 - CD									
	3225 P15 - CD									
	3232 P19									
4040 P19 - CD										



● CSSN - CX 45°

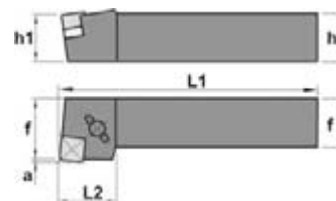
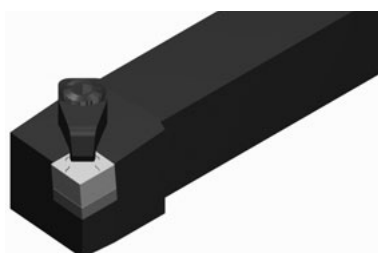
		h	b	L1	L2	f	h1	Insert
Ref.	CSSN ^{R/L} 2525 M12 - 7CX	25	25	150	35	32	25	SNGX 1207
	3225 P12 - 7CX	32	25	170	35	32	32	SNGX 1207
	2525 M15 - CX	25	25	150	37	32	25	SNGX 1507
	3225 P15 - CX	32	25	170	37	32	32	
								
Parts	CSSN ^{R/L} 2525 M12 - 7CX	2415			ISSN 432		1160	LW-4
	ISSN 432							
	2525 M15 - CX				ISSN 533	1180		
	3225 P15 - CX							

	SNG.		d / l	s	SNGN	SNGX
	Ref.	SNG..1204	12.7	4.76		
		SNG..1207	12.7	7.94		
		SNG..1507	15.875	7.94		



● CSXN - 85°

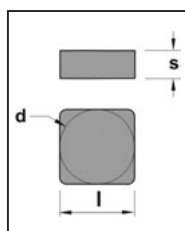
		h	b	L1	L2	f	a	Insert
Ref.	CSXN ^{R/L} 2525 M12 - 7CD	25	25	150	30	32	1.03	SNGN 1207
	3225 P12 - 7CD	32	25	170	30	32	1.03	
	2525 M15 - CD	25	25	150	33	32	1.38	SNGN 1507
	3225 P15 - CD	32	25	170	33	32	1.38	
								
Parts	CSXN ^{R/L} 2525 M12 - 7CD	2417	9414			ISSN 432	1160	LW-4
	3225 P12 - 7CD					ISSN 432		
	2525 M15 - CD					ISSN 533	1180	
	3225 P15 - CD					ISSN 533		



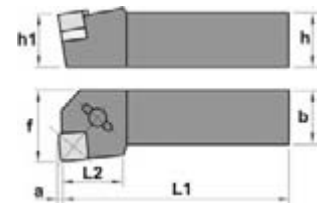
● CSXN - CX 85°

		h	b	L1	L2	f	a	Insert
Ref.	CSXN ^{R/L} 2525 M12 - 7CX	25	25	150	30	32	1.03	SNGN 1207
	3225 P12 - 7CD	32	25	170	30	32	1.03	
	2525 M15 - CD	25	25	150	33	32	1.38	SNGN 1507
	3225 P15 - CD	32	25	170	33	32	1.38	
								
Parts	CSXN ^{R/L} 2525 M12 - 7CX	2415			ISSN 432		1160	LW-4
	ISSN 432							
	3225 P12 - 7CD				ISSN 533		1180	
	2525 M15 - CD							
	3225 P15 - CD							

	SNG.	d / l	s	SNGN	SNGX
Ref.	SNG..1204	12.7	4.76		
	SNG..1207	12.7	7.94		
	SNG..1507	15.875	7.94		

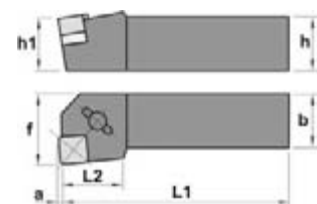
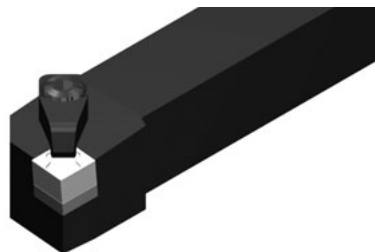


Tool Holders for Ceramic Insert



● CSYN - 85°

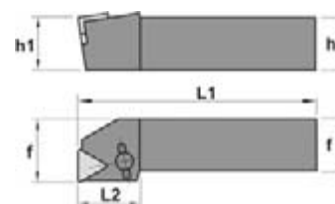
		h	b	L1	L2	f	h1	Insert		
Ref.	CSYN ^{R/L} 2020 K12	20	20	125	30	25	20	SNGN 1204	SNGN 1207	
	2520 M12	25	20	150	30	25	25			
	2525 M12	25	25	150	30	32	25			
	3225 P12	32	25	170	30	32	32	SNGN 1507		
	2525 M15 - CD	25	25	150	27	32	25			
	3225 P15 - CD	32	25	170	27	32	32			
										
		Clamp	Clamping screw							
Parts	CSYN ^{R/L} 2020 K12	CC08M	BS0829W		-	ASN423 ASN433	M3×12	LW-4	SR08	
	2520 M12		BS0835W							
	2525 M12									
	3225 P12				ISSN 533	1180				
	2525 M15 - CD	2417							9414	
	3225 P15 - CD									



● CSYN - CX 85°

		h	b	L1	L2	f	a	Insert
Ref.	CSYN ^{R/L} 2525 M12 - 7CX	25	25	150	27	32	1.03	SNGX 1207
	3225 P12 - 7CX	32	25	170	27	32	1.03	SNGX 1207
	2525 M15 - CX	25	25	150	27	32	1.38	SNGX 1507
	3225 P15 - CX	32	25	170	27	32	1.38	
	   							
Parts	CSYN ^{R/L} 2525 M12 - 7CX	2415			ISSN 432		1160	LW-4
	3225 P12 - 7CX							
	2525 M15 - CX				ISSN 533	1180		
	3225 P15 - CX							

		SNG.		d / l	s	SNGN	SNGX
Ref.		SNG..1204	12.7	4.76			
		SNG..1207	12.7	7.94			
		SNG..1507	15.875	7.94			

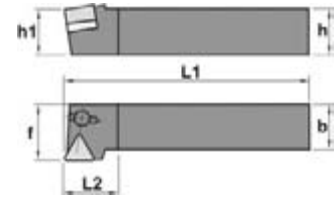


● CTFN - 90°

		h	b	L1	L2	f	h1	Insert		
Ref.	CTFN ^{R/L} 2020 K16	20	20	125	25	25	20	TNGN 1604	TNGN 1607	
	2520 M16	25	20	150	25	25	25			
	2525 M16	25	25	150	28	32	25			
	3225 P16	32	25	170	28	32	32			
										
Parts	CTFN ^{R/L} 2020 K16	CC08MS	BS0829W		-	ATN323 ATN333	M3×12	LW-4	SR08	
	2520 M16									
	2525 M16		BS0835W							
	3225 P16									

	TNG.		l	d	s	TNGN
	Ref.	TNGN..1604	16.5	9.525	4.76	
		TNGN..1607	16.5	9.525	7.94	

Tool Holders for Ceramic Insert



● CTGN - 90°

Ref.		h	b	L1	L2	f	h1	Insert		
	CTGN ^{R/L} 2020 K16	20	20	125	25	25	20	TNGN 1604	TNGN 1607	
	2520 M16	25	20	150	25	25	25			
	2525 M16	25	25	150	25	32	25			
	3225 P16	32	25	170	25	32	32			
 Clamp		 Clamping screw								
Parts	CTGN ^{R/L} 2020 K16	CC08MS	BS0829W		-	ATN323 ATN333	M3×12	LW-4	SR08	
	2520 M16									
	2525 M16	CC08M	BS0835W							
	3225 P16									



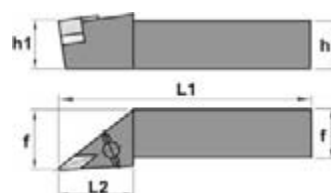
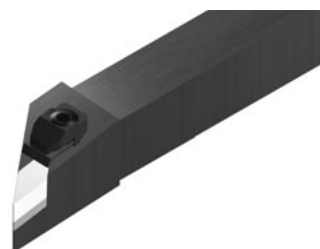
Clamp



Clamping screw

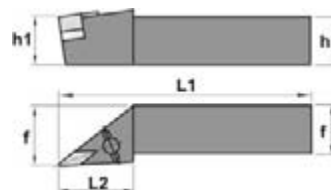
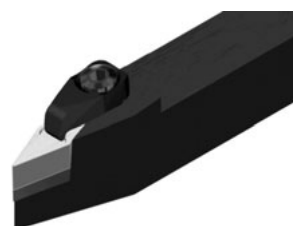


	TNG.		l	d	s	TNGN
	Ref.	TNGN..1604	16.5	9.525	4.76	
		TNGN..1607	16.5	9.525	7.94	
		Ref.				



● CVJN - 93°

		$h=h_1$	b	L_1	L_2	f	Insert
Ref.	CVJN ^{R/L} 2525 M16 - 4CD	25	25	150	41	32	VNGN 1604
	2525 M16 - 7CD	25	25	150	41	32	VNGN 1607
	3225 P16 - 4CD	32	25	170	41	32	VNGN 1604
	3225 P16 - 7CD	32	25	170	41	32	VNGN 1607
Parts	CVJN ^{R/L} 2525 M16 - 4CD	2417	9414	IVSN 342	1150	LW-4	    
	2525 M16 - 7CD						
	3225 P16 - 4CD						
	3225 P16 - 7CD						

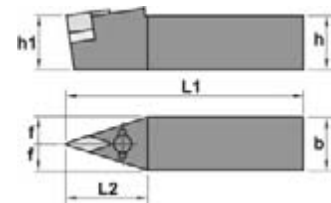
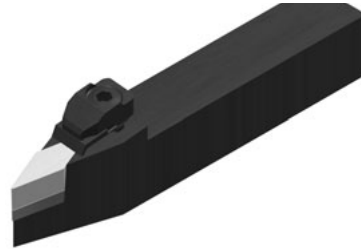


● CVJN - CX 93°

		$h=h_1$	b	L_1	L_2	f	Insert
Ref.	CVJN ^{R/L} 2525 M16 - 7CX	25	25	150	41	32	VNGX 1607
	3225 P16 - 7CX	32	25	170	41	32	VNGX 1607
Parts	CVJN ^{R/L} 2525 M16 - 7CX	2428	IVSN 322	1150	LW-4		   
	3225 P16 - 7CX						

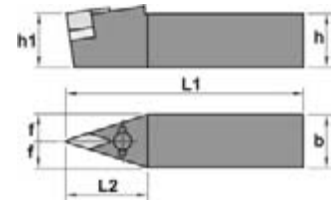
	VNG.		l	d	s	VNGN	VNGX
	Ref.	VNG..1604	16.5	9.525	4.76		
		VNG..1607	16.5	9.525	7.94		

Tool Holders for Ceramic Insert



● CVVN - 62.5°

		h=h1	b	L1	L2	f	Insert
Ref.	CVVN ^{R/L} 2525 M16 - 4CD	25	25	150	45	12.5	VNGN 1604
	2525 M16 - 7CD	25	25	150	45	12.5	VNGN 1607
	3225 P16 - 4CD	32	25	170	45	12.5	VNGN 1604
	3225 P16 - 7CD	32	25	170	45	12.5	VNGN 1607
Parts	CVVN ^{R/L} 2525 M16 - 4CD	2417	9416	IVSN 342	1150	LW-4	
	2525 M16 - 7CD						
	3225 P16 - 4CD						
	3225 P16 - 7CD						

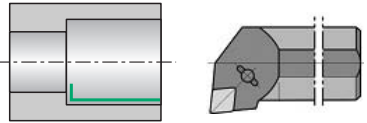
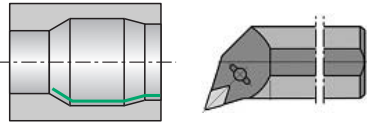
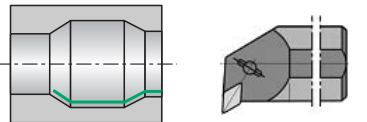
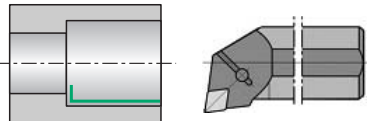
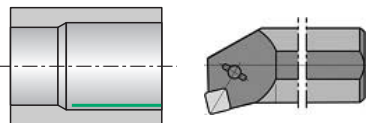
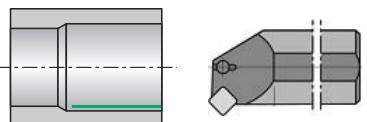
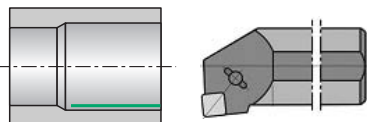


● CVVN - CX 62.5°

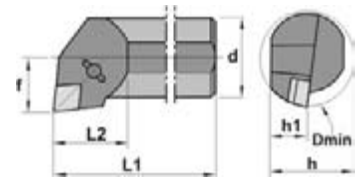
		h=h1	b	L1	L2	f	Insert
Ref.	CVJN ^{R/L} 2525 M16 - 7CX	25	25	150	41	32	VNGX 1607
	3225 P16 - 7CX	32	25	170	41	32	VNGX 1607
Parts	CVJN ^{R/L} 2525 M16 - 7CX	2428	IVSN 322	1150	LW-4		
	3225 P16 - 7CX						

	VNG.		l	d	s	VNGN	VNGX
	Ref.	VNG..1604	16.5	9.525	4.76		
		VNG..1607	16.5	9.525	7.94		

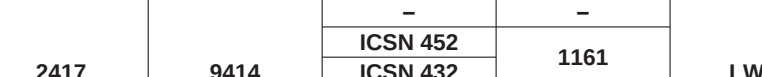


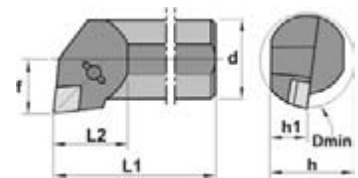
Item-No.	Angle	Shape	Page
CCLN	95°		74
CDQN	107.5		75·76
CDUN	93°		76
CELN	97.5°		77
CSKN	75°		78
CSSN	45°		79
CSYN	85°		80

Boring Bars for Ceramic Insert



● CCLN - 95°

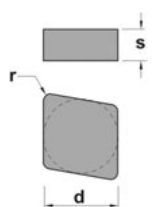
		Dmin	d	h1	L1	L2	f	h	Insert	
Ref.	S32S CCLN ^{R/L} 12 - 7CD	40	32	15.0	250	40	22	30	CNGN 1207..	
	S40T CCLN ^{R/L} 12 - 4CD	70	40	18.5	300	35	27	37	CNGN 1204..	
	S40T CCLN ^{R/L} 12 - 7CD	70	40	18.5	300	35	27	37	CNGN 1207..	
	S50U CCLN ^{R/L} 12 - 4CD	70	50	23.5	350	38	32	47	CNGN 1204..	
	S50U CCLN ^{R/L} 12 - 7CD	70	50	23.5	350	38	32	47	CNGN 1207..	
										
Parts	S32S CCLN ^{R/L} 12 - 7CD	2417		9414		-		-	LW-4	
	S40T CCLN ^{R/L} 12 - 4CD					ICSN 452		1161		
	S40T CCLN ^{R/L} 12 - 7CD					ICSN 432				
	S50U CCLN ^{R/L} 12 - 4CD					ICSN 452		1160		
	S50U CCLN ^{R/L} 12 - 7CD					ICSN 432				

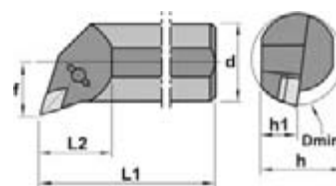


● CCLN - CX 95°

		Dmin	d	h1	L1	L2	f	h	Insert
Ref.	S32S CCLN ^{R/L} 12 - 7CX	40	32	15.0	250	40	22	30	CNGX 1207..
	S40T CCLN ^{R/L} 12 - 7CX	70	40	18.5	300	35	27	37	CNGX 1207..
	S50U CCLN ^{R/L} 12 - 7CX	70	50	23.5	350	38	32	47	CNGX 1207..
Parts	S32S CCLN ^{R/L} 12 - 7CX	2415				-		-	LW-4
	S40T CCLN ^{R/L} 12 - 7CX					ICSN 432		1161	
	S50U CCLN ^{R/L} 12 - 7CX					ICSN 432		1160	

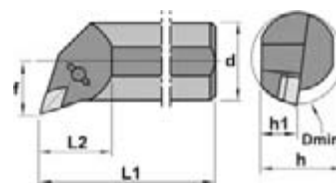
CNG.		d	s	CNGN	CNGX
Ref.	CNG..1204	12.7	4.76		
	CNG..1207	12.7	7.94		





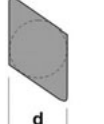
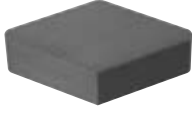
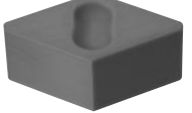
● CDQN - 107.5°

		Dmin	d	h1	L1	L2	f	h	Insert	
Ref.	S32S CDQN ^{R/L} 12 - 7CD	50	32	15.0	250	40	22	30	DNGN 1207..	
	S40T CDQN ^{R/L} 12 - 4CD	70	40	18.5	300	35	27	37	DNGN 1204..	
	S40T CDQN ^{R/L} 12 - 7CD	70	40	18.5	300	35	27	37	DNGN 1207..	
	S50U CDQN ^{R/L} 15 - 4CD	70	50	23.5	350	38	32	47	DNGN 1504..	
	S50U CDQN ^{R/L} 15 - 7CD	70	50	23.5	350	38	32	47	DNGN 1507..	
		    								
Parts	S32S CDQN ^{R/L} 12 - 7CD	2413		9414	-		-		1230	LW-4
	S40T CDQN ^{R/L} 12 - 4CD				3719					
	S40T CDQN ^{R/L} 12 - 7CD				3710					
	S50U CDQN ^{R/L} 15 - 4CD	2417			IDSN 452				1160	
	S50U CDQN ^{R/L} 15 - 7CD				IDSN 432					

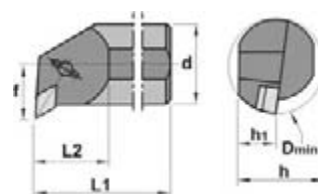


● CDQN - CX 107.5°

		Dmin	d	h1	L1	L2	f	h	Insert
Ref.	S32S CDQN ^{R/L} 12 - 7CX	50	32	15.0	250	40	22	30	DNGX 1207..
	S40T CDQN ^{R/L} 12 - 7CX	70	40	18.5	300	35	27	37	DNGX 1207..
	S50U CDQN ^{R/L} 15 - 7CX	70	50	23.5	350	38	32	47	DNGX 1507..
									
Parts	S32S CDQN ^{R/L} 12 - 7CX	2415		-		-		LW-4	
	S40T CDQN ^{R/L} 12 - 7CX			3710		1230			
	S50U CDQN ^{R/L} 15 - 7CX			IDSN 432		1160			

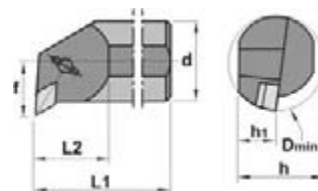
 	DNG.		d	s	DNGN		DNGX	
	Ref.	DNG..1204	10.7	4.76				
		DNG..1207	10.7	7.94				
		DNG..1507	12.7	7.94				

Boring Bars for Ceramic Insert



● CDQN - 107.5°

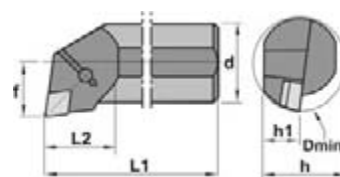
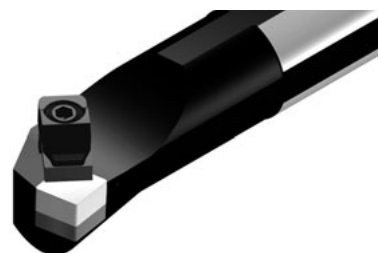
		Dmin	d	h1	L1	L2	f	h	Insert
Ref.	S32S CDUN ^{R/L} 12 - 7CD	40	32	15.0	250	40	22	30	DNGN 1207..
	S40T CDUN ^{R/L} 12 - 4CD	70	40	18.5	300	50	27	37	DNGN 1204..
	S40T CDUN ^{R/L} 12 - 7CD	70	40	18.5	300	50	27	37	DNGN 1207..
	S50U CDUN ^{R/L} 15 - 4CD	70	50	23.5	350	50	32	47	DNGN 1504..
	S50U CDUN ^{R/L} 15 - 7CD	70	50	23.5	350	50	32	47	DNGN 1507..
									
Parts	S32S CDUN ^{R/L} 12 - 7CD	2413	9414		-		-		LW-4
	S40T CDUN ^{R/L} 12 - 4CD				3719	1230			
	S40T CDUN ^{R/L} 12 - 7CD								
	S50U CDUN ^{R/L} 15 - 4CD	2417			IDSN 452	1160			
	S50U CDUN ^{R/L} 15 - 7CD				IDSN 432				



● CDUN - CX 93°

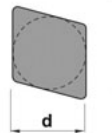
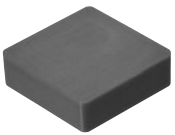
		Dmin	d	h1	L1	L2	f	h	Insert
Ref.	S32S CDUN ^{R/L} 12 - 7CX	40	32	15.0	250	40	22	30	DNGX 1207..
	S40T CDUN ^{R/L} 12 - 7CX	70	40	18.5	300	50	27	37	DNGX 1207..
	S50U CDUN ^{R/L} 15 - 7CX	70	50	23.5	350	50	32	47	DNGX 1507..
Parts	S32S CDUN ^{R/L} 12 - 7CX	2415				-	-	1230	LW-4
	S40T CDUN ^{R/L} 12 - 7CX								
	S50U CDUN ^{R/L} 15 - 7CX								

	DNG.		d	s	DNGN	DNGX
	Ref.	DNG..1204	10.7	4.76		
		DNG..1207	10.7	7.94		
		DNG..1507	12.7	7.94		

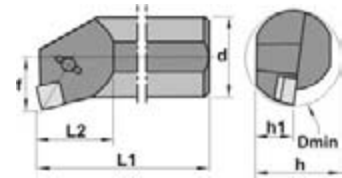


● CELN - 97.5°

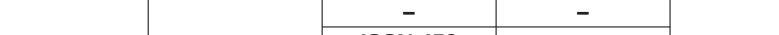
		Dmin	d	h1	L1	L2	f	h	Insert
Ref.	S40T CELN ^{R/L} 13 - CD	50	40	18.5	300	32	27	37	ENGN 1307..
	S50U CELN ^{R/L} 13 - CD	63	50	23.5	350	32	35	47	ENGN 1307..
		    							
Parts	S40T CELN ^{R/L} 13 - CD	2417		9414		IESN 432		1161	LW-4
	S50U CELN ^{R/L} 13 - CD					IESN 432		1160	

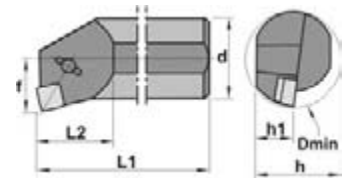
 	ENG.		d	s	ENGN
	Ref.	ENG..1307	12.7	7.94	

Boring Bars for Ceramic Insert



● CSKN - 75°

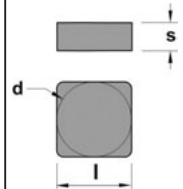
		Dmin	d	h1	L1	L2	f	h	Insert	
Ref.	S32S CSKN ^{R/L} 12 - 7CD	40	32	15.0	250	40	22	30	SNGN 1207..	
	S40T CSKN ^{R/L} 12 - 4CD	70	40	18.5	300	67	27	37	SNGN 1204..	
	S40T CSKN ^{R/L} 12 - 7CD	70	40	18.5	300	67	27	37	SNGN 1207..	
	S50U CSKN ^{R/L} 15 - 4CD	70	50	23.5	350	67	35	47	SNGN 1204..	
	S50U CSKN ^{R/L} 15 - 7CD	70	50	23.5	350	67	35	47	SNGN 1207..	
										
Parts	S32S CSKN ^{R/L} 12 - 7CD	2417		9414		-		-	LW-4	
	S40T CSKN ^{R/L} 12 - 4CD					ISSN 452		1161		
	S40T CSKN ^{R/L} 12 - 7CD					ISSN 432				
	S50U CSKN ^{R/L} 15 - 4CD					ISSN 452		1160		
	S50U CSKN ^{R/L} 15 - 7CD					ISSN 432				

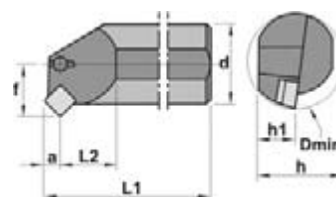
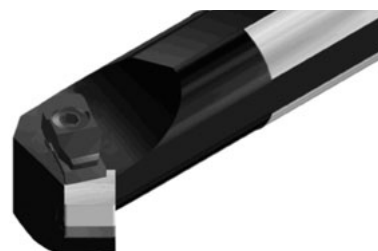


● CSKN - CX 75°

		Dmin	d	h1	L1	L2	f	h	Insert
Ref.	S32S CSKN ^{R/L} 12 - 7CX	40	32.	15.0	250	40	22	30	SNGX 1207..
	S40T CSKN ^{R/L} 12 - 7CX	70	40	18.5	300	67	27	37	SNGX 1207..
	S50U CSKN ^{R/L} 15 - 7CX	70	50	23.5	350	67	35	47	SNGX 1207..
Parts	S32S CSKN ^{R/L} 12 - 7CX	2415				-		-	LW-4
	S40T CSKN ^{R/L} 12 - 7CX					ISSN 432			
	S50U CSKN ^{R/L} 15 - 7CX					ISSN 432			

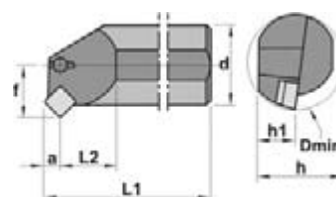
SNG.		d / l	s	SNGN	SNGX
Ref.	SNG..1204	12.7	4.76		
	SNG..1207	12.7	7.94		





● CSSN - 45°

		Dmin	d	h1	L1	L2	f	h	Insert
Ref.	S32S CSSN ^{R/L} 12 - 7CD	40	32	15.0	250	40	22	30	SNGN 1207..
	S40T CSSN ^{R/L} 12 - 4CD	70	40	18.5	300	50	27	37	SNGN 1204..
	S40T CSSN ^{R/L} 12 - 7CD	70	40	18.5	300	50	27	37	SNGN 1207..
	S50U CSSN ^{R/L} 15 - 4CD	70	50	23.5	350	50	32	47	SNGN 1507..
Parts	S32S CSSN ^{R/L} 12 - 7CD	2417	9414	-	-	-	-	-	LW-4
	S40T CSSN ^{R/L} 12 - 4CD								
	S40T CSSN ^{R/L} 12 - 7CD								
	S50U CSSN ^{R/L} 15 - 4CD								

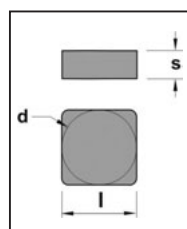


● CSSN - CX 45°

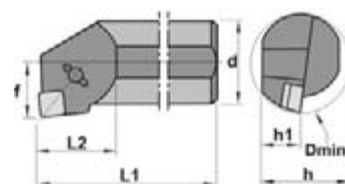
		Dmin	d	h1	L1	L2	f	h	Insert
Ref.	S32S CSSN ^{R/L} 12 - 7CX	40	32	15.0	250	40	22	30	SNGX 1207..
	S40T CSSN ^{R/L} 12 - 7CX	70	40	18.5	300	50	27	37	SNGX 1207..
Parts	S32S CSSN ^{R/L} 12 - 7CX	2415	-	-	-	-	-	-	LW-4
	S40T CSSN ^{R/L} 12 - 7CX								



	SNG.	s	d	SNGN	SNGX
Ref.	SNG..1204	12.7	4.76		
	SNG..1207	12.7	7.94		
	SNG..1207	15.875	7.94		

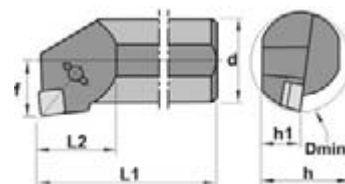


Boring Bars for Ceramic Insert



● CSYN - 85°

		Dmin	d	h1	L1	L2	f	h	Insert
Ref.	S32S CSYN ^{R/L} 12 - 7CD	40	32	15.0	250	40	22	30	SNGN 1207..
	S40T CSYN ^{R/L} 12 - 4CD	70	40	18.5	300	67	27	37	SNGN 1204..
	S40T CSYN ^{R/L} 12 - 7CD	70	40	18.5	300	67	27	37	SNGN 1207..
	S50U CSYN ^{R/L} 15 - 4CD	70	50	23.5	350	67	35	47	SNGN 1204..
	S50U CSYN ^{R/L} 12 - 7CD	70	50	23.5	350	67	35	47	SNGN 1207..
Parts	S32S CSKN ^{R/L} 12 - 7CD	2417	9414			-	-	-	LW-4
	S40T CSKN ^{R/L} 12 - 4CD								
	S40T CSKN ^{R/L} 12 - 7CD								
	S50U CSKN ^{R/L} 15 - 4CD								
	S50U CSKN ^{R/L} 15 - 7CD								

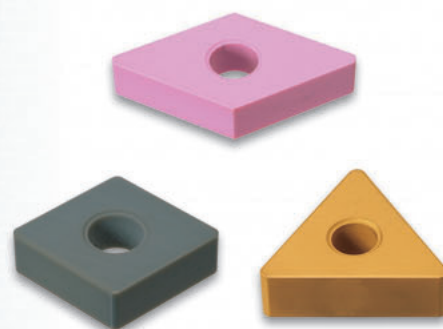
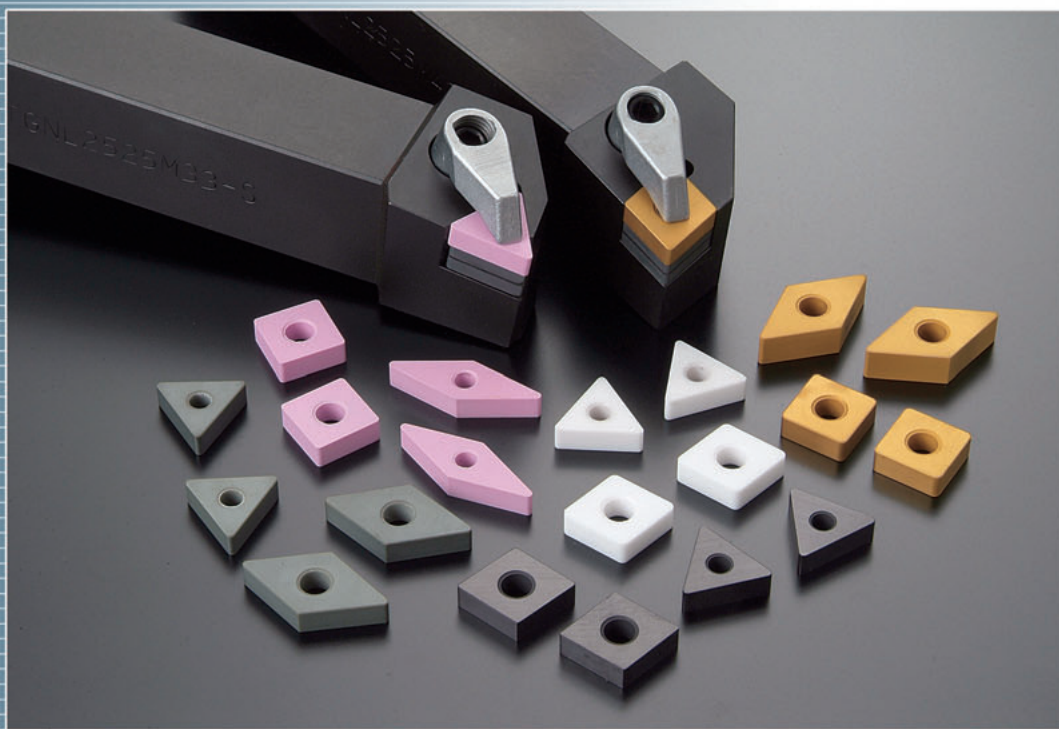


● CSYN - CX 85°

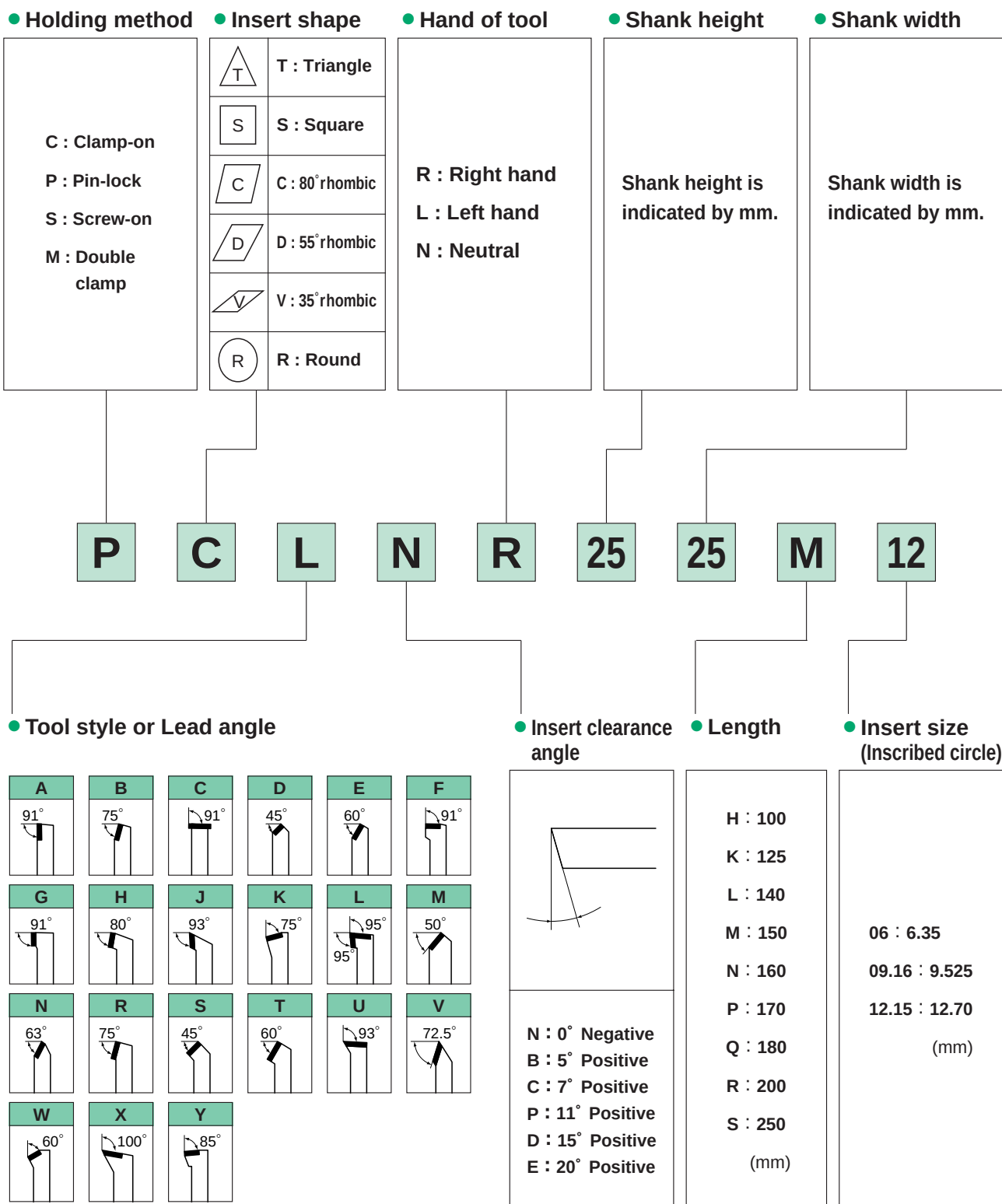
		Dmin	d	h1	L1	L2	f	h	Insert
Ref.	S32S CSYN ^{R/L} 12 - 7CX	40	32	15.0	250	40	22	30	SNGX 1207..
	S40T CSYN ^{R/L} 12 - 7CX	70	40	18.5	300	67	27	37	SNGX 1207..
	S50U CSYN ^{R/L} 12 - 7CX	70	50	23.5	350	67	35	47	SNGX 1207..
Parts	S32S CSKN ^{R/L} 12 - 7CX	2415			-	-	-	-	LW-4
	S40T CSKN ^{R/L} 12 - 7CX								
	S50U CSKN ^{R/L} 15 - 7CX								

	SNG.	d / l	s	SNGN	SNGX
	SNG..1204	12.7	4.76		
	SNG..1207	12.7	7.94		
Ref.					

Outside Machining Holders

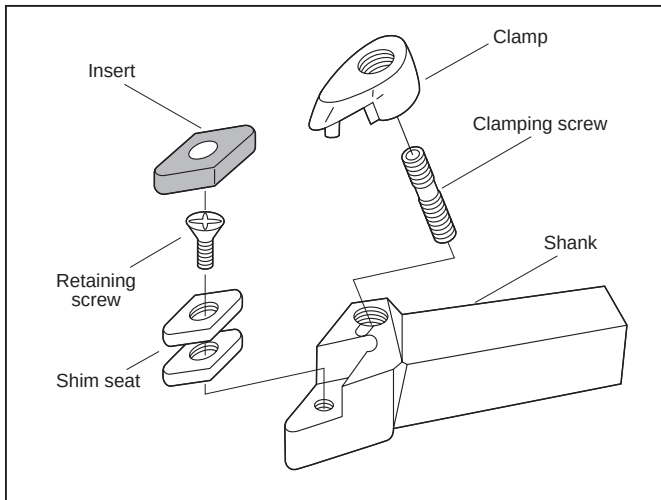


Tool Holder Identification System

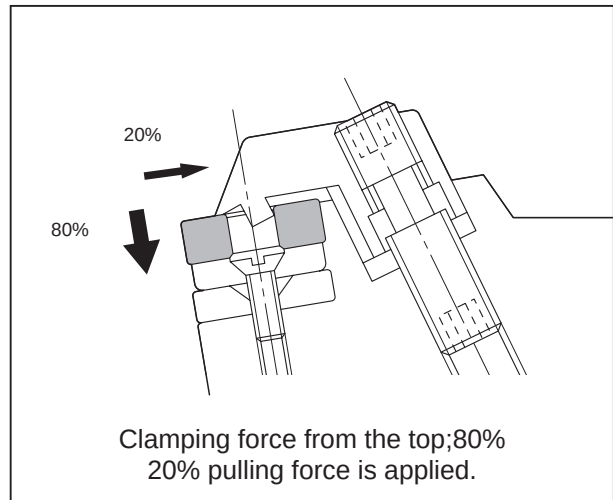


Structure and Features of Double-clamp Toolholders

● Structure



● Mechanism

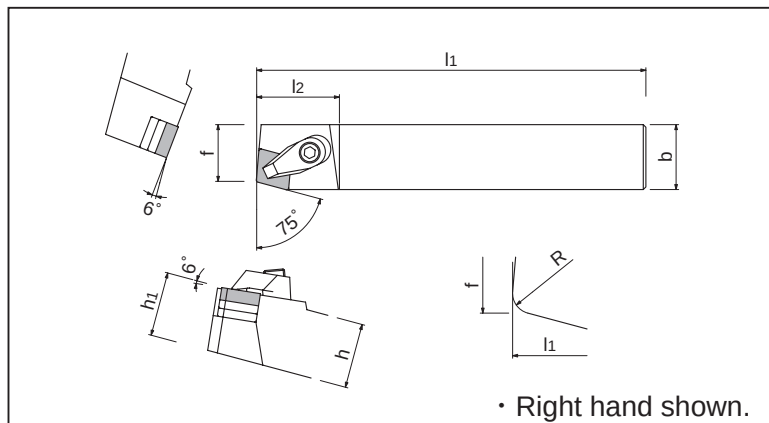
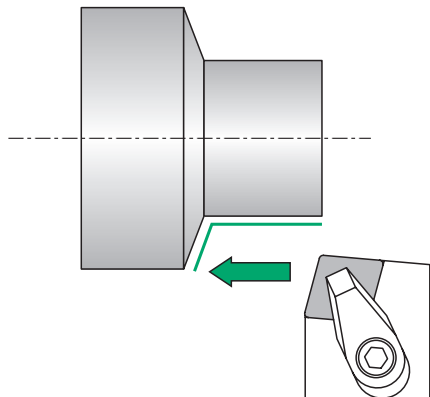


● List of Toolholder

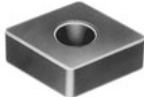
Double clamp type	MCBN (P.84) 	MCLN (P.84) 	MDJN (P.85) 	MDPN (P.85)
	MDQN (P.86) 	MSBN (P.86) 	MSDN (P.87) 	MSSN (P.87)
	MTFN (P.88) 	MTGN (P.88) 	MVJN (P.89) 	MVQN (P.89)
	MVVN (P.90) 			

Double-clamp Tool Holder

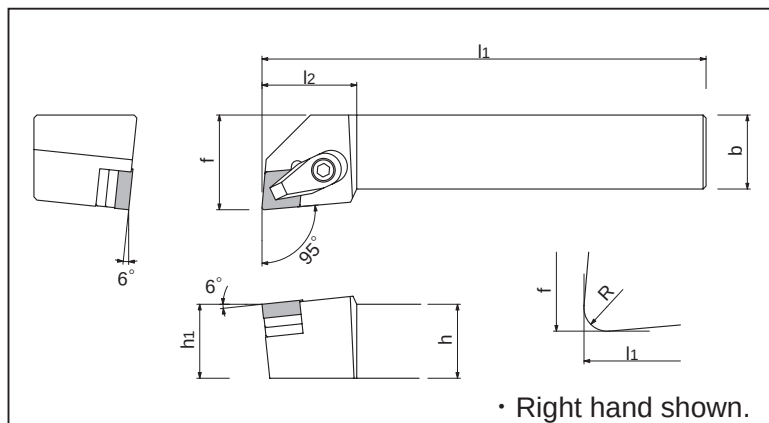
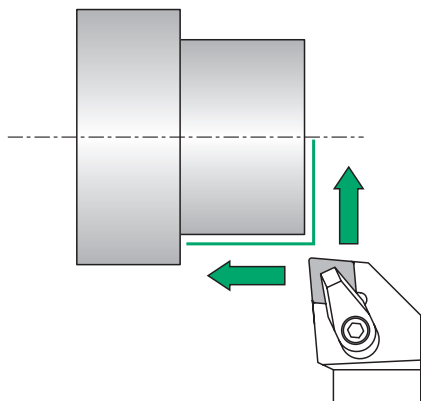
MCBN



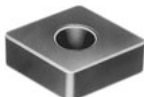
● Holder and Applicable Inserts

Toolholder	Stock		Dimensions (mm)						Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂		
MCBN ^{R/L} 2525M12 3225P12 3232P12	●	●	25	25	150	25	22	32	CNGA1204	CNGA1207
			32	25	170	32	22	32		
			32	32	170	32	29	32		

MCLN



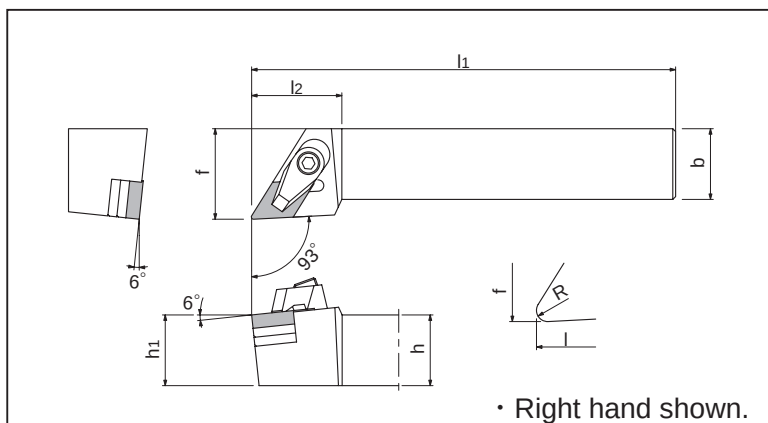
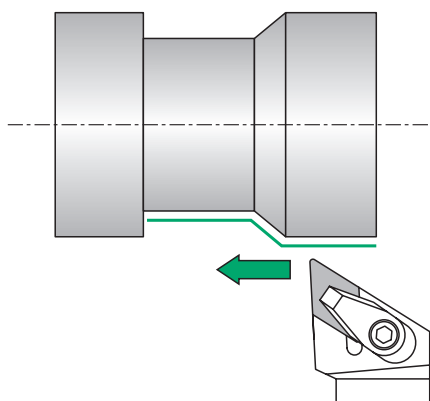
● Holder and Applicable Inserts

Toolholder	Stock		Dimensions (mm)						Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂		
MCLN ^{R/L} 2525M12 3225P12 3232P12	●	●	25	25	150	25	32	32	CNGA1204	CNGA1207
	●	●	32	25	170	32	32	32		
			32	32	170	32	39	32		

* Conform to master insert which has 0.8mm corner R.

• A holder comes with two shims. An insert 7.94 mm thick can likewise be mounted by removing one shim.

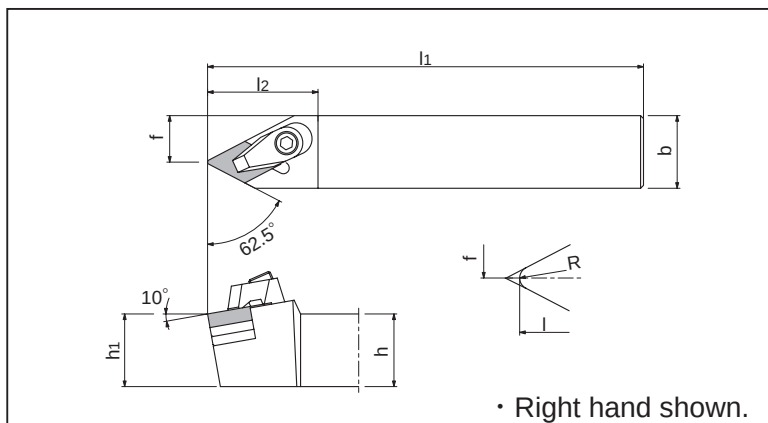
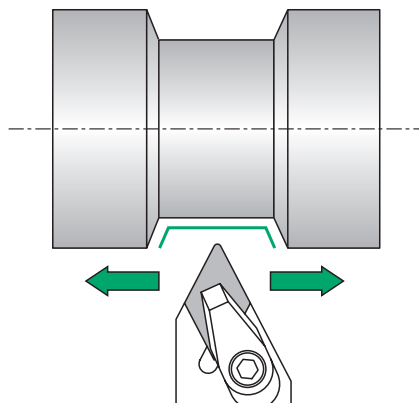
MDJN



• Holder and Applicable Inserts

Toolholder	Stock		Dimensions (mm)							Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂			
MDJN ^{R/L} 2525M15	●	●	25	25	150	25	32	32	DNGA1504	DNGA1507	
	●	●	32	25	170	32	32	32			
	●		32	32	170	32	39	32			

MDPN



• Holder and Applicable Inserts

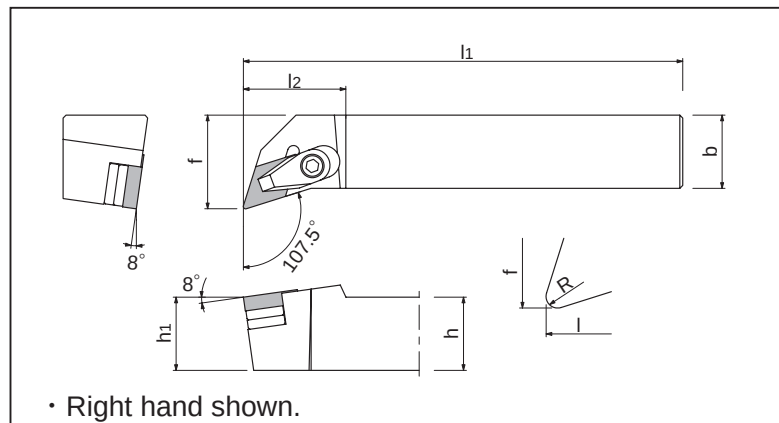
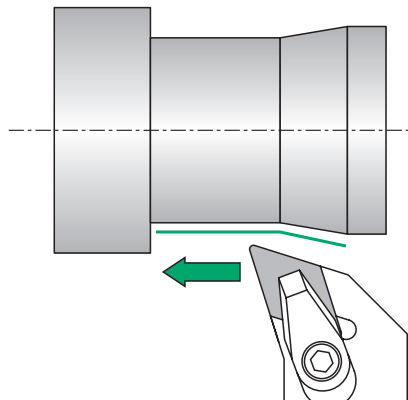
Toolholder	Stock		Dimensions (mm)							Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂			
MDPN ^{R/L} 2525M15	●	●	25	25	150	25	16	38	DNGA1504	DNGA1507	
	●		32	25	170	32	16	38			
	●		32	32	170	32	23	38			

* Conform to master insert which has 0.8mm corner R.

• A holder comes with two shims. An insert 7.94 mm thick can likewise be mounted by removing one shim.

Double-clamp Tool Holder

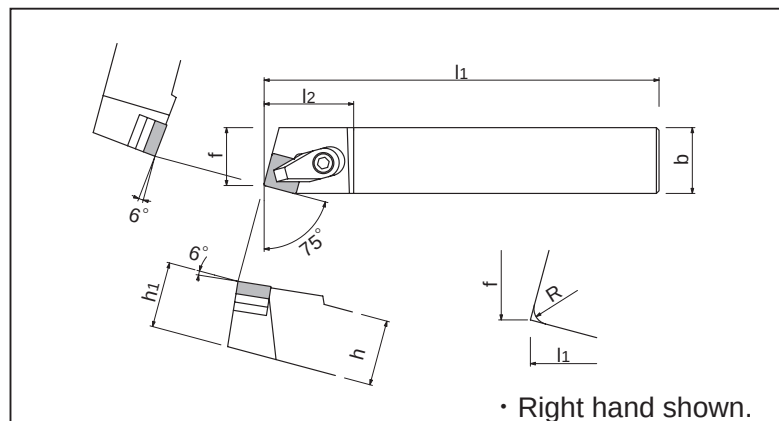
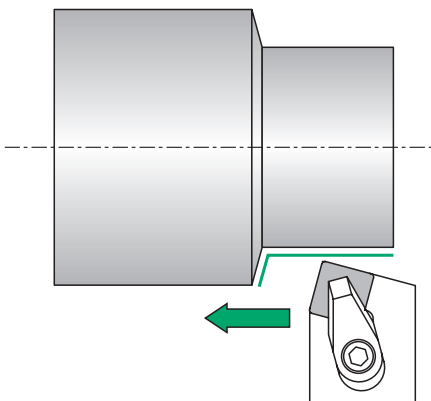
MDQN



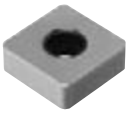
• Holder and Applicable Inserts

Toolholder	Stock		Dimensions (mm)						Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂		
MDQN ^{R/L}	●	●	25	25	150	25	32	35	DNGA1504	DNGA1507
			32	25	170	32	32	35		
			32	32	170	32	39	35		

MSBN



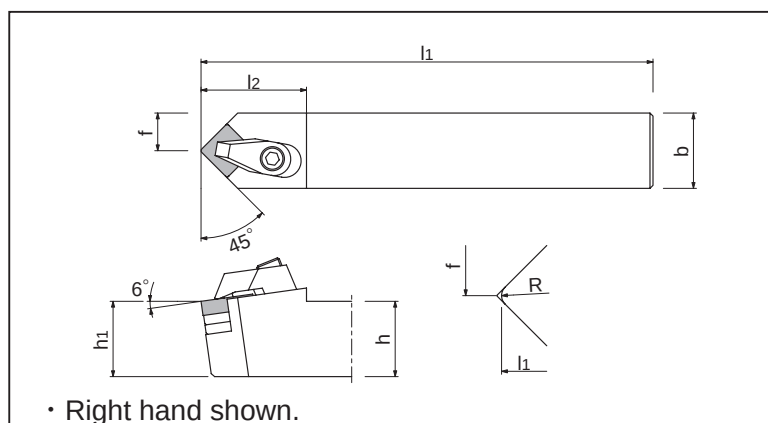
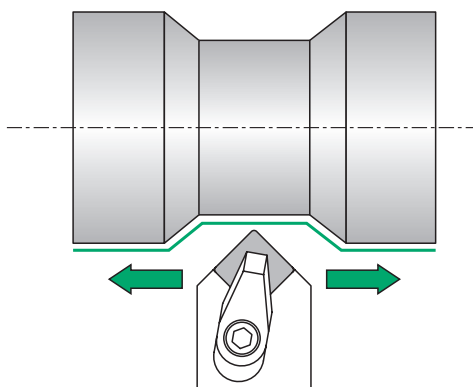
• Holder and Applicable Inserts

Toolholder	Stock		Dimensions (mm)						Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂		
MSBN ^{R/L}	●	●	25	25	150	25	22	34	SNGA1204	SNGA1207
	●	●	32	25	170	32	22	35		
			32	32	170	32	29	35		

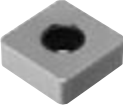
* Conform to master insert which has 0.8mm corner R.

• A holder comes with two shims. An insert 7.94 mm thick can likewise be mounted by removing one shim.

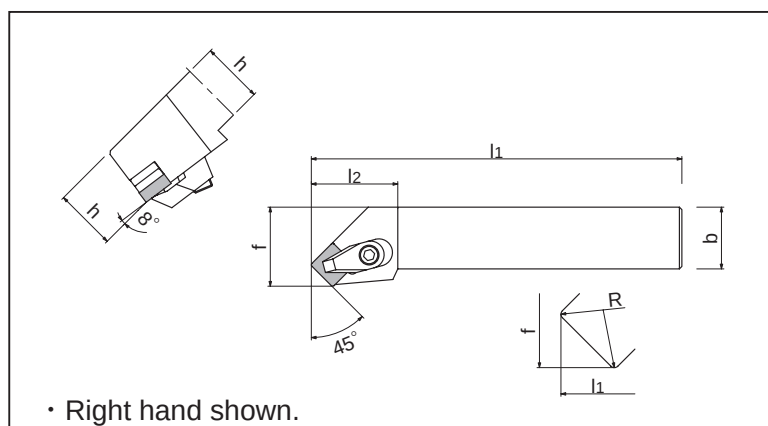
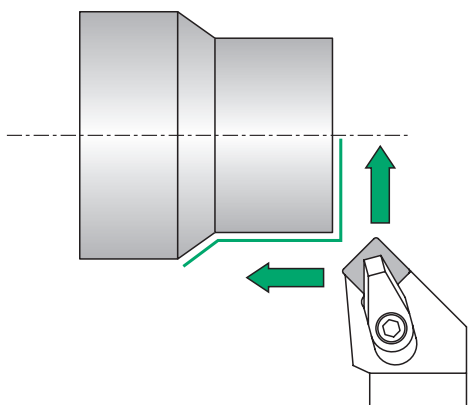
MSDN



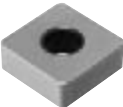
• Holder and Applicable Inserts

Toolholder	Stock	Dimensions (mm)						Insert	
		h	b	l ₁	h ₁	f	l ₂		
MSDNN 2525M12 3225P12 3232P12	●	25	25	150	25	2.5	35	SNGA1204□	SNGA1207
	○	32	25	170	32	12.5	35		
		32	32	170	321	16.0	35		

MSSN



• Holder and Applicable Inserts

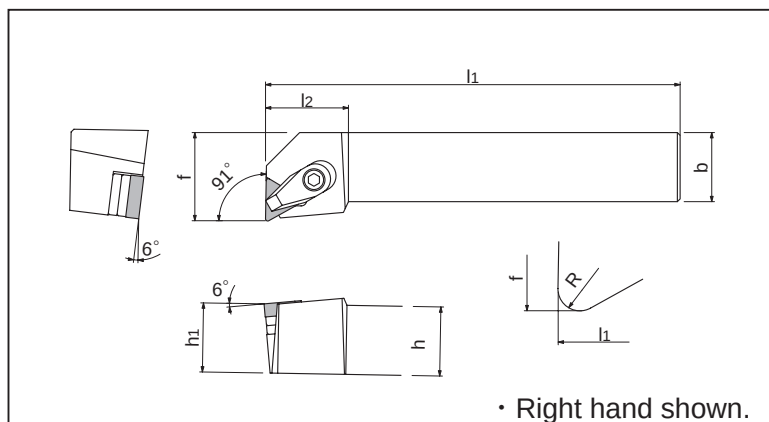
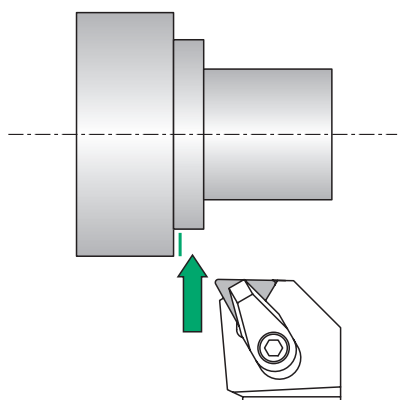
Toolholder	Stock		Dimensions (mm)						Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂		
MSSN ^{R/L} 2525M12 3225P12 3232P12	●	●	25	25	150	25	32	35	SNGA1204	SNGA1207
		●	32	25	170	32	32	35		
			32	32	170	32	39	35		

* Conform to master insert which has 0.8mm corner R.

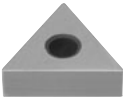
• A holder comes with two shims. An insert 7.94 mm thick can likewise be mounted by removing one shim.

Double-clamp Tool Holder

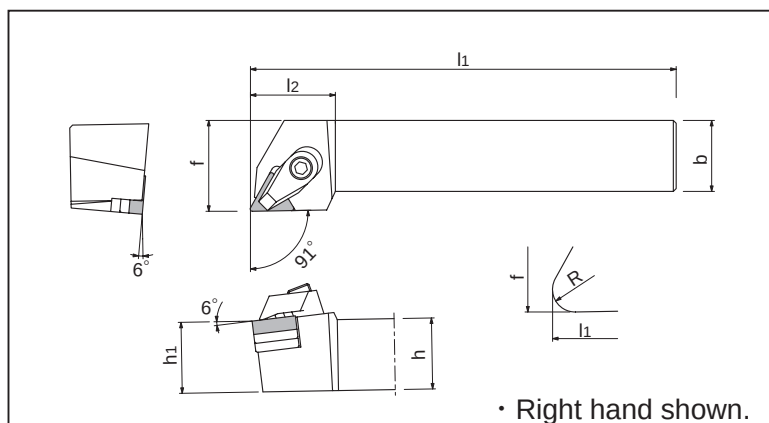
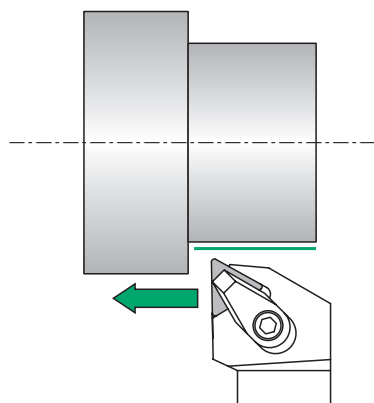
MTFN



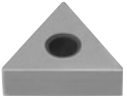
● Holder and Applicable Inserts

Toolholder	Stock		Dimensions (mm)						Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂		
MTFN ^{R/L} 2525M16 3225P16 3232P16	●	●	25	25	150	25	32	30	TNGA1604	TNGA1607
			32	25	170	32	32	30		
			32	32	170	32	39	30		

MTGN

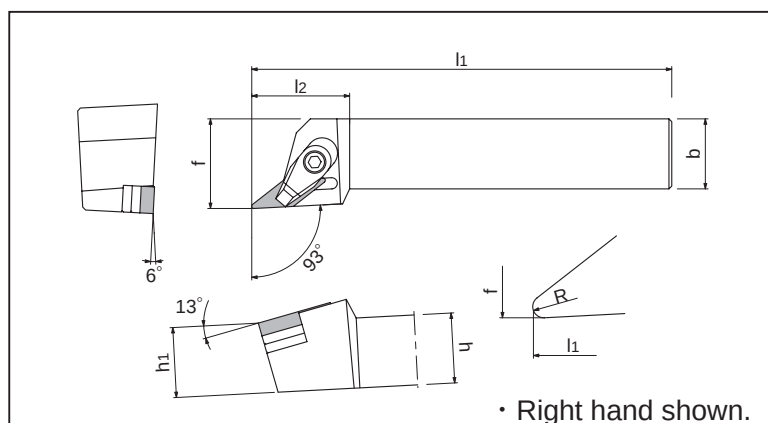
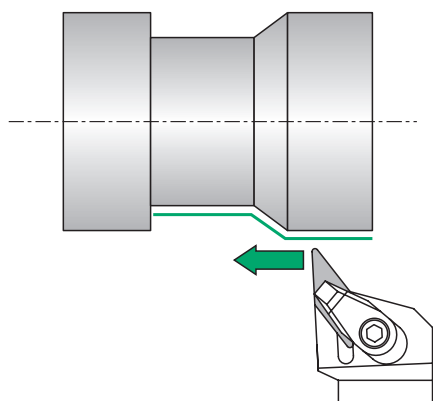


● Holder and Applicable Inserts

Toolholder	Stock		Dimensions (mm)						Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂		
MTGN ^{R/L} 2525M16 3225P16 3232P16	●	●	25	25	150	25	32	30	TNGA1604	TNGA1607
	●		32	25	170	32	32	30		
			32	32	170	32	39	30		

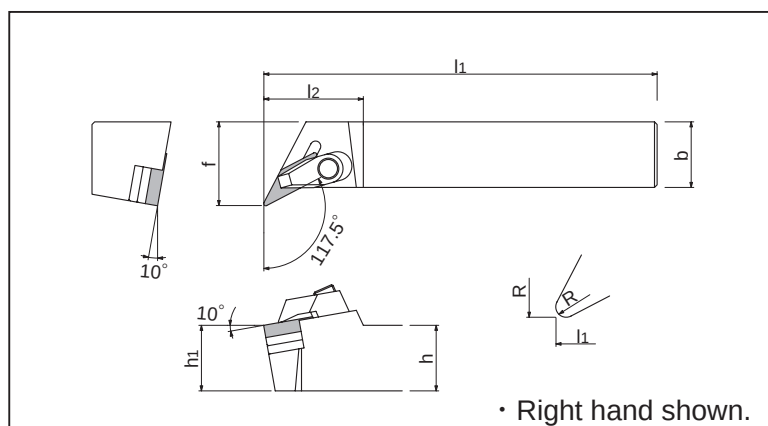
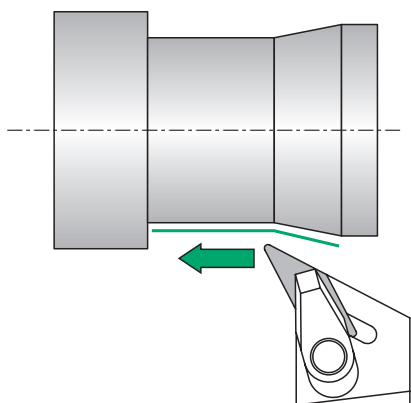
* Conform to master insert which has 0.8mm corner R.

• A holder comes with two shims. An insert 7.94 mm thick can likewise be mounted by removing one shim.

MVJN

• Holder and Applicable Inserts

Toolholder	Stock		Dimensions (mm)							Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂			
MVJN^{R/L} 2525M16 3225P16 3232P16	●	●	25	25	150	25	32	35	VNGA1604	VNGA1607	
			32	25	170	32	32	35			
			32	32	170	32	39	35			

MVQN

• Holder and Applicable Inserts

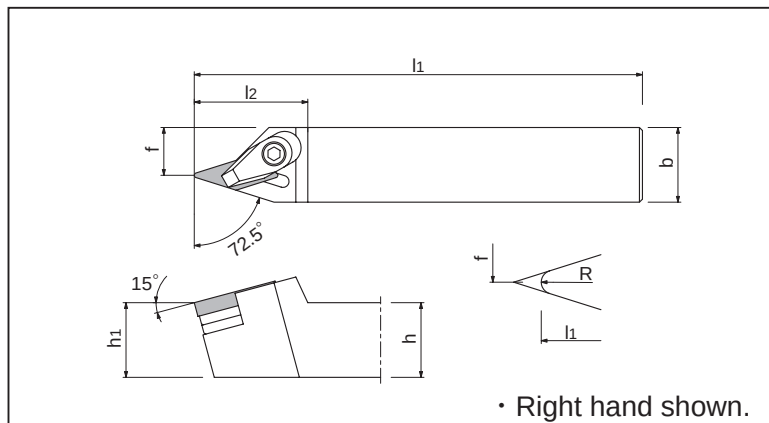
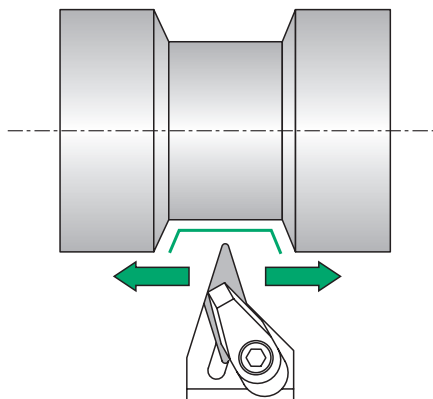
Toolholder	Stock		Dimensions (mm)							Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂			
MVQN^{R/L} 2525M16 3225P16 3232P16	●	●	25	25	150	25	32	38	VNGA1604	VNGA1607	
	●		32	25	170	32	32	38			
			32	32	170	32	39	38			

* Conform to master insert which has 0.8mm corner R.

• A holder comes with two shims. An insert 7.94 mm thick can likewise be mounted by removing one shim.

Double-clamp Tool Holder

MVVN



● Holder and Applicable Inserts

Toolholder	Stock		Dimensions (mm)						Insert	
	R	L	h	b	l ₁	h ₁	f	l ₂		
MVVN^{R/L} 2525M16 3225P16 3232P16	●	●	25	25	150	25	16	38	VNGA1604	VNGA1607
			32	25	170	32	16	38		
			32	32	170	32	23	38		

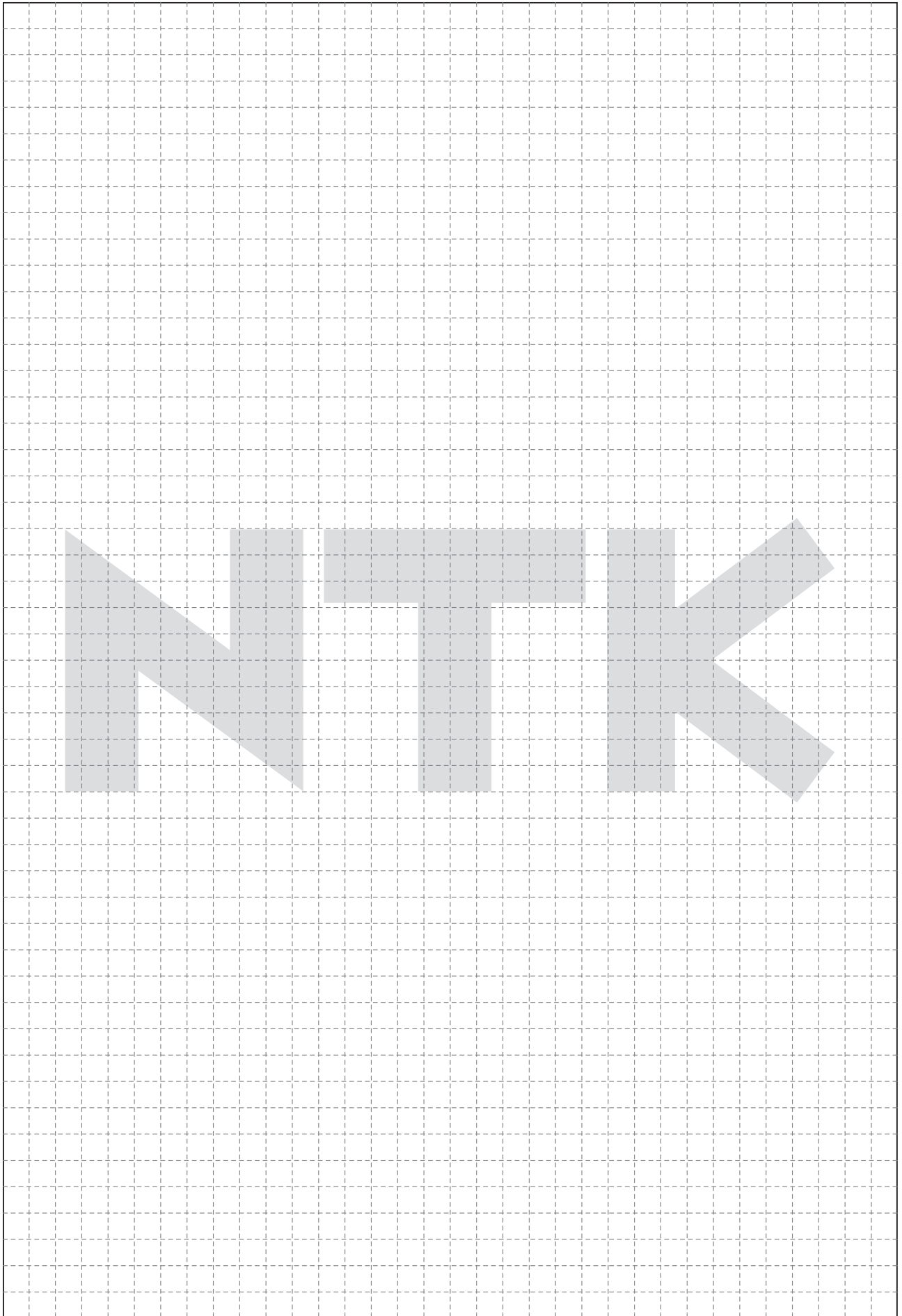
* Conform to master insert which has 0.8mm corner R.

• A holder comes with two shims. An insert 7.94 mm thick can likewise be mounted by removing one shim sheet.

● Parts

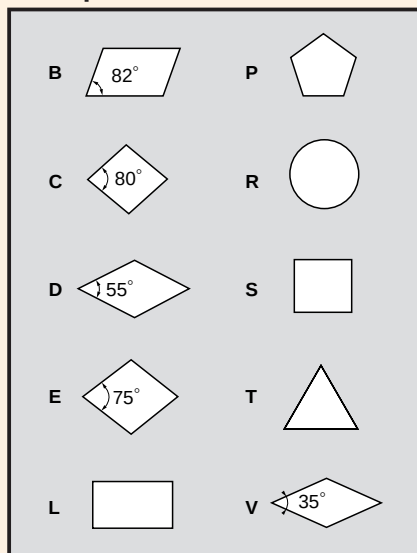
Parts	Clamp	Clamping screw	Shim	Shim screw	Wrench
Tool holder					
MCBN MCLN	CW8PC *(CW8NC)	WS0830	ACN422	M3×12	LW-4
MDJN MDPN MDQN			ADN422		
MSBN MSDN MSSN			ASN423		
MTFN MTGN			ATN323		
MVJN MVQN MVVN			AVN322		

* For inserts without hole use clamp CW8NC.



Insert Identification System

1 Shape



3 Tolerance Class

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	± 0.013	± 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

Inscribed Circle	M tolerance	
	d (mm)	m (mm)
6.35	± 0.05	± 0.08
9.525	± 0.05	± 0.08
12.7	± 0.08	± 0.13
15.875	± 0.10	± 0.15
19.05	± 0.10	± 0.15
25.40	± 0.13	± 0.18

D / K	d (mm)		m (mm)	
	d (mm)	m (mm)	d (mm)	m (mm)
6.35	± 0.05	± 0.11	± 0.05	± 0.11
9.525	± 0.05	± 0.11	± 0.05	± 0.11
12.7	± 0.08	± 0.15	± 0.08	± 0.15
15.875	± 0.10	± 0.15	± 0.10	± 0.15
19.05	± 0.10	± 0.18	± 0.10	± 0.18

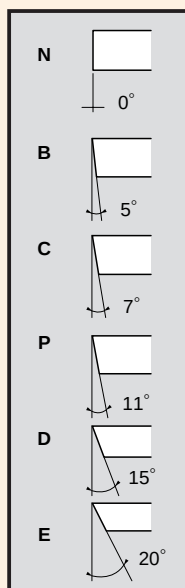
S

N

M

G

2 Clearances



4 Type

Type	Symbol		Type	Symbol
	≤ 6.35mm	Inscribed Circle (Including 7.94mm) ≤ 5.56mm		
(Rectangular)	N	E	(70°-90°)	H
(Notched)	F	L	(70°-90°)	B
(Notched)	R	S	(40°-60°)	T
(Notched)	A	D	(40°-60°)	W
(Notched)	G	K		
(Notched)	M	P		
Special design	X	X		

6 Thickness

Thick-ness S(mm)	Inch		Metric
	Normal ≥ 6.35(mm)	Small ≤ 5.556	
1.59	-	2	01
2.38		3	02
3.18	2	4	03
3.97		5	T3
4.76	3	6	04
5.56			05
6.35	4		06
7.94	5		07
9.52	6		09
12.70	8		12

5 Cutting Edge Length

Inscribed Circle (mm)	Inch		Metric						
	Normal series	Small-size series	C	D	R	S	T	T	V
3.97	–	5		04	03	06	T3		
4.76	–	6	04	05	04	08	04		
5.56	–	7	05	06	05	09	05	09	
6.35	2	(8)	06	07	06	11	06	11	
7.94	–	0	08	09	07	13	08	13	
9.525	3	–	09	11	09	16	09	16	
12.7	4	–	12	15	12	22	13	22	
15.875	5	–	16	19	15	27	16	27	
19.05	6	–	19	23	19	33	19	33	
22.23	7	–	22	27	22	38	22	38	
25.40	8	–	25	31	25	44	26	44	
31.75	03	–	32	38	31	54	32	54	

7 Nose Radius

Corner Radius	Inch	Metric
Round Insert		M0(※)
Sharp	0	00(※)
0.2	y	02
0.4	1	04
0.8	2	08
1.2	3	12
1.6	4	16
2.0	5	20
2.4	6	24
2.8	7	28
3.2	8	32

※M0 = Round insert (Metric)
※00 = Round insert (Inch)

12 04 12 T N - G

8 Edge Condition

Unhoned	(f)
Chamfered	T
Honed	E
Chamfered and Honed	S
Special Honed	K
Double chamfer	P

9 Left / Right / Neutral

Right	R
Left	L
Neutral	N

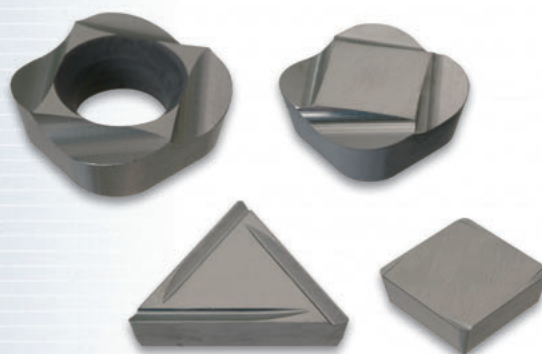
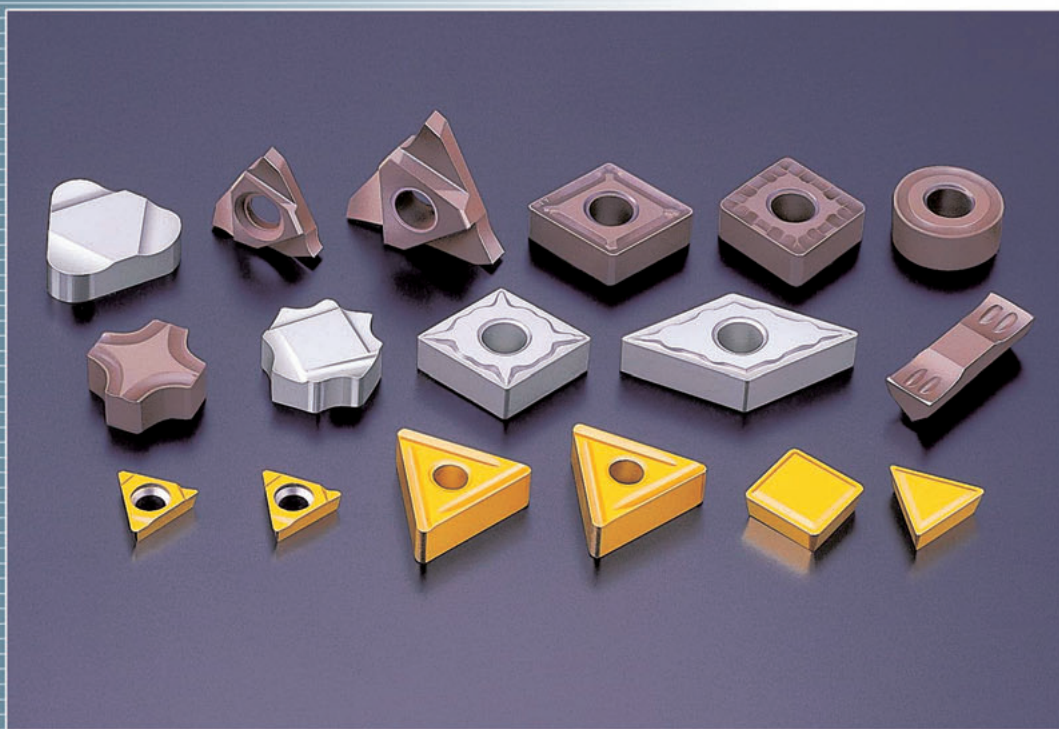
10 Chipbreakers

Symbol	W	ϕ°	
A	1.0	14	
B	1.5	14	
C	2.2	14	
D	2.8	10	
E	3.5	10	
Symbol	W		
N1	1.5		
N2	2.2		
Symbol	W		
P1	0.9		
P2	1.25		
Symbol	W		
F	1.5		
G	2.2		
H	2.8		

NTK

Cermet

PVD Coated Cermet



T3N·T15·C7X·N20·N40·Z15·Q15·C7Z

■ NTK Cermet

Our special manufacturing process increases heat resistance, wear resistance and fracture toughness.

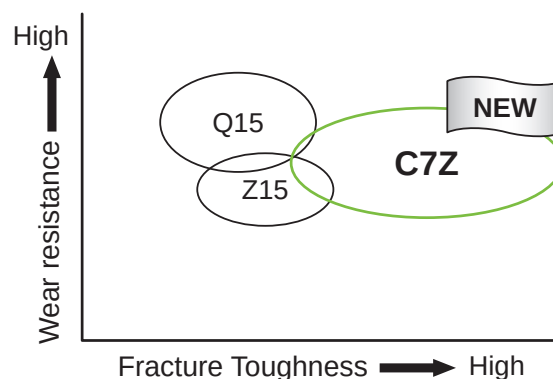
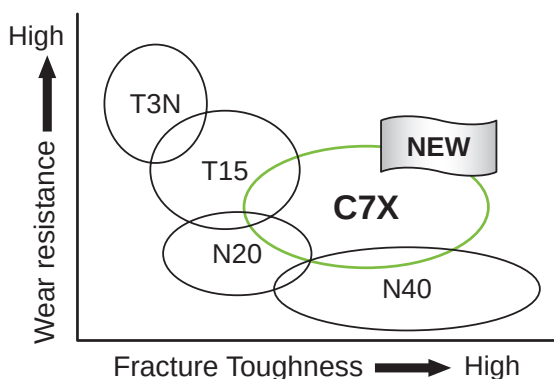
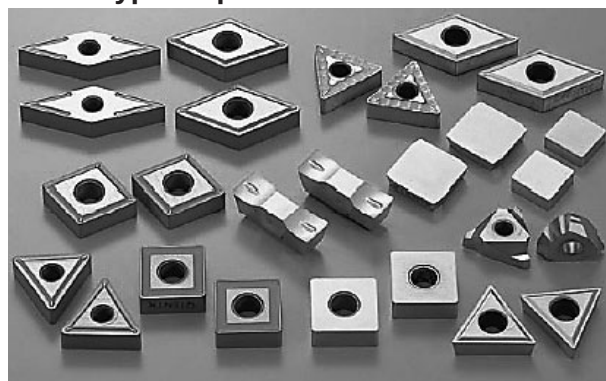
Improved surface finish.

Longer tool life for finish turning , grooving and threading.

Grade type map of cermets



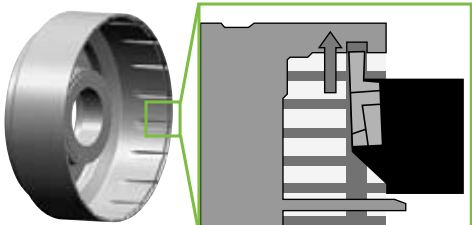
Grade type map of PVD Coated cermets

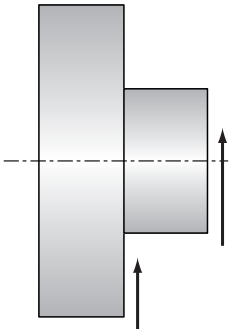
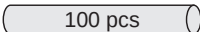


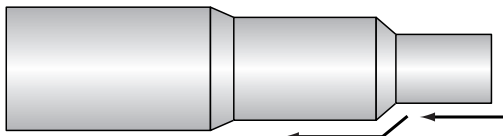
● Applications

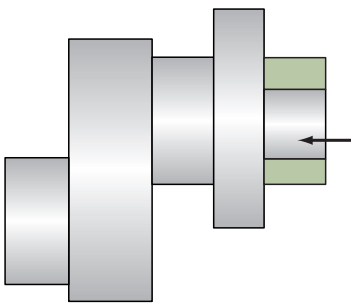
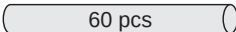
Material	General steel Carbon steel , Alloy steel					Stainless steel Stainless steel , Cast steel					Cast iron Gray cast iron , Ductile cast iron			
Cutting range	Finish ← → Rough					Finish ← → Rough					Finish ← → Rough			
range	P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30
Cermets	T3N					T3N					T3N			
	T15					T15					T15			
		C7X					C7X							
		N20			N40									
PVD Coated cermets	Q15					Z15					Q15			
		C7Z					Q15					Z15		

● Case Study

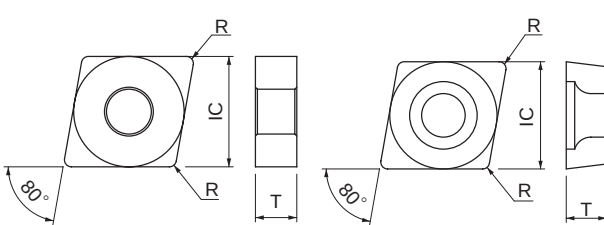
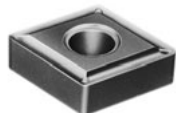
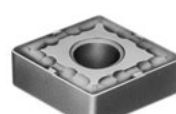
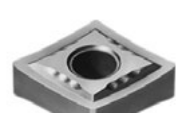
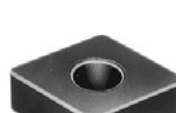
AT clutch		X10CrNiS18-9 Stainless Steel (Austenitic)	
Insert : Grooving insert			
			
Cutting speed (m/min)		270	
Feed (mm/rev)		0.02 -0.04	
Depth of cut (mm)		1.5	
Coolant		WET	
C7X		200 pcs	
Cermet		100 pcs	

Cover		C50 Carbon Steel	
Insert : CNMG120408-ENB-ZF1			
			
Cutting speed (m/min)		240	
Feed (mm/rev)		0.2	
Depth of cut (mm)		0.3 - 0.5	
Coolant		WET	
Q15		 200 pcs	
Cermet		 100 pcs	

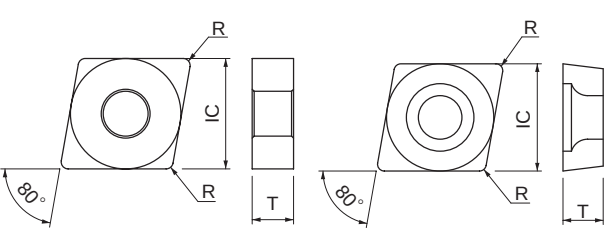
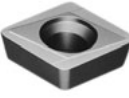
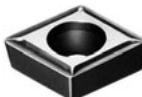
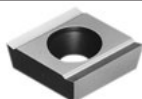
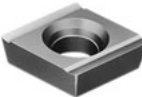
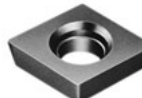
Shaft		C40 Carbon Steel	
Insert : DNMG 150404 ENBZF1			
			
Cutting speed (m/min)		200	
Feed (mm/rev)		0.2	
Depth of cut (mm)		0.3	
Coolant		WET	
N40		200 pcs	
Cermet		140 pcs	

Crank shaft		C50 Carbon Steel	
Insert : TPGH090204-TL--B2			
			
Cutting speed (m/min)		240	
Feed (mm/rev)		0.2	
Depth of cut (mm)		0.3 - 0.5	
Coolant		WET	
Q15			
Cermet			

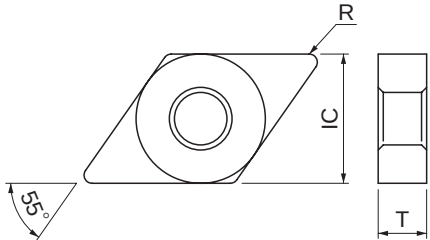
Cermet / PVD Coated Cermet

		Cermet					PVD Cermet	Dimensions (mm)			
Shape	Item	T3N	T15	N20	N40	C7X	Z15/Q15				C7Z
	CNMG 120404 ENB ZF1		●		●				12.70	4.76	0.4
	120408 ENB ZF1		●		●						0.8
	120412 ENB ZF1		●		●						1.2
	CNMG 120408 ENB ZW1		●		●				12.70	4.76	0.8
	120412 ENB ZW1		●		●						1.2
	CNGG 120404 ENB ZP								12.70	4.76	0.4
	120408 ENB ZP										0.8
	CNMG 120408 ENB ZP		●							12.70	4.76
	CNMG 120408 ENB WR				●				12.70	4.76	0.8
	CNMG 120408 ENB Z5								12.70	4.76	0.8
	CNMG 120404G		●		●				12.70	4.76	0.4
	120408G		●		●						0.8
	120412G		●		●						1.2
	CNGA 120408		●						12.70	4.76	0.8
	120412										1.2
	CNMA 120408									12.70	4.76

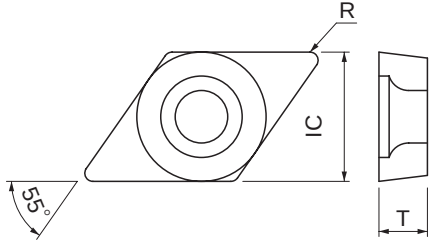
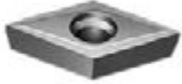
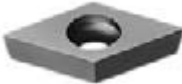
For chipbreaker selection, please refer to guide on page 113.

			Cermet					PVD Cermet	Dimensions (mm)				
			T3N	T15	N20	N40	C7X	Z15/Q15				C7Z	
Shape	Item									IC	T	R	
	CCMT	060204 ENB AM5				●				6.35	2.38	0.4	
	CCMT	09T304 ENB AM5 09T308 ENB AM5				● ●				9.525	3.97	0.4 0.8	
	CCMT	060201 T ^{R/L} AS 060202 T ^{R/L} AS 060204 T ^{R/L} AS								6.35	2.38	0.1 0.2 0.4	
	CCMT	09T301 T ^{R/L} AS 09T302 T ^{R/L} AS 09T304 T ^{R/L} AS								9.525	3.97	0.1 0.2 0.4	
	CCGT	060202 ENB FM 060204 ENB FM	●	● ●						6.35	2.38	0.2 0.4	
	CCGT	09T302 ENB AF1 09T304 ENB AF1 09T308 ENB AF1		● ● ●						9.525	3.97	0.1 0.2 0.4	
	CCGT	060201 ^{R/L} S 060202 ^{R/L} S	● ●	● ●						6.35	2.38	0.1 0.2	
	CCGT	09T301 ^{R/L} S		●						9.525	3.97	0.1	
	CPGH	060202 ENB AM5		●		●				6.35	2.38	0.2	
	CPGH	080202 ENB AM5				●				7.94		0.2	
	CPMH	060204 ENB AM5								6.35	2.38	0.4	
	CPMH	080204 ENB AM5 080208 ENB AM5								7.94		0.4 0.8	
	CPGH	090302 ENB AM5 090304 ENB AM5 090308 ENB AM5		● ●						9.525	3.18	0.2 0.4 0.8	
	CPMH	090304 ENB AM5 090308 ENB AM5				●				9.525	3.18	0.4 0.8	
	CPGH	040102 ^{R/L} A1 040104 ^{R/L} A1			● ●					7.94	1.59	0.2 0.4	
	CPGH	060202 ^{R/L} A 060204 ^{R/L} A 080202 ^{R/L} A 080204 ^{R/L} A		● ● ●	●					6.35 7.94	2.38	0.2 0.4 0.2 0.4	
	CPMH	090304 ^{R/L} B 090308 ^{R/L} B			●					9.525		3.18	0.4 0.8
		CPGB	80204								7.94	2.38	0.4
			ERGH	130102 ^{R/L} A2 130104 ^{R/L} A2		● ●	● ●					3.97	1.59
	MBL		005FL 010FL 015FL								3.60	1.0	0.05 0.10 0.15

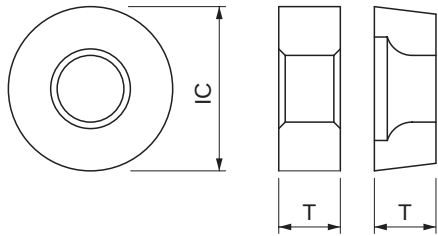
Cermet / PVD Coated Cermet

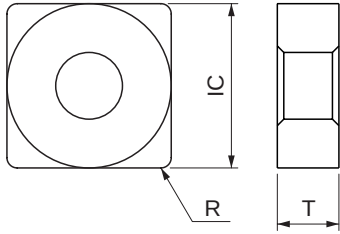
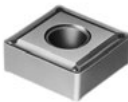
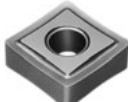
		Cermet					PVD Cermet		Dimensions (mm)		
		T3N	T15	N20	N40	C7X	Z15/Q15	C7Z			
Shape	Item								IC	T	R
	DNMG 150404 ENB ZF1		●		●				12.70	4.76	0.4
	150408 ENB ZF1		●		●						0.8
	150604 ENB ZF1		●		●					6.35	0.4
	150608 ENB ZF1		●		●						0.8
	DNMG 150404 ENB ZW1				●				12.70	4.76	0.4
	150408 ENB ZW1		●		●						0.8
	150608 ENB ZW1		●		●					6.35	0.8
	DNGG 150404 ENB ZP								12.70	4.76	0.4
	150408 ENB ZP										0.8
	DNMG 150408 ENB WR				●				12.70	4.76	0.8
	150412 ENB WR										1.2
	DNMG 150408 ENB Z5								12.70	4.76	0.8
	DNMG 150404 ENB G				●				12.70	4.76	0.4
	150408 ENB G		●		●						0.8
	150412 ENB G		●								1.2
	150604 ENB G				●					6.35	0.4
	DNGG 150404RN1		●						12.70	4.76	0.4
	DNGG 150404TRC		●						12.70	4.76	0.4
	150408TRC		●								0.8
	DNGA 150408								12.70	4.76	0.8
	150412										1.2

For chipbreaker selection, please refer to guide on page 113.

		Cermet					PVD Cermet	Dimensions (mm)		
Shape	Item	T3N	T15	N20	N40	C7X	Z15/Q15 C7Z			
	DCGT 11T302FM 11T304FM 11T308FM	●	● ● ●					9.525	3.97	0.2 0.4 0.8
	DCGT 070200AM3 070202AM3 070204AM3		● ●					6.35	2.38	0.03 0.2 0.4
	DCGT 11T300AM3 11T302AM3 11T304AM3 11T308AM3 11T312AM3		● ● ● ●					9.525	3.97	0.03 0.20 0.4 0.8 1.2
	DCMT 070202AM3 070204AM3 070208AM3				● ●			6.35	2.38	0.20 0.4 0.8
	DCMT 11T304AM3 11T308AM3				● ●			9.525	3.97	0.40 0.8
	DCGT 11T302AF3 11T304AF3		● ●				●	9.525	3.97	0.20 0.4
	DCGT 070200 ^{R/L} S 070201 ^{R/L} S 070202 ^{R/L} S			● ●				6.35	2.38	0.03 0.10 0.2
	DCGT 11T300 ^{R/L} S 11T301 ^{R/L} S 11T302 ^{R/L} S 11T304 ^{R/L} S	● ●		● ● ●				9.525	3.97	0.03 0.1 0.2 0.4
	DCGT 070200 ^{R/L} U 070201 ^{R/L} U 070202 ^{R/L} U			●				6.35	2.38	0.03 0.1 0.2
	DCGT 11T300 ^{R/L} U1 11T301 ^{R/L} U1 11T302 ^{R/L} U1 11T304 ^{R/L} U1							9.525	3.97	0.03 0.1 0.2 0.4
	DCGW 70200 070200H 70201			●				6.35	2.38	0.03 0.03 0.1
	DCGW 11T300 11T301							9.525	3.97	0.03 0.1
	DCGW 11T30V							9.525	3.97	0.0

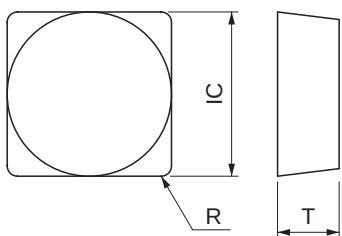
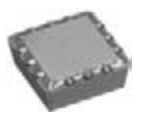
Cermet / PVD Coated Cermet

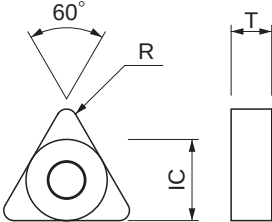
		Cermet					PVD Cermet		Dimensions (mm)		
		T3N	T15	N20	N40	C7X	Z15/Q15	C7Z			
Shape	Item								IC	T	R
	RCMX 1204M0-GB				●				10.00	3.18	—
	RCMX 1204M0-GM				●				12.00	4.76	—
	RNMG 090300F				●				9.525	3.18	—
	RNMG 120400G				●				12.70	4.76	—
	RPMT 0602M0GB				●				6.0	2.38	—
	0802M0GB								8.0	2.38	—
	10T2M0GB				●				10.0	2.78	—
	1203M0GB				●				12.0	3.18	—
	1604M0GB				●				16.0	4.76	—
	2004M0GB				●				20.0	4.76	—
	RPMX 1203M0GB				●				12.0	3.18	—

		Cermet					PVD Cermet		Dimensions (mm)		
		T3N	T15	N20	N40	C7X	Z15/Q15	C7Z			
Shape	Item								IC	T	R
	SNMG 120408 ENB ZF1		●		●				12.70	4.76	0.8
	120412 ENB ZF1		●		●						1.2
	SNMG 120408 ENB ZP		●						12.70	4.76	0.8
	SNMG 120408 ENB ZW1				●				12.70	4.76	0.8
	120412 ENB ZW1		●		●						1.2
	SNMG 120408 ENB WR				●				12.70	4.76	0.8
	SNMG 120408 ENB Z5								12.70	4.76	0.8
	SNMG 090308 ENB G				●				9.525	3.18	0.8
	SNMG 120408 ENB G										0.8
	120412 ENB G								12.70	4.76	1.2
	120416 ENB G										1.6
 Right hand shown	SNGG 090304 ^R / _L B		●						9.525	3.18	0.40
	090308 ^R / _L B										0.8
	SNGG 120404 ^R / _L B								12.70	4.76	0.40
	120408 ^R / _L C										0.8
	SNGA 90304								9.525	3.18	0.40
	90308										0.8
	SNGA 120404								12.70	4.76	0.40
	120408										0.8
	SNGN 90308	●	●						9.525	3.18	0.8
	SNGN 120408	●	●						12.70	4.76	0.8

For chipbreaker selection, please refer to guide on page 113.

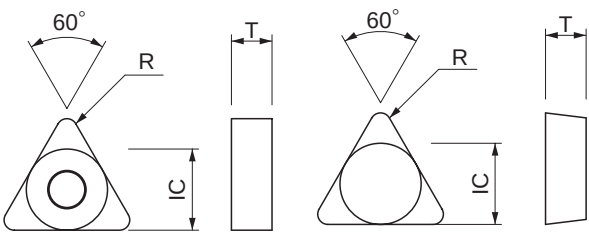
Cermet / PVD Coated Cermet

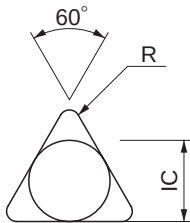
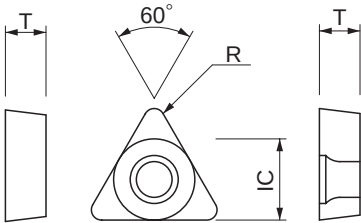
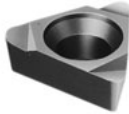
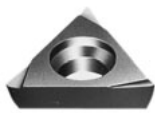
		Cermet					PVD Cermet	Dimensions (mm)			
		T3N	T15	N20	N40	C7X	Z15/Q15				C7Z
Shape	Item								IC	T	R
	SCMT 09T308AM5				●				9.525	3.97	0.8
	SPGR 090308AF1		●						9.525	3.18	0.80
	SPGR 120308AF1		●						12.70	3.18	0.80
 Right hand shown	SPGR 090308 ^R / _L C								9.525	3.18	0.80
	SPGR 120308 ^R / _L C								12.70	3.18	0.80
	SPGR 120308 ^R / _L E								12.70	3.18	0.80
	SPGR 090308ENBQZ								9.525	3.18	0.80
 Left hand shown	SPMH 090324 ^R / _L H1				●				9.525	3.18	2.4
	090332 ^R / _L H1		●								3.2
	SPMR 120440 ^R / _L H2		●						12.70	4.76	4.0
	SPMN 190408				●				19.05	4.76	0.8
	SPMN 120440								12.70	4.76	4.0
	SPGN 90304								9.525	3.18	0.4
	90308										0.8
	SPGN 120304		●						12.70	3.18	0.4
	120308		●								0.8

		Cermet					PVD Cermet		Dimensions (mm)		
		T3N	T15	N20	N40	C7X	Z15/Q15	C7Z			
Shape	Item								IC	T	R
	TNMG 160404 ENB ZF1		●			●			9.525	4.8	0.40
	160408 ENB ZF1		●			●					0.80
	160412 ENB ZF1		●			●					1.20
	TNMG 160404 ENB ZP		●								0.4
	160408 ENB ZP		●								0.8
	TNGG 160404 ENB R1		●						9.525	4.76	0.4
	160408 ENB R1		●								0.8
	TNMG 160404 ENB ZW1	●	●			●			9.525	4.76	0.4
	160408 ENB ZW1		●			●					0.8
	160412 ENB ZW1		●			●					1.2
	TNMG 220408 ENB ZW1					●			12.70		0.8
	TNMG 160408 ENB WR					●			9.525	4.76	0.8
	TNMG 160404 ENB Z5								9.525	4.76	0.4
	160408 ENB Z5										0.8
	TNMG 160404 ENB G	●				●			9.525	4.76	0.4
	160408 ENB G		●			●					0.8
	160412 ENB G		●			●					1.2
	TNMG 220408 ENB G		●			●			12.70		0.8
220412 ENB G					●			1.2			
	TNGG 160308 ^R / _L B								9.525	4.76	0.8
	TNMG 160404 ^R / _L C		●						9.525	4.76	0.4
	160408 ^R / _L C		●								0.8
	TNGG 110304 ^R / _L B								9.525	4.76	0.4
	110308 ^R / _L B								9.525	4.76	0.8
	TNGG 160404 ^R / _L B		●								0.4
	160408 ^R / _L B		●								0.8
	TNGG 160402 ^R / _L C								9.525	4.76	0.2
160404 ^R / _L C								0.4			
160408 ^R / _L C		●	●					0.8			
Right hand shown	TNGG 220408 ^R / _L C			●					12.70		0.8
 NEW	TNGG 160401 ^R / _L DA								9.525	4.76	0.1
Right hand shown											

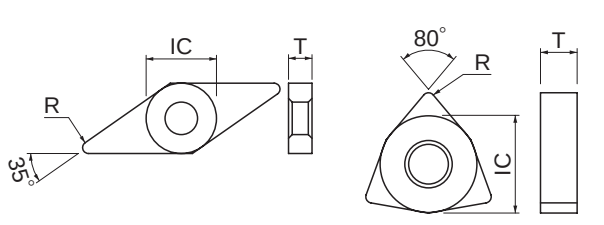
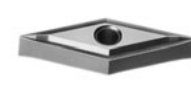
For chipbreaker selection, please refer to guide on page 113.

Cermet / PVD Coated Cermet

		Cermet					PVD Cermet	Dimensions (mm)				
		T3N	T15	N20	N40	C7X	Z15/Q15	C7Z	IC	T	R	
Shape	Item											
 Right hand shown	TNGG 160402 ^{R/L} N1		●						9.525	4.76	0.2	
	160404 ^{R/L} N1		●								0.4	
	160408 ^{R/L} N1		●								0.8	
 Right hand shown	TNGG 160401 ^{R/L} U2		●						9.53	4.76	0.1	
	160402 ^{R/L} U2		●								0.2	
	160404 ^{R/L} U2										0.4	
	160408 ^{R/L} U2										0.8	
	TNGA 110308 TN								6.35	3.18	0.8	
	TNGA 160408 TN								9.525		4.76	0.8
	160412 TN								12.70			1.2
	TNGA 220408 TN										0.8	
	TCMT 16T308 ENB AM5				●				9.525	3.97	0.8	
	TCMT 110204 ENB AM3								6.35	2.38	0.4	
	110208 ENB AM3										0.8	
	TCGT 110202 ENB AM3								9.525	3.97	0.2	
	110204 ENB AM3										0.4	
	TCGT 16T304 ENB AM3		●								0.4	
 Right hand shown	TCGT 090200 ^{R/L} S			●					5.56	2.38	0.03	
	090201 ^{R/L} S			●							0.1	
	090202 ^{R/L} S			●							0.2	
	TCGT 110200 ^{R/L} S								6.35		0.03	
	110201 ^{R/L} S		●	●							0.1	
	110202 ^{R/L} S		●	●							0.2	
Right hand shown 	TCGT 090201 ^{R/L} U								5.56	2.38	0.10	
	090202 ^{R/L} U										0.2	
	TCGW 90200 TN								5.56	2.38	0.03	
	90201 TN										0.1	
	TCGW 110200 TN								6.35		0.03	
	110201 TN										0.1	
	TPGR 110304 ENB AF1		●						6.35	3.18	0.4	
	110308 ENB AF1		●								0.8	
	TPGR 160304 ENB AF1		●						9.525		0.4	
	160308 ENB AF1		●							0.8		
	TPGR 220408 ENB AF1								12.70	4.76	0.8	
Left hand shown 	TPGR 110304 ^{R/L} P2		●						6.35	3.18	0.4	
	TPGR 090204 ^{R/L} P2	●	●						5.56	2.38	0.4	
	TBGR 060104 ^{R/L} P1		●						3.97	1.59	0.4	
Right hand shown 	TPGR 110304 ^{R/L} B		●						6.35		0.4	
	TPGR 160304 ^{R/L} B	●	●		●				9.53	3.18	0.4	
	TPGR 160304 ^{R/L} C								9.53		0.4	

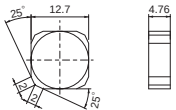
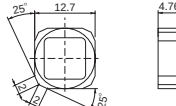
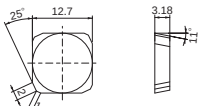
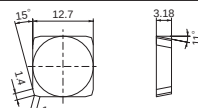
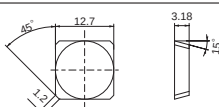
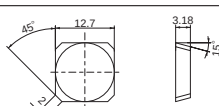
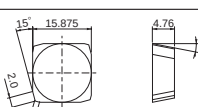
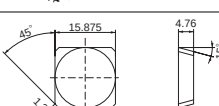
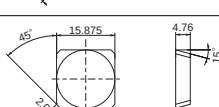
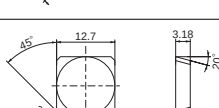
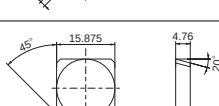
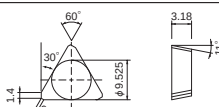
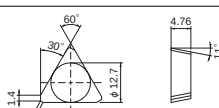
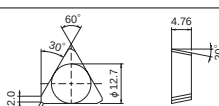
							Cermet		PVD Cermet	Dimensions (mm)			
		T3N	T15	N20	N40	C7X	Z15/Q15	C7Z					
Shape	Item									IC	T	R	
	TBGN 060108									3.97	1.59	0.80	
	TPGN 090204		●							5.56	2.38	0.40	
	090208											0.80	
	TPGN 110304	●	●							6.35	3.18	0.40	
	110308	●										0.80	
	TPGN 160304	●	●							9.525		0.40	
160308	●	●								0.80			
TPGN 220420										12.70	4.76	2.00	
	TCGH 060102 ^{R/L} F05			●						3.97	1.59	0.2	
	060104 ^{R/L} F05			●								0.4	
	TPGH 080202 ^{R/L} F1									4.76	2.38	0.2	
	080204 ^{R/L} F1		●									0.4	
	TPGH 090202 ^{R/L} F1		●							5.56	2.38	0.2	
	TPGH 090204 ^{R/L} F1		●	●								0.4	
	TPGH 090208 ^{R/L} F1											0.8	
	TPGH 110302 ^{R/L} F1		●								6.35	3.18	0.2
	TPGH 110304 ^{R/L} F1		●									0.4	
TPGH 110308 ^{R/L} F1											0.8		
	TCGH 060102 ^{R/L} B1		●							3.97	1.59	0.2	
	TCGH 060104 ^{R/L} B1		●									0.4	
	TPGH 080202 ^{R/L} B3									4.76	2.38	0.2	
	TPGH 080204 ^{R/L} B3											0.4	
	TPGH 090200 ^{R/L} B2									5.56		0.2	
	TPGP 090204 ^{R/L} B2										0.4		
	TPGP 090208 ^{R/L} B2										0.8		
TPGH 110304 ^{R/L} B3		●		●					6.35	3.18	0.4		
	TCGB 060102									3.97	1.59	0.2	
	TCGB 060104											0.4	
	TPGB 080202									4.76	2.38	0.2	
	TPGB 080204											0.4	
	TPGB 090202									5.56		0.2	
	TPGB 090204										0.4		

Cermet / PVD Coated Cermet

		Cermet					PVD Cermet	Dimensions (mm)			
Shape	Item	T3N	T15	N20	N40	C7X	Z15/Q15				C7Z
	VNMG 160404ZF1				●				9.525	4.76	0.4
	VNMM 160404ZP		●						9.525	4.76	0.4
 Right hand shown	VNGG 160404 ^R / _L C 160408 ^R / _L C								9.525	4.76	0.4 0.8
	VNMG 160404AM1 160408AM1	●	● ●		● ●				9.525	4.76	0.4 0.8
	VBMT 160404AM3				●				9.525	4.76	0.4
	VBGT 160404GA 160412GA		● ●						9.525	4.76	0.4 1.2
	WNGG 080404ZP 080408ZP								12.70	4.76	0.4 0.8
	WNMG 080408WR				●				12.70	4.76	0.8
	WNMG 080408Z5 080412Z5								12.70	4.76	0.8 1.2

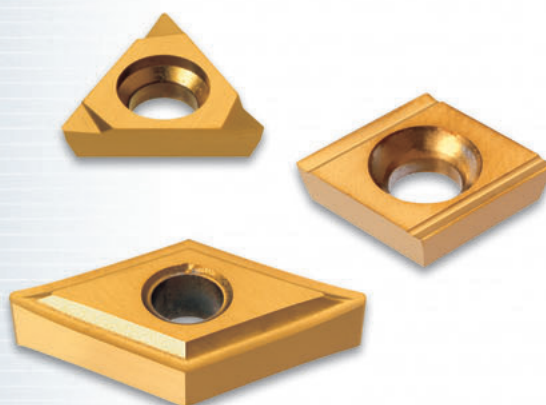
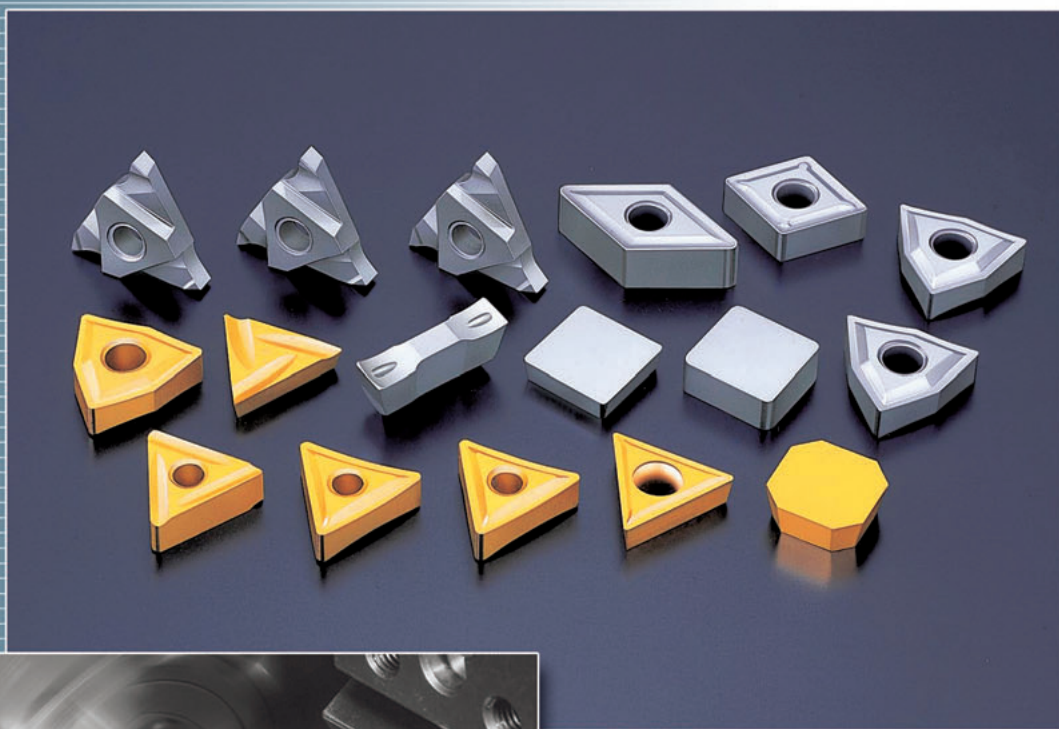
For chipbreaker selection, please refer to guide on page 113.

● Inserts for Milling

Shape	Insert Number	Accuracy	Dimensions	Cermets	
				C7X	N40
	SNCN1204CN	C			
	SNMN1204CN	M			
	SNUF1204CN	U			
	SPCN1203CP ^{R/L}	C			
	SPK1203C ^{R/L}	K			
	SPCN1203ED ^{R/L}	C			
	SPKN1203ED ^{R/L}	K			
	SDCN1203AE	C			
	SDK1203A	K			
	SPCN1504ED ^{R/L}	C			
	SPKN1504ED ^{R/L}	K			
	SDCN1504AE	C			
	SDK1504A	K			
	SEK1203A	K			
	SEK1504A	K			
	TPCN1603PD ^{R/L}	C			
	TPK1603P ^{R/L}	K			
	TPCN2204PD ^{R/L}	C			
	TPK2204PR	K			
	TEE2204PR	E			

NTK

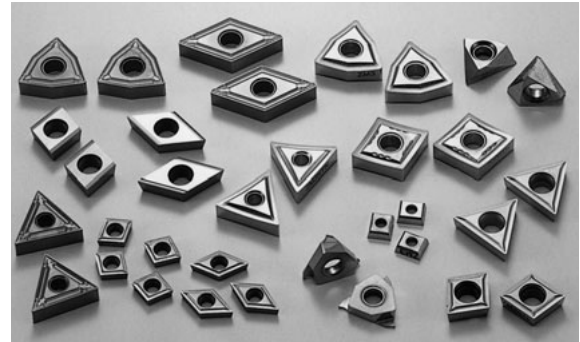
PVD Coated Micro Grain Carbides



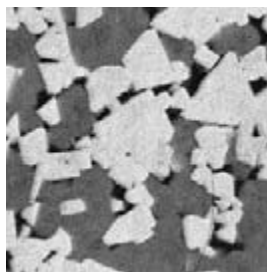
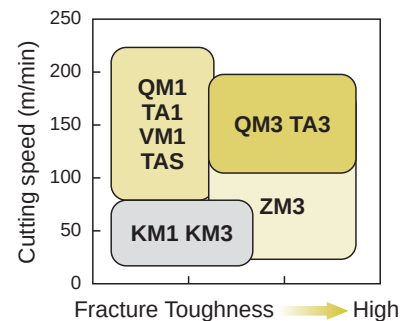
KM3·ZM3·QM3·TA3·QM1·VM1·TA1·TAS

■ NTK Micro Grain Carbide

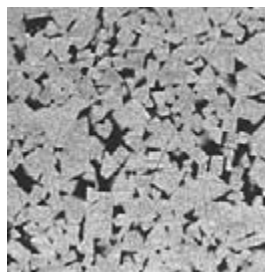
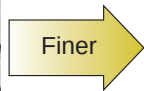
This grade has been developed by reducing the size of WC hard grains, which are the main component of cemented carbide, to about $1\mu\text{m}$. Therefore, it has more toughness and hardness than the conventional cemented carbides, and also attains sharp cutting edges. It shows excellent wear resistance and anticracking property at high temperature, as well as higher toughness and sharp cutting edges.



Application range



General carbide



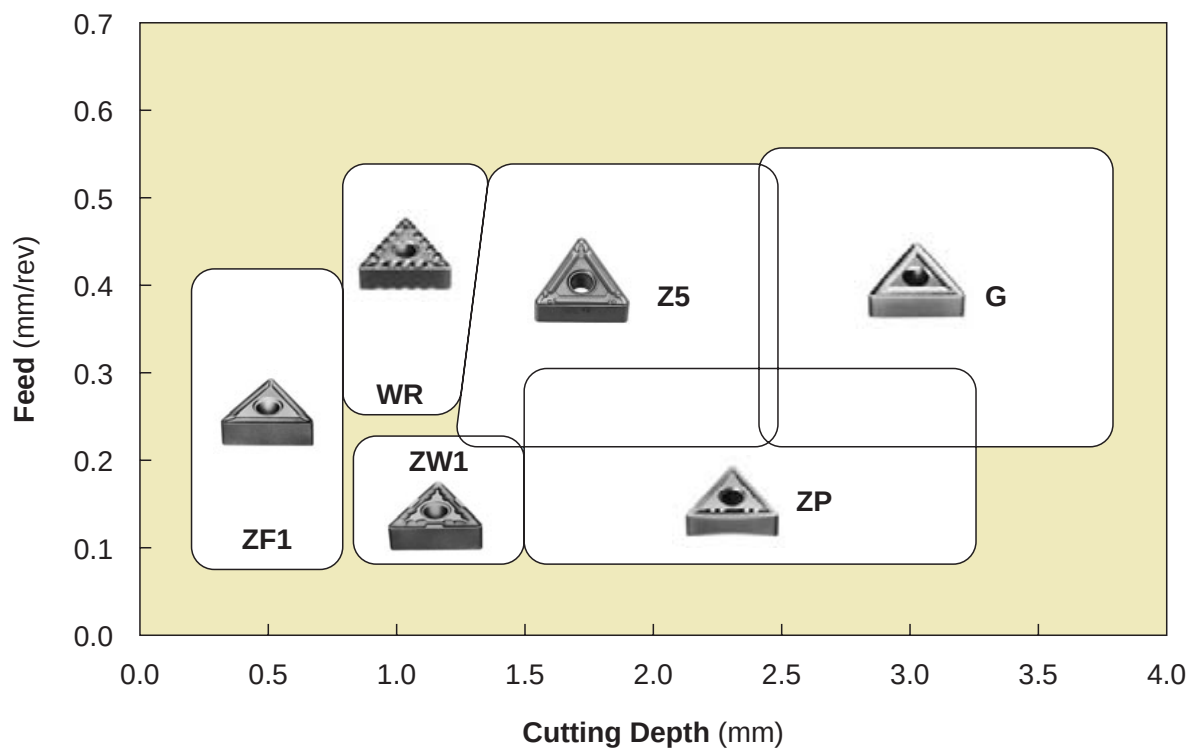
Micro grain carbide

Grade	Composition	Features	Applications
KM1, KM3	WC	Sharp cutting edges	Cast iron , Aluminum
ZM3	TiN	Deposition resistance	Stainless steel and Titanium
QM1	TiCN	Abrasion resistance	Cast iron
QM3	TiCN	Heat resistance , wear resistance	General steel , Grooving tool.
VM1	Special TiCN	Sharp cutting edges	Free cutting steel
TA1	TiAlN	Abrasion and thermal shock resistance	Ductile cast iron milling.
TA3	TiAlN	Thermal shock resistance	Ductile cast iron milling.
TAS	TiAlN	Abrasion and thermal shock resistance	Stainless steel

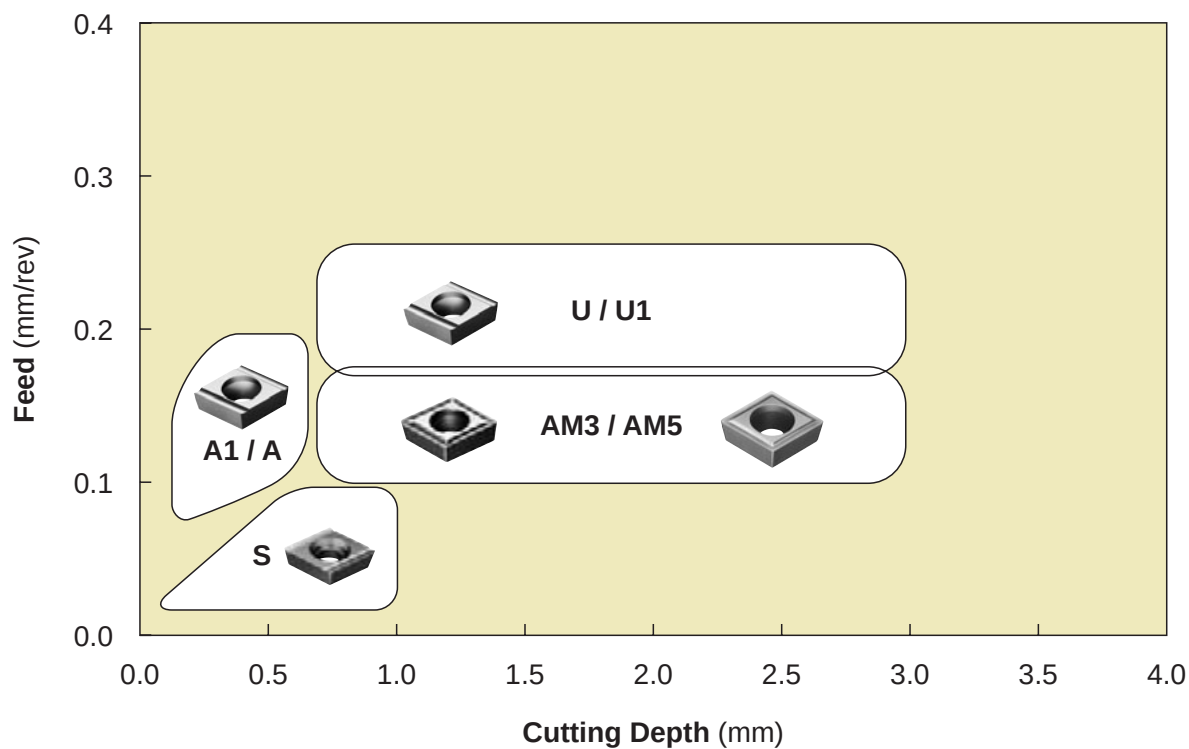
● Applications

Material	General steel Carbon steel , Alloy steel					Stainless steel , Cast steel					Cast iron Gray cast iron , Ductile cast iron			
Cutting	Finish ← → Rough					Finish ← → Rough					Finish ← → Rough			
Range	P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30
Cermet	TA3					VM1					TA1			
	QM3					TAS					QM1			
	ZM3					QM3					KM3 , KM1			
						ZM3								

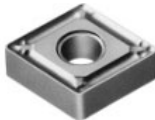
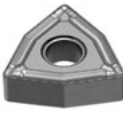
● Chipbreakers Selection for Negative Inserts



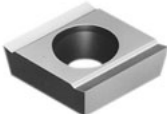
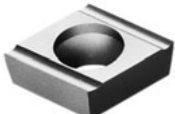
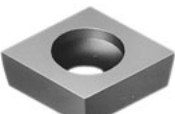
● Chipbreakers Selection for Positive Inserts



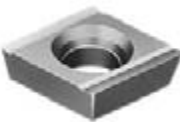
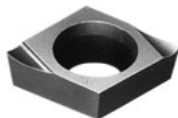
● NEGATIVE Insert

Shape	Item	Grade								Inscribed Circle (mm)	Thickness (mm)	Nose Radius (mm)
		KM1	KM3	ZM3	QM1	QM3	VM1	TA3	TAS			
	CNGG 120404 FN ZP			●		●						0.4
	120408 FN ZP			●		●		●	●	12.7	4.76	0.8
	120412 FN ZP											1.2
	CNMG 120408 TNB Z5					●		●		12.7	4.76	0.8
	DNGG 150404 FN ZP			●		●			●	12.7	4.76	0.4
	150408 FN ZP			●		●			●			0.8
	DNMG 150404 TN G									12.7	4.76	0.4
	DNMG 150408 TNB Z5					●		●		12.7	4.76	0.8
	SNMG 120408 TNB Z5					●		●		12.7	4.76	0.8
	TNGG 160402 FN ZP			●		●						0.2
	160404 FN ZP			●		●	●		●	9.525	4.76	0.4
	160408 FN ZP			●		●	●					0.8
	TNMG 160404 TNB Z5							●		9.525	4.76	0.4
	160408 TNB Z5							●				0.8
	VNMG 160404 TNB AM1							●		9.525	4.76	0.4
	160408 TNB AM1							●				0.8
	WNGG 080404 FN ZP					●				12.7	4.76	0.4
	080408 FN ZP					●						0.8
	WNMG 080408 TNB Z5					●		●		12.7	4.76	0.8
	080412 TNB Z5					●		●				1.2

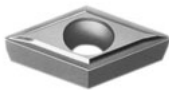
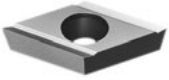
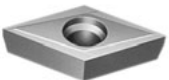
● Type C and E POSITIVE Insert

Shape	Item	Grade								Inscribed Circle (mm)	Thickness (mm)	Nose Radius (mm)
		KM1	KM3	ZM3	QM1	QM3	VM1	TA3	TAS			
	CCMT 060202 ENA AZ8									9.525	3.97	0.2
	060204 ENA AZ8											0.4
	060208 ENA AZ8											0.8
	09T302 ENA AZ8											0.2
	09T304 ENA AZ8											0.4
	09T308 ENA AZ8											0.8
	CCGT 060200 FN AM3						●		●	6.35	2.38	0.03
	060202 FN AM3			●		●	●					0.2
	060204 FN AM3			●			●					0.4
	09T300 FNAM3						●					0.03
	09T302 FNAM3			●			●					0.2
	09T304 FNAM3			●		●	●					0.4
 Left hand shown	CCGT 060200 ^{R/L} S						●		●	6.35	2.38	0.03
	060201 ^{R/L} S		●	●			●					0.1
	060202 ^{R/L} S		●	●			●					0.2
	CCGT 09T300 ^{R/L} S						●			9.525	3.97	0.03
	09T301 ^{R/L} S		●				●					0.1
	09T302 ^{R/L} S			●								0.2
	09T304 ^{R/L} S											0.4
	CCGT 060200 ^{R/L} U		●				●		●	6.35	2.38	0.03
 Right hand shown	060201 ^{R/L} U		●	●			●					0.1
	060202 ^{R/L} U		●	●			●					0.2
	CCGT 09T300 ^{R/L} U1									9.525	3.97	0.03
	09T301 ^{R/L} U1											0.1
	09T302 ^{R/L} U1			●								0.2
	09T304 ^{R/L} U1			●								0.4
	CCGW 060200									6.35	2.38	0.03
	060201											0.1
	CCGW 09T300									9.525	3.97	0.03
	09T301											0.1
	CCGW 060200 H									6.35	2.38	0.03
	09T30V											0
	09T301 P									9.525	3.97	0.1
	09T302 P											0.2

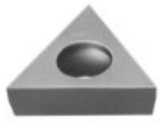
● Type C and E POSITIVE Insert

Shape	Item	Grade								Inscribed Circle (mm)	Thickness (mm)	Nose Radius (mm)	
		KM1	KM3	ZM3	QM1	QM3	VM1	TA3	TAS				
	CPGH 060202 AM5									6.35	2.38	0.2	
	CPGH 080202 AM5									7.94		0.2	
	CPMH 060204 AM5									6.35	2.38	0.4	
	CPMH 080204 AM5									7.94		0.4	
	080208 AM5											0.8	
	CPGH 090302 AM5									9.525	3.18	0.2	
	090304 AM5											0.4	
	090308 AM5											0.8	
	CPMH 090304 AM5									9.525	3.18	0.4	
	090308 AM5											0.8	
	CPGH 040102 ^{R/L} A1									4.76	1.59	0.2	
	040104 ^{R/L} A1											0.4	
	CPGH 060202 ^{R/L} A									6.35	2.38	0.2	
	060204 ^{R/L} A											0.4	
	080202 ^{R/L} A			●						7.94		0.2	
	080204 ^{R/L} A											0.4	
	CPMH 090304 ^{R/L} B									9.525	3.18	0.4	
	090308 ^{R/L} B											0.8	
	Left hand shown												
		ERGH 130102 ^{R/L} A2		●	●						3.97	1.59	0.2
130104 ^{R/L} A2										0.4			
Right hand shown													

● Type D POSITIVE Insert

Shape	Item	Grade								Inscribed Circle (mm)	Thickness (mm)	Nose Radius (mm)
		KM1	KM3	ZM3	QM1	QM3	VM1	TA3	TAS			
	DCGT 11T302 FM									9.525	3.97	0.2
	11T304 FM											0.4
	11T308 FM											0.8
	DCGT 070200 AM3		●	●			●		●	6.35	2.38	0.03
	070202 AM3		●	●		●	●		●			0.2
	070204 AM3			●			●					0.4
	DCGT 11T300 AM3									9.525	3.97	0.03
	11T302 AM3			●		●	●		●			0.2
	11T304 AM3			●		●	●	●				0.4
	11T308 AM3			●		●	●		●			0.8
	11T312 AM3											1.2
	DCMT 070202 AM3									6.35	2.38	0.2
	070204 AM3											0.4
	070208 AM3											0.8
	DCMT 11T304 AM3									9.525	3.97	0.4
	11T308 AM3											0.8
	DCGT 11T302 AF3									9.525	3.97	0.2
	11T304 AF3											0.4
 Left hand shown	DCGT 070200 ^{R/L} S		●	●						6.35	2.38	0.03
	070201 ^{R/L} S		●	●			●		●			0.1
	070202 ^{R/L} S		●	●			●		●			0.2
	DCGT 11T300 ^{R/L} S		●							9.525	3.97	0.03
	11T301 ^{R/L} S		●	●								0.1
	11T302 ^{R/L} S		●				●					0.2
	11T304 ^{R/L} S						●					0.4
 Right hand shown	DCGT 070200 ^{R/L} U									6.35	2.38	0.03
	070201 ^{R/L} U			●					●			0.1
	070202 ^{R/L} U			●			●		●			0.2
	DCGT 11T300 ^{R/L} U1									9.525	3.97	0.03
	11T301 ^{R/L} U1			●								0.1
	11T302 ^{R/L} U1			●			●					0.2
	11T304 ^{R/L} U1		●	●								0.4
	DCGW 070200		●							6.35	2.38	0.03
	070200H		●									0.03
	070201											0.1
	DCGW 11T300		●							9.525	3.97	0.03
	11T301		●	●								0.1
	DCGW 11T30V									9.525	3.97	0.0

● Type T POSITIVE Insert

Shape	Item	Grade								Inscribed Circle (mm)	Thickness (mm)	Nose Radius (mm)
		KM1	KM3	ZM3	QM1	QM3	VM1	TA3	TAS			
	TCGH 060104 FRF05		●							3.97	1.59	0.4
	TCGT 090200 ^R / _{LS}		●							5.56	2.38	0.03
	090201 ^R / _{LS}		●									0.1
	110200 ^R / _{LS}									6.35		0.03
	110201 ^R / _{LS}		●	●			●					0.1
	TCGW 090200 FN									5.56	2.38	0.03
	090201 FN		●									0.1
	110200 FN		●							6.35		0.03
	110201 FN											0.1
	TPGH 080204 FRF1									4.76	2.38	0.4

Grooving



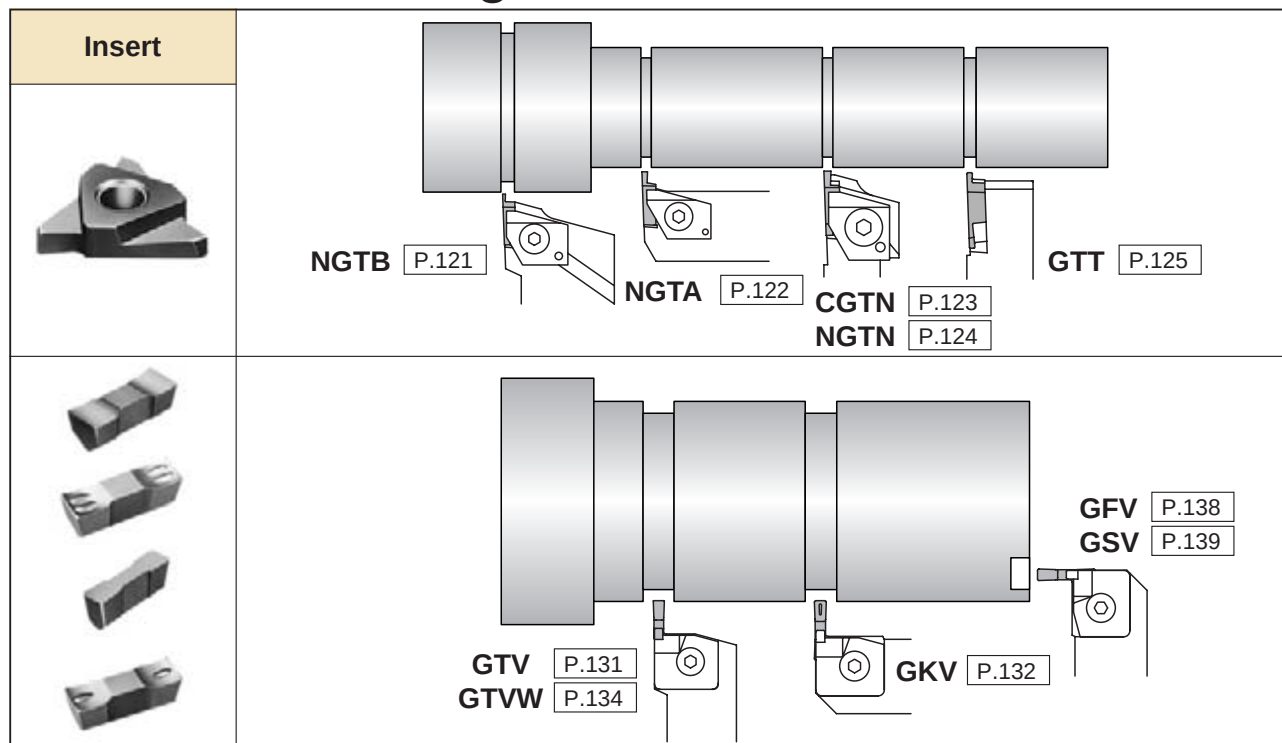
Outside Grooving P.121

Internal Grooving P.135

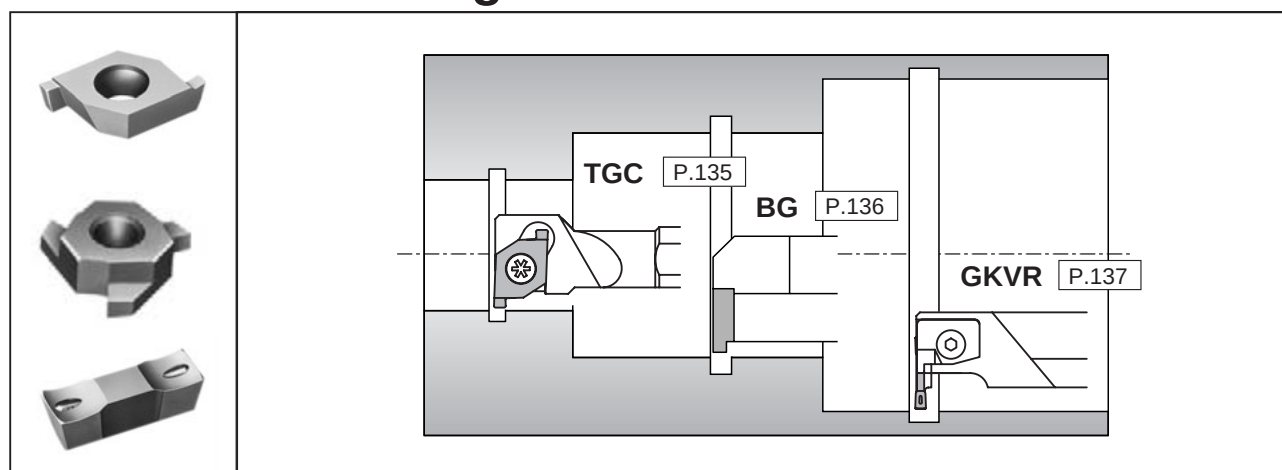
Recommended Cutting Conditions

Insert Grade	Coated carbide				Cermet N40 · N20	
	QM3		ZM3			
Conditions Work piece	Cutting speed (m/min)	Feed (mm/rev)	Cutting speed (m/min)	Feed (mm/rev)	Cutting speed (m/min)	Feed (mm/rev)
Carbon steel Alloy steel	~ 200	~ 0.2	~ 180	~ 0.2	~ 250	~ 0.2
Stainless steel	~ 180	~ 0.15	~ 150	~ 0.15	~ 180	~ 0.15
Cast iron	~ 200	~ 0.2	~ 200	~ 0.2		

Outside Grooving



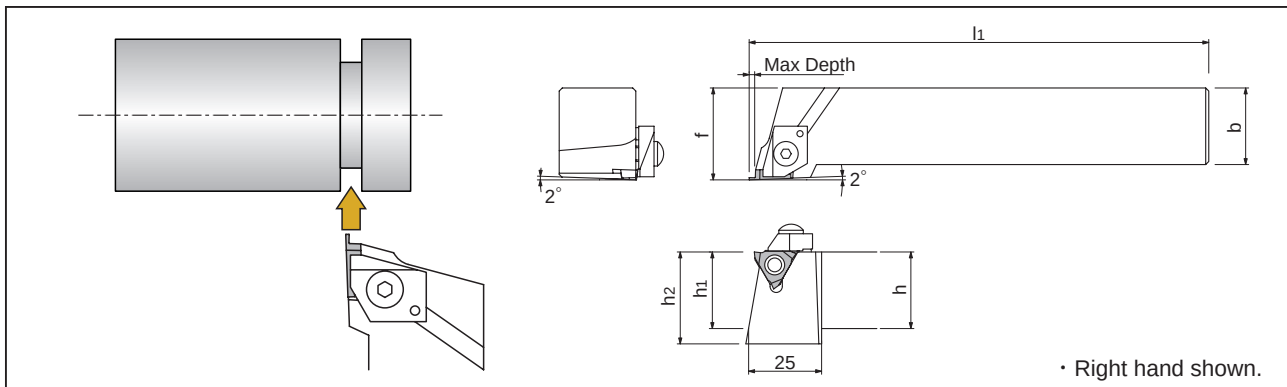
Internal Grooving



Outside Grooving Holder

NGTB

Clamp-on type



Grooving condition		Dimensions (mm)						Insert	Item-No.		stock	
Width (mm)	Max Depth (mm)	h	b	l1	h1	h2	f				R	L
0.30 ~ 1.45	3.0	20	20	125	20	—	25	GTM..32  P.126~128	NGTB ^{R/L}	202032 - 00S	●	●
1.50 ~ 2.30										202032 - 15S	●	●
2.50 ~ 3.00										202032 - 25S	●	○
0.30 ~ 1.45										252532 - 00S	●	○
1.50 ~ 2.30	252532 - 15S	●	●									
2.50 ~ 3.00	252532 - 25S	●	○									
1.45 ~ 2.49	3.5	16	16	100	16	25	20			161643 - 00S	○	○
2.50 ~ 3.49										161643 - 20S	○	○
3.50 ~ 5.50								161643 - 35S		○	○	
1.45 ~ 2.49								202043 - 00S		○	○	
2.50 ~ 3.49	5.5	20	20	125	20	25	25	202043 - 20S		●	●	
3.50 ~ 5.50								202043 - 35S		○	○	
1.45 ~ 2.49								252543 - 00S		●	○	
2.50 ~ 3.49								252543 - 20S		●	●	
3.50 ~ 5.50	5.5	25	25	150	25	25	30	252543 - 35S		●	●	
2.50 ~ 3.49								322543 - 20S		●	●	
3.50 ~ 5.50								322543 - 35S	○	○		
1.45 ~ 2.49								32	25	170	32	32

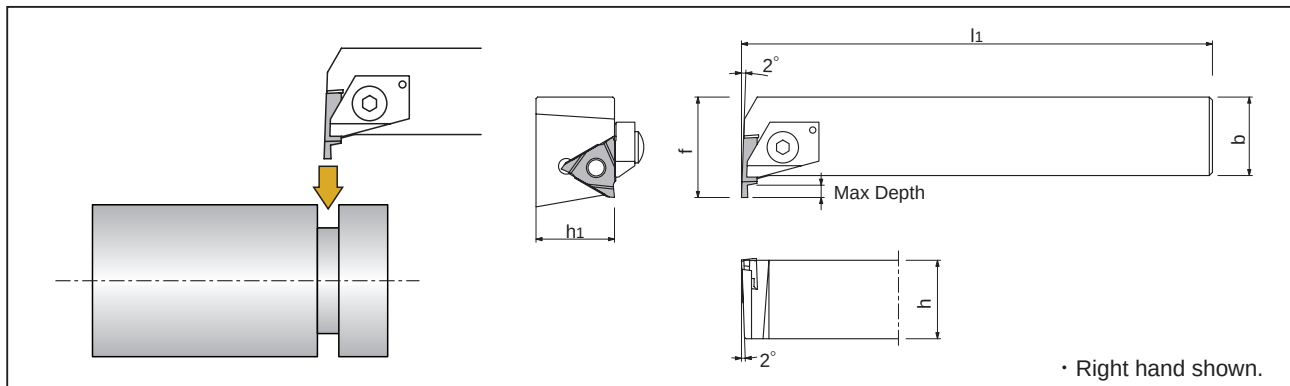
● Parts

Item-No.	Clamp	Clamping screw	Spring	Wrench
NGTB ^{R/L} 202032 - 00S 202032 - 15S 202032 - 25S 252532 - 00S 252532 - 15S 252532 - 25S 161643 - 00S 161643 - 20S 161643 - 35S	 CP ^{R/L} 5	 AOS-5×25	 ASG-5	 LW-2.5
202043 - 00S 202043 - 20S 202043 - 35S 252543 - 00S 252543 - 20S 252543 - 35S 322543 - 20S 322543 - 35S	 CP ^{R/L} 6	 AOS-6×30	 ASG-6	 LW-2.5

Outside Grooving Holder

NGTA

Clamp-on type



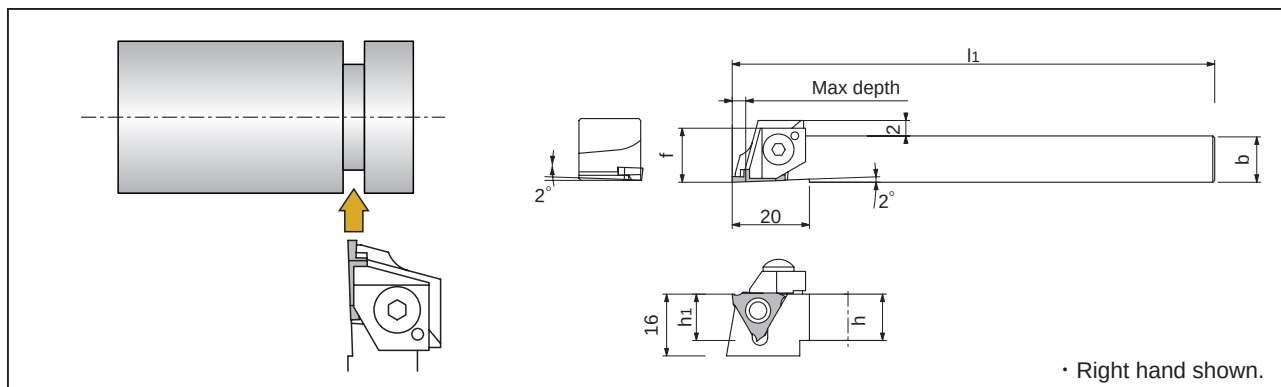
Grooving condition		Dimensions (mm)					Insert	Item-No.	stock	
Width (mm)	Max Depth (mm)	h	b	l1	h1	f			R	L
0.30 ~ 1.45	3.0	20	20	125	20	25	GTM..32	NGTA^{R/L} 202032 - 00S 202032 - 15S 202032 - 25S		○
1.50 ~ 2.30										
2.50 ~ 3.00							P.126~128			
2.50 ~ 3.49	5.5	25	25	150	25	32	GTM..43	252543 - 20S 252543 - 35S	●	
3.50 ~ 5.50							 P.129~130			

● Parts

Item-No.	Clamp	Clamping screw	Spring	Wrench
NGTA^{R/L} 202032 - 00S 202032 - 15S 202032 - 25S	 CP^{R/L} 5	 AOS-5×25	 ASG-5	 LW-2.5
252543 - 20S 252543 - 35S	CP^{R/L} 6	AOS-6×30	ASG-6	LW-2.5

CGTN

Clamp-on type



Grooving condition		Dimensions (mm)						Insert	Item-No.		stock	
Width (mm)	Max Depth (mm)	h	b	l1	h1	f	g				R	L
0.30 ~ 3.00	3.0	10	10	125	10	10	6	GTM..32  P.126~128	CGTN^{R/L} 101032K00	○	○	
1.45 ~ 3.00		10	10	125	10	10	6			101032K15	○	○
		12	12	125	12	12	4			121232K15	○	○
0.30 ~ 1.45		12	12	80	12	12	4			121232F00	○	○

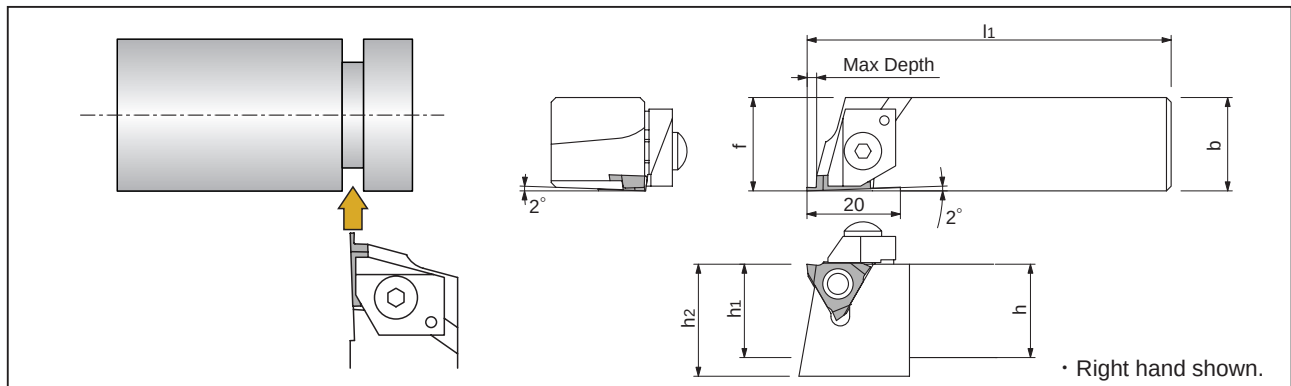
● Parts

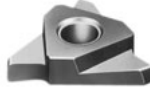
Item-No.	Clamp	Clamping screw	Spring	Wrench
CGTN ^{R/L} 101032K00	 CP^{R/L} 5	 AOS-5×25	 ASG-5	 LW-2.5
101032K15				
121232K15				
121232F00				

Outside Grooving Holder

NGTN

Clamp-on type



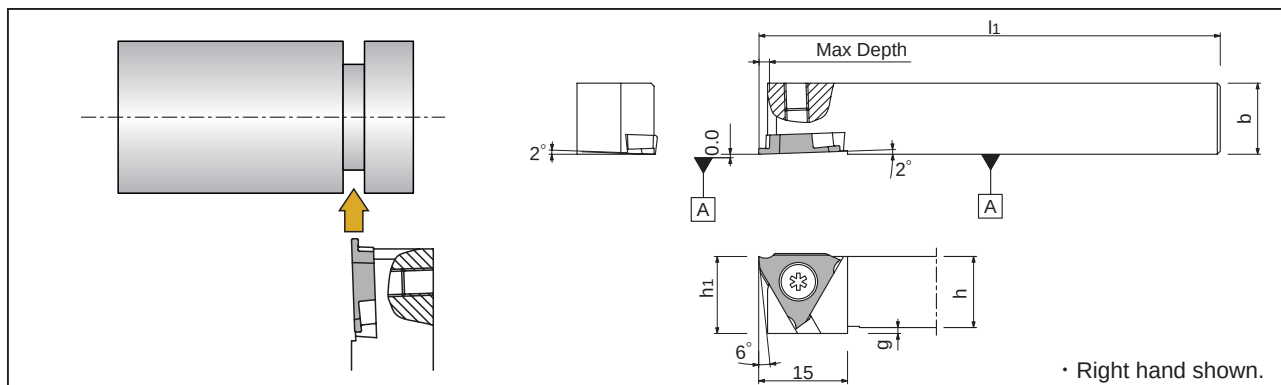
Grooving condition		Dimensions (mm)						Insert	Item-No.	stock	
Width (mm)	Max Depth (mm)	h	b	l1	h1	h2	f			R	L
0.30 ~ 1.45	3.0	16	16	78	16	—	16	GTM..32  P.126~128	NGTN ^{R/L} 161632 - 00	●	●
1.50 ~ 3.00									161632 - 15	●	●
2.50 ~ 3.00									161632 - 25	●	●
1.45 ~ 2.49	3.5	16	16	100	16	25	20	GTM..43  P.129~130	161643 - 00S		
2.50 ~ 3.49	5.5								161643 - 20S	●	○
3.50 ~ 5.50									161643 - 35S	●	○

● Parts

Item-No.	Clamp	Clamping screw	Spring	Wrench
NGTN ^{R/L} 161632 - 00 161632 - 15 161632 - 25 161643 - 00S 161643 - 20S 161643 - 35S	 CP ^{R/L} 5	 AOS-5×25	 ASG-5	 LW-2.5

GTT

Screw-on type



Grooving condition		Dimensions (mm)					Insert	Item-No.	stock	
Width (mm)	Max Depth (mm)	h	b	l1	h1	g			R	L
0.30 ~ 1.45	2.0	8	8	80	8	5		GTT ^{R/L} 08F00	○	○
		10	10		10	3		10F00	●	○
		12	12		12	1		12F00	●	○
1.45 ~ 3.00	3.0	10	10	120	10	3		10F15	○	○
2.50 ~ 3.00		10	10		10	3		10F25	○	○
0.30 ~ 1.45	2.0	8	8		8	5		08K00	○	○
		10	10		10	3		10K00	●	○
		12	12		12	1		12K00	●	○
1.45 ~ 3.00	3.0	10	10		10	3		10K15	●	○
2.50 ~ 3.00		10	10		10	3		10K25	○	○
0.30 ~ 1.45	2.0	10	10		16	0	P.126~128	16K00	●	○

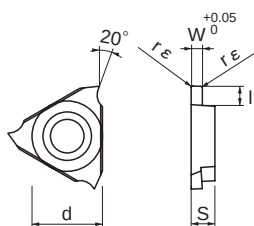
● Parts

Item-No.	Clamping screw	Wrench
GTT ^{R/L} 08F00 10F00 12F00 10F15 10F25 08K00 10K00 12K00 10K15 10K25 16K00	 LR-S-4×10PW	 LLR×15S

GTM..32 type Outside Grooving Inserts

Type U

Width tolerance $W \begin{smallmatrix} +0.05 \\ 0 \end{smallmatrix}$

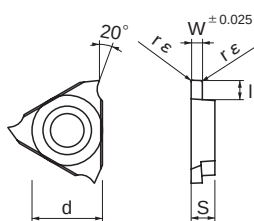


Right hand shown

Grooving condition		Dimensions (mm)				Item-No.		Grade								
Width (mm)	Max Depth (mm)	l	rε	d	s			ZM3		KM3						
								R	L	R	L					
0.30	0.3	0.6	0.03	9.525	3.18	GTMH	32030 ^{R/L} U	○	○	○	○					
0.50	0.9	1.2	0.05					32050 ^{R/L} U	●	●	●	●				
0.75	1.6	2.0							32075 ^{R/L} U	●		●	●			
0.80										32080 ^{R/L} U						
0.95											32095 ^{R/L} U	○	○	●	●	
1.00												32100 ^{R/L} U	●	○	●	●
1.03													32103 ^{R/L} U	○		
1.25			32125 ^{R/L} U					●						○	●	●
1.45	32145 ^{R/L} U	●						○	●					●		
1.50		32150 ^{R/L} U						○	○	●				●		
1.75								32175 ^{R/L} U	○	○	●			●		
2.00									32200 ^{R/L} U	●	●	●		●		
2.50										32250 ^{R/L} U	●	○	●	●		

Type E

Width tolerance $W \begin{smallmatrix} \pm 0.025 \end{smallmatrix}$

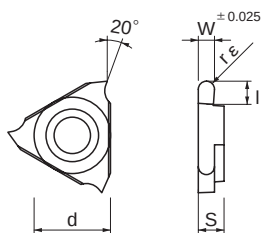


Right hand shown

Grooving condition		Dimensions (mm)				Item-No.		Grade												
Width (mm)	Max Depth (mm)	l	rε	d	s			ZM3												
								R	L											
0.33	0.3	0.6	0.03	9.525	3.18	GTMH 32033 ^{R/L} E	●	○												
0.43	0.9	1.2	0.05				●	○												
0.53	1.6	2.0							○	○										
0.75											●	○								
0.95													●	○						
1.00															●	○				
1.20																	○	○		
1.40																			○	○
1.50	2.7	3.0							○	○										
1.80											○	○								
2.00													○	○						
2.25															○	○				
2.50																	○	○		
2.75																			○	○
3.00																				
1.00	1.6	2.0	0.10			32100 ^{R/L} E01	○	○												
1.20									32120 ^{R/L} E01	○	○									
1.50	2.7	3.0										32150 ^{R/L} E01	●	●						
1.50															32200 ^{R/L} E01	●				

Type E

Width tolerance $W \pm 0.025$ Full radius grooving type

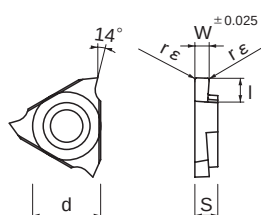


Right hand shown

Grooving condition		Dimensions (mm)				Item-No.	Grade	
Width (mm)	Max Depth (mm)	l	rε	d	s		ZM3	
1	1.6	2.0	0.5	9.525	3.2	GTMH 32100RE05	○	
2	2.7	3.0	1.0			32200RE10		
3			1.5			32300RE15		

Type VT

Width tolerance $W \pm 0.025$ For grooving and turning operation



Right hand shown

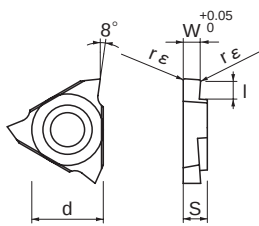
Grooving condition		Dimensions (mm)				Item-No.		Grade	
Width (mm)	Max Depth (mm)	l	rε	d	s			VM1	
								R	L
0.33	0.3	0.6				GTMH 32033 ^{R/L} VT	○	●	
0.43	0.9	1.2					32043 ^{R/L} VT		○
0.53	1.6	2.0					32053 ^{R/L} VT		○
0.65							32065 ^{R/L} VT		○
0.75							32075 ^{R/L} VT		○
0.80							32080 ^{R/L} VT		○
0.85							32085 ^{R/L} VT		○
0.95							32095 ^{R/L} VT		○
1.00							32100 ^{R/L} VT		○
1.10							32110 ^{R/L} VT		○
1.20							32120 ^{R/L} VT		○
1.30							32130 ^{R/L} VT		○
1.45							32140 ^{R/L} VT		○
1.50	2.7	3.0					32150 ^{R/L} VT		○
2.00							32200 ^{R/L} VT		○

GTM..32 type Outside Grooving Inserts

Cermet Insert

Width tolerance $W \begin{smallmatrix} +0.05 \\ 0 \end{smallmatrix}$

Moulded chipbreaker



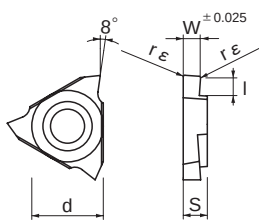
Right hand shown

Grooving condition		Dimensions (mm)				Item-No.		Grade	
Width (mm)	Max Depth (mm)	l	rε	d	s			N40	
								R	L
0.75	1.6	2.0	0.1	9.525	3.18	GTM 32075 ^{R/L} 01		●	
0.95						32095 ^{R/L} 01	●		
1.00						32100 ^{R/L} 01	●		
1.25						32125 ^{R/L} 01			
1.45	2.7	3.0	0.2			32145 ^{R/L}	○		
1.50						32150 ^{R/L}	○	○	
1.75						32175 ^{R/L}			
2.00						32200 ^{R/L}	○		
2.30						32230 ^{R/L}	○		
2.50						32250 ^{R/L}	○		
3.00						32300 ^{R/L}	○		

Cermet Insert

Width tolerance $W \begin{smallmatrix} \pm 0.025 \end{smallmatrix}$

Moulded chipbreaker



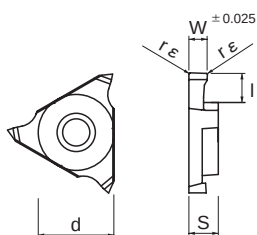
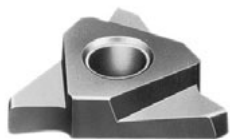
Right hand shown

Grooving condition		Dimensions (mm)				Item-No.		Grade		
Width (mm)	Max Depth (mm)	l	rε	d	s			N20		
								R	L	
0.75	1.6	2.0	0.1	9.53	3.18	GTM 32075 ^{R/L} 01				
0.95			32095 ^{R/L} 01							
1.00			32100 ^{R/L} 01							
1.00			32100 ^{R/L}			●	○			
1.25			32125 ^{R/L} 01			○				
1.45	2.7	3.0	0.2			32145 ^{R/L}			●	●
1.50						32150 ^{R/L}			●	○
1.75						32175 ^{R/L}			○	
2.00						32200 ^{R/L}			●	●
2.30						32230 ^{R/L}			○	●
2.50						32250 ^{R/L}			●	●
3.00						32300 ^{R/L}			●	●

GTM..43 type Outside Grooving Inserts

Carbide Insert

Width tolerance $W \pm 0.025$ For grooving and turning operation

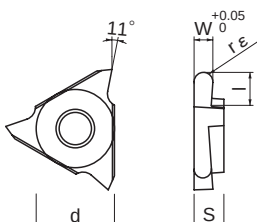
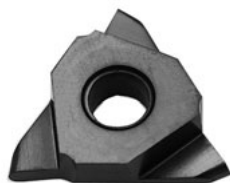


Right hand shown

Grooving condition		Dimensions (mm)				Item-No.	Grade	
Width (mm)	Max Depth (mm)	l	rε	d	s		QM3	
							R	L
1.45	2.8	3.5	0.2	12.7	4.76	GTMT 43145 ^{R/L}	○	○
1.50						43150 ^{R/L}	○	○
1.75						43175 ^{R/L}	○	○
1.85						43185 ^{R/L}	○	○
2.00						43200 ^{R/L}	○	○
2.30						43230 ^{R/L}	○	○
2.50	4.4	5.5	0.3			43250 ^{R/L}	○	●
2.65						43265 ^{R/L}	○	○
2.80						43280 ^{R/L}	○	○
3.00						43300 ^{R/L}	○	○
3.30						43330 ^{R/L}	○	○
3.50						43350 ^{R/L}	○	○
4.00			0.4			43400 ^{R/L}	○	○
4.30						43430 ^{R/L}	○	○
4.50						43450 ^{R/L}	○	○
5.00					43500 ^{R/L}	○	○	
5.50					43550 ^{R/L}	○	○	
				5.76				

Full Radius grooving

Width tolerance $W \begin{smallmatrix} +0.05 \\ 0 \end{smallmatrix}$



Right hand shown

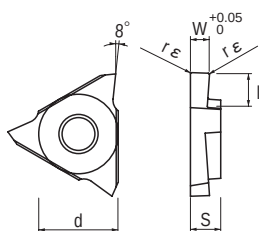
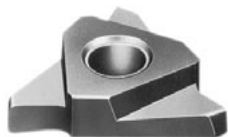
Grooving condition		Dimensions (mm)				Item-No.	Grade
Width (mm)	Max Depth (mm)	l	rε	d	s		QM3
2.00	2.8	3.5	1.00	12.7	4.76	GTMA 43200R10R	○
3.00	4.4	5.5	1.50			43300R15R	○
4.00			2.00			43400R20R	○

GTM..43 type Outside Grooving Inserts

N40 Cermet Insert

Width tolerance $W \begin{smallmatrix} +0.05 \\ 0 \end{smallmatrix}$

Moulded chipbreaker



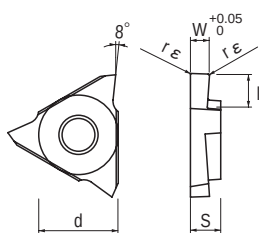
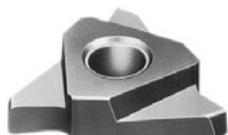
Right hand shown

Grooving condition		Dimensions (mm)				Item-No.		Grade	
Width (mm)	Max Depth (mm)	l	rε	d	s			N40	
								R	L
2.00	2.8	3.5	0.2	12.7	4.76	GTM 43200 ^{R/L}	○	●	
2.30							○		
2.50	4.4	5.5					○		
3.00							○		
4.00							●		
4.50							○		

N20 Cermet Insert

Width tolerance $W \begin{smallmatrix} +0.05 \\ 0 \end{smallmatrix}$

Moulded chipbreaker



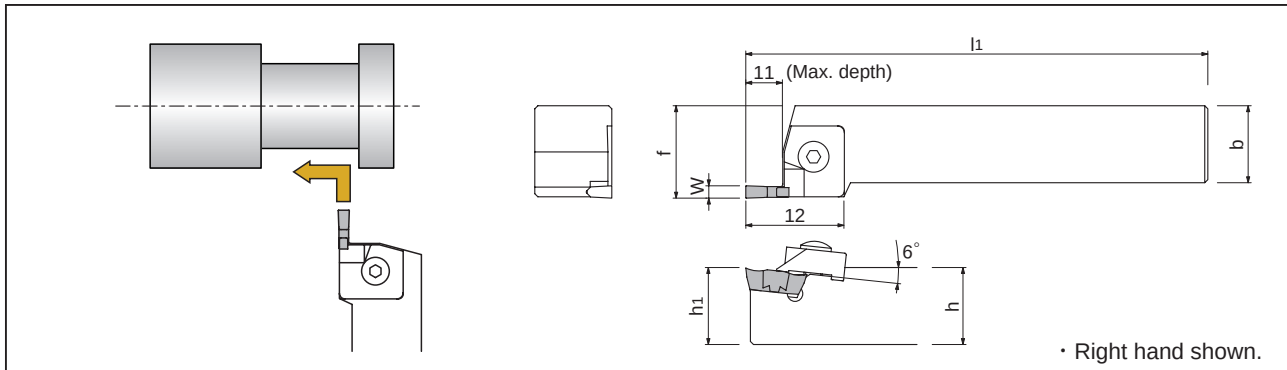
Right hand shown

Grooving condition		Dimensions (mm)				Item-No.	Grade	
Width (mm)	Max Depth (mm)	l	rε	d	s		N20	
							R	L
2.00	2.8	3.5	0.2	12.7	4.76	GTMA 43200 ^{R/L}	●	○
2.30							○	○
2.50	4.4	5.5					○	●
2.65							○	
2.80							○	
3.00							●	●
3.30							○	○
3.50							○	○
4.00							●	○
4.30							○	
4.50							○	○

Outside Grooving Holder

GTV

Clamp-on type



Grooving condition		Dimensions (mm)							Insert	Item-No.	stock		
Width (mm)	Max Depth (mm)	w	h	b	l1	h1	f	l2			R	L	
3.00 ~ 3.50	11.0	3.0	16	16	100	16	20	25	 GEV	GTV ^{R/L} 16 - 3N	●		
3.00 ~ 3.50		3.0	20	20	125	20	25	32		20 - 3N	●	●	
3.00 ~ 3.90		3.0	25	25	150	25	30	32		25 - 3N	●	●	
4.00 ~ 5.90		4.0	4.0	16	16	100	18	20	25	 GTV	16 - 4N	●	●
4.00 ~ 5.90			6.0	20	20	125	20	25	32		20 - 4N	●	●
6.00 ~ 7.90											20 - 6	●	
8.00 ~ 9.00		8.0	25	25	150	25	30	32	 GVMB	20 - 8	●		
4.00 ~ 5.90		4.0								25 - 4N	●	●	
6.00 ~ 7.90		6.0								25 - 6	●	●	
8.00 ~ 9.00		8.0	32	25	170	32	30	32	 GVMN GVGN P.133	25 - 8	●		
4.00 ~ 5.90		4.0								32A - 4N	●	●	
6.00 ~ 7.90		6.0								32A - 6	●	●	
8.00 ~ 9.00		8.0								32A - 8	●	●	

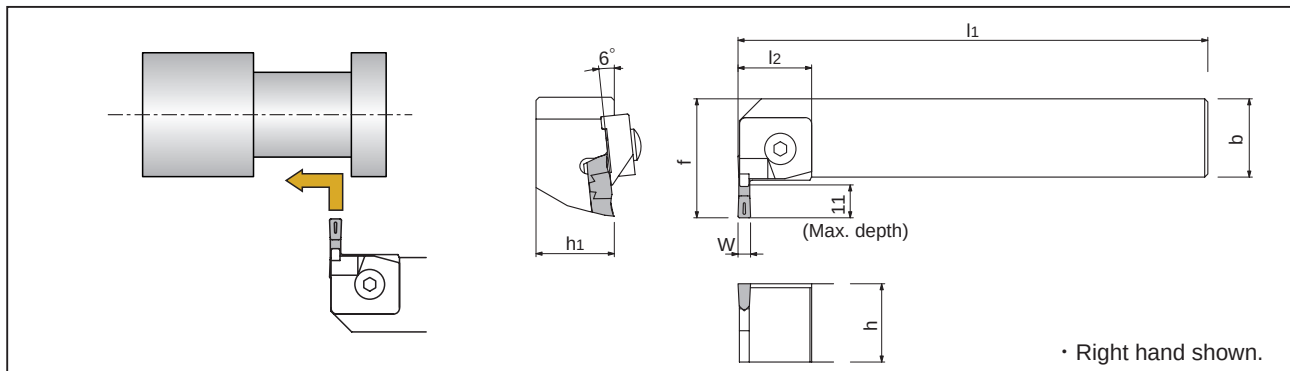
● Parts

Toolholder	Clamp	Clamping screw	Spring	Wrench
GTV ^{R/L} 16 - 3N	 CV ^{R/L} 3N	 AOB-6C	 ASG-6	 LW-4
20 - 3N				
25 - 3N				
16 - 4N				
20 - 4N				
20 - 6				
20 - 8				
25 - 4N				
25 - 6				
25 - 8				
32A4N				
32A6				
32A8				

Outside Grooving Holder

GKV

Clamp-on type



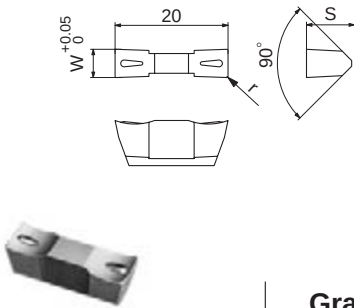
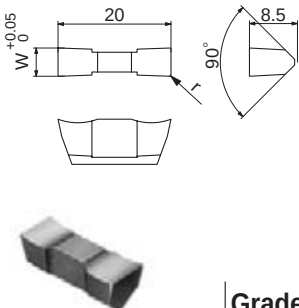
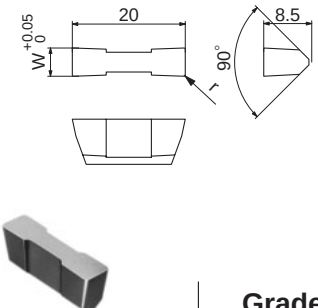
Grooving condition		Dimensions (mm)							Insert	Item-No.	stock	
Width (mm)	Max Depth (mm)	w	h	b	l1	h1	f	l2			R	L
4.00 ~ 5.90	11.0	4.0	20	20	125	20	23.5	33	 GEV	GKV^{R/L} 20 - 4N	●	○
6.00 ~ 7.90		6.0									○	
8.00 ~ 9.00		8.0										
4.00 ~ 5.90		4.0	25	25	150	25	23.5	38	 GTV  GVMB  GVMN GVGN P.133	20 - 6	○	
6.00 ~ 7.90		6.0										
8.00 ~ 9.00		7.0										
										20 - 8		
										25 - 4N	●	○
										25 - 6	○	○
										25 - 8		

● Parts

Toolholder	Clamp	Clamping screw	Spring	Wrench
GKV^{R/L} 20 - 4N	 CV^{R/L} 4N CV^{R/L} 6 CV^{R/L} 8 CV^{R/L} 4N CV^{R/L} 6 CV^{R/L} 8	 AOB-6C	 ASG-6	 LW-4
20 - 6				
20 - 8				
25 - 4N				
25 - 6				
25 - 8				

Outside Grooving Insert

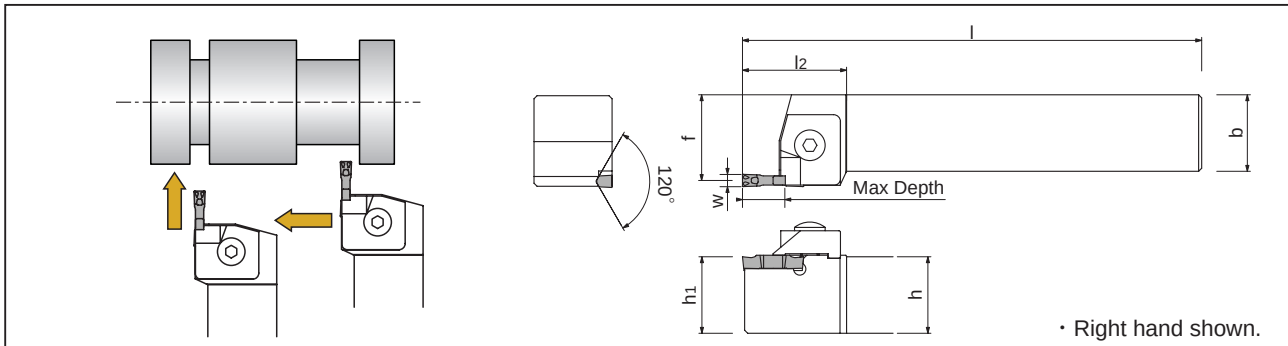
● Insert

Width (mm)												
	GEV	s	rε	Grade		GVMB	rε	Grade	GVMN / GVGN	rε	Grade	
3.00	300N	5.2	0.2	●	●				300N	0.2		
	300N04		0.4		●				300N04	0.4		●
3.50	350N	5.2	0.2						350N	0.2		
	350N04		0.4		●				350N04	0.4		
4.00	400N	8.5	0.2	●	●	20400N		●	400N	0.2	○	●
	400N04		0.4	●	●				400N04	0.4		●
4.50	450N	8.5	0.2			20450N		●	450N	0.2		
	450N04		0.4		●				450N04	0.4		
5.00	500N	8.5	0.2	●	●	20500N		●	500N	0.2	○	
	500N04		0.4		●				500N04	0.4		●
5.50	550N	8.5	0.2	●		20550N		○	550N	0.2	○	
	550N04		0.4		●				550N04	0.4		
6.00	600N	8.5	0.2	●	●	20600N		○	600N	0.2	○	●
	600N04		0.4	●	●				600N04	0.4		●
6.50	650N	8.5	0.2			20650N		○	650N	0.2	○	
	650N04		0.4		●				650N04	0.4		
7.00	700N	8.5	0.2			20700N		○	700N	0.2	○	
	700N04		0.4		●				700N04	0.4		
7.50	750N	8.5	0.2	●		20750N		○	750N	0.2	○	
	750N04		0.4		●				750N04	0.4		
8.00	800N	8.5	0.2	●		20800N		●	800N	0.2	○	●
	800N04		0.4		●				800N04	0.4		
9.00	900N	8.5	0.2			20900N			900N	0.2		●
	900N04		0.4						900N04	0.4		

Outside Grooving Holder

GTVW

Clamp-on type

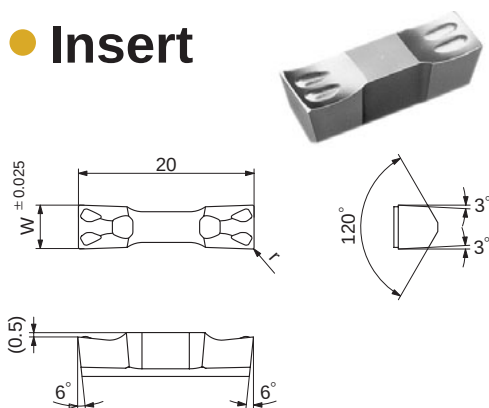


Grooving condition		Dimensions (mm)						Insert	Item-No.	stock	
Width (mm)	Max Depth (mm)	h	b	l	h1	f	l2			R	L
3.0	8.0	20	20	125	20	23.5	34	GVW300	GTVW ^{R/L} 20 - 3	●	○
		25	25	150	25	28				25 - 3	○
4.0 5.0	8.0	20	20	125	16	23.5		GVW400 GVW500	20 - 4	●	○
		25	25	150	20	28				25 - 4	○
6.0	8.0	20	20	125	16	27		GVW600	20 - 6	○	○
		25	25	150	20					25 - 6	○

● Parts

Toolholder	Clamp	Clamping screw	Spring	Wrench
GTVW ^{R/L} 20 - 3	 CV ^{R/L} 3N			
25 - 3				
20 - 4				
25 - 4				
20 - 5				
25 - 5				
	CV ^{R/L} 4N	AOB-6C	ASG-6	LW-4
	CV ^{R/L} 6			

● Insert

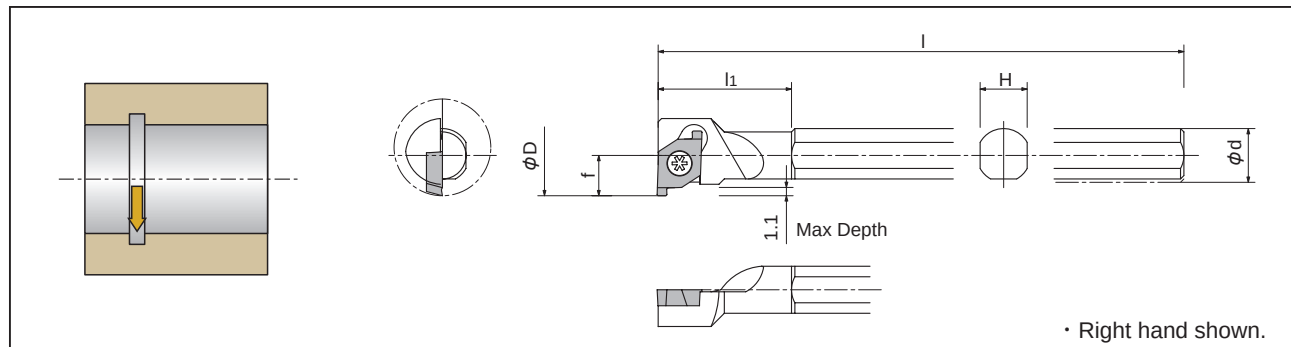


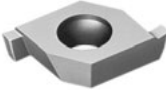
Toolholder	W	rε	QM3
GVW300N02	3.0	0.2	●
300N04		0.4	●
400N02	4.0	0.2	●
400N04		0.4	●
500N02	5.0	0.2	●
500N04		0.4	●
600N02	6.0	0.2	●
600N04		0.4	●

Internal Grooving Holder

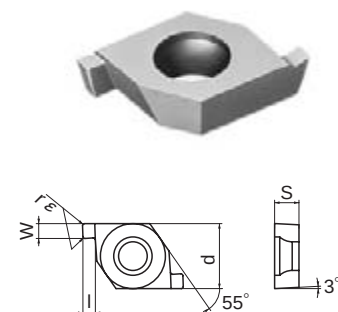
TGC

Screw-on type



Grooving condition		Dimensions (mm)					Insert	Item-No.	stock	
ϕD (mm)	Max Depth (mm)	ϕd	H	I	l_1	f			R	L
12	1.1	8.0	16	16	100	16	GDW.. 	TGC 10Z08H029R	○	
14		10.0	20	20	125	20		10Z10K030R	●	

GDW Insert



Grooving condition		Dimensions (mm)				Item-No.	KM3	ZM3
Width (mm)	Max Depth (mm)	l	rε	d	s		L	L
0.75	1.1	1.2	0.2	6.35	2.38	GDW 07075L	○	
0.95						07095L	○	
1						07100L	○	
1.45						07145L	●	

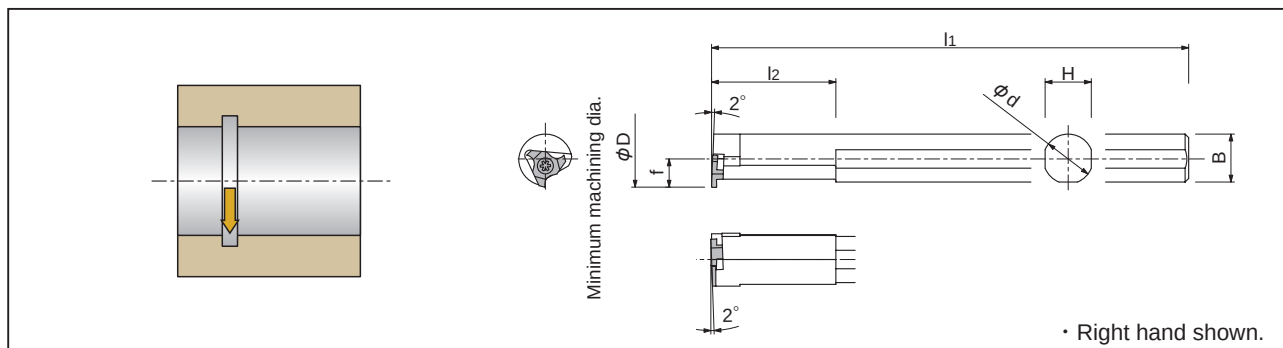
● Parts

Toolholder	Clamp	Wrench
TGC 10Z08H029R 10Z10K030R	 LRIS×2.5×7	 RLR-15S

Internal Grooving Holder

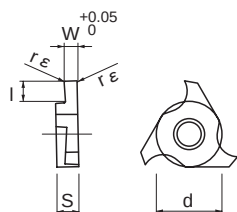
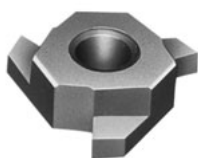
BG

Screw-on type



Grooving condition		Dimensions (mm)						Insert	Item-No.	stock	
ϕD (mm)	Max Depth (mm)	ϕd	H	B	l_1	l_2	f			R	L
10	1.1	8	7	7.5	125	20	5	GTG10..	BG ^{R/L} 8	●	●
12		10	9	9.5	150	25	6		10	●	●
14	2	12	11	11.5	180	30	7	GTG14..	12	●	●
16		14	13	13.5	180	35	8		14	●	●
20	3	16	15	15.5	200	40	10	GTG20..	16	●	●
25		18	19	19.5	200	40	12		20	○	●

GTG Insert



Right hand shown

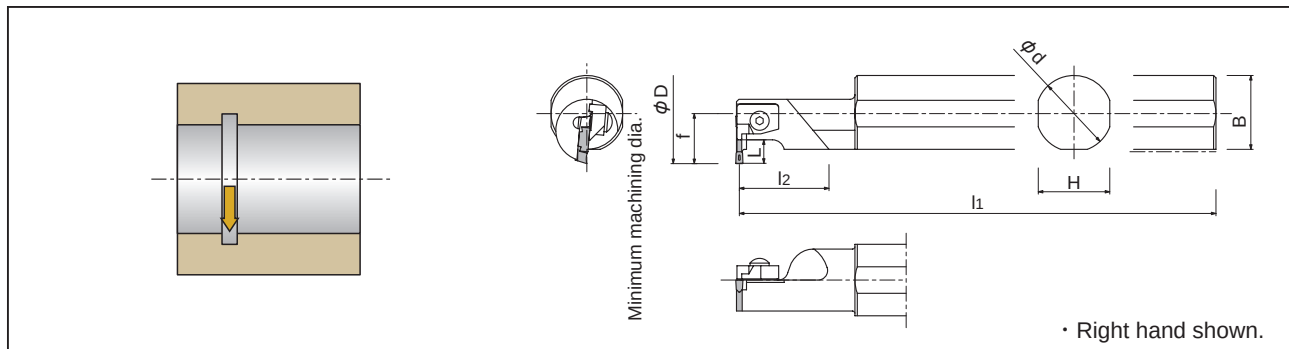
Grooving condition		Dimensions (mm)				Item-No.		Grade			
Width (mm)	Max Depth (mm)	l	rε	d	s			N20	ZM3		
0.75	1.1	1.2	0.05	5.56	3.18	GTG	10075FL00	●	●		
1							10100FL00			○	●
1.25			0.2				10125L				
1.45			0.05				10145L				
1.5			0.1				10150FL00				
2							10200FL01				
1	2.0	2.2	0.05	7.94		14100FL00	●	●			
1.45			0.2			14145L			○		
1.5			0.05			14145FL00					
1.75			0.2			14175L					
2			0.1			14200FL01					
1.75			3.0			3.2				0.2	9.53
2	20200L	○									

Parts

Toolholder	Clamp	Wrench
BG ^{R/L} 8	 LR - S - 2.5×6.8 LR - S - 3×7.8	RLR - 15S
10		 RLR - 20S
12		
14		
16		
20		

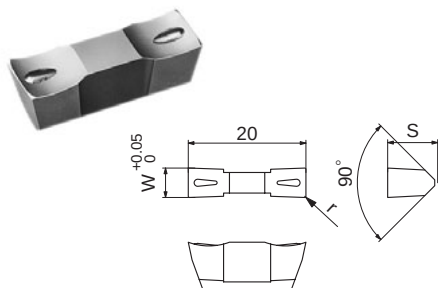
GKV

Clamp-on type



Grooving condition		Dimensions (mm)							Insert	Toolholder	stock	
ϕD (mm)	Max Depth (mm)	ϕd	H	B	l_1	l_2	f	L			R	L
30	5	32	30	31	200	20	21	5.5		GKV ^{R/L} 3230 - 3	☐	
40	7.5	32	30	31	250	20	23	7.5		3240 - 3	☐	
50	9.5	40	38	39	300	35	29	9.5		4055 - 3	☐	

GEV Insert



Width (mm)	Dimensions (mm)		Item-No.	N40	QM3
	S	rε			
3	5.2	0.2	GEV 300N	●	●
		0.4	300N04		●
3.5		0.2	350N	○	
		0.4	350N04		●

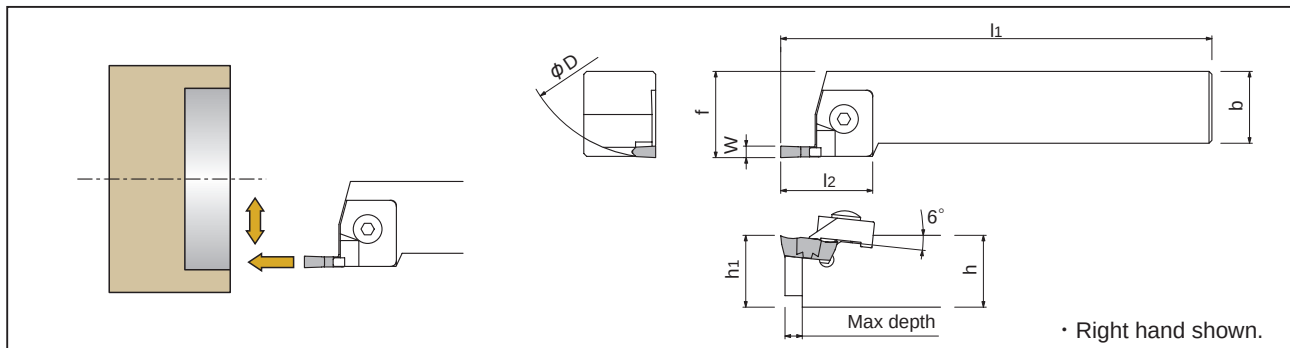
Parts

Toolholder	Clamp	Clamping screw	Spring	Wrench
GEVW 300N 300N04 350N 350N04	 CV ^{R/L} 35N	 AOB - 5C	 ASG - 5	 LW - 3

Outside Grooving Holder

GFV

Clamp-on type

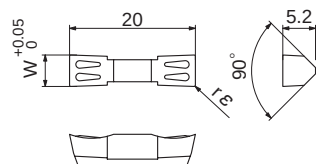


Grooving condition		Dimensions (mm)							Insert	Item-No.	stock	
Width (mm)	Max Depth (mm)	ϕD	H	b	l1	h1	l2	f			R	L
6	6.0	38	20	20	125	20	32	25		GFV ^{R/L} 20 - 6	○	●
6		38	25	25	150	25	32	30		25 - 6	●	○

GFV Insert



Insert	W	$r\epsilon$	N40	QM3
GFV 600 N	6.0	0.15	○	○
600 N04		0.4	○	○

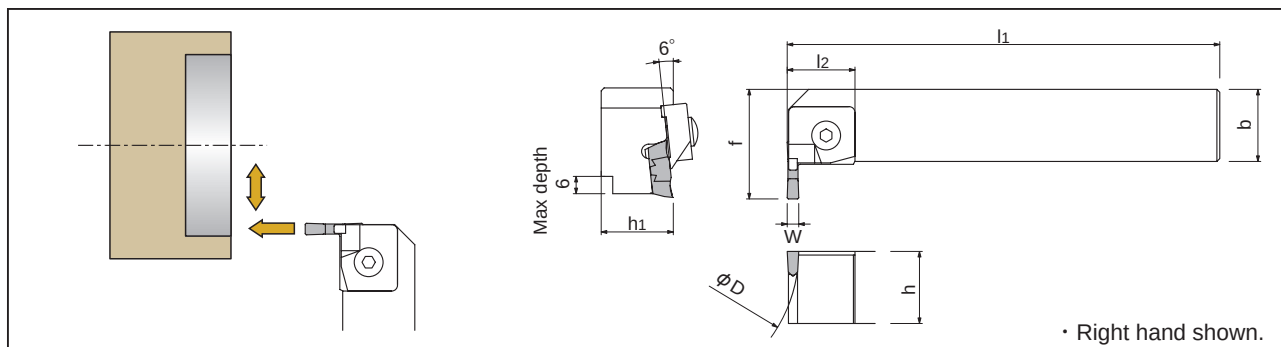


● Parts

Toolholder	Clamp	Clamping screw	Spring	Wrench
GFV ^{R/L} 20 - 6	 CV ^{R/L} 6	 AOB - 6C	 ASG - 6	 LW - 4
25 - 6				

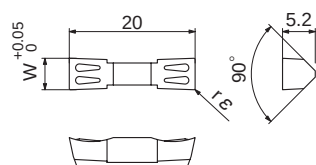
GSV

Clamp-on type



Grooving condition		Dimensions (mm)							Insert	Item-No.	stock	
Width (mm)	Max Depth (mm)	φD	H	b	l1	h1	l2	f			R	L
6	6.0	38	20	20	125	20	23.5	33		GSV ^{R/L} 20 - 6	○	○
6		38	25	25	150	25	23.5	38		25 - 6	●	○

GFV Insert

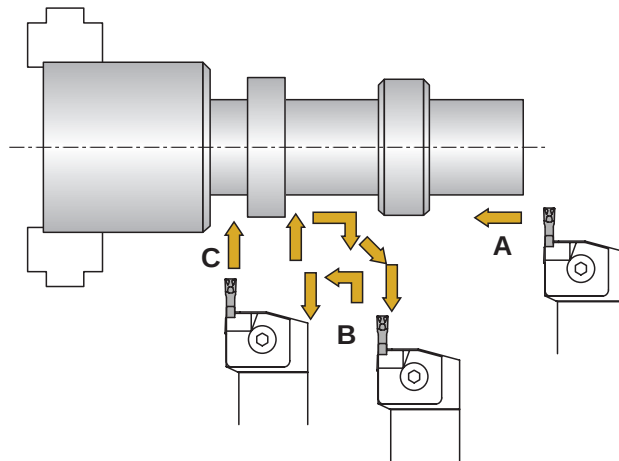


Insert	W	rε	N40	QM3
GFV 600 N	6.0	0.15	○	○
600 N04		0.4	○	○

● Parts

Toolholder	Clamp	Clamping screw	Spring	Wrench
GFV ^{R/L} 20 - 6	 CV ^{R/L} 6	 AOB - 6C	 ASG - 6	 LW - 4
25 - 6				

● GT Tool Applications

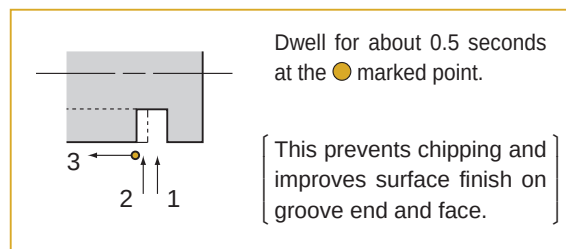


Note : For operation A and B, use of stronger insert (6mm wide) is recommended.

● Recommended Cutting Conditions

		A	B	C
		Outside Turning	Outside Turning	Outside Turning
Cutting speed (m/min)		50 ~ 150	50 ~ 150	50 ~ 150
Insert grade	Insert width	Feed × Max. depth of cut	(Max depth of cut, max feed)	Feedrate (mm/rev)
Cutting speed (m/min)	4mm	0.45	(3mm、0.15mm/rev)	0.05 ~ 0.15
	6mm	0.60	(3mm、0.2mm/rev)	0.05 ~ 0.15
Insert grade : QM3				
Cutting speed (m/min)		50 ~ 200	50 ~ 200	50 ~ 200
Insert grade	Insert width	Feed × Max. depth of cut	(Max depth of cut, max feed)	Feedrate (mm/rev)
QM3	4mm	0.70	(3mm、0.3mm/rev)	0.1 ~ 0.3
	6mm	1.00	(4mm、0.3mm/rev)	0.1 ~ 0.3

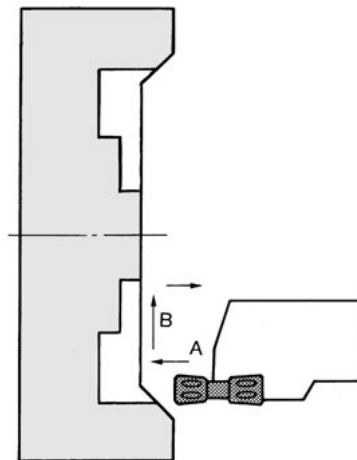
- In the case of side turning after grooving, it is recommended to groove twice, and to dwell for about 0.5 seconds in order to prevent the insert from breaking before side turning after the second groove.
- In case of grooving, it is recommended to make a step feeding in order to get better chip control.



Note : The recommended cutting conditions for GT tools, turning and, facing is based on alloy steel work material.

As the cutting condition varies depending on the workpiece material, it is recommended to establish the cutting condition to 80% of the optimum cutting conditions and then increase gradually.

● GFV / GSV Tool Applications

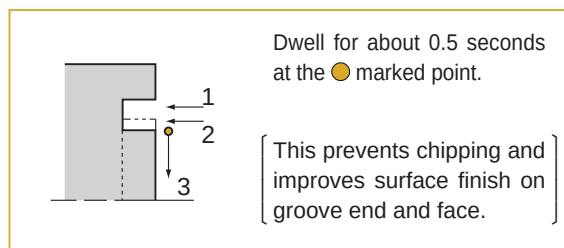


Note : It is recommended to feed from outside to the center as shown above for facing in order to prevent insert from breakage.

● Recommended Cutting Conditions

			B	A
			Side turning	Grooving
Cutting speed (m/min)			50 ~ 150	50 ~ 150
Insert grade	Insert width	Directions	Feed × Max. depth of cut (Max depth of cut, max feed)	Feedrate (mm/rev)
N40	6mm	Center to OD	0.5 (2mm、0.25mm/rev)	0.05 ~ 0.15
		OD to center	0.6 (3mm、0.2mm/rev)	0.05 ~ 0.15
Insert grade : QM3				
Cutting speed (m/min)			50 ~ 200	50 ~ 200
Insert grade	Insert width	Directions	Feed × Max. depth of cut (Max depth of cut, max feed)	Feedrate (mm/rev)
QM3	6mm	Center to OD	0.5 (2mm、0.25mm/rev)	0.1 ~ 0.3
		OD to center	0.6 (2mm、0.2mm/rev)	0.1 ~ 0.3

- In the case of side turning after grooving, it is recommended to groove twice, and to dwell for about 0.5 seconds in order to prevent the insert from breaking before side turning after the second groove.
- In case of side turning after grooving, it is recommended to make a step feeding in order to get better chip control.



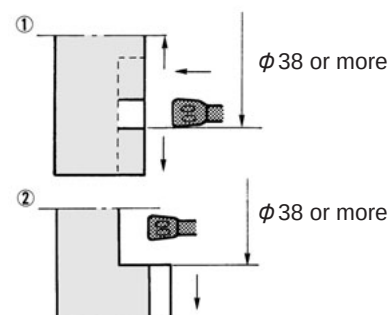
● Reference Data

① Grooving and facing

Perform grooving with ϕ 38 or more (see figure right) and then facing either to the center or to OD side.

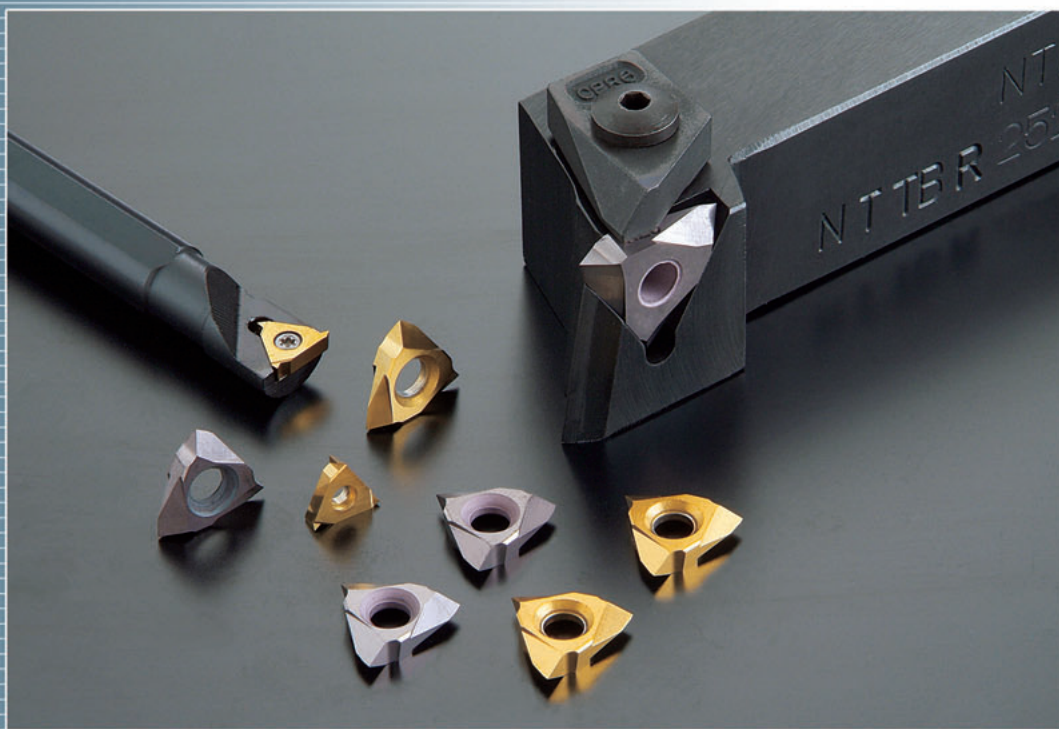
② Facing from center to outside

In case of end facing as shown on the right, since GFV / GSV tools do not work from outside to center on ϕ 38 or less perform facing from center to out side on this case.



NTK

Threading



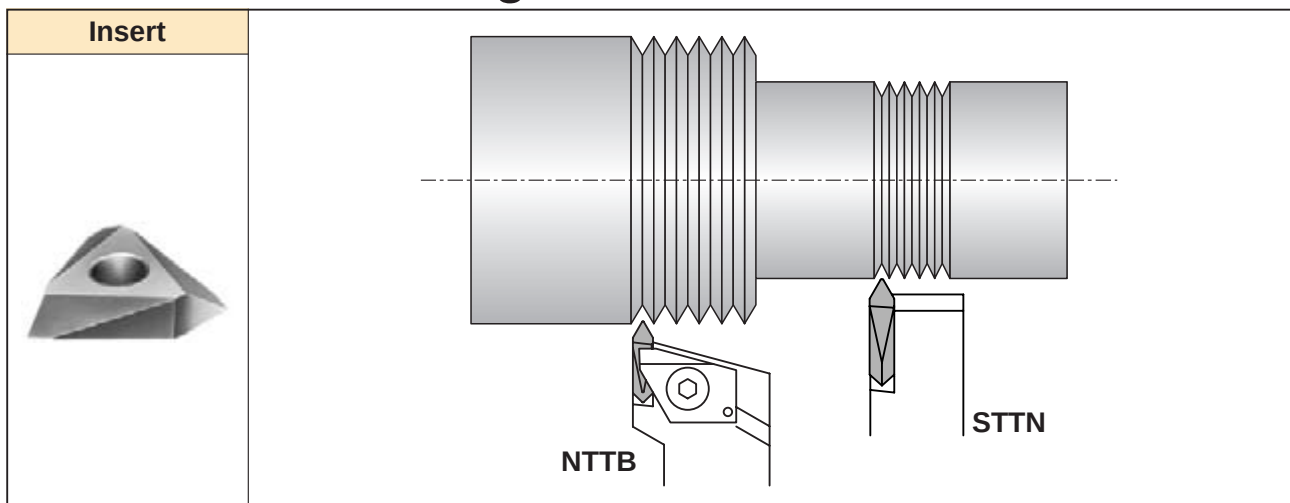
Outside threading P.145

Internal threading P.147

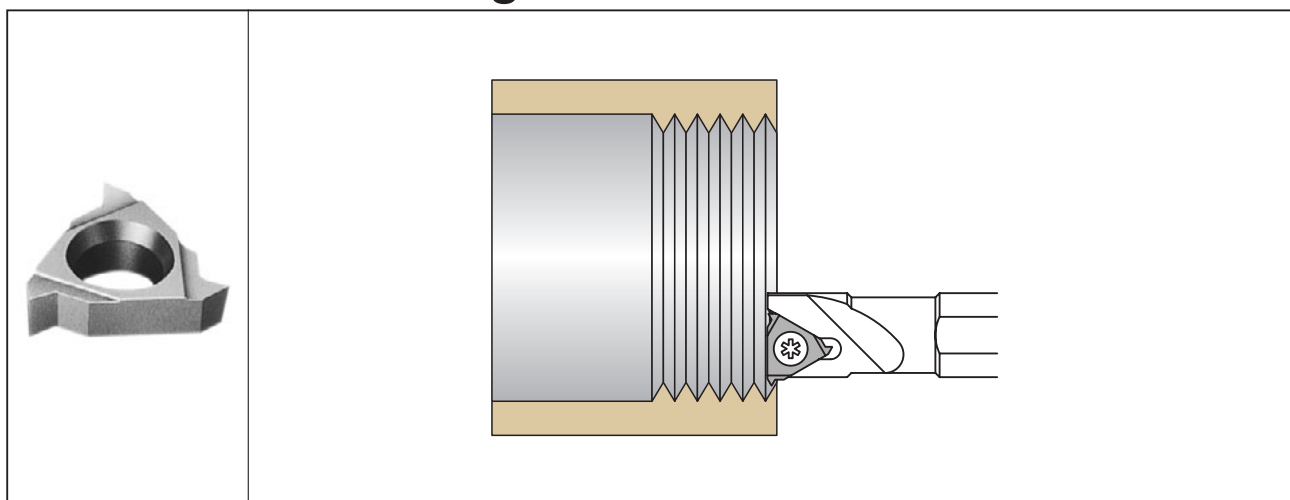
▼ Recommend Cutting Conditions

Insert Grade	Coated carbide		Cermet
	QM3	ZM3	N20
Conditions Work piece	Cutting speed (m/min)	Cutting speed (m/min)	Cutting speed (m/min)
Carbon steel Alloy steel	~ 200	~ 180	~ 250
Stainless steel	~ 180	~ 150	~ 180
Cast iron	~ 200	~ 200	

● Outside Threading

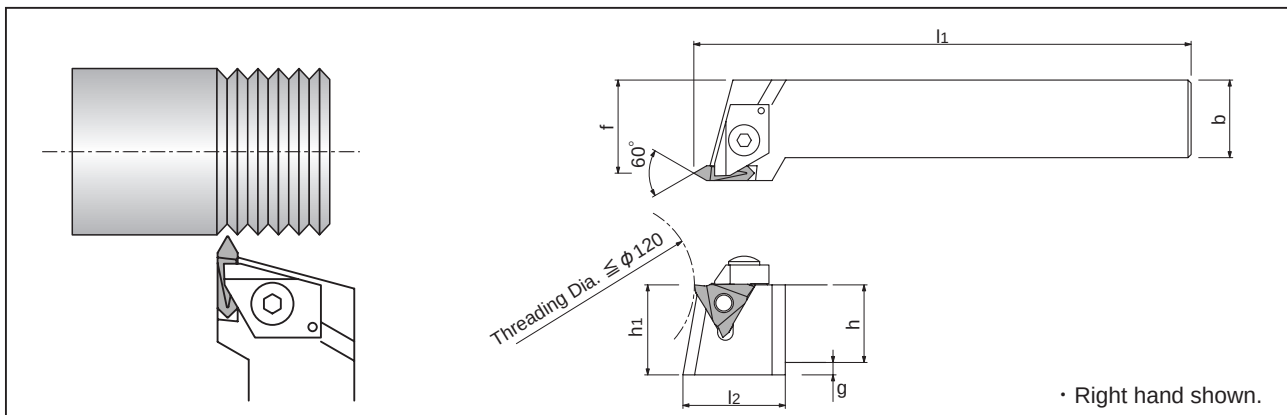


● Internal Threading



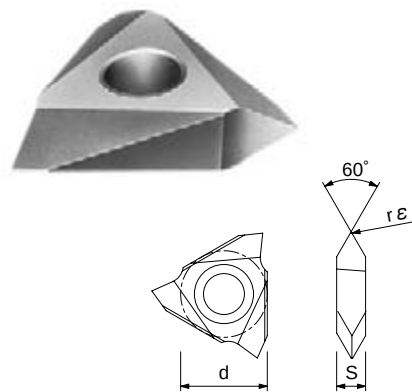
NTTB

Clamp-on type



Dimensions (mm)							Insert	Item-No.	Stock	
h	b	l1	h1	f	l2	g			R	L
16	16	120	16	20	20	4	TTMH 3260 R	NTTB ^{R/L} 161632	●	
20	20	140	20	25				202032	●	
25	25	160	25	30			TTMA 4360 R	252543	●	

TTM Insert



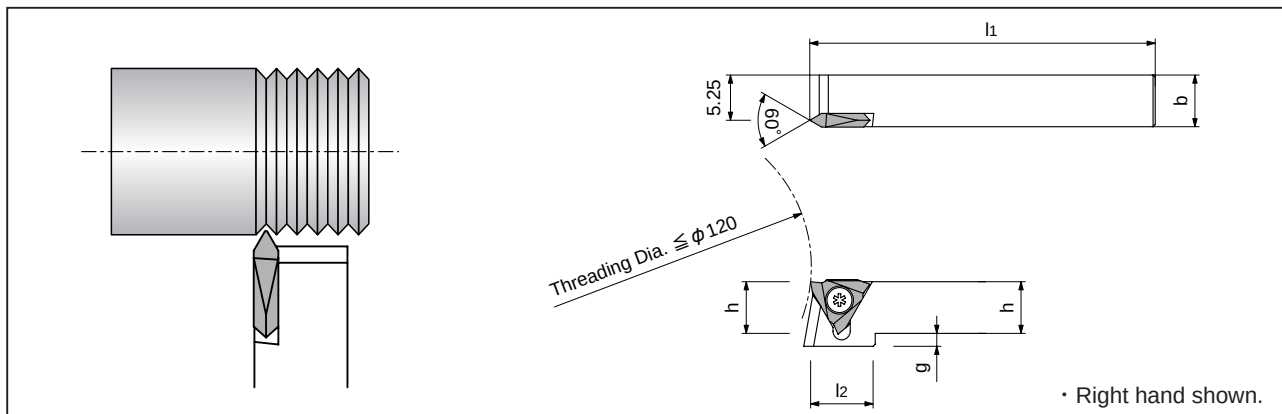
Dimensions (mm)			Item-No.	N20	ZM3
d	S	rε			
9.525	3.18	0.1	TTMH 3260R010	○	○
		0.15	3260R015	○	○
		0.2	3260R020		○
		0.25	3260R025	○	
12.7	4.76	0.15	TTMA 4360R015	○	
		0.2	4360R020	○	
		0.25	4360R025		
		0.3	4360R030		

● Parts

Item-No.	Clamp	Clamping screw	Spring	Wrench
NTTB ^{R/L} 161632 202032 252543	CP ^{R/L} 5	AOS - 5×25	ASG - 5	LW - 2.5
	CP ^{R/L} 6	AOS - 6×30	ASG - 6	LW - 3

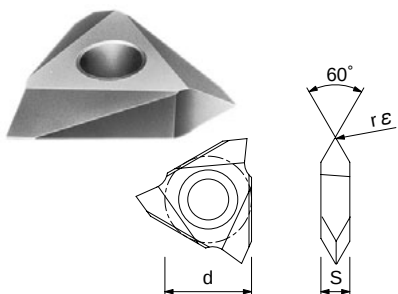
STTN

Screw-on type



Dimensions (mm)							Insert	Item-No.	Stock	
h	b	l1	h1	f	l2	g			R	L
10	10	80	10	8.5	15	5	TTMH 3260 ^{R/L}	STTN ^{R/L} 101032	●	
12	12	80	12	10.5	15	5		121232	●	
12	12	125	12	10.5	15	5		121232-K		

TTM Insert



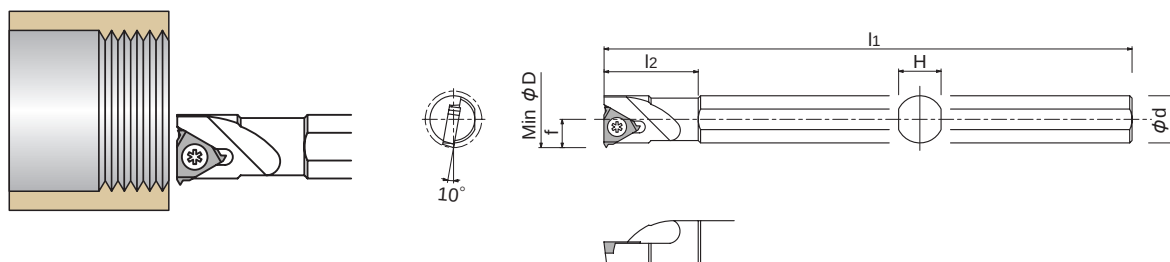
Dimensions (mm)			Item-No.	N20	ZM3
d	S	rε			
9.525	3.18	0.1	TTMH 3260R010	●	○
		0.15	3260R015	○	○
		0.2	3260R020		○
		0.25	3260R025	○	

● Parts

Toolholder	Clamp	Wrench
		
STTN ^{R/L} 101032 121232 121232-K	LR -S - 4 × 5.8	RLR - 20S

HN

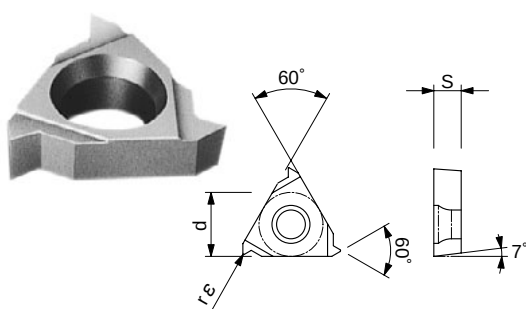
Screw-on type



• Right hand shown.

Dimensions (mm)						Insert		Item-No.		Stock	
Minimum diameter	ϕd	H	l_1	l_2	f					R	
8	6	5.5	100	13	3.8	TMN	06R03	HN	59Z-0028	○	
10	8	7.0	125	17	4.7		08R03		59Z-0029	○	
12	10	9.0	150	20	6.0		09R03		59Z-0030	○	

TMN Insert



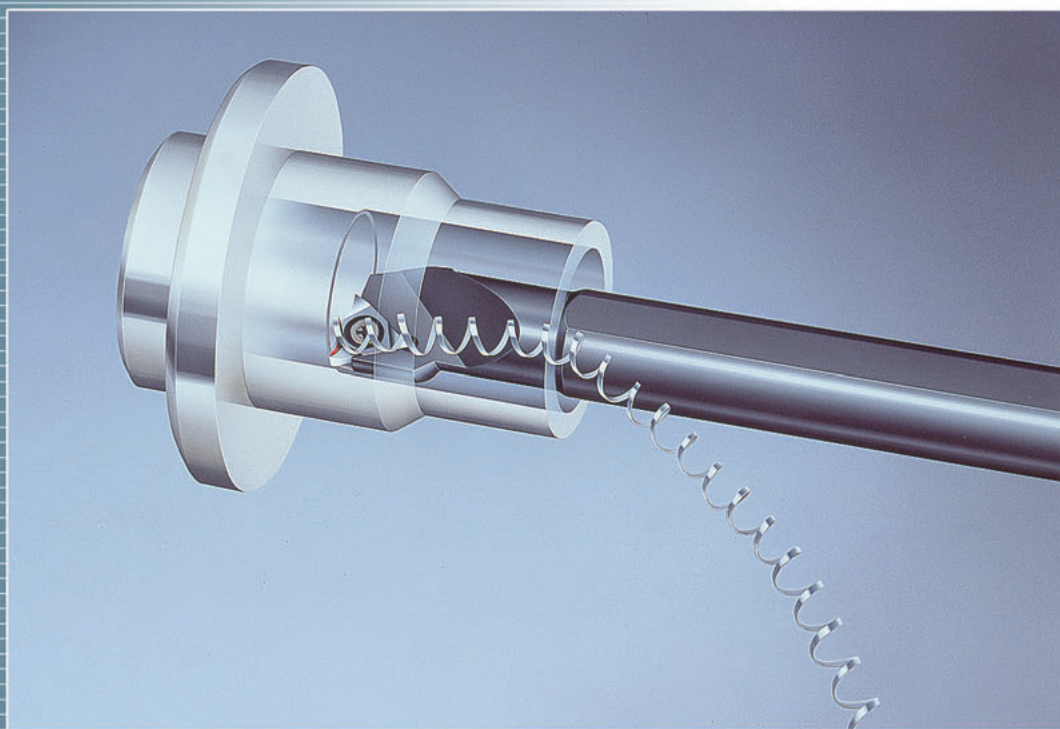
Dimensions (mm)			Item-No.	ZM3
d	S	$r\epsilon$		
3.97	1.59	0.03	TMN 06R03	○
4.76	2.38		08R03	○
5.56			09R03	○

● Parts

Toolholder		Clamp	Wrench
			
HN	59Z-0028	LR -S - 2 × 4.4	RLR - 13S
	59Z-0029	LR -S - 2 × 5.5	
	59Z-0030	LR -S - 2 × 6	

NTK

Boring Bar

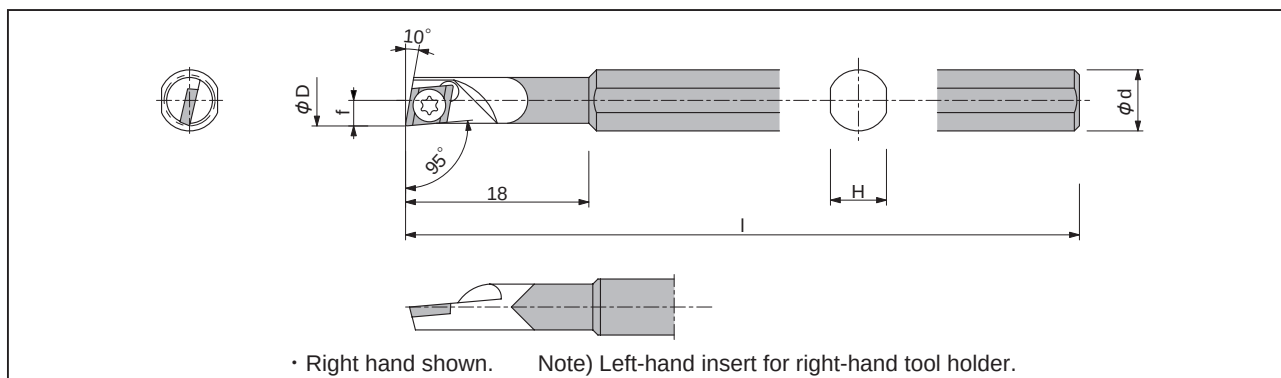


Structure and Features

Minimum machining diameter	Shape	
$\phi 5$ (MBR) $\phi 5.7$ (MSBR)	 MBR P.151	 MSBR P.152
$\phi 6 \sim 8$	 SELR P.153	 SCLP P.154
$\phi 8$	 STUC / STUP P.156	 C-STUC / C-STUP P.156
$\phi 10$	Back Boring  STZ P.157	
$\phi 15 \sim 20$	 BBR P.159	
$\phi 20$	 CTFP P.161	 CSKP P.162
$\phi 25 \sim 30$	 BBR P.160	
$\phi 32$	 MCLN P.163	
$\phi 40$	 MDUN P.164	

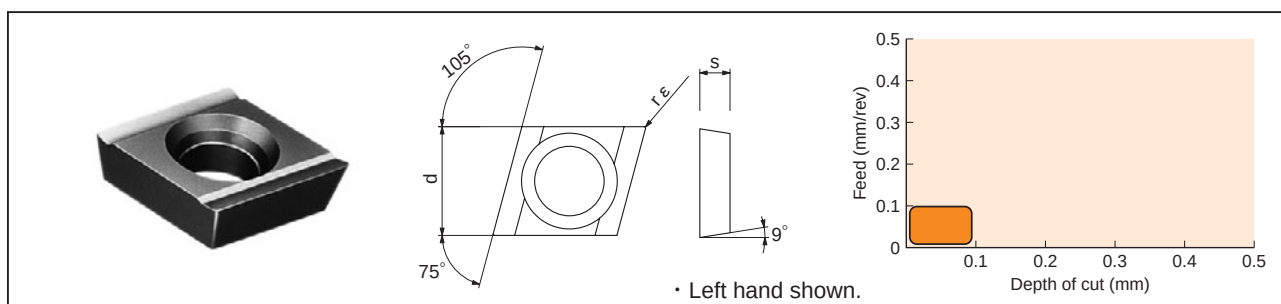
MBR
Minimum machining diameter $\phi 5$

● Carbide Shank



Minimum machining diameter	Maximum over hang	Dimensions (mm)				Parts		Holder
						Clamping screw	Wrench	
ϕD		ϕd	H	l ₁	f			
5	6D	6	5.5	80	2.5	LR-S-2 × 3.7	RLR-13S	C06F - MBR

● Insert

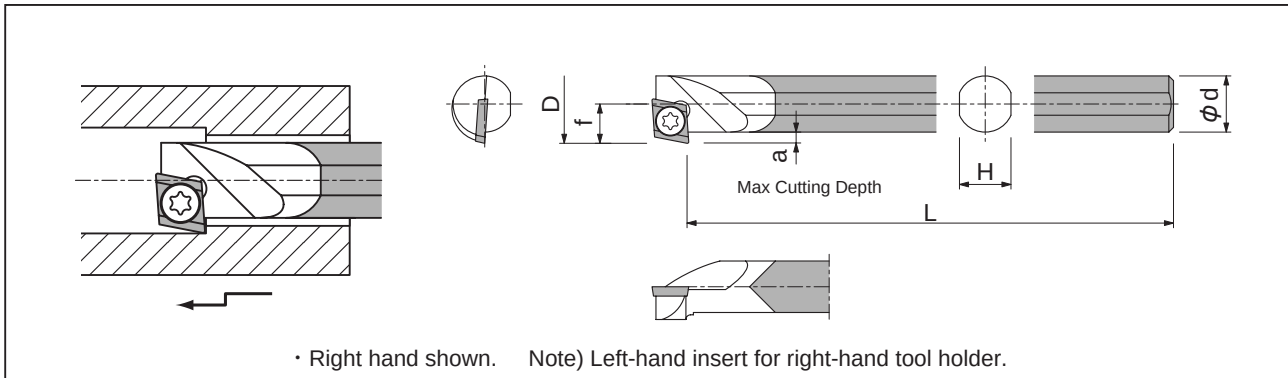


Insert-No.	Chipbreaker	Dimensions (mm)			Grade	
		d	s	rε	KM3	ZM3
MBL 005FL		3.60	1.0	0.05	●	○
010FL				0.10		●
015FL				0.15	●	●

MSBR

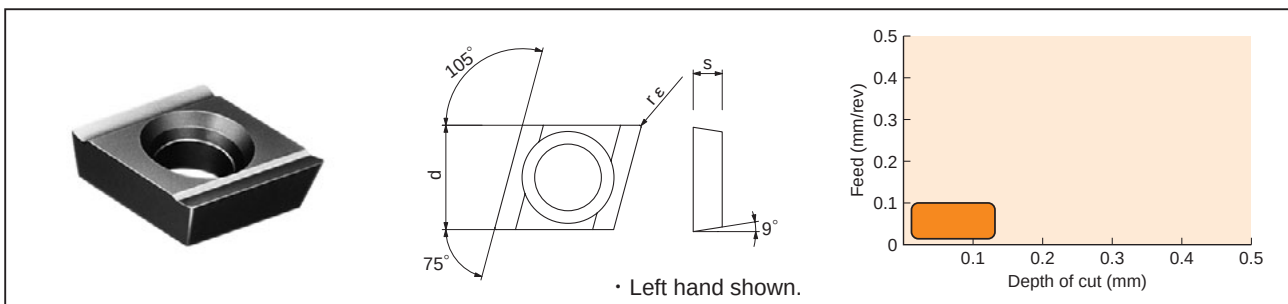
Minimum Machining Diameter $\phi 5.7$

Carbide Shank



Minimum machining diameter	Maximum over hang	Dimensions (mm)					Parts		Holder	Stock
							Clamping screw	Wrench		
ϕD		ϕd	H	l_1	f	a				
5.7	6D	4	3.5	110	3.2	1.0	LR-S-2 $\times$ 3.7	RLR-13S	C04J-MSBR	○
7.7		6	5.5		4.2				C06J-MSBR	○

Insert

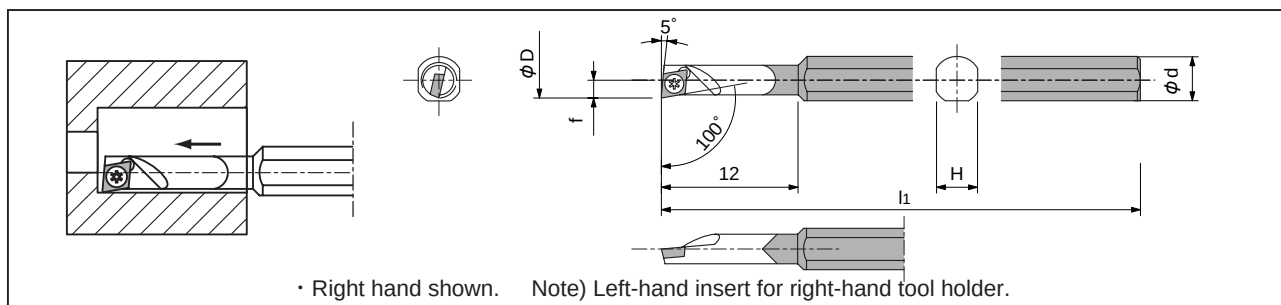


Insert-No.	Chipbreaker	Dimensions (mm)			Grade	
		d	s	r ϵ	KM3	ZM3
MBL 005FL		3.60	1.0	0.05	●	○
010FL				0.10		●
015FL				0.15	●	●

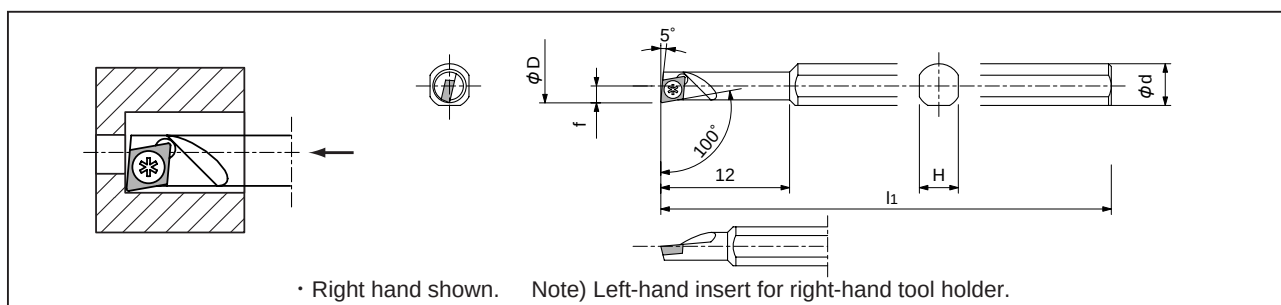
SELR

Minimum Machining Diameter $\phi 6$

• Carbide Shank

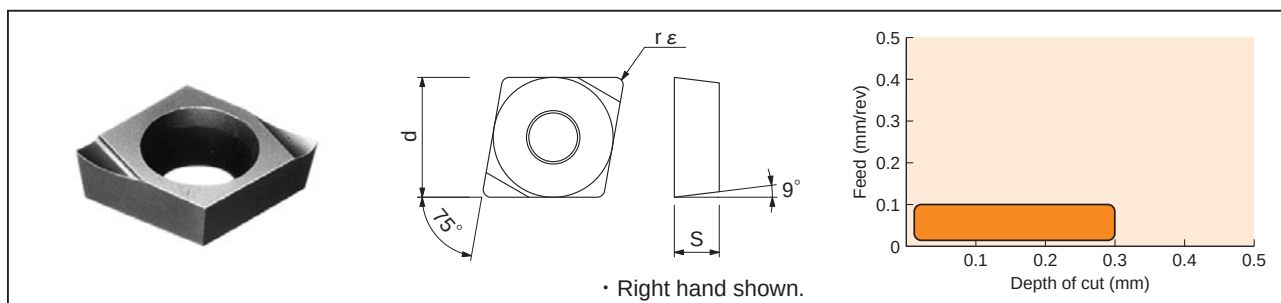


• Steel Shank



Shank	Minimum machining diameter	Dimensions (mm)				Parts		Holder	Stock	
	ϕD	ϕd	H	l_1	f	Clamping screw	Wrench		R	L
Carbide	6	5	4.5	110	3	LR-S-2 $\times$ 4.4	RLR-13S	C05J-SELR $^R/L$ -T3	●	●
		6	5.2	110	3	LR-S-2 $\times$ 4.4		C06J-SELR $^R/L$ -T3	●	
Steel		8	7	100	3	LR-S-2 $\times$ 4.4		SELR $^R/L$ -0008HT3	●	●

• Insert

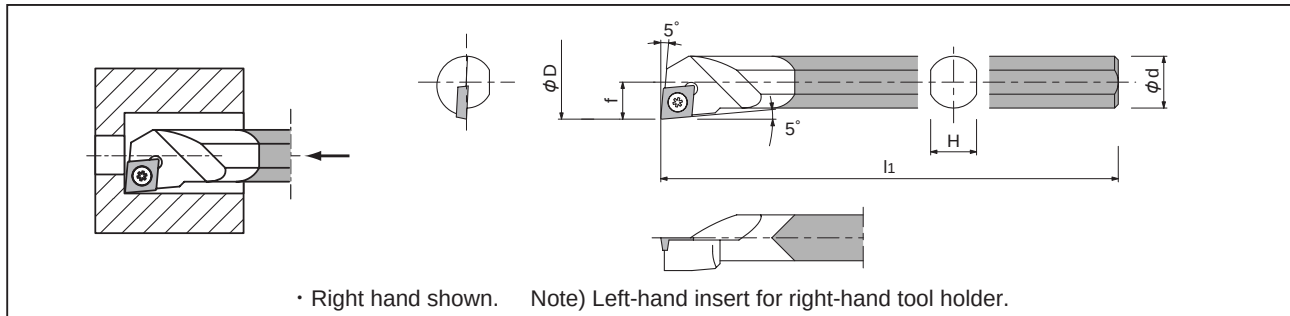


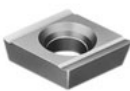
Insert-No.	Dimensions (mm)			Cermet		Carbide	Coated Carbide	
	d	s	$r \epsilon$	T15	N20	KM3	ZM3	VM1
ERGH T30102FRA2 T30102FLA2 T30104FLA2	3.97	1.59	0.2	○	●	●	●	○
			0.2	●	●	●	●	○
			0.4		●		○	

SCLP

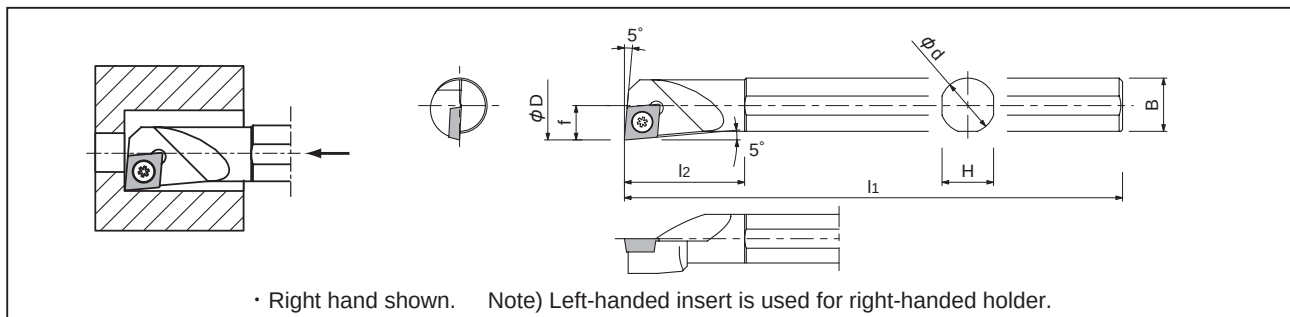
Minimum Machining Diameter $\phi 8$

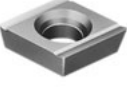
● Carbide Shank



Minimum machining diameter	Dimensions (mm)				Insert	Parts		Holder	Stock	
						Clamping screw	Wrench			
ϕ D	ϕ d	H	l ₁	f					R	L
8	6	5.2	110	4	CPGH 0401	LR-S-2 × 4.4	RLR-13S	C06J -SCLP ^{R/L} -04	●	●
10	8	7.0	125	5	CPGH 0602	LR-S-2.5 × 4.8	RLR-15S	C08K -SCLP ^{R/L} -06	●	●
12	10	9.0	150	6	CPGH 0802	LR-S-3 × 6.2	RLR-20S	C10M-SCLP ^{R/L} -08	●	●
16	12	11.0	180	8	CPMH 0903	LR-S-4 × 5.8		C12Q-SCLP ^{R/L} -09	●	●
20	16	14.5	200	10				C16R-SCLP ^{R/L} -09	●	●

● Steel Shank



Minimum machining diameter	Dimensions (mm)						Insert	Parts		Holder	Stock	
								Clamping screw	Wrench			
ϕD	ϕd	H	B	l_1	l_2	f					R	L
8	6	5.2	5.75	110	15	4	CPGH 0401	LR-S-2 × 4.4	RLR-13S	SCLP ^{R/L} -0006H62S -0008H83S -0010M03S -0012M32 -0016Q32 -0020R32 -0025S32	●	●
10	8	7.0	7.5	125	20	5	CPGH 0602	LR-S-2.5 × 4.8	RLR-15S		●	●
12	10	9.0	9.5	150	25	6	CPGH 0802	LR-S-3 × 6.2	RLR-20S		●	●
16	12	11.0	11.5	180	30	8	CPMH 0903 CPGH 0903	LR-S-4 × 5.8			●	●
20	16	14.5	15.5	200	35	10					●	●
25	20	19.0	19.5	200	40	12.5					●	●
32	25	24.0	24.5	250	45	16					●	●

Please see page 155 for inserts.

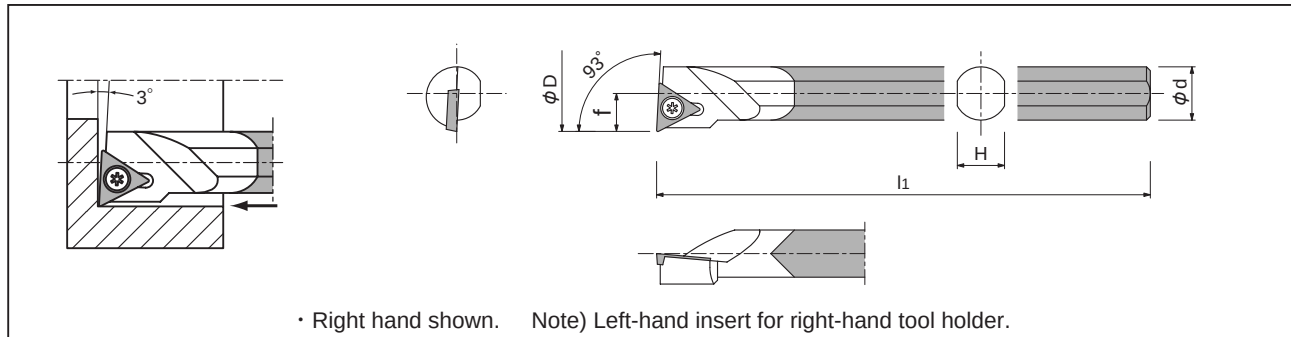
● CP Insert for 80°

Shape	Insert Number	Inscribed circle	Thickness	Nose radius	Cermet			PVD coated ZM3
					T15	N20	N40	
	CPGB 080204 TN	7.94	2.38	0.4	○			
 ※Left hand shown	CPGH 040102 _LA1	4.76	1.59	0.2	●	●		○
	040104 _LA1			0.4	●	●		○
	060202 _LA	6.35	2.38	0.2	●	●		○
	060204 _LA			0.4	●			○
	080202 _LA	7.94	2.38	0.2	●			●
	080204 _LA			0.4	●			○
	040102 _RA1	4.76	1.59	0.2	●	●		
	040104 _RA1			0.4	●			
	060202 _RA	6.35	2.38	0.2	●	●		
	060204 _RA			0.4	●			
	080202 _RA	7.94	2.38	0.2	●			
	080204 _RA			0.4	●			
	CPGH 060202 ENBAM5	6.35	2.38	0.2	●		●	○
	080202 ENBAM5	7.94		0.2			●	○
	CPGH 090302 ENBAM5	9.525	3.18	0.2	●			○
	090304 ENBAM5			0.4	●			○
	090308 ENBAM5			0.8				○
	CPMH 060204 AM5	6.35	2.38	0.4			●	
	080204 AM5	7.94		0.4			●	
	080208 AM5			0.8				
 ※Left hand shown	CPMH 090304 TLB	9.525	3.18	0.4		●		
	090308 TLB			0.8		●		
	090304 TRB			0.4				
	090308 TRB			0.8				
	CPMH 090304 AM5	9.525	3.18	0.4			●	
	093308 AM5			0.8				

STUP/STUC

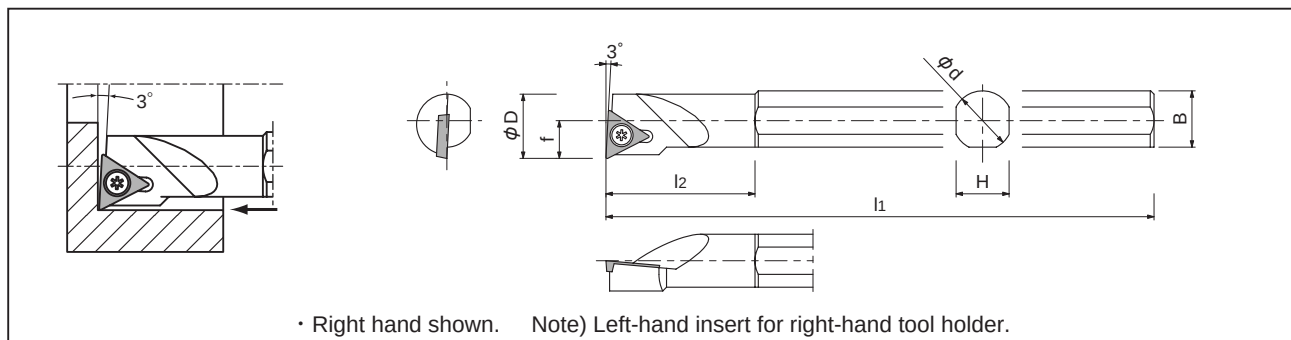
Minimum Machining Diameter $\phi 8$

● Carbide Shank



Minimum machining diameter	Dimensions (mm)				Insert	Parts		Holder	Stock	
						Clamping screw	Wrench			
ϕD	ϕd	H	l ₁	f					R	L
8	6	5.2	110	3.8	TCGH 0601	LR-S-2 × 4.4	RLR-13S	C06J -STUC ^{R/L} -06	●	●
10	8	7.0	125	5.0	TPGH 0802	LR-S-2 × 5.5		C08K -STUP ^{R/L} -08	●	●
12	10	9.0	150	6.0	TPGH 0902	LR-S-2.5 × 6	RLR-15S	C10M -STUP ^{R/L} -09	●	●
16	12	11.0	180	8.0		LR-S-2.5 × 6.8		C12Q -STUP ^{R/L} -09	●	
22	16	14.0	200	11.0	TPGH 1103	LR-S-3 × 7.8	RLR-20S	C16R -STUP ^{R/L} -11	●	

● Steel Shank

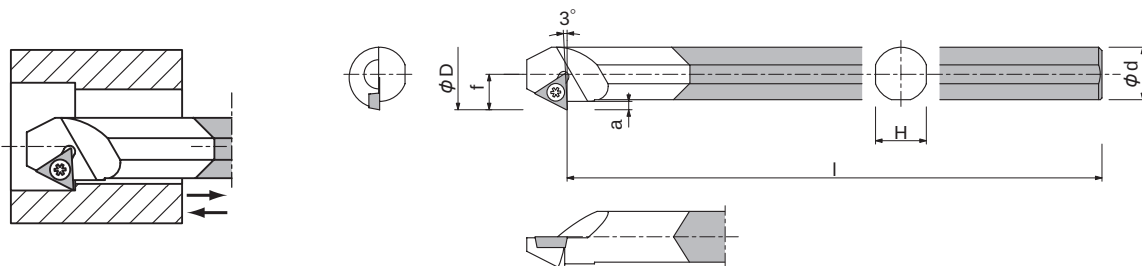


Minimum machining diameter	Dimensions (mm)						Insert	Parts		Holder	Stock	
								Clamping screw	Wrench			
ϕD	ϕd	H	B	l ₁	l ₂	f					R	L
8	6	5.5	5.75	100	15	4	TCGH 0601	LR-S-2 × 4.4	RLR-13S	STUCR/L-0006H52S	●	●
10	8	7	7.5	100	20	5	TPGH 0802	LR-S-2 × 5.5		-0008H63S	○	
10	8	7	7.5	125	20	5				-0008K63S		
12	10	9	9.5	150	25	6	TPGH 0902	LR-S-2.5 × 6	RLR-15S	-0010M73S	○	○
16	12	11	11.5	150	30	8	TPGH 1103	LR-S-2.5 × 6.8		-0012M73S	○	○
20	16	15	15.5	180	35	10		LR-S-3 × 7.8	RLR-20S	-0016Q22	○	
25	20	19	19.5	200	32	12.5					-0020R22	○
32	25	24	24.5	250	45	16	TPGH 1603	LR-S-4 × 5.8		-0025S32	○	

Please see page 158 for inserts.

STZ**Minimum Machining Diameter $\phi 10$**

Carbide Shank **Back Boring**

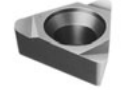


• Right hand shown.

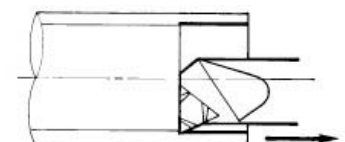
Minimum machining diameter	Dimensions (mm)					Insert	Parts		Holder	Stock
							Clamping screw	Wrench		
ϕD	ϕd	H	l_1	f	a					
10	6	5.2	110	5.5	2.5	TCGH 0601	LR-S-2 $\times$ 4.4	RLR-13S	B06J-STZCR-06	●
12	8	7.0	125	7.0	3.0	TPGH 0802			B08K-STZPR-08	
14	10	9.0	150	8.0	3.0	TPGH 0902	LR-S-2.5 $\times$ 4.8	RLR-15S	B10M-STZPR-09	
16	12	11.0	180	9.0	3.0		LR-S-2.5 $\times$ 6.8		B12Q-STZPR-09	○
20	16	14.5	200	11.0	3.0	TPGH 1103	LR-S-3 $\times$ 7.8	RLR-20S	B16R-STZPR-11	●

Please see page 158 for inserts.

T type insert

Shape	Insert Number		Inscribed circle	Thickness	Nose radius	Cermet		PVD coated ZM3				
						T15	N20					
	TCGB	060102 TN 060104 TN	3.97	1.59	0.2 0.4	○ ○						
 Left hand shown	TCGH	060102 _LB1 060104 _LB1 060102 _RB1 060104 _RB1	3.97	1.59	0.2 0.4 0.2 0.4	● ● ● ●		○ ●				
 Right hand shown	TCGH	060102 _LF05 060104 _LF05 060102 _RF05 060104 _RF05	3.97	1.59	0.2 0.4 0.2 0.4		● ● ● ●	● ●				
	TPGB	080202 TN 080204 TN 090202 TN 090204 TN	4.76	2.38	0.2 0.4	●						
			5.56		0.2 0.4							
					6.35				0.2 0.4 0.8			
			110302 TN 110304 TN 110308 TN						3.18	0.2 0.4 0.8	●	
		TPGH		080202 _LB3 080204 _LB3 090202 _LB3 090204 _LB2 090208 _LB2 110302 _LB3 110304 _LB3 110308 _LB4 080202 _RB3 080204 _RB3 090202 _RB2 090204 _RB2 090208 _RB2 110302 _RB3 110304 _RB3 110308 _RB4	4.76	2.38	0.2 0.4	●		●	●	
							5.56					0.2 0.4 0.8
												6.35
			4.76				2.38		0.2 0.4			
5.56	0.2 0.4 0.8											
	6.35	0.2 0.4 0.8										
TPGH		080202 _RF1 080204 _RF1 090202 _RF1 090204 _RF1 090208 _RF1 110302 _RF1 110304 _RF1 110308 _RF1			4.76	2.38		0.2 0.4	● ●		● ●	
	5.56		0.2 0.4 0.8									
			6.35				0.2 0.4 0.8					
							3.18	0.2 0.4 0.8				

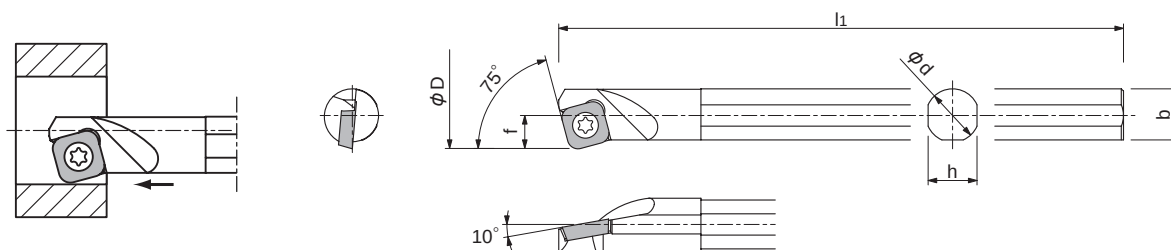
Note) For insert with F05 & F1 type chipbreaker, please use **RIGHT** hand boring bar for right-handed insert.



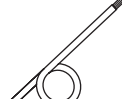
Chip control direction

BBR

Minimum Machining Diameter $\phi 15 \sim 20$

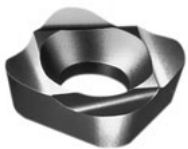


• Right hand shown.

Minimum machining diameter	Dimensions (mm)					Insert	Parts		Holder	Stock	
							Clamping screw	Wrench		R	L
ϕD	ϕd	H	B	l_1	f						
15	12	11	11.5	150	7.5	SPMH 0903	LR-S-4 × 5.8	RLR-20S	BBR 1532	●	
20	16	15	15.5	150	10				2032	●	

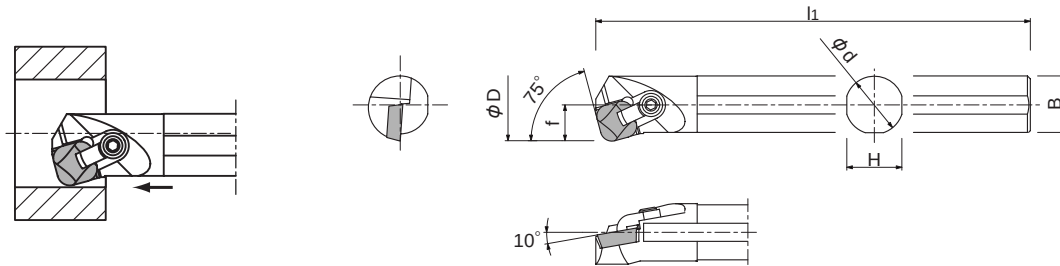
※Please use SPMH 090332 LH1 if significant burrs are created during retraction.

● Insert

Shape	Insert Number	Dimensions (mm)			Grade
		Inscribed Circle	Thickness	Nose Radius	T15
	SPMH 090324 TLBH1	9.525	3.18	2.4	○
	SPMH 090332 TLAH1			3.2	●

BBR

Minimum Machining Diameter $\phi 25 \sim 30$



• Right hand shown.

Minimum machining diameter	Dimensions (mm)					Insert		Holder	Stock	
ϕD	ϕd	H	B	l_1	f				R	L
25	20	19	19.5	150	12.5	SPMN 120440 TN	SPMR 120440 TLH2	BBR 2543	●	
30	25	24	24.5	180	15.0			3043	●	

● Insert

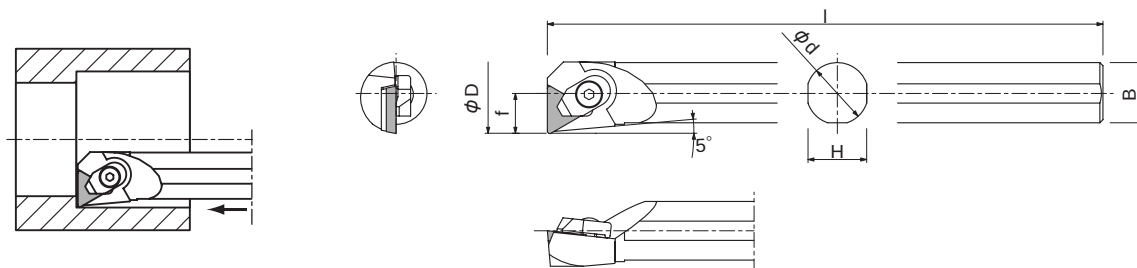
Shape	Insert Number	Dimensions (mm)			Grade
		Inscribed Circle	Thickness	Nose Radius	T15
	SPMN120440 TN	12.7	4.76	4	○
	SPMR120440 TLH2				●

● Parts

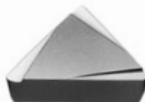
Parts		Clamp	Clamping screw	Wrench
Toolholder				
	BBR 2543 3043	AM-612L-9	WS 0616	LW-3

CTFP

Minimum Machining Diameter $\phi 20$

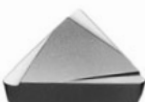


• Right hand shown. Note) Left-hand insert for right-hand tool holder.

Minimum machining diameter	Dimensions (mm)					Insert	Holder	Stock	
ϕD	ϕd	H	B	l ₁	f			R	L
20	16	15	15.5	150	11	TRGR 1103 TRGN 1103	CTFP ^{R/L} - 0016M2 - 0020Q3 - 0025R3 - 0032S3	●	●
25	20	19	19.5	180	13	TRGR 1603 TRGN 1603		●	●
35	25	24	24.5	200	17			●	●
45	32	31	31.5	250	22			●	●

※Conform to master insert which has 0.8mm corner R.
(The CTFP ^{R/L}-0016M2 is for mounting an insert with 0.4-mm corner R.)

CTFP insert

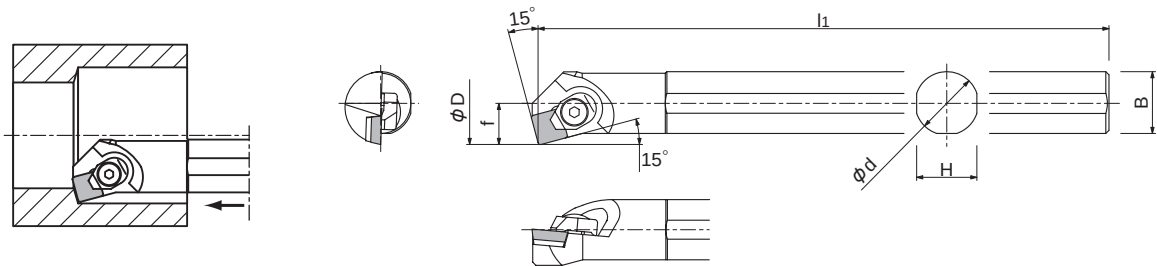
Toolholder	With chipbreaker		Without chipbreaker	CBN
				
CTFP ^{R/L} -0016M2 -0020Q3 -0025R3 -0032S3	TPGR 110304 TLP2	TPGR 1103_ENBAF1	TPGN 1103_	TPGN 110304P
	TPGR 160304 -TL-B	TPGR 1603_ENBAF1	TPGN 1603_	TPGN 160304P TPGN 160308P

Parts

Parts	Clamp	Clamping screw	Shim	Shim screw	Wrench
Toolholder					
CTFP ^{R/L} -0016M2 -0020Q3 -0025R3 -0032S3	AMS -4	AOB -4S	HATP311 ^{R/L} ATP31.51 ATP321	M2 × 5	LW -2.5
	AMS -5T	AOB -5SS			LW -3
	AMS -6T	AOB -6SS	M3 × 8	M3 × 8	LW -4

CSKP

Minimum Machining Diameter $\phi 20$



· Right hand shown. Note) Left-hand insert for right-hand tool holder.

Minimum machining diameter	Dimensions (mm)					Insert	Holder	Stock	
ϕD	ϕd	H	B	l_1	f			R	L
20	16	15	15.5	150	11	SPGR 0903	CSKP ^{R/L} -0016M3 -0020Q3 -0025R4 -0032S4	●	
25	20	19	19.5	180	13	SPGN 0903		●	
35	25	24	24.5	200	17	SPGR 1203		○	
45	32	31	31.5	250	22	SPGN 1203			

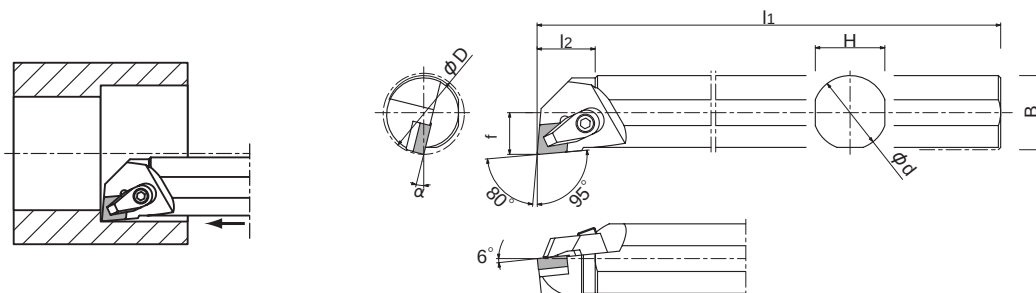
※ Conform to master insert which has 0.8mm corner R.

● Insert

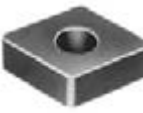
Holder	CSKP ^{R/L} -0016M3 -0020Q3 -0025R4 -0032S4	With chipbreaker		Without chipbreaker
				
		SPGR 090308 -TL-C	SPGR 090308 ENBAF1	SPGN 0903
		SPGR 120308 -TL-C	SPGR 120308 ENBAF1	SPGN 1203

● Parts

Parts	Clamp	Clamping screw	Shim	Shim screw	Wrench
Holder					
	AMS -5	AOB-5SS	HASP311 ^{R/L}	M2 × 5	LW-3
	AMS -6T	AOB-6S × 15	ASP41.51 ASP421	M3 × 8	LW-4

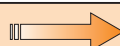
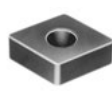
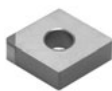
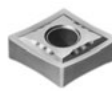


• Right hand shown.

Minimum machining diameter	Dimensions (mm)							Insert	Holder	Stock	
ϕD	ϕd	H	B	l1	f	l2	α			R	L
32	25	24	24.5	200	17	40	14	CN_1204	MCLN ^{R/L} -0025R4 -0032S4 -0040T4 -0050T4	●	●
40	32	30	31	250	22	50	12			●	●
50	40	38	39	300	27	60	10			●	●
63	50	47	48.5	300	35	65	8			●	○

※Conform to master insert which has 0.8mm corner R.

● Insert

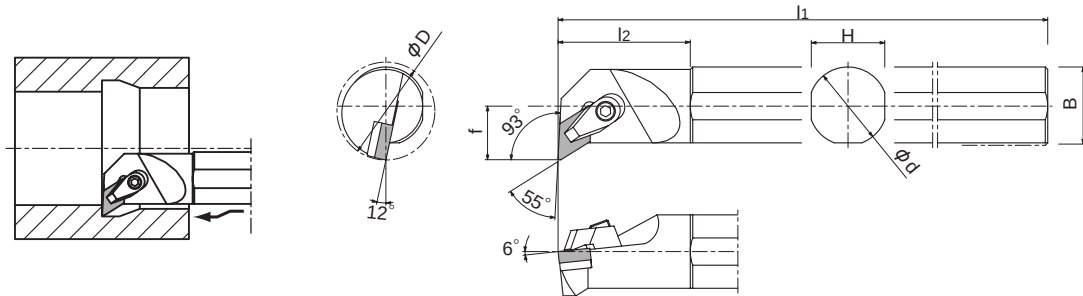
Usage	 				CBN	For interrupted	For stainless steel
	Finishing	Semi-cutting	Rough cutting				
Toolholder MCLN ^{R/L} -0025R4 -0032S4 -0040T4 -0050T4							
	CNMG 1204_ZF1	CNMG 1204_ZW1	CNMG 1204_G	CNGA 1204_	CNMA 1204_P 1204_PTR	CNMG 120408-Z5	CNGG 1204_ZP

● Parts

Parts	Clamp	Clamping screw	Shim	Shim screw	Wrench
					
Toolholder MCLN ^{R/L} -0025R4 -0032S4 -0040T4 -0050T4	CW8PC	WS 0825	ACN 422	M3 × 8	LW-4
		WS 0830			

MDUN

Minimum Machining Diameter $\phi 40$

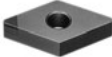
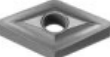


• Right hand shown.

Minimum machining diameter	Dimensions (mm)							Insert	Holder	Stock	
ϕD	ϕd	H	B	l_1	f	l_2	α			R	L
40	32	30	31	250	22	50	12	DN_1504	MDUN ^R /L -0032S4	●	●

※Conform to master insert which has 0.8mm corner R.

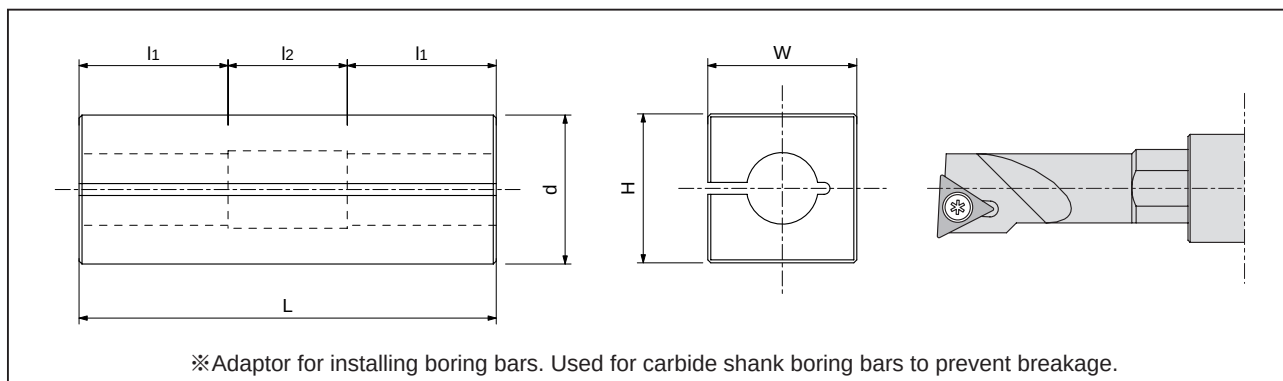
● Insert

Usage	 			Ceramic	CBN	For interrupted	For stainless steel
	Finishing	Semi-cutting	Rough cutting				
Insert							
Toolholder							
MDUN ^R /L -0032S4	DNMG 1504_ZF1	DNMG 1504_ZW1	DNMG 1504_G	DNGA 1504_	DNMA 1504_P 1504_PTR	DNMG 150408-Z5	DNGG 1504_ZP

● Parts

Parts	Clamp	Clamping screw	Shim	Shim screw	Wrench
					
Toolholder					
MDUN ^R /L -0032S4	CW8PC	WS 0830	ADN 422	M3 × 8	LW-4

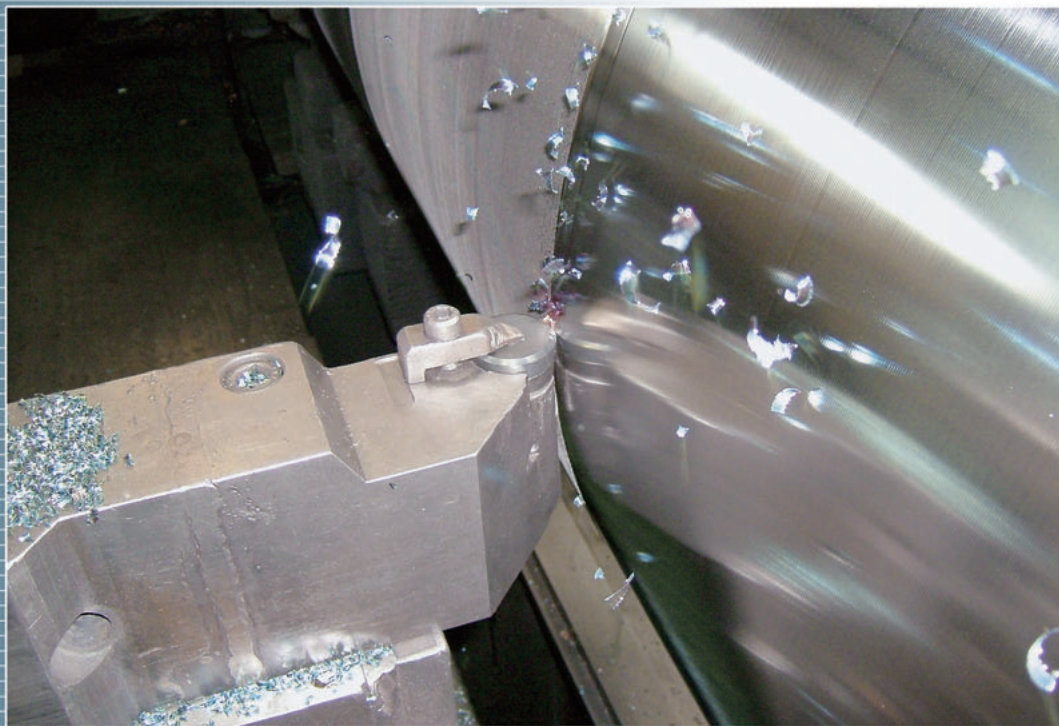
Adaptor for Boring Bar

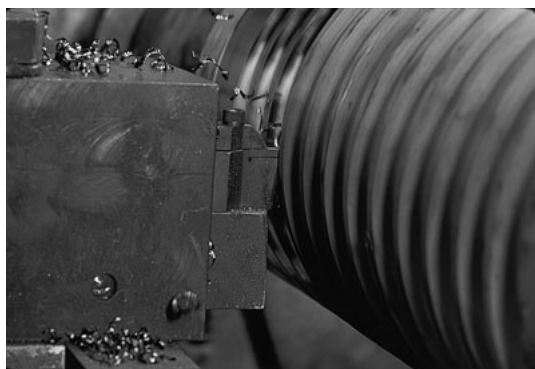


Dimensions (mm)						Insert	Adaptor number	Stock
H	W	L	l1	l2	d1			
20	20	60	20	20	6	for $\phi 6$ shank	S06-H	●
20	20	60	20	20	8	for $\phi 8$ shank	S08-H	●
20	20	60	20	20	10	for $\phi 10$ shank	S10-H	●
25	25	70	20	25	12	for $\phi 12$ shank	S12-H	●

NTK

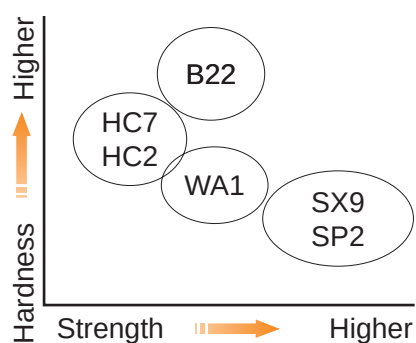
Roll Tools





NTK offers various types of ceramic materials and CBN tools, including the whisker-based WA1, in order to meet mill rolls machining requirements. These materials and tools are intended primarily for round inserts. The user can therefore select the appropriate product according to cutting operation.

Features of Grade



NTK Grade for each Roll Material

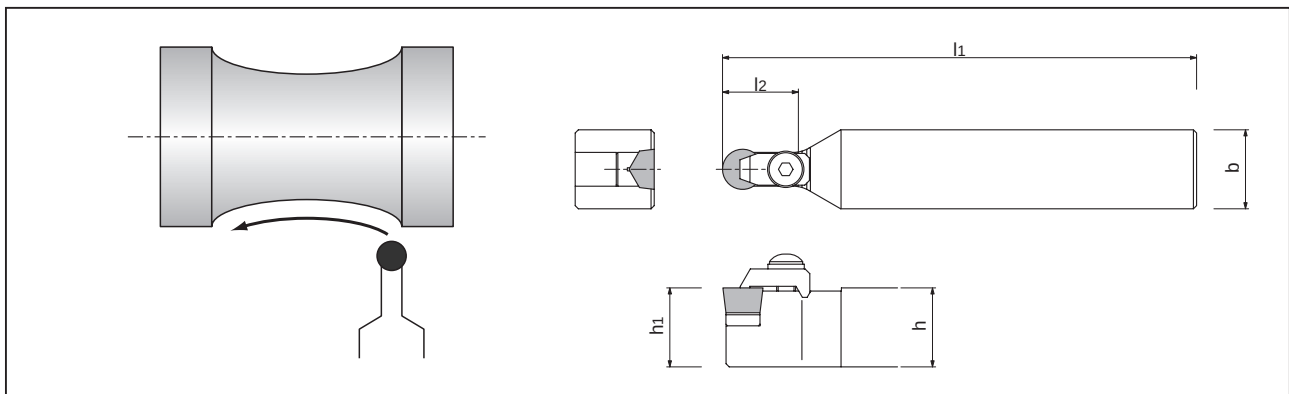
Grade Mill Roll	CBN	Ceramics		
	B22	Alumina HC7·HC2	Whisker WA1	Silicon-nitride SX9·SP2
Forged (High-speed steel)	○	◎	○	
Cast steel	○	◎	○	
Cast iron (Ductile)	○	◎	○	◎

Recommended cutting condition

	Insert Grade	○	◐	Dry	Cutting speed (m/min)					Feed (mm/rev)					
					100	200	300	400	500	0.1	0.2	0.3	0.4	0.5	0.6
HSS	HC2 / HC7	●		●	—●—							—●—			
	WA1		●	●	—●—							—●—			
	B22		●	●	—●—							—●—			
Cast steel	HC2 / HC7	●		●	—●—							—●—	—●—		
	WA1		●	●	—●—							—●—	—●—	—●—	
	B22		●	●	—●—							—●—	—●—	—●—	
Cast Iron Ductile	HC2 / HC7	●		●	—●—							—●—	—●—		
	SX9		●	●	—●—							—●—	—●—		
	SP2		●	●	—●—							—●—	—●—	—●—	
	B22		●	●	—●—							—●—	—●—	—●—	

Mill Roll Machining Holders

CRDCN



Holder	Stock	Dimensions (mm)					Insert	
		l1	l2	b	h	h1		
CRDCN	2525M06	●	150	20	25	25	RCGX 0608	RCGN 0607
	2525M09	●	150	20	25	25	RCGX 0908	RCGN 0907
	2525M12	●	150	25	25	25	RCGX 1208	RCGN 1207
	3225P06	●	170	20	25	32	RCGX 0608	RCGN 0607
	3225P09	●	170	20	25	32	RCGX 0908	RCGN 0907
	3225P12	●	170	25	25	32	RCGX 1208	RCGN 1207
	3232P15	●	170	30	32	32	RCGX 1510	
	3232P19	●	170	42	32	32	RCGX 1910	
	3232P25	●	170	42	32	32	RCGX 2512	

● Insert

Shape	Insert	Dimensions (mm)			Stocked tem		
		d	s	θ	HC2	HC7	WA1
	RCGX 0608 PN 0908 PN 1208 PN 1510 PN 1910 PN 2512 PN	6.35	7.86	120°	●		●
		9.525	7.86		●		●
		12.70	7.86		●	●	●
		15.875	9.86		●	●	
		19.05	9.86		●	●	●
		25.4	11.91		●		

To use RCGN insert, please change shim-seat as follows.
PN : Double T-land with R-horning

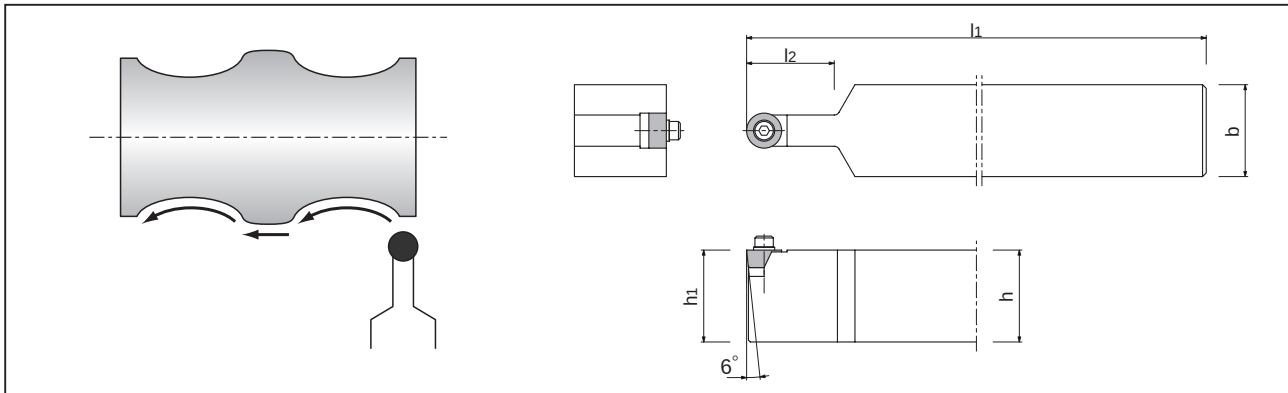
Shape	Insert	d	s	Shim sheet
	RCGN 060700 090700 120400 120700	6.35 9.525 12.70 15.875	7.94	HARCGN 0607-15 0907-15 1204-15 1207-15

● Parts

Parts	Clamp	Shim	Clamping screw	Spring pin	Washer	Wrench
Toolholder						
CRDCN3225P06 / 2525M06	HC35KR-4099	HARCGX06	BS0520		WS-5	LW-3
CRDCN3225P09 / 2525M09	HC35KR-6075	HARCGX0908V	BS0625	2X8AW	WS-6	LW-4
CRDCN3225P12 / 2525M12	HC35KR-6076	HARCGX1208V	BS0625	2.5X8AW	WS-6	LW-4
CRDCN3232P15	CC08M	HARCGX1510V	BS0835W	2.5X8AW	SR08	LW-4
CRDCN3232P19	CC08M	HARCGX1910V	BS0835W	2.5X8AW	SR08	LW-4
CRDCN3232P25	AMS-10	HARCGX2512V	AOB-10S	2.5X8AW		LW-6

Mill Roll Machining Holders

HRCD



Toolholder	Stock	Dimensions (mm)					Insert
		h	b	l 1	h1	l 2	
HRCD- - 22 - 33 - 42 - 43 - 53	●	50	50	300	50	30	CDH 22
	●						CDH 33
							CDH 42
							CDH 43
							CDH 53

● Insert

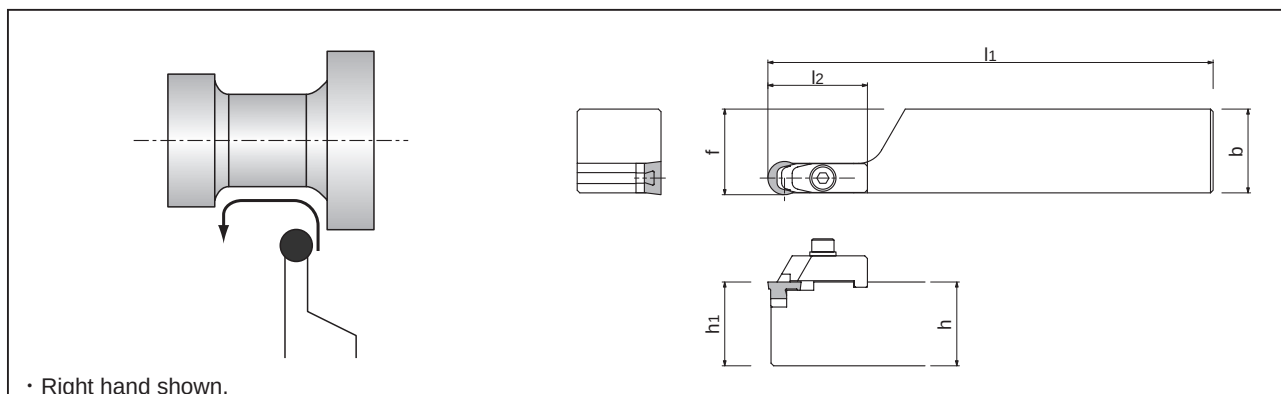
Shape	Insert	Dimensions (mm)			Grade	
		d	s	d1	HC2	HC7
	CDH 22 PN	12.70	6.35	3.18	●	
	CDH 33 PN	19.50	9.52	6.35	●	●
	CDH 42 PN	25.40	12.70	6.75	●	
	CDH 43 PN		19.05			●
	CDH 53 PN	31.75	19.05	9.92	●	

PN : Double T-land with R-horning

● Parts

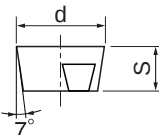
Parts	Cap screw	Washer	Shim	Wrench
Toolholder HRCD - 22 - 33 - 42 - 43 - 53	CS0316	W120	HACDH22	LW-2.5
	CS0625	W110	HACDH33	LW-5
	1/4-20UNC × 11/4	W106	HACDH42	LWU-4
	1/4-20UNC × 11/2	W106	HACDH43	
	3/8-16UNC × 11/2	W107	HACDH53	LWU-5

CRXC



Toolholder	Stock		Dimensions (mm)						Insert
	R	L	h	b	l1	h1	f	l2	
CRXC ^{R/L} 3232P09Y	○		32	32	170	32	32.7	28	 RCGY090603
3232P12Y	○		32	32	170	32	32.7	28	

● Insert

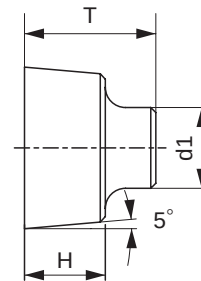
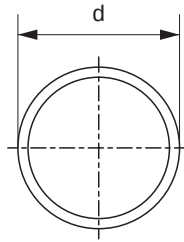
Shape	Insert	Dimensions (mm)		Stocked item		
		d	S	HC2	HC7	WA1
 	RCGY 090603 TNB (T00525)	9.525	6.35			○
	120603 TNB (T00525)	12.70	6.35			○

● Parts

Parts	Clamp	Shim	Clamping screw	Retaining screw	Washer	Spring	Wrench
							
Toolholder							
CRXC ^{R/L} 3232P09Y	CRN4	HAR09Y	CS0425	M2 × 8	WS-4	ASGL4	LW-3
3232P12Y	CRN5	HAR12Y	CS0525	M3 × 8	WS-5	ASGL5	LW-4

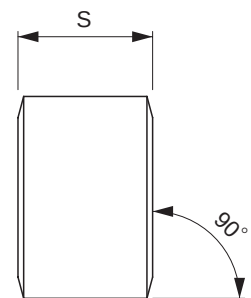
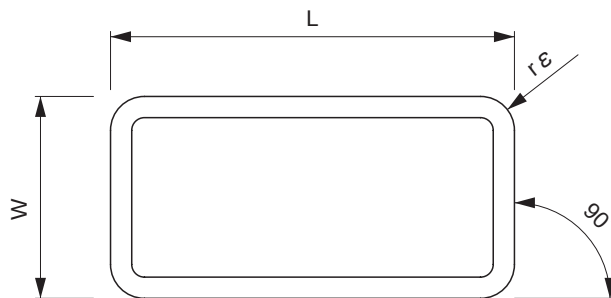
Mill Roll Machining Inserts

RBGX-S



Insert		Dimensions (mm)				Grade		
		d	d1	T	H	HC2	WA1	B22
RBGX	16S PN2	16	8	8	13	○		
	16S SN2						○	
	16S							○
	20S PN	20	10	10	15	○		
	20S S							
	20S							○
	26S PN	26	14	10	15	○		
	26S SN3						○	

LNМ



Insert		Dimensions (mm)				Grade		
		W	L	S	rε	HC2	HC7	SX9
LNМ	4454 PN	12.7	25.40		1.6			
	5464 PN	15.875	25.40	9.525	1.6			
	6688 PN	19.05	38.10	12.70	3.2	●		●
	6688 SNX6	19.05	38.10	12.70	3.2		●	

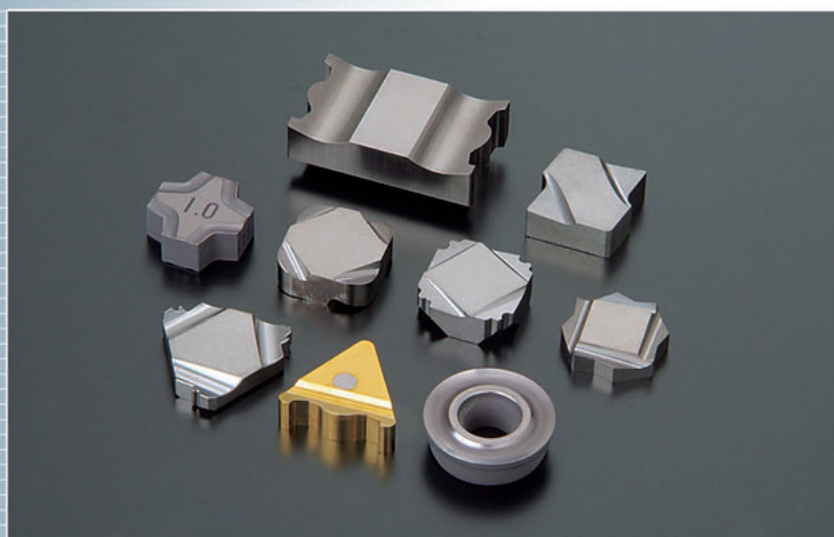
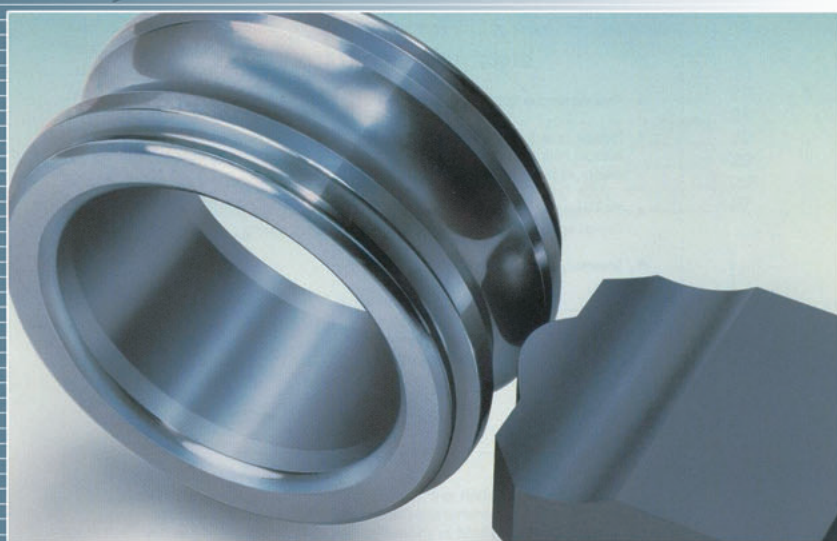
Before ordering the parts marked "○" above, please contact NTK for the delivery deadline.
 PN : Double T-land with R-horn SN : T-land with R-horn

● Types, applications, and features of rolls

Mill Rolls Material	Applications	Features
Forged rolls ● Cr-Mo-based ● High-speed-steel-based ● Carbon-based	Bloom-milling at heavy rolling load. Work rolls for rough cold rolling, and rolls for reinforcement.	Strong and relatively high in heat resistance.
Cast iron rolls ● Carbon-based	Semi-rolling or finishing that requires a very heavy load	More wear-resistant than steel in between ordinary steel and cast-iron-based steel.
Cast iron rolls ● Amadite roll for deep caliber ● Chilled roll for boards and wire steel process ● Grain roll for steel finishing process boards (Resistant to thermal crack) ● Ductile roll for boards, profile steel, and bar wire steel process (Rolls for roughing and finishing use) ● Special cast iron roll	Wide range of applications from bloom-milling and semi-rolling to finishing.	Suitable for the applications that require heat resistance and strength. Suitable for the applications that require wear resistance.

NTK

Bearing Tool



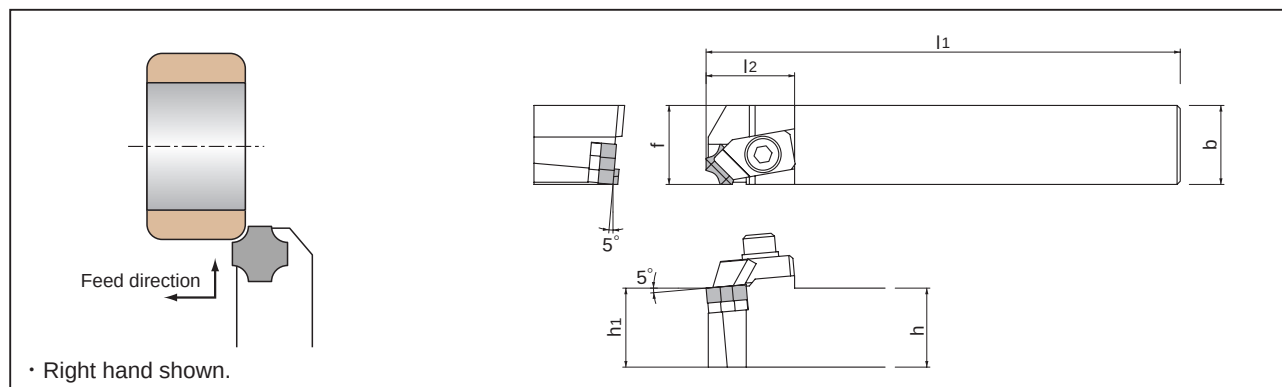
R-Chamfering P.176

Outside Machining P.182

Internal Machining P.186

R-Chamfering Holders (for outside machining)

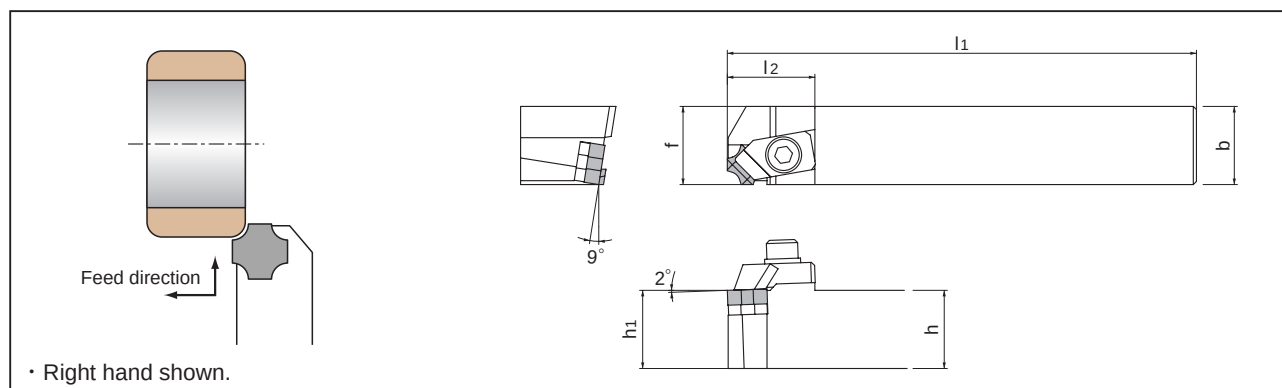
CBS···type F



Toolholder	Stock		Dimensions (mm)					Insert	
	R	L	h/h1	b	l1	f	l2		
CBS ^{R/L} 16K32F 20K43F 25M43F 25M53F	●	●	16	16	125	16	23	BSMF32	BSMF43
	●	○	20	20	125	20	28	BSMF43	
	●		25	25	150	25	28		
	○	○	25	25	150	25	35	BSGF53	

For details of insert, please see next page.

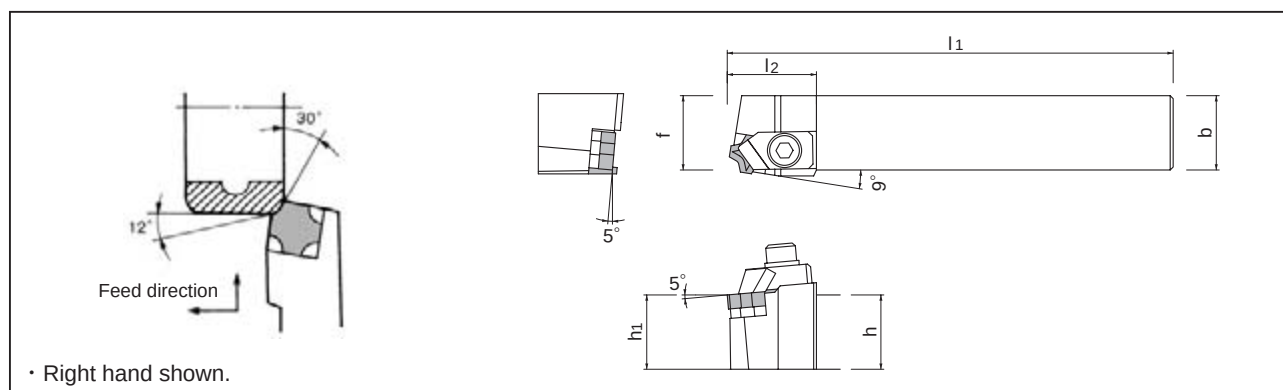
CBS···type B



Toolholder	Stock		Dimensions (mm)					Insert	
	R	L	h/h1	b	l1	f	l2		
CBS ^{R/L} 16K32B 20K43B 25M43B 25M53B	●	●	16	16	125	16	23	BSMF32	BSMF43
	○	○	20	20	125	20	28	BSMF43	
	●	●	25	25	150	25	28		
			25	25	150	25	35	BSGF53	

For details of insert, please see next page.

CBG···type F



Toolholder	Stock		Dimensions (mm)					Insert	
	R	L	h/h1	b	l1	f	l2		
CBG ^{R/L} 20K43F 25M43F	○		20	20	125	20	30	BSMF43	
	●		25	25	150	25	30		

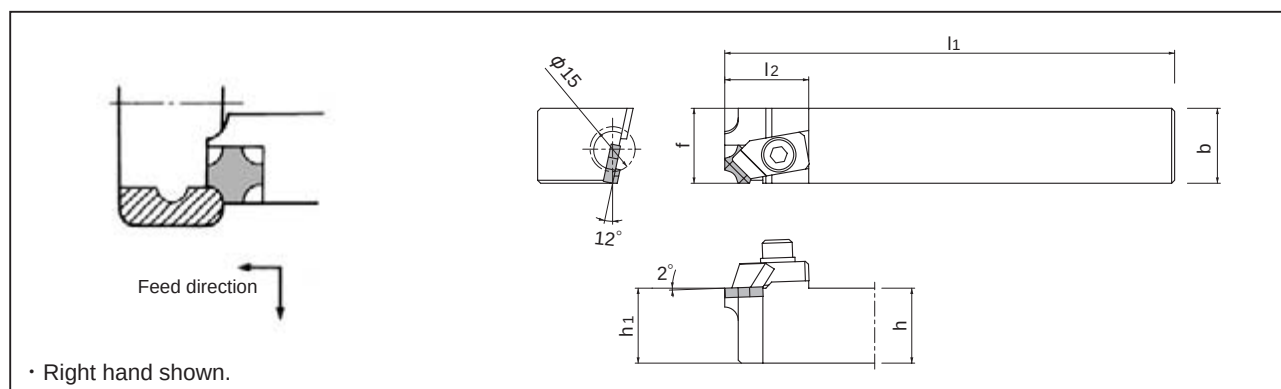
● Insert

Shape	Insert Number	Dimensions (mm)					Grade	
		R	θ	B	Inscribed circle	Thickness	T15	N40
	BSMF 3206H20EM	0.6	15°	2.0	9.525	3.18		
	3206D20EM	0.6	18°	2.0				●
	BSMF 4315H29EM	1.5	18°	2.9	12.70	4.76	○	
	4320H26EM	2.0	18°	2.6				●
	4330H33EM	3.0	18°	3.3			○	
	BSMF 4306H20EN	0.6	18°	2.0	12.70	4.76		
	4306T20EN	0.6	21°	2.0				○
	4308D34EN	0.8	15°	3.4				○
	4310H30EN	1.0	18°	3.0				●
	4310T30EN	1.0	21°	3.0				○
	4312D29EN	1.2	15°	2.9				●
	4312H29EN	1.2	18°	2.9				
	4315H29EN	1.5	18°	2.9				
	4316T35EN	1.6	21°	3.5				●
	4317D29EN	1.7	15°	2.9				●
	4317H29EN	1.7	18°	2.9				
	4320H26EN	2.0	18°	2.6				●
	4321T35EN	2.1	21°	3.5				●
	4325H37EN	2.5	18°	3.7				
	4330H37EN	3.0	18°	3.7				●
	4335H39EN	3.5	18°	3.9				●
	4340E35EN	4.0	20°	3.5				

R-Chamfering Holders (for internal machining)

CBU···type B

Minimum machining diameter $\phi 15$

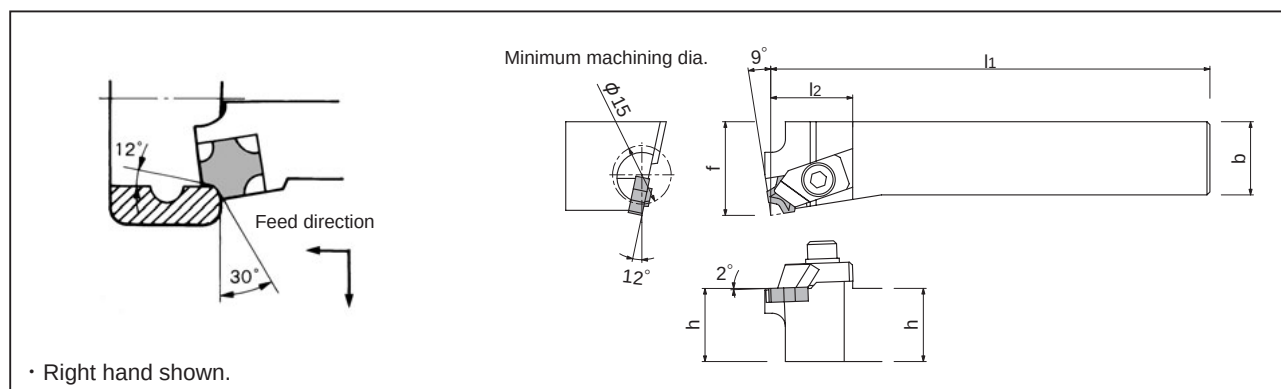


Toolholder	Stock		Dimensions (mm)					Insert
	R	L	h/h ₁	b	l ₁	f	l ₂	
CBU ^{R/L} 20K42B	○		20	20	125	20	28	BSMF42
25M42B	●	●	25	25	150	25	28	

For details of insert, please see next page.

CBN···type B

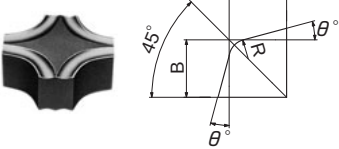
Minimum machining diameter $\phi 15$



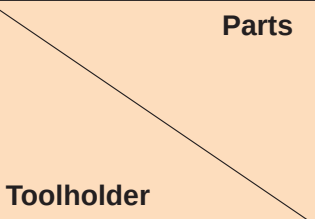
Toolholder	Stock		Dimensions (mm)					Insert
	R	L	h/h ₁	b	l ₁	f	l ₂	
CBN ^{R/L} 20K42B	●		20	20	125	25	28	BSMF42
25M42B			25	25	150	32	28	

For details of insert, please see next page.

● Inserts

Shape	Insert Number	Dimensions (mm)					Grade	
		R	θ	B	Inscribed circle	Thickness	T15	N40
	BSMF 4206T20EN 4210T30EN 4216T35EN 4221T35EN	0.6	21°	2.0	12.70	3.18		
		1.0	21°	3.0				
		1.6	21°	3.5				
		2.1	21°	3.5				●

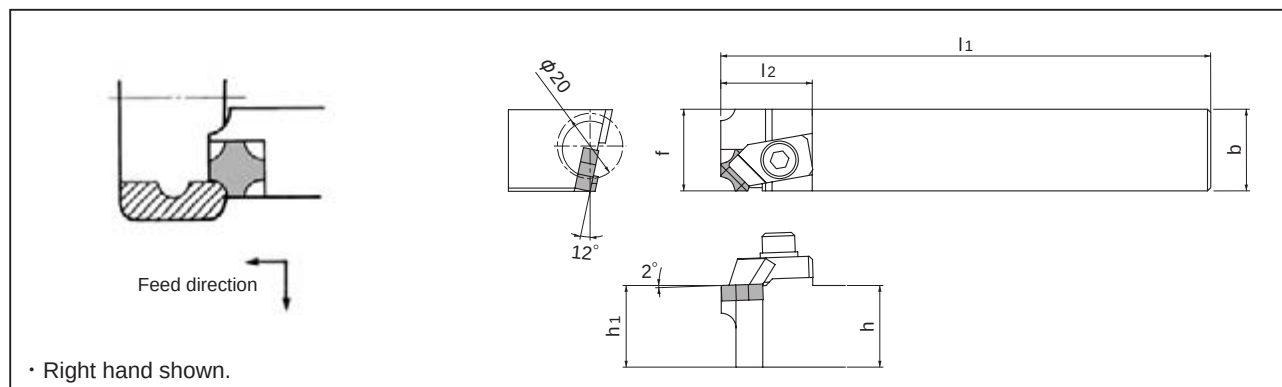
● Parts

Parts	Clamp	Shim sheet	Clamping screw	Retaining screw	Washer	Wrench
						
CBS^{R/L} 16K32 20K43 25M43 25M53	CB ^{R/L} 3	ABS32	CS0520	M2 X 6	WS-5	LW-4
	CB ^{R/L} 4	ABS42	CS0625	M3 X 8	WS-6	LW-5
	CB ^{R/L} 5	ABS52	CS0625	M4 X 10	WS-6	LW-5
CBG^{R/L} 20K43F 25M43F	CB ^{R/L} 4	ABS42	CS0625	M3 X 8	WS-6	LW-5
CBU^{R/L} 20K42B 25M42B	CB ^{R/L} 4		CS0625		WS-6	LW-5
CBN^{R/L} 20K42B 25M42B						

R-Chamfering Holders (for internal machining)

CBU···type B

Minimum machining diameter $\phi 20$

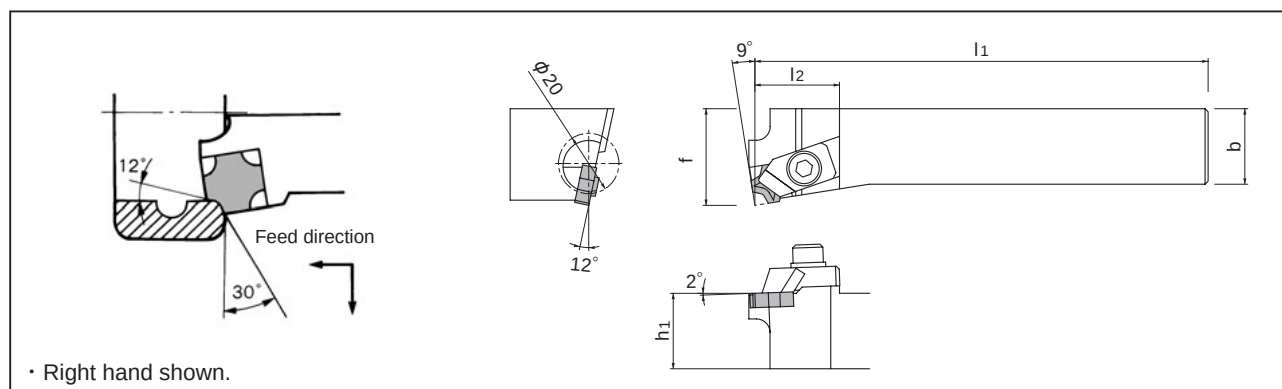


Toolholder	Stock		Dimensions (mm)					Insert	
	R	L	h/h ₁	b	l ₁	f	l ₂		
CBU ^{R/L} 20K43B	●	●	20	20	125	20	20	BSMF43	BSMF43
25M43B	●	●	25	25	150	25	25		

For details of insert, please see next page.

CBN···type B

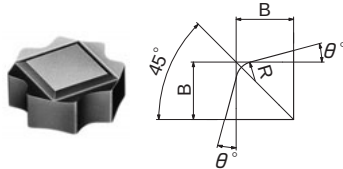
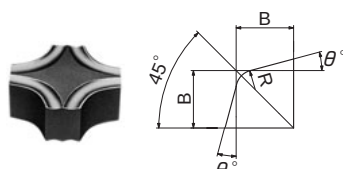
Minimum machining diameter $\phi 20$



Toolholder	Stock		Dimensions (mm)					Insert	
	R	L	h/h ₁	b	l ₁	f	l ₂		
CBN ^{R/L} 20K43B	●		20	20	125	25	28	BSMF43	BSMF43
25M43B	○		25	25	150	32	28		

For details of insert, please see next page.

● Insert

Shape	Insert Number	Dimensions (mm)					Grade	
		R	θ	B	Inscribed circle	Thickness	T15	N40
	BSMF 3206H20EM	0.6	15°	2.0	9.525	3.18		○
	3206D20EM	0.6	18°	2.0				●
	BSMF 4315H29EM	1.5	18°	2.9	12.70	4.76	○	
	4320H26EM	2.0	18°	2.6				●
	4330H33EM	3.0	18°	3.3			○	
	BSMF 4306H20EN	0.6	18°	2.0	12.70	4.76		
	4306T20EN	0.6	21°	2.0				○
	4308D34EN	0.8	15°	3.4				○
	4310H30EN	1.0	18°	3.0				●
	4310T30EN	1.0	21°	3.0				○
	4312D29EN	1.2	15°	2.9				●
	4312H29EN	1.2	18°	2.9				
	4315H29EN	1.5	18°	2.9				
	4316T35EN	1.6	21°	3.5				●
	4317D29EN	1.7	15°	2.9				●
	4317H29EN	1.7	18°	2.9				
	4320H26EN	2.0	18°	2.6				●
	4321T35EN	2.1	21°	3.5				●
	4325H37EN	2.5	18°	3.7				
	4330H37EN	3.0	18°	3.7				●
	4335H39EN	3.5	18°	3.9				●
	4340E35EN	4.0	20°	3.5				

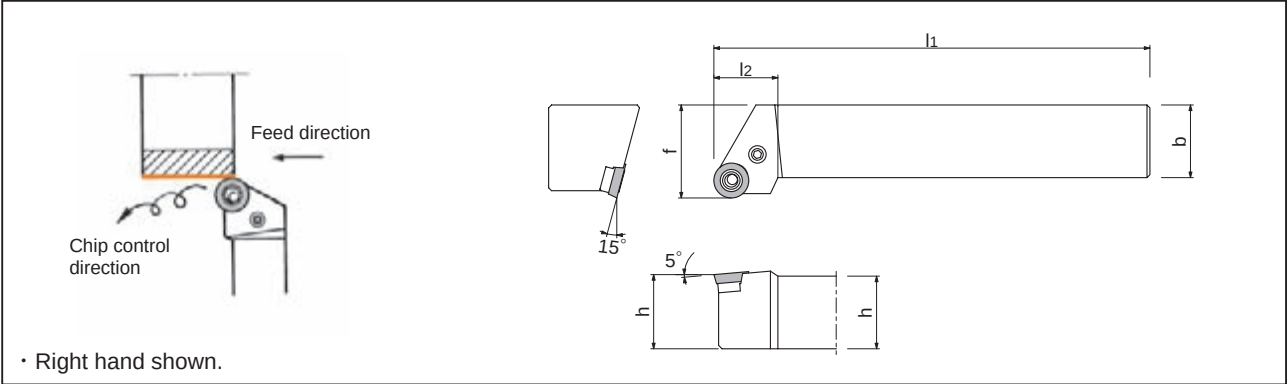
● Parts

Parts <
--

Outside Machining Holders (lever-lock-type)

PRGP···type F

• It is designed so that the chips are thrown in the **SAME** direction as the tool's feed.



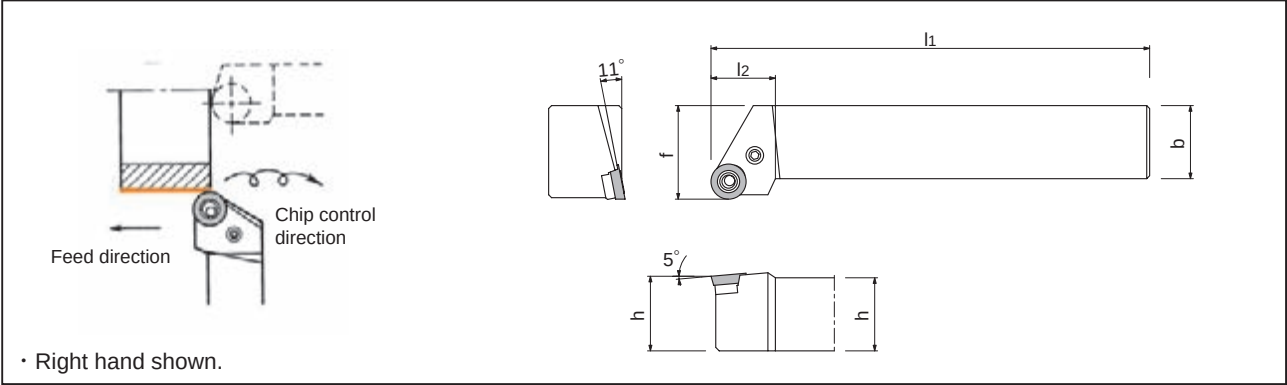
• Right hand shown.

Toolholder	Stock		Dimensions (mm)					Insert
	R	L	h/h1	b	l1	f	l2	
PRGP ^{R/L} 20K1203F 25M1203F			20	20	125	25	22	RPMT1604M0GB
			25	25	150	32	22	RPMT2004M0GB

For details of insert, please see P187.

PRGP···type B

• It is designed so that the chips are thrown in the **OPPOSITE** direction as the tool's feed.



• Right hand shown.

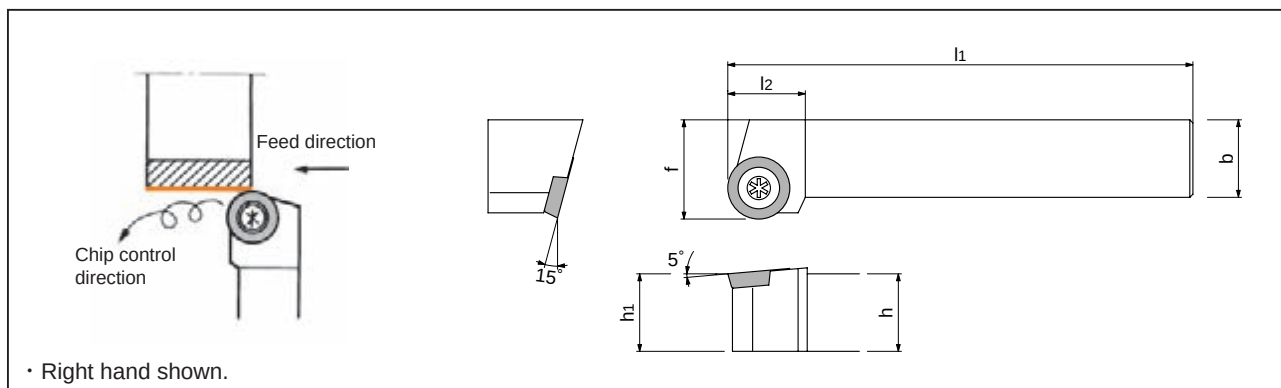
Toolholder	Stock		Dimensions (mm)					Insert
	R	L	h/h1	b	l1	f	l2	
PRGP ^{R/L} 20K1203B 25M1203B			20	20	125	25	22	RPMX1203MGB
			25	25	150	32	22	

For details of insert, please see P187.

Outside Machining Holders (screw-on-type)

SRG...type F

- It is designed so that the chips are thrown in the **SAME** direction as the tool's feed.

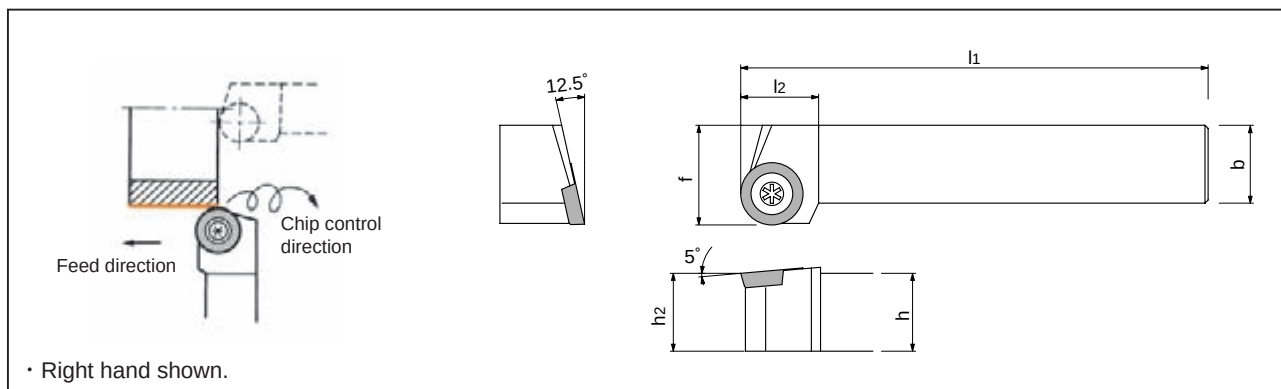


Toolholder	Stock		Dimensions (mm)						Insert
	R	L	h/h1	b	l1	f	l2		
SRG ^R / _L 20K16F 25M20F	○	○	20	20	125	20	20	RPMT1604M0GB	
	●		25	25	150	25	25	RPMT2004M0GB	

For details of insert, please see P187.

SRG...type B

- It is designed so that the chips are thrown in the **OPPOSITE** direction as the tool's feed.



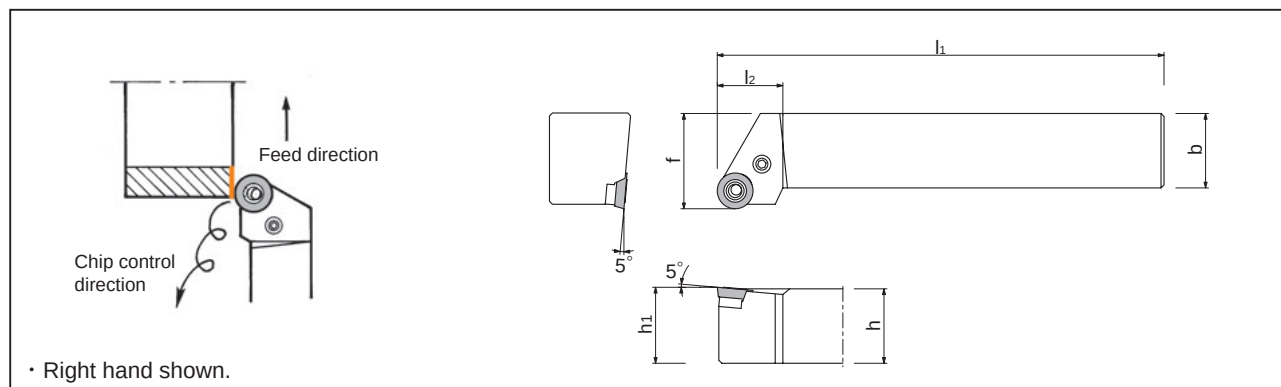
Toolholder	Stock		Dimensions (mm)						Insert
	R	L	h/h1	b	l1	f	l2		
SRG ^{R/L} 20K16B	●		20	20	125	25	20	RPMT1604M0GB	
	●		25	25	150	32	25	RPMT2004M0GB	

For details of insert, please see P187.

Facing Holders (lever-lock-type)

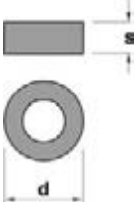
PRFP...type B

• It is designed so that the chips are thrown in the **OPPOSITE** direction as the tool's feed.



Toolholder	Stock		Dimensions (mm)					Insert
	R	L	h/h1	b	l1	f	l2	
PRFP ^R / _L 20K1203B	●		20	20	125	25	22	RPMX1203MGB
25M1203B	●		25	25	150	32	22	

● Insert

	Shape	Insert Number	Dimension (mm)		Grade
			d	S	N40
		RPMX1203M0GB	12.0	3.18	●

Note) The taper of the countersink differs in shape between the RPMX and the RPMT. Use the RPMX for the lever-lock type.

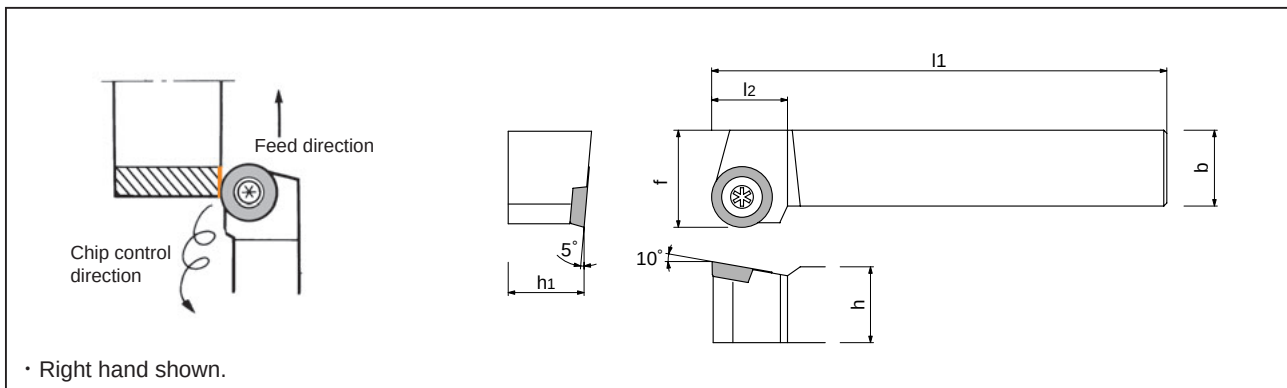
● Parts

Parts	Shim	Lever	Clamping screw	Spring	Wrench
					
Toolholder					
PRGP ^R / _L 20K1203F 25M1203F					
PRGP ^R / _L 20K1203B 25M1203B	ELSR42C	LCL4C	LCS3	LSP3	LW-2.5
PRFP ^R / _L 20K1203B 25M1203B					

Facing Holders (screw-on-type)

SRF...type B

• It is designed so that the chips are thrown in the **OPPOSITE** direction as the tool's feed.



Toolholder	Stock		Dimensions (mm)					Insert
	R	L	h/h1	b	l1	f	l2	
SRF ^{R/L} 20K16B 25M20B			20	20	125	25	20	RPMT1604M0GB
	●		25	25	150	32	25	RPMT2004M0GB

● Insert

	Shape	Insert Number	Dimension (mm)		Grade
			d	S	N40
		RPMT 1604M0GB	16.0	4.76	●
		2004M0GB	20.0	4.76	●

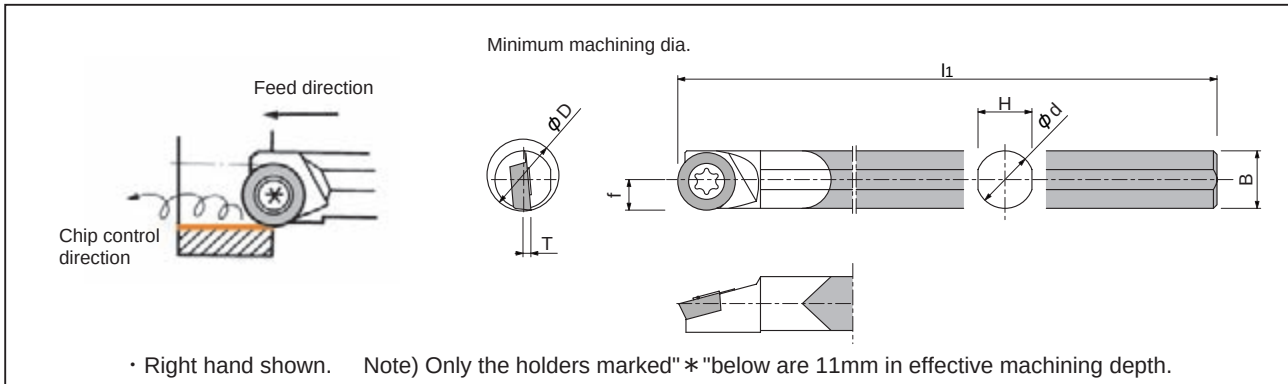
● Parts

Parts	Clamping screw	Wrench
		
Toolholder		
SRG ^{R/L} 20K16F 25M20F 20K16B 25M20B	LRIS-5 X 10	LLR-28S
SRF ^{R/L} 20K16B 25M20B		

Internal Machining Holders (screw-on-type)

C

(Carbide Shank)

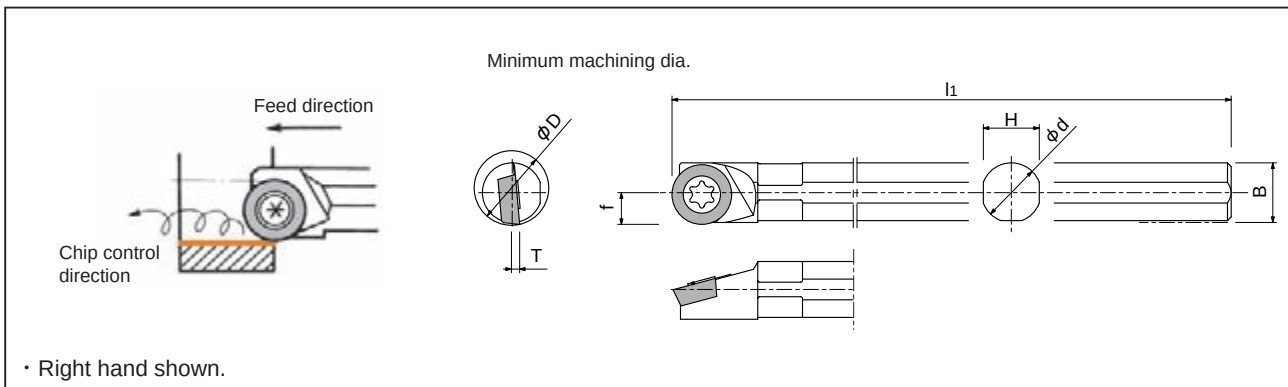


Toolholder	Stock		Dimensions (mm)						Insert	
	R	L	ϕd	H	B	l ₁	f	T	ϕD	
*C08K-SRC ^{R/L} 06F	●		8	7	7.5	125	4.0	1.0	8	RPMT 0602M0GB 0802M0GB 10T2M0GB 1203M0GB
C08K-SRC ^{R/L} 08F		●	8	7	7.5	125	4.5	0.8	10	
C10M-SRC ^{R/L} 10F	●		10	9	9.5	150	5.5	1.2	12	
C12M-SRC ^{R/L} 12F	●		12	11	11.5	150	6.5	1.5	15	

• It is designed so that the chips are thrown in the **SAME** direction as the tool's feed.

S

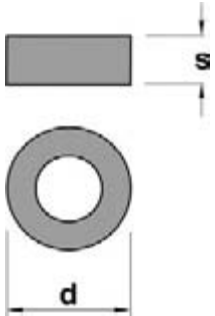
(Steel Shank)



Toolholder	Stock		Dimensions (mm)						Insert	
	R	L	ϕd	H	B	l ₁	f	T	ϕD	
S08K-SRC ^{R/L} 08F	●		8	7	7.5	125	4.5	0.3	10	RPMT 0802M0GB 10T2M0GB 1203M0GB 1604M0GB 2004M0GB 2004M0GB
S10M-SRC ^{R/L} 10F	●		10	9	9.5	150	5.5	1.2	12	
S12M-SRC ^{R/L} 12F	●		12	11	11.5	150	6.5	1.5	15	
S16Q-SR ^{R/L} 16F	●		16	15	15.5	180	8.5	2.0	20	
S20Q-SRC ^{R/L} 20F	●		20	19	19.5	180	10.5	2.0	25	
S25Q-SRC ^{R/L} 20F			25	24	24.5	180	13.0	2.0	30	

For details of insert, please see next page.

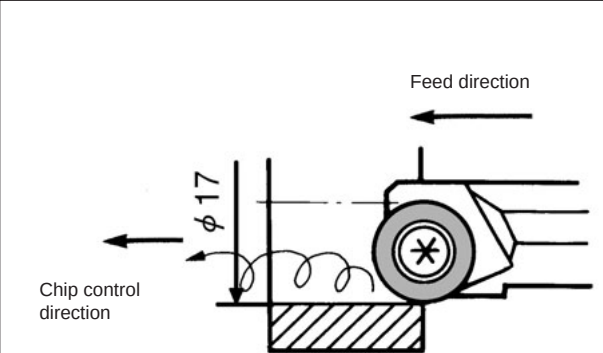
● Insert

	Shape	Insert Number	Dimension (mm)		Grade
			d	S	N40
		RPMT 0602M0GB	6.0	2.38	●
		0802M0GB	6.0	2.38	●
		10T2M0GB	10.0	2.78	●
		1203M0GB	12.0	3.18	●
		1604M0GB	16.0	4.76	●
		2004M0GB	20.0	4.76	●

● Parts

Carbide Shank	Steel Shank	Clamping screw	Wrench	
			RLR- 	LLR- 
C08K-SRC ^R /L06F C08K-SRC ^R /L08F C10M-SPC ^R /L10F C12M-SRC ^R /L12F	S08K-SRC ^R /L08F S10M-SRC ^R /L10F S12M-SRC ^R /L12F	LRIS-2.2 × 6	RLR-13S	
		LRIS-3 × 6	RLR-20S	
		LRIS-4 × 6	LLR-25S	
		LRIS-4 × 8		
	S16Q-SRC ^R /L16F S20Q-SRC ^R /L20F S25Q-SRC ^R /L20F	LRIS-5 × 10	LLR-28S	

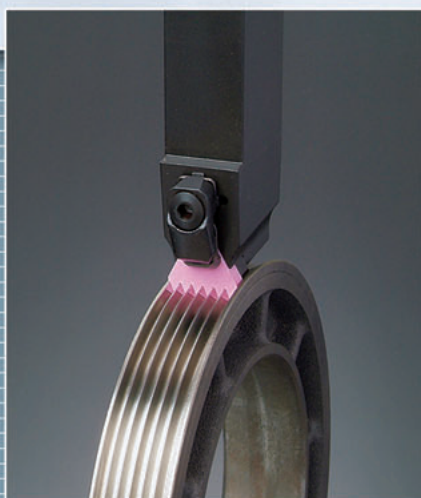
● Application Examples of N40 GB Chipbreakers

Tool shape		Current tool	NTK	Part Name		Bearing
Insert	Shape	SPMR090308	RPMT1203M0GB	Work Material		100 Cr6
	Grade	Carbide	N40			
Cutting condition	Cutting speed V (m/min)	45	65			
	Feed f (mm/rev)	0.23	1.2			
	Depth of cut d (mm)	0.7	0.7			
	Coolant	DRY	DRY			
	Tool life (pcs)	2000	3000			

Comment: It has been possible to extend life to 1.5 times that of the carbide tool. It has also been possible to increase the feed rate to 5 times and thus to improve machining efficiency significantly.

NTK

Poly-V



3 teeth P.190

4 teeth P.191

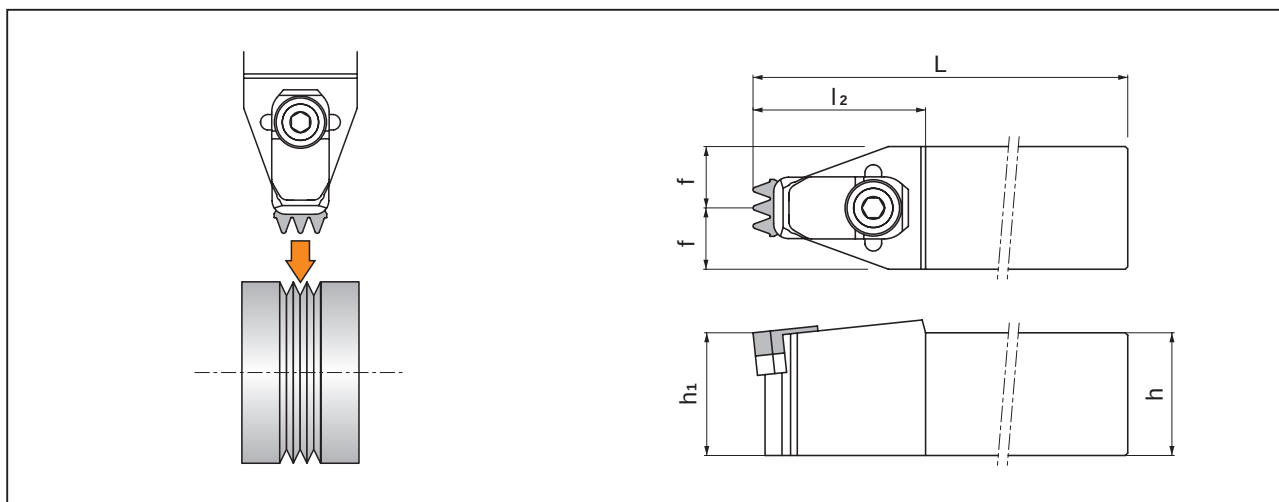
5 teeth P.192

6 teeth P.193

Poly-V Holder and Inserts

Poly-V

Clamp-on type

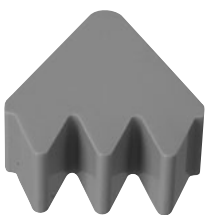
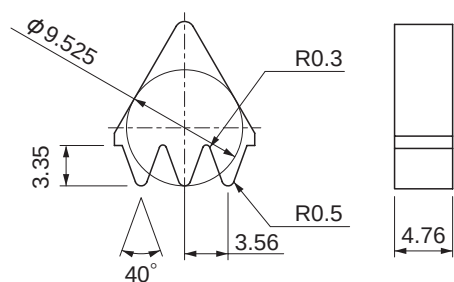
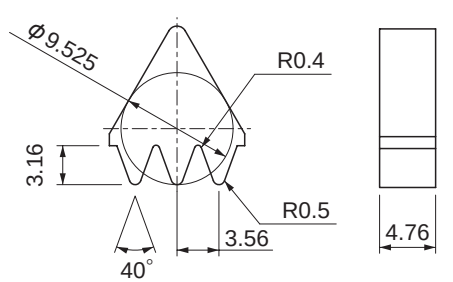


Item-No.	Stock	Dimensions (mm)						Insert	
		h	h1	b	L	f	l2		
Poly-V 2525 M-K3-C	●	25	25	25	150	12.5	30	PTM33	K305ENB
Poly-V 3225 P-K3-C	●	32	32	25	170	12.5			K30504ENB

Parts

Holder	Clamp	Thrust Plate	Shim	Shim-Screw
Poly-V 2525 M-K3-C	 2413-C	 9414-C	 K3-H	 1230
Poly-V 3225 P-K3-C				

Insert

Shape	PTM33K305ENB HW2	PTM33K30504ENB HW2
		

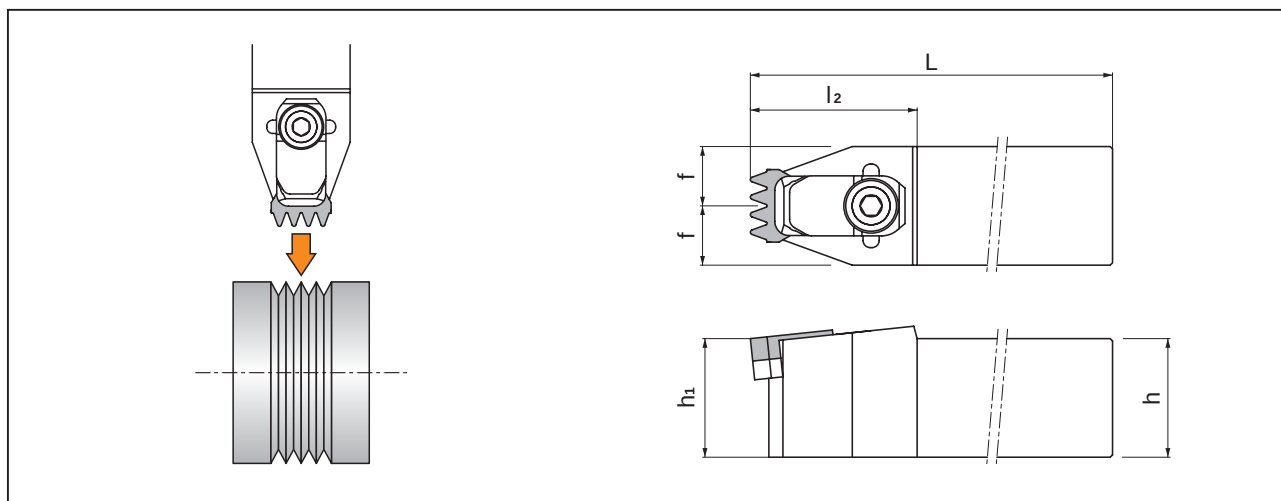
※ENB : R-horn

Recommendation

Insert Grade		Dry	Cutting speed (m/min)							Feed (mm/rev)		
			100	200	300	400	500	600	700	0.05	0.1	0.15
HW2	●	●										

Poly-V

Clamp-on type

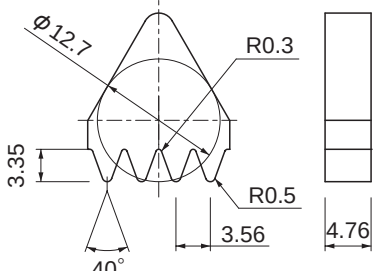
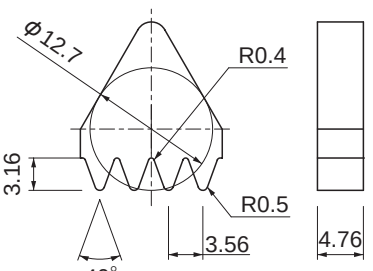


Item-No.	Stock	Dimensions (mm)						Insert	
		h	h1	b	L	f	l2		
Poly-V 2525 M-K4-C	●	25	25	25	150	12.5	34	PTM43	K405ENB
Poly-V 3225 P-K4-C	●	32	32	25	170	12.5			K40504ENB

Parts

Holder	Clamp	Thrust Plate	Shim	Shim-Screw
Poly-V 2525 M-K4-C Poly-V 3225 P-K4-C	 2413-C	 9414-C	 K4-H	 1230

Insert

Shape	PTM43K405ENB HW2	PTM43K40504ENB HW2
		

※ENB : R-horn

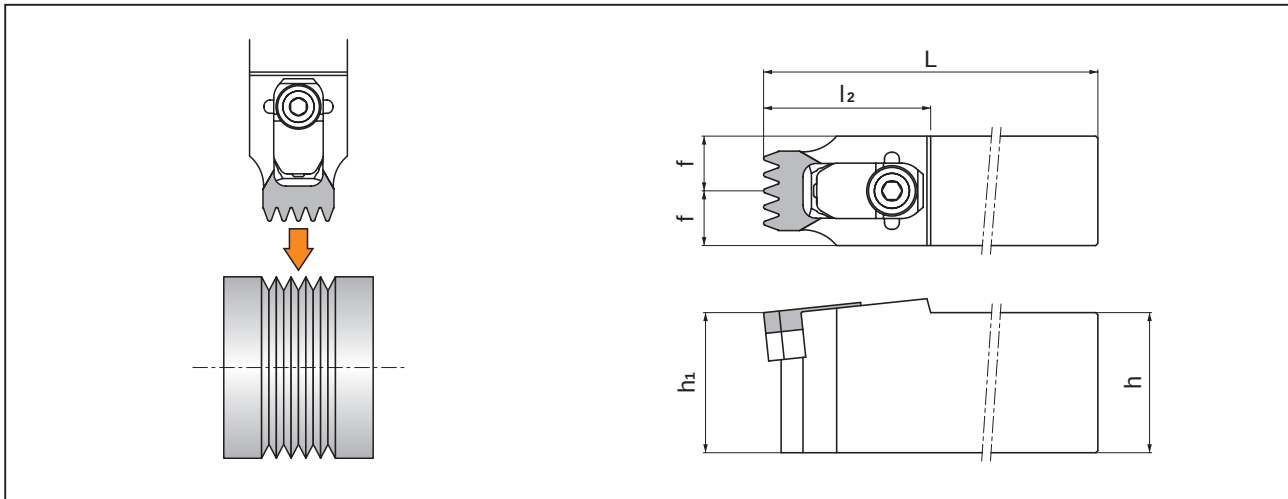
Recommendation

Insert Grade		Dry	Cutting speed (m/min)							Feed (mm/rev)		
			100	200	300	400	500	600	700	0.05	0.1	0.15
HW2	●	●										

Poly-V Holder and Inserts

Poly-V

Clamp-on type

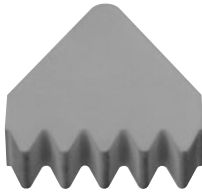
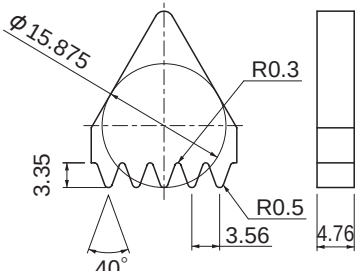
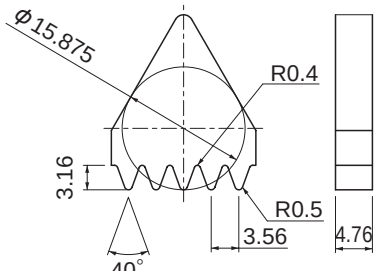


Item-No.	Stock	Dimensions (mm)						Insert	
		h	h1	b	L	f	l2		
Poly-V 3225 P-K5-C	●	32	32	25	170	12	35.5	PTM53 K505ENB K50504ENB	

Parts

Holder	Clamp	Thrust Plate	Shim	Shim-Screw
Poly-V 3225 P-K5-C	 2413-C	 9414-C	 K5-H	 1230

Insert

Shape	PTM53K505ENB HW2	PTM53K50504ENB HW2
		

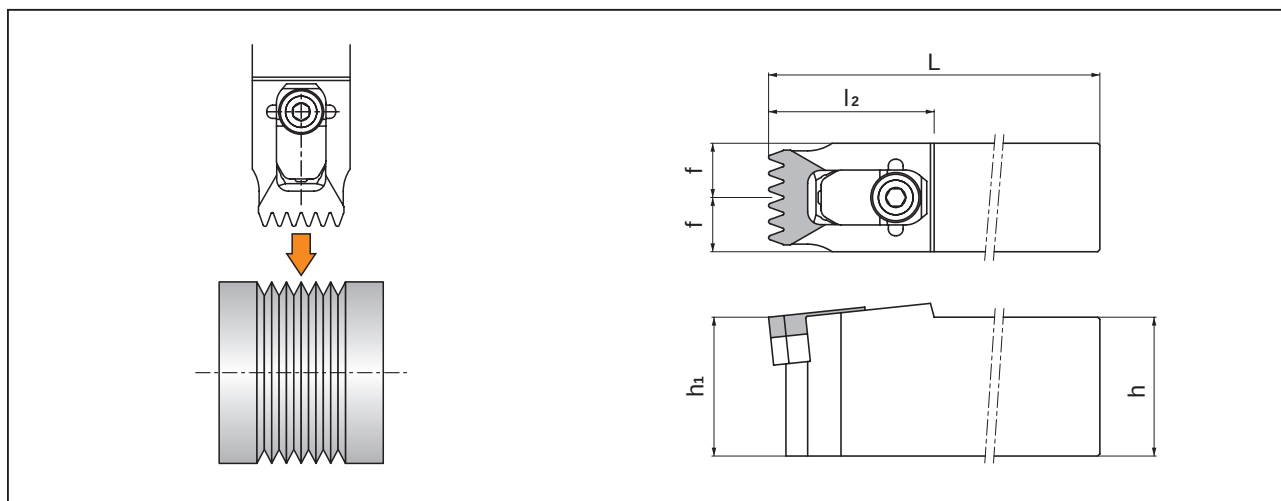
※ENB : R-horn

Recommendation

Insert Grade		Dry	Cutting speed (m/min)							Feed (mm/rev)		
			100	200	300	400	500	600	700	0.05	0.1	0.15
HW2	●	●										

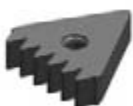
Poly-V

Clamp-on type

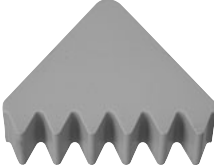
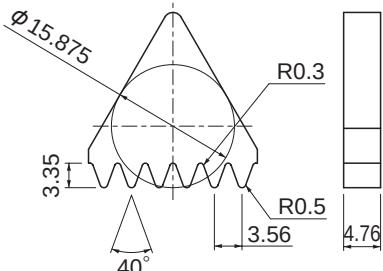
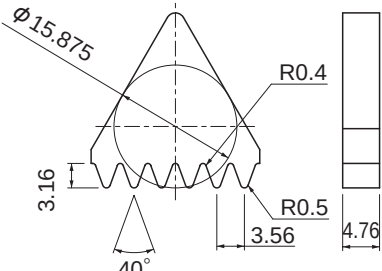


Item-No.	Stock	Dimensions (mm)						Insert	
		h	h1	b	L	f	l2		
Poly-V 3225 P-K6-C	●	32	32	25	170	12	35.5	PTM53 K605ENB K60504ENB	

Parts

Holder	Clamp	Thrust Plate	Shim	Shim-Screw
Poly-V 3225 P-K6-C	 2413-C	 9414-C	 K6-H	 1230

Insert

Shape	PTM53K605ENB HW2	PTM53K60504ENB HW2
		

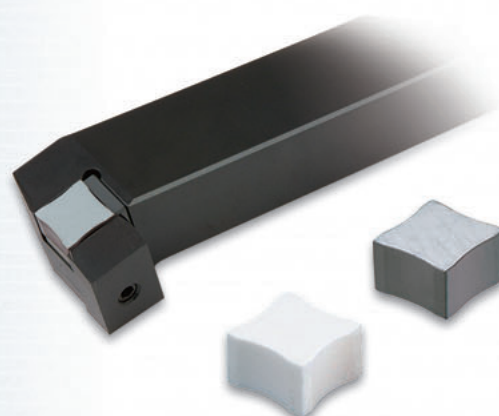
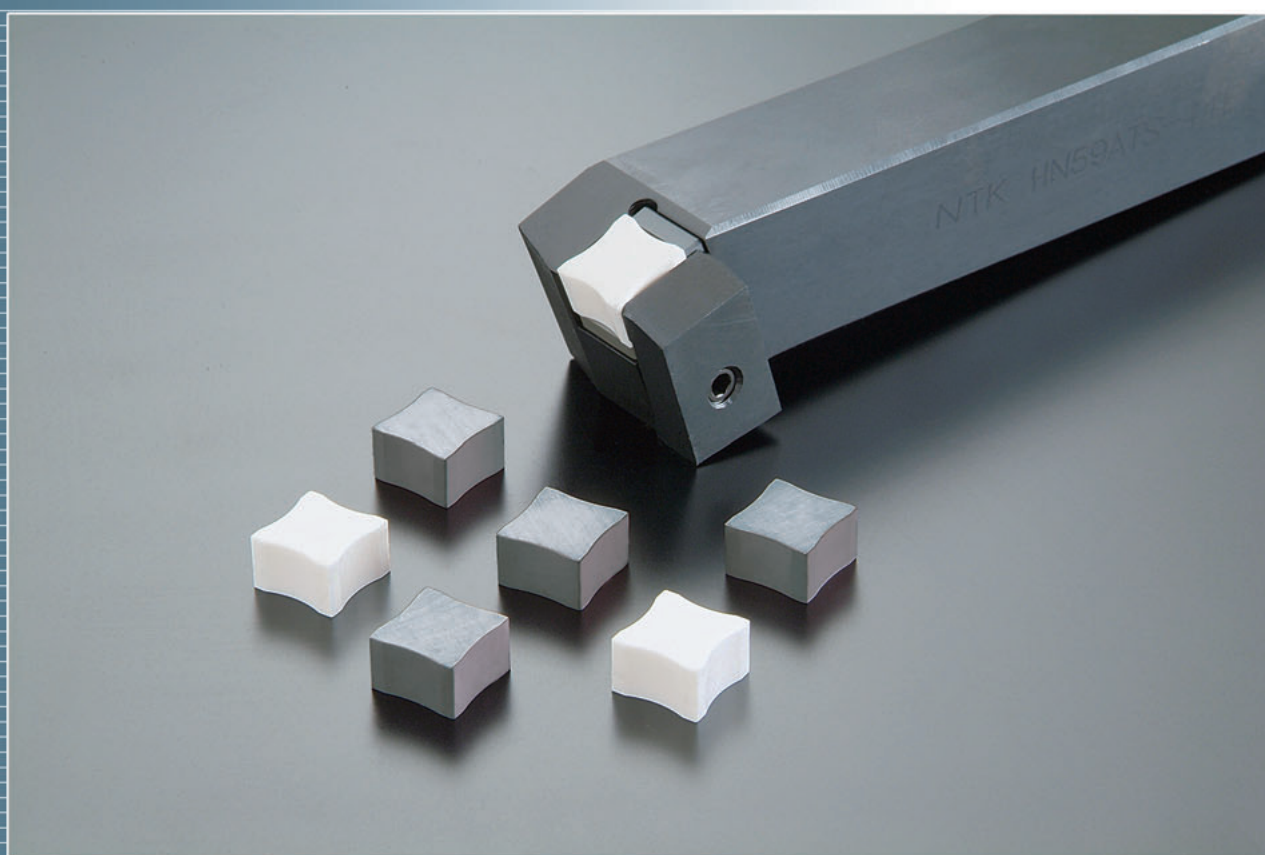
※ENB : R-horn

Recommendation

Insert Grade		Dry	Cutting speed (m/min)							Feed (mm/rev)		
			100	200	300	400	500	600	700	0.05	0.1	0.15
HW2	●	●										

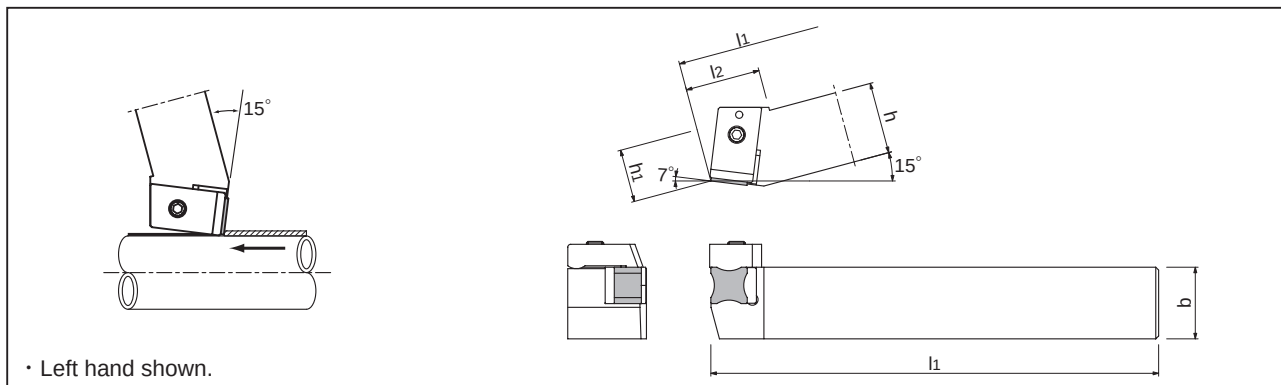
NTK

Tube Scarfing



ATS

(HN59ATS type [Right hand] · HN60ATS type [Left hand])

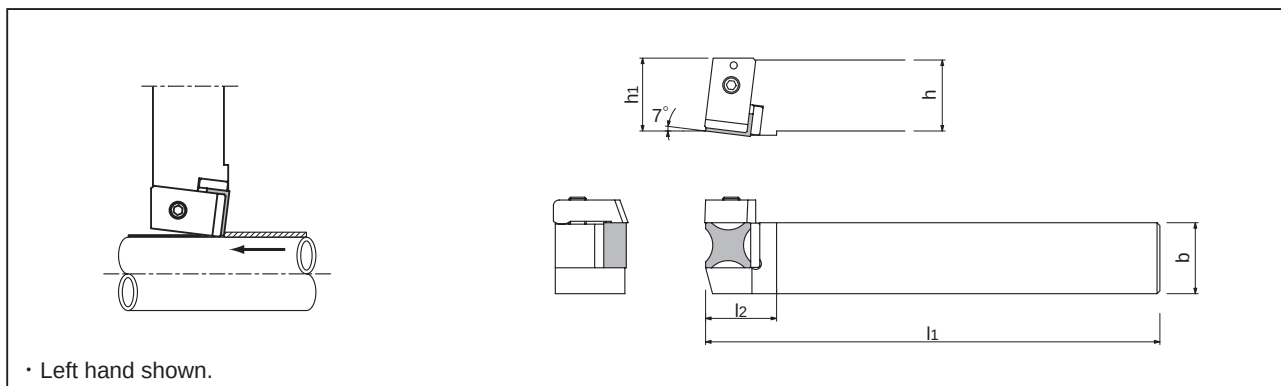


Toolholder	Stock		Dimensions (mm)					Insert	
	R(59)	L(60)	h	b	l1	h1	l2		
HN ⁶⁰ / ₅₉ ATS-33E			19	19	160	12.5	26		TSN45
ATS-44E	●	●	25	25	160	18.5	26		
ATS-44E-5			25	25	160	18.5	26		TSN55

For details of insert, see next page.

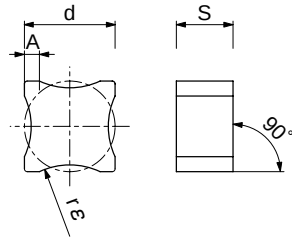
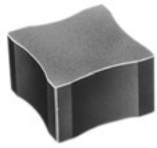
BTS

(HN59BTS type [Right hand] · HN60BTS type [Left hand])



Toolholder	Stock		Dimensions (mm)					Insert	
	R(59)	L(60)	h	b	l1	h1	l2		
HN ⁶⁰ / ₅₉ BTS-33E			19	19	160	19	25		TSN45
BTS-44E		●	25	25	160	25	25		
BTS-44E-5			25	25	160	25	25		TSN55

● Insert



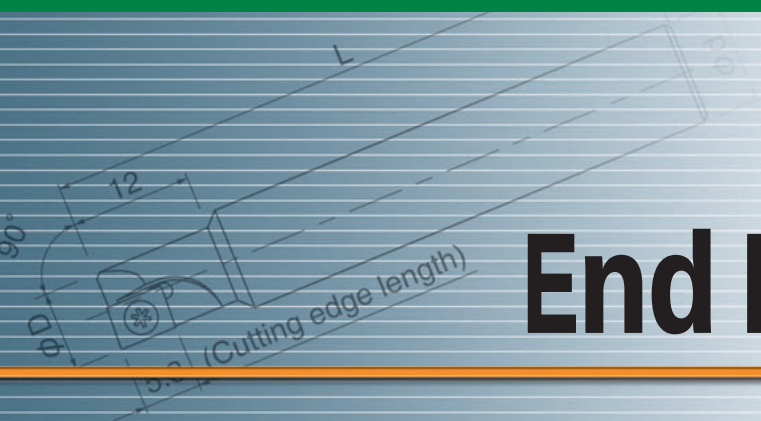
Insert Number		Dimensions (mm)				Ceramic	Cermet
		r E	A	d	S	CX3 *	N20
TSN	45-8	8	2.10	12.70	7.94		
	45-10	10					
	45-12	12				○	
	45-14	14					
	45-16	16				○	●
	45-18	18				○	
	45-20	20				○	●
	45-25	25				○	●
	45-30	30				○	●
	45-35	35				○	
	45-40	40				○	●
	45-50	50				○	
	45-60	60					
	45-70	70				○	
	45-90	90					
TSN	55-12	12	32.0	15.875	7.94		
	55-15	15				○	
	55-20	20				○	
	55-25	25				○	
	55-30	30				○	
	55-35	35					
	55-40	40				○	
	55-45	45				○	
	55-70	70					
	55-100	100					

* The CX3 is an alumina-based ceramic like HC1.

● Parts

Parts	Clamp	Clamping screw	Shim	Shim screw	Wrench
Toolholder					
HN ⁶⁰ / ₅₉ ATS-33E ATS44E	HC ⁶⁰ / ₅₉ TS-4	WS0620	ASN423 AZT659D	M3×5.5 M3×8	LW-3
ATS44E-5			ASN522 HAZT1255A	M3×8 M4×5.5	
HN ⁶⁰ / ₅₉ BTS-33E BTS-44E			ASN423 AZT659D	M3×5.5 M3×8	
BTS-44E-5			ASN522 HAZT1255A	M3×8 M4×5.5	

NTK



End Milling Tools



Indexable Milling Tools

P.200

Gear Tooth Chamfering Tools

P.206

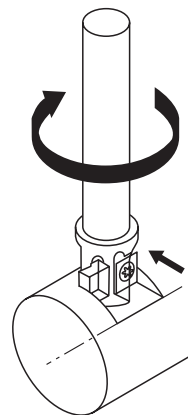
Small Diameter Indexable End Mills for CNC Auto lathes

Best for D-cutting!!

<Features>

- The use of ZM3 inserts achieves high speed machining at three to five times that of a conventional high-speed steel end-milling tool.
- Surface quality can be improved to about 5 microns Rz.
- REZ type allows square corner cutting.

φ8 mm Dia. tools are now available !!



RE

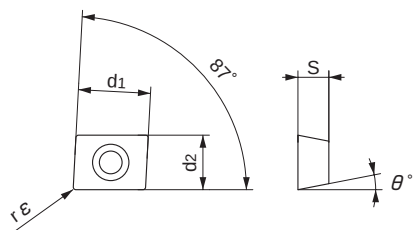
	Clamping screw		Wrench	
	FSI02-2.2×4.0		T-07	
Note				

Item-No.	Stock	Number of teeth	Dimensions (mm)			inserts
			φD	L	φd	
REZ080C1R212	●	1	8	60	10	CZH040

	Clamping screw		Wrench	
	FSI02-2.2×4.0		T-07	
	Note			

Item-No.	Stock	Number of teeth	Dimensions (mm)			Applicable inserts
			φD	L	φd	
REZ100C2R133	●	2	10	50	6	CZH040□□□CFR-070
R132	●				7	
R141	●				10	

● Insert

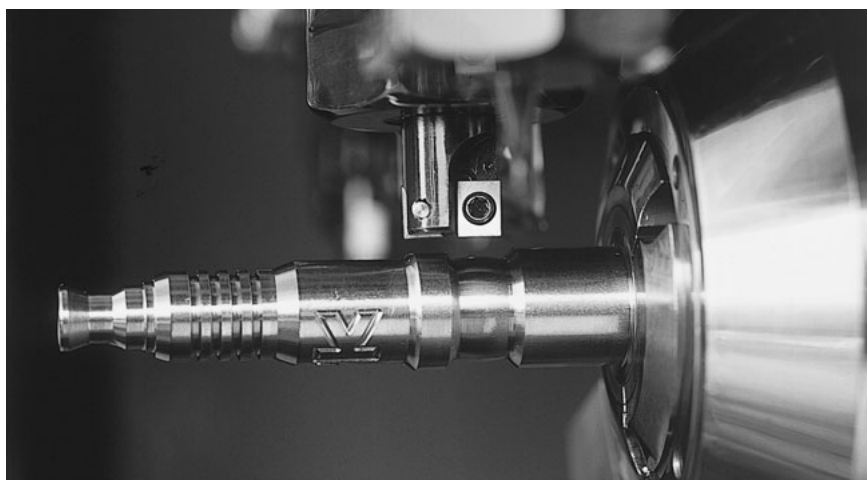
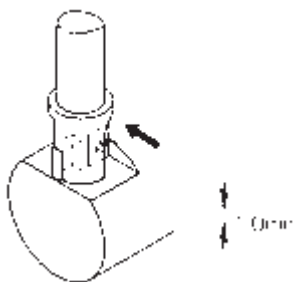
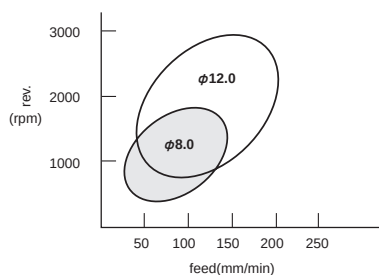


Note : Extended use could result in unusual screw wear, making it impossible to fully tighten the screw. Therefore, please replace the screw regularly.

• Right hand shown.

Item-No.	Stock		ItemsDimensions (mm)				
	ZM3		d1	d2	S	θ	rε
CZH04005CFR-070	●	●	5.56	4.2	1.88	7	0.05
CZH0402CFR-07	●						0.2

● Recommended Cutting Condition (X5CrNi18-9)



Material : X5CrNi18-9

Diameter : $\phi 8.0$ and $\phi 12.0$

Depth of cut : 1.0mm

Insert : ZM3CZH0402CFR-070

Toolholder : REZ100CZR141

Note : The smaller the workpiece diameter becomes, the more chattering occurs.
When chattering occurs, please decrease speed and feed.

● Application Example

Slow away end mill machining by ZM3.

	Current tool	NTK	Work piece	PLUG
Insert Number	Standard	CZH0402CFR-070	Material	X5CrNi18-9
Grade	PVD coated carbide	ZM3		
Rev.	1,200 rpm	1,200 rpm		
Cutting speed	38 m/min	38 m/min		
Feed	36 mm/min	72 mm/min		
Depth of cut	2.5 mm	2.5 mm		
Coolant	Yes	←		
Tool life	200 pcs	1200 pcs		

Note : Current tool suffered wear and poor size control.
NTK cycle time was double with an increase in a tool life.

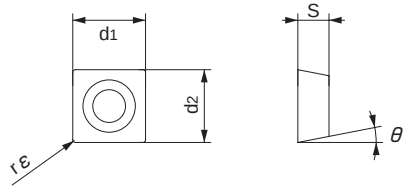
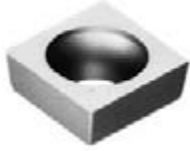
End mill (D cut) by ZM3.

	Current tool	NTK	Work piece	Shaft
Insert Number	Solid end mill (N.O.B 4)	CZH0402CFR-070 (N.O.B 2)	Material	X6Cr17
Grade	Coated carbide	ZM3		
Rev.	2,500 rpm	1,500 rpm		
Cutting speed	78.5 m/min	47.1 m/min		
Feed	100 mm/min	200 mm/min		
Depth of cut	1.0 mm	1.0 mm		
Coolant	Yes	←		
Tool life	5000 pcs	8000 pcs		

Note : NTK type End-Mill eliminated the need for re-grinding.
Cycle time was halved and tool life was 1.6 times longer.

● Insert

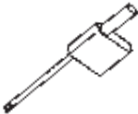
CLH,CSH



• Right hand shown.

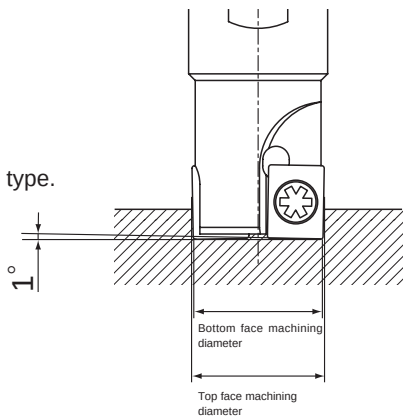
Insert Number	Stocked item	Dimensions (mm)				
	Micro grain carbide					
	ZM3	d1	d2	S	θ°	r ε
CLH04005CFN-045	○	5.56	4.20	1.88	7	0.05
0402 CFN-045	●					0.2
CSH0402 CFN-020	○	4.86	4.86	2.18	11	
0502 CFN-019	○	5.56	5.56	2.38		

● Parts

Parts	Clamping screw	Wrench
Toolholder		
REL100C2R043 REL100C2R106 REL100C2R107 RES120C2R048 RES140D2R047	FSI02-2.2×4.3 FSI02-2.2×5.6	T-07

● Notice for Using Type REL

Taper angles occur in the workpiece in the following sizes, if you use REL type end mill.

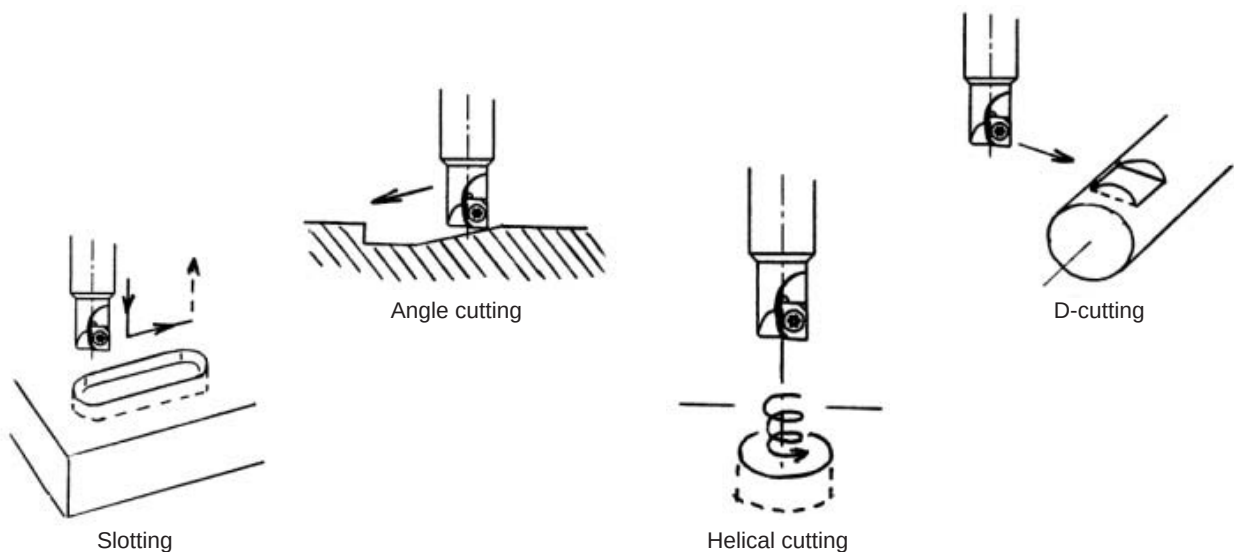
Depth of cut (mm)	Top face machining diameter - Bottom face machining diameter (mm)	
2	0.05	Edge angle is 1° with REL type. 
3	0.08	
4	0.12	
5	0.15	



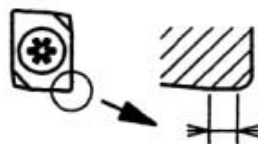
The 8-mm Dia.cutter has made its debut as a member of the Small Diameter Indexable End-Mills forming which is now enjoying a favorable reputation. In addition to conventional special design for D-cutting, new inserts each with a centre cutting edge are now available to allow slotting, angle cutting, and helical cutting. Changing from the conventional solid End-mill to the throwaway type makes re-grinding and re-coating unnecessary, thus permitting significant reduction in setup time.

● Features

- The use of 8mm-diameter and 10mm-diameter throw-away end milling tools makes re-grinding and re-coating unnecessary.
- End-milling tools with a centre cutting edge are available for roughing and semi-finishing.
- A variety of machining patterns can be created using the centre cutting edge.



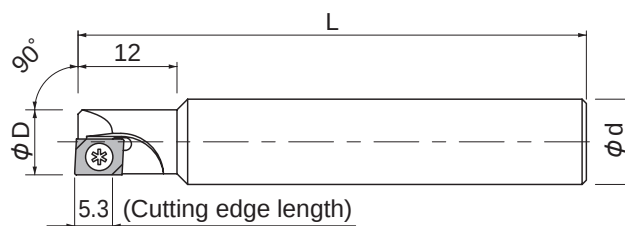
- An insert with a wiper facet allows components to be machined to 1-micron Rz surface quality (JIS-spec).



● Recommended Condition

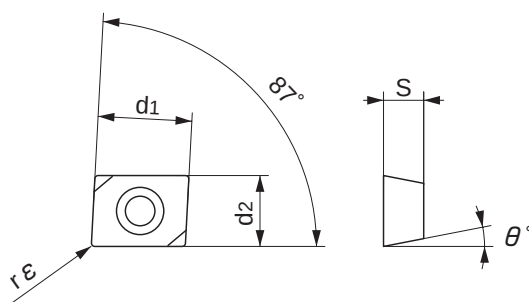
Work Material	Speed V(m/min)	Axial feed f(mm/rev)	Transversal feed f(mm/rev)	Depth of cut t(mm)
General steel	80~120	~ 0.03	~ 0.05	~ 3.0
Stainless	40~60	~ 0.02	~ 0.04	~ 2.0

● Toolholder



Toolholder	Stock	Dimensions				Parts		Insert
		φD	Number of teeth	φd	L	Clamping screw	Wrench	
								
REZ080C1R212	-	8	1	10	60	FSI02-2.2×4.0	T-07	CZH04
REZ100C1R218	-	10	1	10	75	FSI02-2.2×4.3	T-07	CZH05

● Insert



Item-No.	Dimensions					Center blade	Wiper	Grade	
	d1	d2	S	θ	rε			ZM3	TA3
CZH 0402CFR-140 04005CFR-140 0402CFR-070 04005CFR-070	5.56	4.2	1.88	7	0.2	○	○	●	
					0.05	○	○	●	
					0.2	×	×	●	
					0.05	×	×	●	
0502CFR-141 05005CFR-141	5.28	5.56	2.18	10	0.2	○	○	●	
					0.05	○	○	●	

Throw-Away End-Milling Tools for Gear Tooth Chamfering

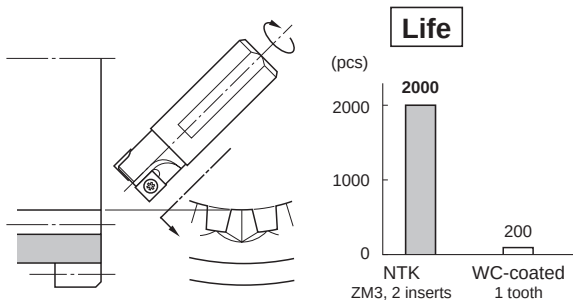
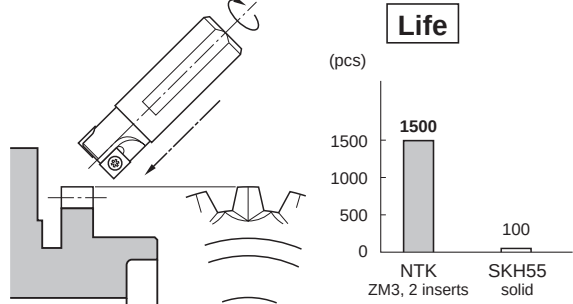
Changing from the conventional solid type end-mill to the throw-away type can be implemented.

<Features>

- (1) Surface finish can be improved.
- (2) Shape and accuracy are stabilized.
- (3) Compared to that of a high-speed end-milling tool, life can be extended by a full order of magnitude.
- (4) These new products can be used under the same machining conditions as those of existing products such as high-speed end-milling tools.
- (5) Compared to that of a single-edge throw-away type, long tool life can be obtained.



Examples

Sleeve rectangular tooth chamfering	Speed gear oblique chamfering
 Life (pcs) 2000 200 NTK ZM3, 2 inserts WC-coated 1 tooth	 Life (pcs) 1500 100 NTK ZM3, 2 inserts SKH55 solid
Cutting conditions Work material : 15CrMo4 No. of revolutions (N) : 3,500min⁻¹ Cutting speed (V) : 154m/min Coolant : Wet (Oily) Grade : ZM3 Insert No. : CLH0504CFN Holder No. : RCL140D2^{R/L} 021	Cutting conditions Work material : 20CrS4 (HB140 - 230) No. of revolutions (N) : 955min⁻¹ Cutting speed (V) : 42m/min Coolant : Wet (Oily) Grade : ZM3 Insert No. : CLH0502CFN Holder No. : RCL140D2^{R/L} 021

Operating Precautions on NTK Throw-Away End-Milling Tools for Gear Tooth Chamfering

① Cutter diameters and machining conditions

Cutter diameter	Recommended depth of cut	Recommended feed rate
$\phi 14$	2.25 or less	0.3 mm/rev or less
$\phi 12$	2.15 or less	0.3 mm/rev or less

If the recommended depth of cut or the recommended feed rate is exceeded, clamping screws should be retightened at least once or twice a day.

② The amount of overhang of the end-milling tool

When mounting the end-milling tools, adjustments for a minimum amount of overhang from the chuck to the tool nose should be made in order to prevent run out during machining. (Target value: approx. 20 mm)

③ Durability of the holder

As is known, rectangular tooth chamfering usually applies shock load to the tool at a rate of up to 500,000 times a day. Therefore, the holder, the durability of which depends on actual operating conditions, is usually designed so that the body can be used for several months.

However, as the deformation of the wrench hole in the clamping screw progresses, the tightening torque applied to the clamping screw will be insufficient and this will result in the screw becoming loose. For these reasons, NTK suggests that the clamping screw be replaced periodically.

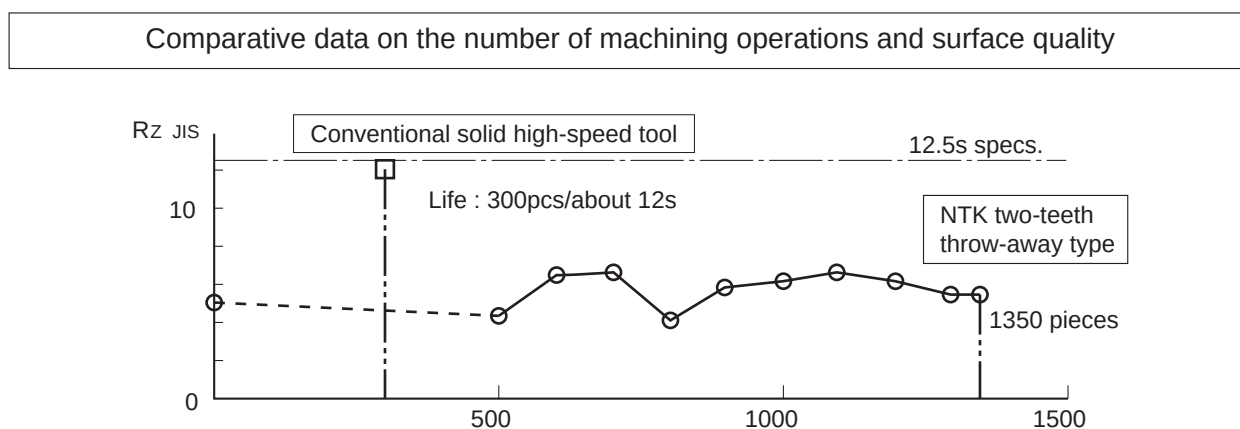
④ Number of corners at which the tip can be used

The insert has a rectangular shape with 2 cutting edges. When the depth of cut is small or the amount of wear is not great, it may be possible to use four corners by mounting the insert in an opposite handed holder after it has been used for machining with the initial two corners.

⑤ Special products

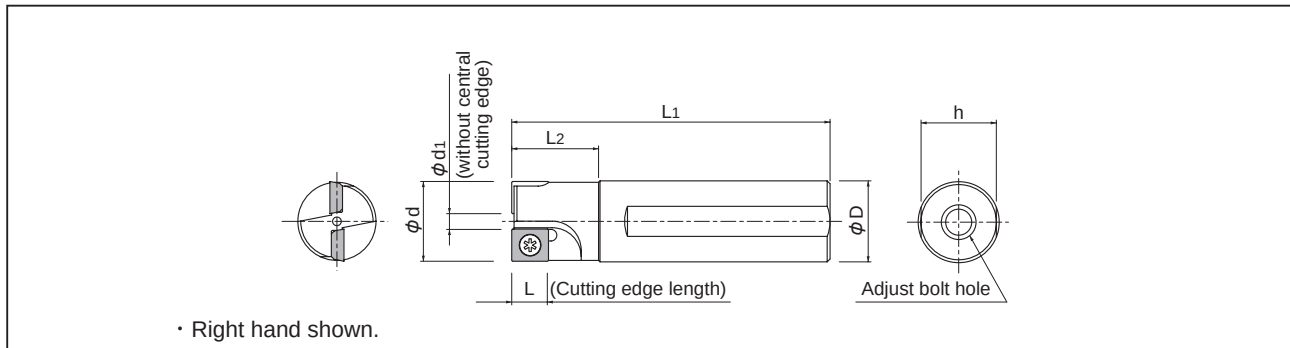
Please consult NTK if you desire products with special cutter diameters or shank sizes that are not usually kept in stock.

⑥ Examples from actual users



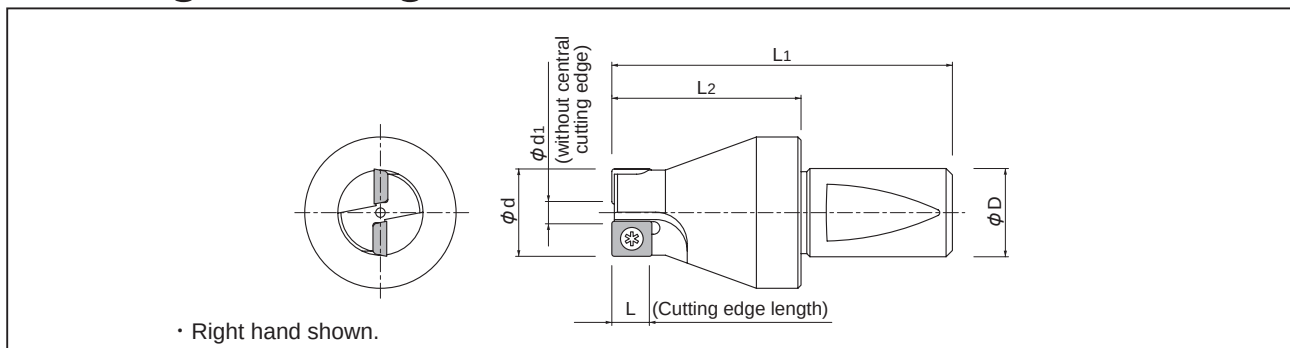
Gear Tooth Chamfering Tools

• Straight Shank



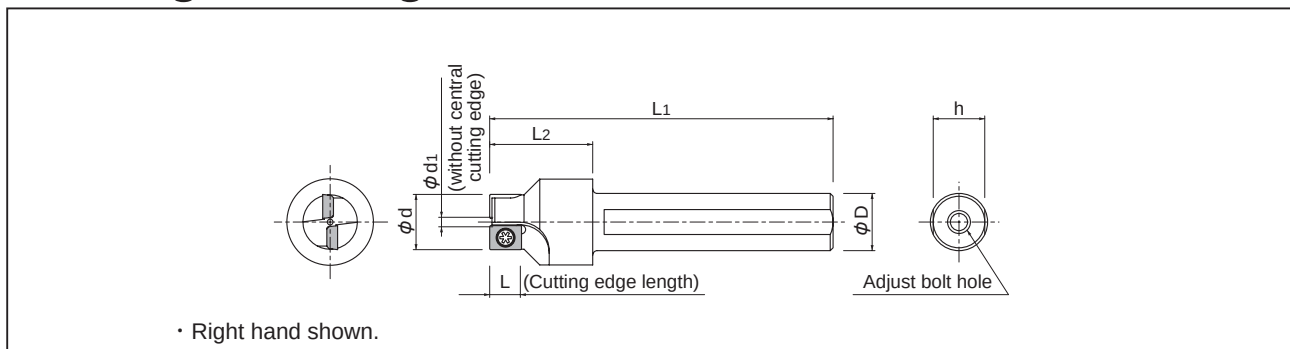
Item-No.	Stock	Dimensions (mm)							Adjust bolt	Insert
		ϕd	L_1	L_2	L	ϕd_1	ϕD	h		
RCL 140D2 ^{R/L} 021	○	14	55	15	(6)	($\phi 4$)	14	13	M6 × 20L	CLH050□CFN
120D2 ^{R/L} 050	○	12	60	15	(5)	($\phi 3$)	12	11	M4 × 20L	CLH0402C□□□-004

• Flanged Straight Shanks



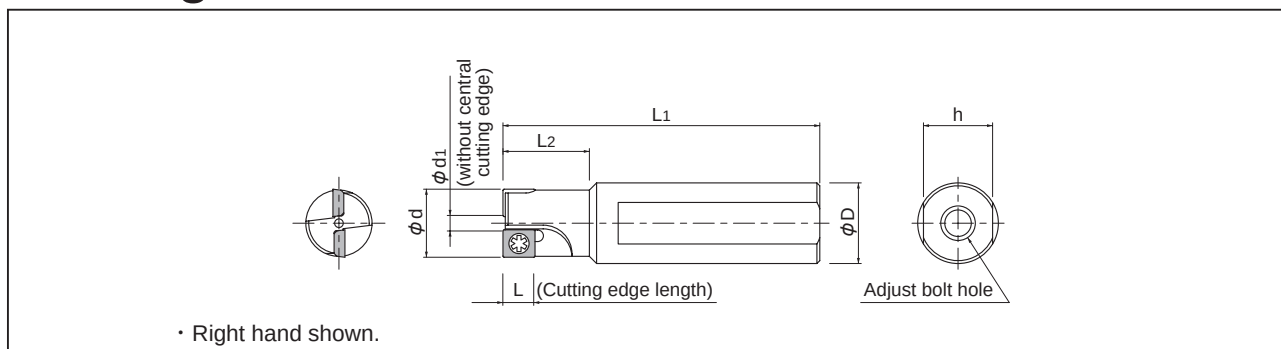
Item-No.	Stock	Dimensions (mm)							Insert
		ϕd	L_1	L_2	L	d_1	ϕD		
RCL 140Z2 ^{R/L} 020	○	14	54	30	6	($\phi 4$)	14		CLH050□CFN

• Flanged Straight Shanks



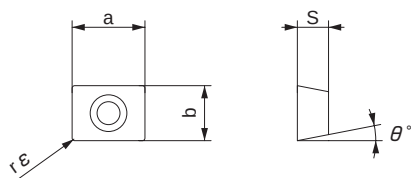
Item-No.	Stock	Dimensions (mm)							Adjust bolt	Insert
		ϕd	L_1	L_2	L	ϕd_1	ϕD	h		
RCL 100D2 ^{R/L} 066	○	10	60	18	(5)	($\phi 3$)	10	9.5	M4 × 20L	CLH0402C□□□-035

● Straight Shank



Item-No.	Stock	Dimensions (mm)							Adjust bolt	Insert
		ϕd	L1	L2	L	$\phi d1$	ϕD	h		
RCL 120D2 ^R /L 059	○	12	55	15	(5)	($\phi 3$)	14	13	M6 × 20L	CLH04

● Insert



Item-No.	Grade ZM3	Dimensions (mm)				
		a	b	s	θ	rε
CLH 0502CFN 0504CFN 0402CFN-004 0402CTNB004 0402CFN-035 0402CTNB035	○	6.35	5.56	2.18	11°	0.2
	○					0.4
	○	5.56	4.76	1.88	7°	0.2
	○					0.2
	○	5.56	4.2	1.88	7°	0.2
	○					0.2

Note) FN : Sharp edge TNB : T00525

● Parts

Parts	Clamping screw	Wrench	
		(A)	(B)
Toolholder			
RCL 140D2 ^R /L 021 140Z2 ^R /L 020 120D2 ^R /L 050 120D2 ^R /L 059 100D2 ^R /L 066	FSI01-2.5 × 5	(A)	RLR-15S
	FSI04-2.0 × 4.3	(B)	T-06

NTK

Technical Information

NTK RECOMMENDATION CHART FOR MACHINING

● Steel

Work Material	Process		Cutting speed (m/min)	Feed rate (mm/rev)	Depth of Cut (mm)	Grade	
						1	2
Carbon Steel Alloy Steel	Turning	Rough	150 - 300	- 0.5	- 3.0	QM3	ZM3
			300 -	- 0.2	- 1.0	WA1	
		Finish	150 - 300	- 0.2	- 0.5	T15	T3N
			300 -	- 0.2	- 0.5	HC1	WA1
	Milling		100 - 150	- 0.15 (mm/t)	- 2.0	TA3	QM3
			200 -	- 0.1 (mm/t)	- 2.0	C7X	
	Grooving		100 - 150	- 0.2		QM3	ZM3
			200 -	- 0.2		N40	C7X
Stainless Steel 3 series			100 - 150	- 0.2	- 2.0	ZM3	QM3
			150 - 300	- 0.2	- 2.0	T15	C7X
Stainless Steel 4 series			100 - 150	- 0.2	- 2.0	ZM3	QM3
			150 - 300	- 0.3	- 2.0	T15	C7X
Bearing Steel			100 - 300	- 0.3	- 3.0	C7X	N40
Tool Steel			100 - 180	- 0.2	- 3.0	T15	T3N
Sintered Alloy			50 - 200	- 0.2	- 3.0	QM1	C7X
Hardened Steel	Continuous		100 - 150	- 0.25	- 0.5	HC7	HC4
	Interrupted		- 180	- 0.25	- 0.5	B36	
Inconel 718	Rough		50 - 150	- 0.5	- 3.0	SX9	
			50 - 250	- 0.4	- 3.0	WA1	
	Finish		30 - 100	- 0.2	- 1.0	TA3	QM3
Waspaloy	Rough		80 - 200	- 0.5	- 3.0	WA1	
			100 - 400	- 0.4	- 3.0	SX9	
	Finish		50 - 100	- 0.2	- 1.0	TA3	QM3
Inconel 713 Rene 88	Rough		50 - 100	- 0.5	- 3.0	SX9	
			50 - 150	- 0.4	- 3.0	WA1	
	Finish		30 - 80	- 0.2	- 1.0	TA3	QM3
Inconel 6 series	Rough		80 - 200	- 0.5	- 3.0	SX9	
			100 - 400	- 0.4	- 3.0	WA1	
	Finish		50 - 100	- 0.2	- 1.0	TA3	QM3
Hasteloy	Rough		80 - 250	- 0.5	- 3.0	SX9	
			100 - 500	- 0.4	- 3.0	WA1	
	Finish		50 - 100	- 0.2	- 1.0	TA3	QM3
Stellite	Rough		50 - 250	- 0.5	- 2.0	WA1	
	Finish		50 - 150	- 0.3	- 1.0	HC7	

● Cast Iron

Work Material	Process		Cutting speed (m/min)	Feed rate (mm/rev)	Depth of Cut (mm)	Grade	
						1	2
Gray Cast Iron	Turning	Rough	100 - 500	- 0.5	- 5.0	SX1	SX9
			500 - 1000	- 0.7	- 5.0	SX1	SX9
		Finish	100 - 500	- 0.3	- 1.0	HW2	HC2
			500 - 1000	- 0.3	- 1.0	B20	B16
	Milling	Rough	100 - 200	- 0.3 (mm/t)	- 5.0	QM1	QM3
			200 - 500	- 0.3 (mm/t)	- 5.0	SX1	SX8
		Finish	100 - 150	- 0.15 (mm/t)	- 2.0	QM1	
			200 - 500	- 0.1 (mm/t)	- 2.0	SX1	SX8
	Grooving		100 - 150	- 0.2		QM3	
			200 -	- 0.2		HW2	HC2
Ductile Cast Iron	Rough		150 - 300	- 0.5	- 2.0	SX9	SP2
	Finish	Continuous	100 - 450	- 0.25	- 1.0	HC6	
		Interrupted	100 - 350	- 0.25	- 1.0	SX8	Q15
	Grooving		-200	- 0.2		Q15	HC6
Alloy Cast Iron (Cylinder Liner)			300 - 600	- 0.4	- 2.0	HW2	HC2
			600	- 0.4	- 2.0	B16	
Chilled Cast Iron			100 - 200	- 0.4	- 2.0	HC2	SX9

● Others

Aluminum	Low Si content	100 - 500	- 0.4	- 2.0	UC2	UC1
	Hi Si content	500 -	- 0.4	- 2.0	UC2	UC1
Non Ferrous (Copper , Brass)		300 - 700	- 0.3	- 4.0	KM1	T3N

Types, Applications, and Characteristics of NTK Insert Materials

● Ceramic Series

	NTK Grade	Components	Applications	Physical characteristics					
				Density	Hardness	Bending strength	Young's modulus	Thermal expansion coefficient	Heat conductivity
				g/cm ³	HRA	MPa	GPa	X10 ⁻⁶ /K	W/m-K
Silicon-nitride-based	SX1	Si ₃ N ₄	• Highly efficient cutting of gray cast iron	3.2	93.5	1200	320	3.0	29
	SX2	Si ₃ N ₄	• Milling of gray cast iron	3.2	93.5	1100	320	3.0	29
	SX8	Si ₃ N ₄	• Strong interrupted cutting of gray cast iron	3.2	93.0	1200	320	3.2	33
	SX9	Si ₃ N ₄	• Ni-based Heat Resistant Alloys	3.3	93.5	1200	330	3.0	15
	SP2	TiN-coating + Si ₃ N ₄	• Rough turning of gray cast iron	3.2	93.5	1100	320	3.0	29
Alumina-based	HC1	Al ₂ O ₃	• Semi-finishing and finishing of cast iron • Tube scarfing	4.0	94.0	700	400	7.8	17
	HW2	Al ₂ O ₃	• Semi-finishing and finishing of cast iron • Liner machining	4.1	94.0	750	390	7.8	19
	HC2	Al ₂ O ₃ + TiC	• Semi-finishing and finishing of cast iron • Machining of hardened materials	4.3	94.5	800	420	7.8	21
	HC4	Al ₂ O ₃ + TiC	• Machining of hardened materials	4.6	95.5	1000	420	7.9	25
	ZC4	TiN-coating Al ₂ O ₃ + TiC	• Machining of hardened materials	4.6	95.5	1000	420	7.8	25
	HC6	TiC + Al ₂ O ₃	• Semi-finishing and finishing of ductile materials • Using Coolant semi-finishing and finishing of cast iron	4.7	94.0	800	450	7.6	29
	HC7	Al ₂ O ₃ + TiC	• Machining of hardened materials Turning of roll materials • Semi-finishing and finishing of cast iron	4.6	95.5	1000	420	7.9	25
	ZC7	TiN-coating Al ₂ O ₃ + TiC	• Machining of hardened materials Turning of roll materials • Semi-finishing and finishing of cast iron	4.6	95.5	1000	420	7.9	25
Whisker-based	WA1	Al ₂ O ₃ + SiC	• Rough turning of heat-resistant alloys • Highly efficient machining of cast iron • Roughing of hardened rolls	3.7	94.5	1200	400	7.6	-

● CBN Series

Ultrahigh-pressure sintered compacts	NTK Grade	Binder	CBN content	Applications
	B16	TiN-coated special ceramics	82%	High-speed rough finishing of gray cast iron and rolled materials
	B20	Special ceramics	60%	High-speed finish turning of gray cast iron
	B22	TiN-based	80%	Turning of hardened rolls
	B24/B26	TiN-based	65%	Continuous and interrupt cutting of sintered steel at middle speed ranges
	B36	Special ceramics	65%	Interrupt cutting of sintered steel at middle speed ranges

* Note : Data of coated products relates to the respective base materials.

● Cermet Series

	NTK Grade	Components	Applications	Physical characteristics					
				Density	Hardness	Bending strength	Young's modulus	Thermal expansion coefficient	Heat conductivity
				g/cm ³	HRA	MPa	GPa	X10 ⁻⁶ /K	W/m-K
Cermets	T3N	TiC + TiN	• High-speed finishing of steel • Machining of sintered alloys	6.0	92.7	1400	450	8.3	13
	T15	TiC + TiN	• Semi-finishing and finishing of steel	6.3	92.5	1700	450	8.4	21
	N20	TiN-based	• Boring and grooving of steel • Pipe scarfing	5.6	91.5	1600	460	9.0	42
	N40	TiN-based	• General turning of steel • Grooving of steel	5.9	91.5	1900	450	8.9	42
	C7X	TiCN	• Semi-finishing and finishing of steel • Grooving of steel	7.0	91.5	1800	440	8.2	31
PVD coated cermets	Z15	TiN-coating	• Semi-finishing and finishing of steel • Finishing of ductile cast iron	6.3	92.5	1700	450	8.4	21
	Q15	TiCN-coating	• High-speed finishing of ductile cast iron	6.3	92.5	1700	450	8.4	21
	C7Z	TiN-coating	• Boring and grooving of steel	7.0	91.5	1800	440	8.2	31

● Micrograin Carbide Series

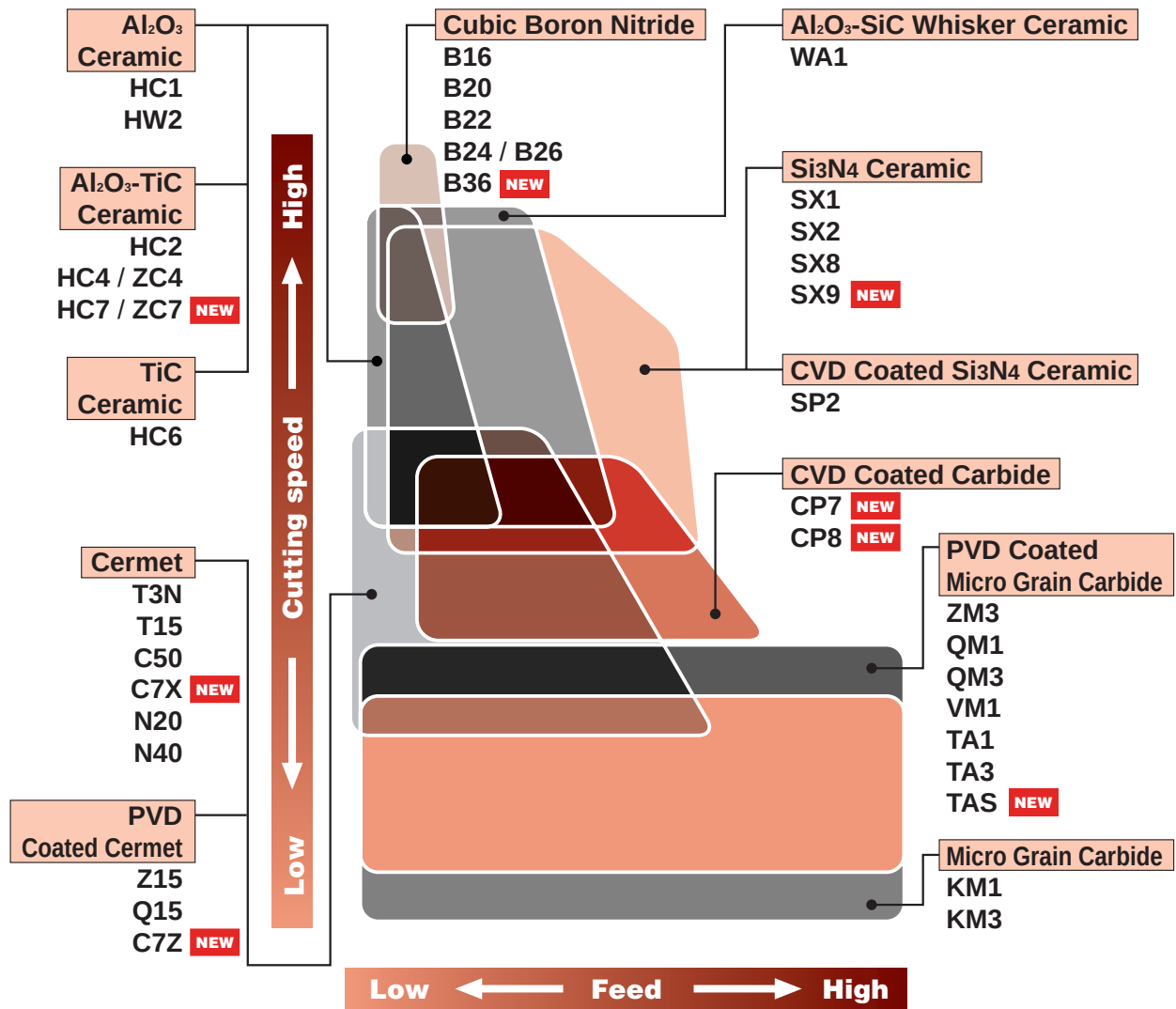
	NTK Grade	Components	Applications	Physical characteristics					
				Density	Hardness	Bending strength	Young's modulus	Thermal expansion coefficient	Heat conductivity
				g/cm ³	HRA	MPa	GPa	X10 ⁻⁶ /K	W/m-K
Micrograin carbide	KM1	Micrograin carbide	• Turning for aluminum	14.4	91.0	3000	580	5.8	63
PVD coated Micrograin carbides	ZM3	TiN-coating	• Turning of stainless steel and titanium	14.4	91.0	3000	580	5.8	63
	QM1	TiCN-coating	• Turning of sintered alloys and heat resistant alloys	14.8	92.0	2500	640	5.7	84
	QM3	TiCN-coating	• Continuous/interrupt cutting and milling of steel	14.4	91.0	3000	580	5.8	63
	VM1	TiCN-coating	• Turning of free-cutting steel	14.8	92.0	2500	640	5.7	84
	TA1	TiAlN-coating	• Turning and milling of steel and ductile cast iron	14.8	92.0	2500	640	5.7	84
	TA3	TiAlN-coating	• Turning and milling of steel and ductile cast iron	14.4	91.0	3000	580	5.8	63
	TAS	TiAlN-coating	• Turning for stainless steel	14.8	92.0	2500	640	5.7	84

● CVD-Coated Carbide Series

	NTK Grade	Components	Applications	Physical characteristics					
				Density	Hardness	Bending strength	Young's modulus	Thermal expansion coefficient	Heat conductivity
				g/cm ³	HRA	MPa	GPa	X10 ⁻⁶ /K	W/m-K
CVD-coated carbides	CP7	Al ₂ O ₃ - TiCN + carbide	• Rough and semi-finish turning of cast iron	13.8	90.1	2200	580	-	-
	CP8	Al ₂ O ₃ - TiC + carbide	• Rough and semi-finish turning of cast iron	15.0	92.2	2000	600	4.5	79

* Note : Data of coated products relates to the respective base materials.

Application Range of NTK Insert Grade



GUIDELINES FOR CERAMIC SUCCESS

Use a Rigid Set-Up.

NTK ceramics work best when both the machine and work piece are secure - eliminate overhang.

Use Sturdy Tooling.

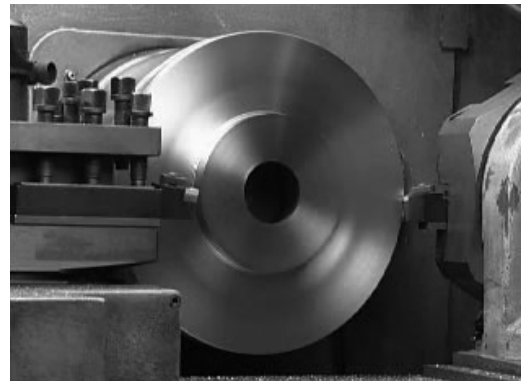
For best results, use toolholders designed for ceramics whenever possible. A top clamp with a pin lock is recommended when using an insert with a hole. Use a mechanical chip breaker if possible. Also, make sure that the insert pocket is clean and burr free.

Use the Largest Insert Size Possible

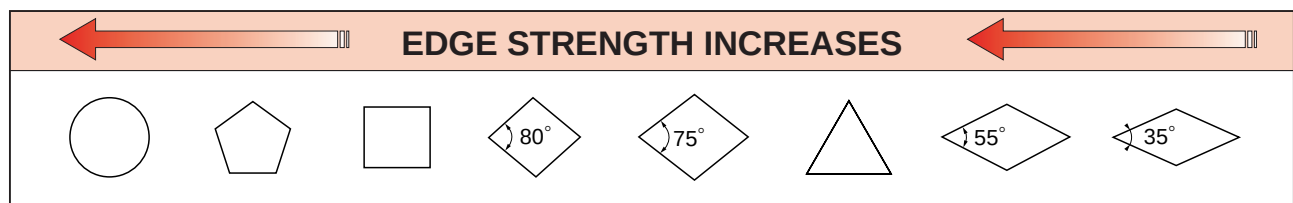
The strength of Ceramics has increased dramatically over the years, but the fact remains - larger is stronger.

Use Suggested Speeds and Feeds

Avoid dwelling in cuts. Consult charts.



Use a Negative Insert with the Largest Corner Angle.



Use the Largest Nose Radius Possible

Without Causing Chatter.

Usually the stronger the nose radius the longer the tool life. Avoid using 0.4 corner radius inserts.

Use the Largest Lead Angle Possible.

Distributing the workload over a greater area of the cutting edge will prolong tool life.

Use Proper Edge Preparation.

Success with ceramic greatly depends upon the cutting edge. Consult the edge preparation sections for proper specifications.

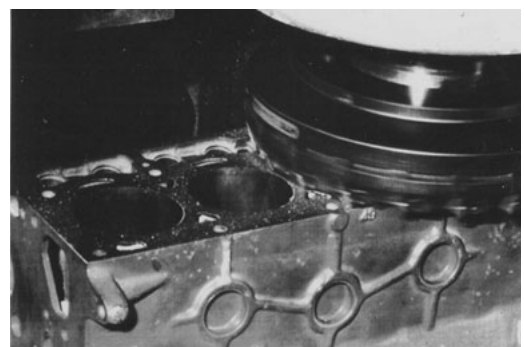
Use No Coolant with Ceramics Except

Silicon Nitride.

If this is not possible then a flooded coolant condition must be used.

Use Ceramics Safely.

Make sure machine operators have adequate training in the use of high speed ceramics. Follow machining parameters with safety in mind at all times.



● GUIDELINES FOR SUCCESSFUL MACHINING OF CAST IRONS

No Coolant.

Do not use coolant on heavy interruptions - especially at high speeds.

Roughing

When roughing cast iron the nose of the insert must be below the surface scale.

Out of Roundness

Out of round cutting conditions cause excessive tool wear. Make sure the insert nose is cutting at all times.

Sand in Castings.

When the scale contains sand, insert failure from depth of cut notching increases. Reduce the lead angle to minimize this problem.

Burrs

When a breakout problem occurs, use a larger nose radius, larger lead angle or decrease the feed rate exiting the workpiece.

Dwelling

Avoid dwelling in cuts. This will cause premature insert wear.

● Turning Gray Cast Iron (HB 180 - 230)

Cutting Condition	Coolant	NTK Grade Selection Per Speed Range
Roughing-interrupted (as cast)	×	SX8 silicon nitride (200 - 600m/min)
Roughing-continuous (as cast)	○	SX1, SP2 silicon nitride (300 - 1000m/min)
	×	HW2 ceramic (500 - 800m/min)
Finish-interrupted	○	SP2, SX1 silicon nitride (200 - 600m/min)
	○	HC6 ceramic (200 - 600m/min)
Finish-continuous	×	HW2, HCl ceramic (500 - 800m/min)
	×	HC2 ceramic (300 - 600m/min)
	○	HC2 ceramic (400 - 600m/min)
	○	HC6 ceramic (200 - 600m/min)

● Turning Ductile (Nodular) Cast Iron (HB 180 - 250)

Cutting Condition	Coolant	NTK Grade Selection Per Speed Range
Roughing-interrupted (as cast)	○	SX8 silicon nitride (200 - 400m/min)
Roughing-continuous (as cast)	○	SX9, SX1, SP2 silicon nitride (300 - 600m/min)
Finish-interrupted	×	HC6 ceramic (200 - 600m/min)
Finish-continuous	○	HC6 ceramic (300 - 600m/min)
	○	HC2 ceramic (300 - 600m/min)

● Milling Cast Irons

Cutting Condition	Coolant	NTK Grade Selection Per Speed Range
Rough-gray-ductile	×	SX9, SX1 silicon nitride (200 - 600m/min)
	×	SX8 silicon nitride (200 - 400m/min)
Finish-gray or ductile	○	SX9, SP2 silicon nitride (200 - 600m/min)
	×	HC6 ceramic (100 - 200m/min)

● GUIDELINES FOR SUCCESSFUL USING CERMETS

Tuning Steels.

Using cermets to machine steels provide the user with extended tool life, superior surface finishes and higher productivity through the use of speed. When using cermets to machine steels, feed rates and depth of cuts have to be selected more conservatively than with carbides because of the difference in strength.

Milling Steels.

The criteria for success when using cermets for milling are two fold - improved surface finishes and extended tool life. Most successful applications of cermets for milling are with cutters under 250 in diameter

Consult the "Guidelines for Cermet Success" section for additional information.

GRADE DISCUSSION	
T3N	- Use this grade when turning (35-50Rc) steels. Do not use on interrupted cuts, only for finish applications. Can be used to mill (40 HRC) die steels. Do not run with coolant, if possible.
T15	- Use these general purpose grades to finish and semi-finish steels and stainless steels.
N40	- Use N40 for the toughest steel applications. Maximum depth of cut -3.5mm. Can be run with or without coolant. Good choice on older machines. (90m/min and up)
C7X	- Use C7X for general purpose milling of steels. Both exhibit excellent shock and wear resistance.

● Carbon and Alloy Steels

Hardness (HB)	Cutting Condition	Speed Range	NTK Grade Selection
130 - 220	Rough Turning	90 - 200	N40 / C7X
	Finish Turning	240 - 360	T3N / T15 / C7X
	Milling	150 - 240	C7X
260 - 300	Rough Turning	100 - 175	N40 / C7X
	Finish Turning	150 - 240	T3N / T15 / C7X
	Milling	120 - 165	C7X
300 - 400	Rough Turning	80 - 125	T15
	Finish Turning	100 - 180	T3N
	Finish-Milling	75 - 120	C7X / T3N

● Tool Steels

- 45 HRC	Finish Turning	100 - 135	T3N
	Finish-Milling	75 - 150	C7X

NOTE - Speeds based upon using a CNGA-120408 insert.
 - Ceramics can be used in machining steels. Consult speed and feed chart.
 - Mechanical chipbreakers should be used with ceramics.

GUIDELINES FOR CERMET SUCCESS

Use a Rigid Set-Up.

NTK cermets work best when both the machine and work piece are secure - eliminate overhang.

Use Sturdy Tooling.

Use rigid tooling which reduces the chance of chatter. Make sure the insert pocket is clean and burr free. Use a top clamp.

Use Largest insert Size Possible. Use Largest Nose Radius Possible. Use Largest Lead Angle Possible. Use Cermets to Machine the Following.



Carbon Steels	Stainless Steels	Aluminum (with low Si)
Alloy Steels	Powdered Metal	Non-Ferrous Materials
Tools Steels	Inco 600-700 Series	Non-Metallic Materials

Use Cermets to Machine (HRC 35-50) Materials.

Cermets resist edge deformation and are very wear resistant when machining harder materials.

Use Suggested Speed Range.

Consult the speed chart for proper speeds. Cermet speeds increase productivity.

Use Correct Chipbreaker Design.

Do not curl the chips too tight. Avoid chips from striking the insert or piling up at cutting edge.

Use Light Feeds.

Do not exceed 0.38mm/rev feed rate. Cermets are more feed sensitive than carbides.

● IMPORTANT POINTS TO REMEMBER

Thermal Toughness.

Cermets are more thermal sensitive to coolant than carbides. As a result, rough turning, boring and milling should not be performed using coolant. Conversely, coolant can be used when finish turning or boring.

If a cermet insert breaks after machining several parts and coolant is being used, turn off the coolant, replace the cutting edge and start over. Usually, this type of cermet failure is thermal related. The toughness level of cermet materials increases when no coolant is used. Cermets resist cutting edge build-up, so they cut much freer and surface finishes are excellent without the use of coolant. If coolant has to be used, it must be a flooded condition.

Fracture Toughness.

Cermets are best used in semi-finishing and finishing applications. Cermets do not bend - carbides do. Roughing through scaled surfaces are usually best performed by carbides. Cermets can machine parts with interruptions but care must be taken in the form of larger lead angles, stronger insert geometries and larger nose radius. Do not rough any material using a 55° or 35° rhomboid cermet insert.

EDGE PREPARATION OF CERAMICS

- Much of the success of ceramics are the result of using the correct edge preparations. Since ceramic is such a hard material, it needs some edge work in order to withstand cutting forces to optimize the cutting tool performance. The correct edge preparation must correspond to the ceramic grade being used, the kind of material being machined and the machining operation being performed.

- The majority of ceramic applications can be handled with NTK's standard edge preparations. These edges are described on the next page. Whenever possible use a stocked standard edge preparation. As special conditions arise, then the edge preparation will have to be modified to meet these conditions. The following chart offers an explanation of edge preparations.

Explanation of Ceramic Cutting Edges

EDGE STRENGTH INCREASES		Up sharp edges are not recommended for ceramics. Only cermet in some special cutting tool applications.
		Hones help protect the edge of ceramics from chipping or fracturing. Feed rates must be greater than the hone size to prevent a rubbing rather than a cutting action. Excessive honing reduces tool life
		This geometry is typically the most common ceramic edge preparation. The cutting forces are distributed over a concentrated area of the ceramic edge. Aword of caution - the larger the T-land or hone the greater the cutting pressure, temperature and wear.
		A hone added to a T-land provides a stronger edge to prevent chipping. Usually this thype of geometry works best on interrupted cuts or turning hardened steels.
		Double T-lands and hones are generally used in heavy roughing cuts of hardened materials. This edge is extremely shock resistant but also generates large cutting forces.

Standard Edge Preparation for NTK Ceramics

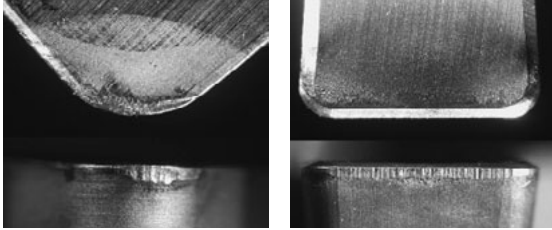
Grade	Shape	Thickness	I.C. Size	NTK Std. Edge Prep.
HC1	Negative Rake	4.76 or less	all sizes	0.1 T-land
HC2		6.35 or over		0.2 T-land
HC6				
HW2	Positive Rake	all sizes	7.94 or less	0.05 T-land
HC4 / ZC4			9.525 or over	
HC7 / ZC7				
SX1 SX8 SP2	Negative Rake	all sizes	7.94 or less	0.1 T-land
			12.7 or over	0.2 T-land
	Positive Rake	all sizes	7.94 or less	0.1 T-land
			9.525 or over	
SX5	Negative Rake	all sizes	all sizes	0.05 T-land
SX9	Positive Rake			

Recommended Edge Preparation for HC1, HC2, HC6, HW2, ZC4, ZC7, SX1, SX8, SP2, SX9

Material	Application	Shape & Edge Preparation
Cast iron	Rough	① Negative rake 0.2 T-land (standard)
	Fine Finish	① Positive rake 0.05 T-land (standard)
		② Negative rake 0.1 T-land (standard)
Mild Steel	Rough	① Negative rake 0.2 T-land (standard) 7.94 thick
		② Negative rake 0.4 T-land (standard) 7.94 thick with Hone
	Finish-Semi-Finish	① Negative rake 0.1 T-land (standard)
		② Negative rake 0.2 T-land (standard)
	Finish with interruption	① Negative rake 0.2 T-land (standard)
		② Negative rake 0.2 T-land (special) with Hone
Hardened Steel	Finish-Semi-Finish	① Negative rake 0.2 T-land (special)
	Fine Finish	① Negative rake 0.1 T-land (standard)
		② Positive rake 0.05 T-land (standard)
Chilled Iron	Finish-Semi-Finish	② Positive rake 0.2 T-land with Hone (special)
	Mill Roll Turning	① CDH or RCGX Double T-land (standard) insert
Hi-Ni Alloy INCONEL 718 WASPALLOY etc.	Rough	① Positive rake 0.05 T-land
	Finish	① Positive rake Heavy hone (special)
		② Positive rake 0.05 T-land

Damage and Solution

Normal Wear (Flank wear [VB])



Solution

Reduce the cutting speed.
Increase the feed rate.
Increase nose-R size.
Change the tool grade with better wear resistance.

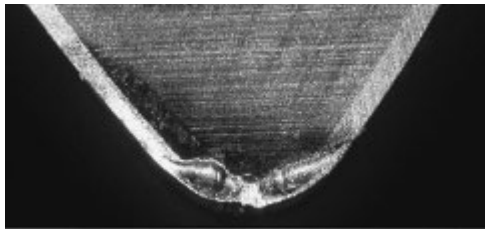
Notch wear [VC]



Solution

Change the tool grade with better wear resistance.
Decrease the approach angle or change insert shape.
Increase the feed rate.

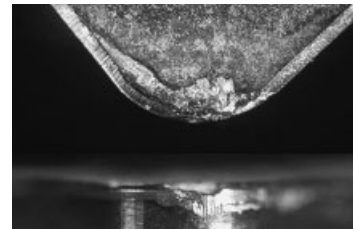
Crater wear [KT]



Solution

Reduce the cutting speed.
Change dry cutting to wet cutting.
Change the tool grade with better wear resistance.

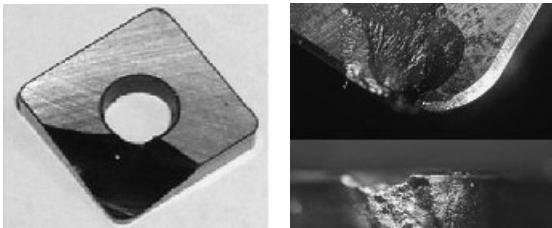
Chipping



Solution

Increase the amount of cutting-edge honing.
Reduce the rake angle.
Change the tool grade with better notch resistance.

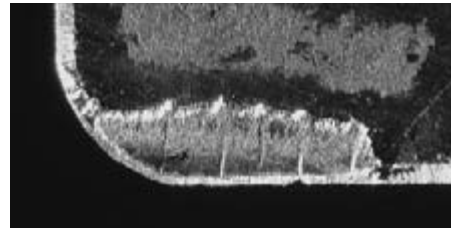
Fracture and breakage



Solution

Review the cutting conditions (reduce " $f \times d$ ").
Increase the amount of cutting-edge honing.
Change the tool grade with better notch resistance.

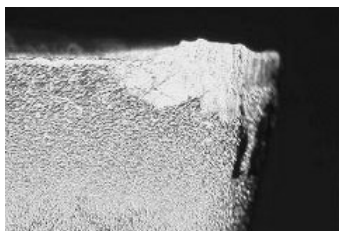
Thermal shock crack



Solution

Reduce the cutting speed and the feed rate.
Change wet cutting to dry cutting.
Change the tool grade with better thermal shock resistance.

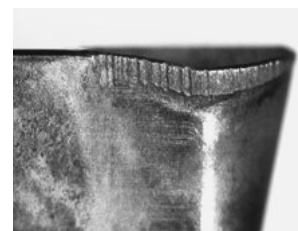
Built-up edge



Solution

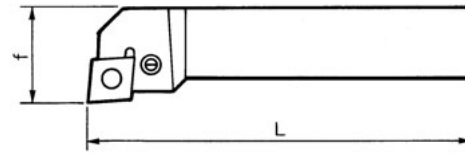
Increase the cutting speed and the feed rate.
Increase the rake angle.
Use oil coolant.

Plastic Deformation



Solution

Reduce the cutting speed and feed rate.
Reduce the cutting depth.
Change the tool grade with better heat resistance.



Edge code	Shape of the edge	Dimensions (mm)			Edge code	Shape of the edge	Dimensions (mm)		
		r ε	X	Y			r ε	X	Y
K	80-deg rhombic insert. 	0.4	0.007	0.028	Q	35-deg rhombic insert 	0.4	0.537	0.537
		0.8	0.015	0.055			0.8	1.073	1.073
		1.2	0.022	0.083			1.2	1.61	1.610
		1.6	0.029	0.110			1.6	2.146	2.146
		2.4	0.044	0.165			2.4	3.218	3.218
L	80-deg rhombic insert Type 31) 	0.4	0.040	0.040	S	Square insert (Type 12). 	0.4	0.164	0.164
		0.8	0.079	0.079			0.8	0.329	0.329
		1.2	0.119	0.119			1.2	0.493	0.493
		1.6	0.159	0.159			1.6	0.658	0.658
		2.4	0.238	0.238			2.4	0.986	0.986
P	55-deg rhombic insert 	0.4	0.463	—	V	35-deg rhombic insert 	0.4	0.923	—
		0.8	0.925	—			0.8	1.846	—
		1.2	1.389	—			1.2	2.769	—
		1.6	1.851	—			1.6	3.692	—
		2.4	2.776	—			2.4	5.538	—
Q	55-deg rhombic insert 	0.4	0.211	0.211	Y	Square insert (Type 17) 	0.4	0.003	0.033
		0.8	0.422	0.422			0.8	0.006	0.066
		1.2	0.633	0.633			1.2	0.009	0.099
		1.6	0.844	0.844			1.6	0.012	0.132
		2.4	1.265	1.265			2.4	0.017	0.132

Note: The values of X and Y in this table are based on a rake angle of 0 degrees. Therefore, these values slightly differ from actual ones.

“(Type XX)” denotes the type number of a standard C-shaped holder.

● Determining the Position of the Insert Nose

Method of calculating the position of the nose(mm)

Values of “φd” and “γ ε” used to calculate “m” (mm)

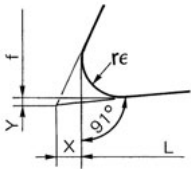
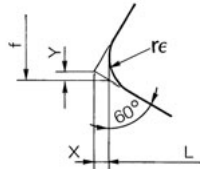
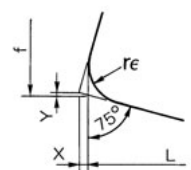
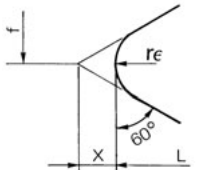
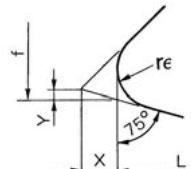
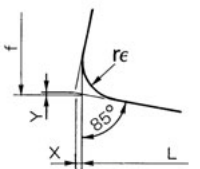
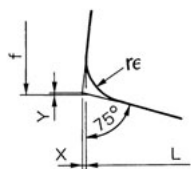
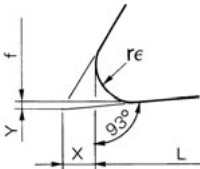
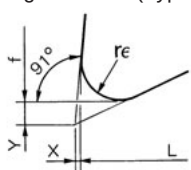
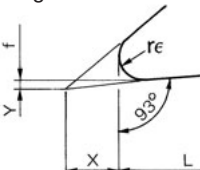
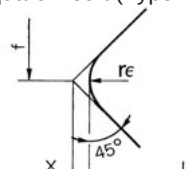
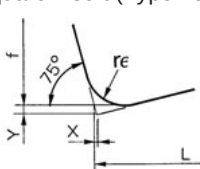
Shape	Calculation expression
Triangular 	$m = \frac{3}{2} d - \gamma \varepsilon$
Square 	$m = (\sqrt{2} - 1) \times \frac{d}{2} - \gamma \varepsilon$
Rhombic 	$m = \left(\frac{1}{\sin \frac{\theta}{2}} - 1 \right) \times \left(\frac{d}{2} - \gamma \varepsilon \right)$

Inscribed circle code	Calculation value(φ d)
—	5
—	6
—	7
2	8
—	0
3	—
4	—
5	—
6	—
8	—

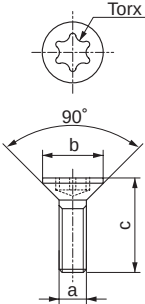
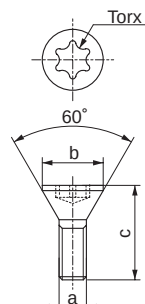
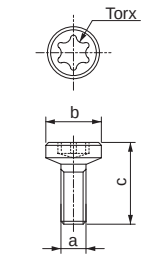
Nose code	Nominal value	Calculation value(γ ε)
Y	0.2	0.2032
1	0.4	0.3969
2	0.8	0.7938
3	1.2	1.1906
4	1.6	1.5875
6	2.4	2.3812

Cutting Edge Positional Dimension List for Each Nose R

• Nose-R and Cutting Edge Positional Dimensions

Edge code	Shape of the edge	Dimensions (mm)			Edge code	Shape of the edge	Dimensions (mm)		
		r_E	X	Y			r_E	X	Y
A (G)	Triangular insert (Type 21, 22) 	0.4	0.283	0.012	E (T)	Square insert (Type 13) 	0.4	0.145	0.043
		0.8	0.567	0.024			0.8	0.291	0.084
		1.2	0.850	0.036			1.2	0.436	0.168
		1.6	1.134	0.048			1.6	0.581	0.252
		2.4	1.701	0.072			2.4	0.872	0.503
B (R)	Square insert (Type 11, 16) 	0.4	0.089	0.024	H	Triangular insert (Type 24) 	0.4	0.397	—
		0.8	0.178	0.048			0.8	0.794	—
		1.2	0.268	0.072			1.2	1.191	—
		1.6	0.357	0.096			1.6	1.587	—
		2.4	0.535	0.143			2.4	2.281	—
	Triangular insert (Type 23) 	0.4	0.370	0.099	J	Square insert 	0.4	0.033	0.003
		0.8	0.740	0.198			0.8	0.066	0.006
		1.2	1.110	0.297			1.2	0.099	0.009
		1.6	1.480	0.397			1.6	0.132	0.012
		2.4	2.219	0.595			2.4	0.089	0.017
	80-deg rhombic insert (Type 21, 22) 	0.4	0.028	0.007		55-deg rhombic insert 	0.4	0.344	0.039
		0.8	0.055	0.015			0.8	0.687	0.079
		1.2	0.083	0.022			1.2	1.031	0.118
		1.6	0.110	0.029			1.6	1.375	0.157
		2.4	0.165	0.044			2.4	2.062	0.236
C (F)	Triangular insert (Type 25) 	0.4	0.012	0.283	K	35-deg rhombic insert 	0.4	0.839	0.065
		0.8	0.024	0.567			0.8	1.679	0.131
		1.2	0.036	0.850			1.2	2.518	0.196
		1.6	0.048	1.134			1.6	3.357	0.261
		2.4	0.072	1.701			2.4	5.036	0.392
D	Square insert (Type 14) 	0.4	0.164	—		Square insert (Type 15) 	0.4	0.024	0.089
		0.8	0.329	—			0.8	0.048	0.178
		1.2	0.493	—			1.2	0.072	0.268
		1.6	0.658	—			1.6	0.096	0.357
		2.4	0.986	—			2.4	0.143	0.535

Screw and Wrench List for Holders

Shape	Screw No.	Dimensions (mm)				Wrench Item-No.
		a	b	c	Torx	
	LR-S-2×3.7	M2×0.4	3.2	3.7	T6	RLR-13S
	LR-S-2×4.4	M2×0.4	3.2	4.4	T6	RLR-13S
	LR-S-2×5.5	M2×0.4	3.2	5.5	T6	RLR-13S
	LR-S-2.5×4.8	M2.5×0.45	3.6	4.8	T7	RLR-15S
	LR-S-2.5×6	M2.5×0.45	3.6	6.0	T7	RLR-15S
	LR-S-2.5×6.8	M2.5×0.45	3.6	6.8	T7	RLR-15S
	LR-S-3×6.2	M3×0.5	5.2	6.2	T10	RLR-20S
	LR-S-3×7.8	M3×0.5	4.2	7.8	T10	RLR-20S
	LR-S-4×5.8	M4×0.7	5.8	5.8	T10	RLR-20S
	LR-S-4×9	M4×0.7	5.8	9.0	T10	RLR-20S
	LRIS-2.2×6	M2.2×0.45	3.2	6.0	T6	RLR-13S
	LRIS-2.5×7	M2.5×0.45	3.6	7.0	T7	RLR-15S
	LRIS-3×6	M3×0.5	4.0	6.0	T10	RLR-20S
	1230 - C	M3×0.5	4.4	9.0	T8	
	LRIS-4×6	M4×0.7	5.8	6.0	T15	LLR-25S
	LRIS-4×8	M4×0.7	5.8	8.0	T15	LLR-25S
	LRIS-4×10	M4×0.7	5.8	10.0	T15	LLR-25S
	LRIS-5×10	M5×0.8	7.0	10.0	T20	LLR-28S
	1150 - C	M5×0.8	6.4	13.5	T10	RLR-20S
	1160 - C	M6×1	8.0	13.5	T20	LLR-28S
	1161 - C	M6×1	8.0	10.5	T20	LLR-28S
	1180 - C	M8×1	11.0	13.5	T20	LLR-28S

ISO standard

Competitors' Grade Comparison Tables

● Ceramic

	NTK	CeramTec	Kennametal	Sandvik	Greenleaf	Toshiba	Ssang Yong
Al ₂ O ₃ -based (White ceramics)	HC1 HW2	SN60 SN80	K060 KW80 K090	CC620	GEM9/GEM19	LXA AZ5000	SZ200
Al ₂ O ₃ -TiC-based (Black ceramics)	HC2 HC4(ZC4) HC7(ZC7)	SH1/SH2 SH20F	KY1615 HT46D	CC650	GEM7 GEM2	LX11 LX21	ST100 ST300
Si ₃ N ₄ -based (Silicon-nitride)	SX1 SX2(SP2) SX9	SL500 SL100/SL250C SL800	KY3500 KY3400 KY1540	CC690 (GC1690)		FX105 FX90 CX710	SN500 SN300 SN700
Al ₂ O ₃ -SiCw-based (Whisker)	WA1		KY4300	CC670	WG300		
TiC-based	HC6						SD200

() : Coating

● CBN

NTK	CBN content (%)	Sumitomo	Mitsubishi	Toshiba
B16	82		BN500	BX930
B20	60	BN250	MB730	BX350
B22	80	BN100	MB710	BX360
B24, B26	60	BNX20	MB820 MB825	BX850
B36	65	BN300	MB835	BX380

● Cermet

	NTK	Sumitomo	Toshiba	Mitsubishi	Kyocera	Iscar
P01	T3N	T05A	N302 X407 X407	NX22 NX33	TN30 (PV30) (PV30)	IC20N
P10	T15 (Z15)(Q15) N20	T12A (T12Z) T1200A	NS520 (GT530) N308	NX1010 (GP20N) NX55	TN60	IC520N
P15	C7X(C7Z)			(UP35N) NX335 NX99 NX530 NX2525	TC40N TN60	IC530N
P20	C7X (C7Z) N40	T250A T130A (T130Z)	N350 NS530			IC75T IC30N
P25		CS8000	NS540		TN90 (PV90) TC60M	

() : Coating

● Coated Carbide

	NTK	Sumitomo	Toshiba	Mitsubishi	Sandvik	Iscar
P01		AC1000	T7005.T715X	UE6005	GC4015	TX100
P10		AC1000 AC2000	T715X	UE6005 UE6010	GC4015	TP100 TP1000/CP200
P20	QM1, VM1, TA1	AC2000 AC3000	T7020	UC6010.UC6025 F620.UP20M	GC4025.GC4030 GC1120.GC1020	TP200/TX150 CP250/CP300
P30	ZM3 QM3, TA3	AC3000.AC304 AC230.AC325	T725.T325 GH330.AH330	UC6025.UE6035 AP15TF	GC4035.GC235 GC1025.GC4030	TP400 CP500
P40	TA3, ZM3 QM3	AC3000 AC304		UE6035		TP400 P500
M10	CP8	AC1000 AC2000	T715X	UC7020	GC215 GC2015	TP100 CP200
M20	CP8	AC2000.AC3000 AC325.AC304	T715X GH330.AH330	UC7020.F620 UP20M	GC1025.GC2025 GC4035.GC1120	TP200/TP300 CP300/CP500
M30		AC3000 AC325	T335S T325.AH740	US735.F620 AP15TF	GC2035 GC235	TP300/TP400 TP40/CP500
M40			GH340		GC235	TP400
K01		AC105G	T5010.AH110	UC5005.UE6005	GC4015	TX100
K10	CP8	AC500G.AC211 EH10Z	T5020.AH1020 GH110	UC6010 F5010	GC3015 GC4015	TP100 TX100/TX150
K20	TA1, QM1	AC500G EH20Z	T5020.AH120 J740.AH750	UC6010 AP15TF	GC4025 GC1120.GC1020	TX150 CP200/CP250
K30	QM1, TA3	ACZ310		AP15TF	GC4035	CP500

The above data is based on estimations from the respective competitors' catalogs and other documents. Therefore, the listed data is not always the latest data or was approved by those competitors.

Material Cross Reference List

• Carbon Steel

DIN	ISO	JIS
C10E / C10R	C10	S10C
C15E / C15R	C15E4 / C15M2	S15C
C22 / C22E / C22R	-	S20C
C25 / C25E / C25R	C25 / C25E4 / C25M2	S25C
C30 / C30E / C30R	C30 / C30E4 / C30M2	S30C
C35 / C35E / C35R	C35 / C35E4 / C35M2	S35C
C40 / C40E / C40R	C40 / C40E4 / C40M2	S40C
C45 / C45E / C45R	C45 / C45E4 / C45M2	S45C
C50 / C50E / C50R	C50 / C50E4 / C50M2	S50C
C55 / C55E / C55R	C55 / C55E4 / C55M2	S55C
C60 / C60E / C60R	C60 / C60E4 / C60M2	S58C

• Cast Iron

EN-GJL-100	100	FC100
EN-GJL-150	150	FC150
EN-GJL-200	200	FC200
EN-GJL-250	250	FC250
EN-GJL-300	300	FC300
EN-GJL-350	350	FC350
EN-GJL-400	400	FC400

• Ductile Cast Iron

EN-GJS-350	350-22	FCD350
EN-GJS-400	400-15	FCD400
EN-GJS-450	450-10	FCD450
EN-GJS-500	500-7	FCD500
EN-GJS-600	600-3	FCD600
EN-GJS-700	700-2	FCD700

• Heat Resistant Alloy

X53CrMnNi21-9		SUH36
CrNi2520		SUH310
CrAl1205		SUH21
X6CrTi12	X6CrTi12	SUH409
	X2CrTi12	SUH409L
X45CrSi9-3		SUH1

• High Alloy Steel

DIN	ISO	JIS
	C70U	SK70
	HS18-0-1	SKH2
	HS6-5-3-8	SKH40
	HS1-8-1	SKH50
S6-5-2	HS6-5-2	SKH51
-	HS6-6-2	SKH52
S6-5-3	HS6-5-3	SKH53
-	HS6-5-4	SKH54
S5-5-2-5	HS6-5-2-5	SKH55
S10-4-3-10	HS10-4-3-10	SKH57
	HS2-9-2	SKH58
	HS2-9-1-8	SKH59
	105V	SKS3
105WCr6	105WCr1	SKS31
X210Cr12	210Cr12	SKD1
	100CrMoV5	SKD12
X30WCrV9	X30WCrV9-3	SKD5
	X37CrMoV5-1	SKD6
X40CrMoV5	X40CrMoV5-1	SKD61
	X35CrWMoV5	SKD62
	32CrMoV12-28	SKD7
	55NiCrMOV7	SKT4

• Low Alloy Steel

DIN	ISO	JIS
17Cr3	-	SCr415
17CrS3	-	SCr415
-	20Cr4(H)	SCr420(H)
-	20CrS4	SCr420
34Cr4	34Cr4	SCr430
34CrS4	34CrS4	SCr430
37Cr4	37Cr4	SCr435
37CrS4	37CrS4	SCr435
41Cr4	41Cr4	SCr440
41CrS4	41CrS4	SCr440
18CrMo4	18CrMo4	SCM418
18CrMoS4	18CrMoS4	SCM418
34CrMo4	34CrMo4	SCM435
34CrMoS4	34CrMoS4	SCM435
42CrMo4	42CrMo4	SCM440
42CrMoS4	42CrMoS4	SCM440
-	22Mn6	SMn420
-	36Mn6	SMn438
-	42Mn6	SMn443
	41CrAlMo74	SACM645

• Stainless Steels (Austenitic)

X12CrNi17-7	X10CrNi18-8	SUS301
X2CrNi18-7	X2CrNi18-7	SUS301L
X10CrNiS18-9	X10CrNiS18-9	SUS303
X5CrNi18-10	X5CrNi18-9	SUS304
X2CrNi19-11	X2CrNi19-11	SUS304L
X2CrNi18-10	X2CrNi18-9	SUS304LN
X5CrNi18-12	X6CrNi18-12	SUS305
	x6CrNi25-20	SUS310S
X5CrNiMo17-12-2	X5CrNiMo17-12-2	SUS316
X2CrNiMo17-13-2	X2CrNiMo17-12-2	SUS316L
X2CrNiMoN17-12-2	X2CrNiMoN17-11-2	SUS316LN
X6CrNiMoTi17-12-2	X6CrNiMoTi17-12-2	SUS316Ti
X2CrNiMo18-16-4	X2CrNiMo19-14-4	SUS317L
	X2CrNiMoN18-12-4	SUS317LN
	X1CrNiMoCu25-20-5	SUS890L
X6CrNiTi18-10	X6CrNiTi18-10	SUS321
X6CrNiNb18-10	X6CrNiNb18-10	SUS347
	X3NiCr18-16	SUS384
	X3CrNiCu18-9-4	SUSXM7

• Stainless Steels (ferritic / tensitic)

X6CrAl113	X6CrAl113	SUS405
X6Cr17	X6Cr17	SUS430
X7CrS18	X7CrS17	SUS430F
X6CrTi17	X3CrTi17	SUS430LX
X6CrNb17	X2CrTi17	SUS430J1L
X6CrMo17-1	X6CrMo17-1	SUS434
	X1CrMoTi16-1	SUS436L
	X2CrMoTi18-2	SUS444
X10Cr13	X12Cr13	SUS410
X6Cr13	X6Cr13	SUS410S
	X12CrS13	SUS416
X20Cr13	X20Cr13	SUS420J1
X30Cr13	X30Cr13	SUS420J2
	X29CrS13	SUS420F
X20CrNi17-2	X19CrNi16-2	SUS431
	X70CrMo15	SUS440A
	X105CrMo17	SUS440C

• Titanium Alloys

TiAl5Sn2.5		
TiAl6V4		
TiAl6V4ELI		
TiAl4Mo4Sn4Si0.5		

Conversions on Brinell Hardness of Steel

Brinell recess diameter mm	Brinell hardness 10mm balls, 3000kgf load			Vickers hardness	Rockwell hardness				Special Rockwell hardness Special brale indenter			Shore hardness	Tensile strength kgf/mm2 [N/mm2] Approximate value (1)
	Standard ball	Hultgren ball	Tungsten carbide ball		Scale A Load: 60 kgf brale indenter	Scale B Load: 100 kgf Diameter: 1/16" indenter	Scale C Load: 150 kgf brale indenter	Scale D Load: 100 kgf brale indenter	15-N scale Load: 15 kgf	30-N scale Load: 30 kgf	45-N scale Load: 45 kgf		
—	—	—	—	940	85.6	—	68.0	76.9	93.2	84.4	75.4	97	—
—	—	—	—	920	85.3	—	67.5	76.5	93.0	84.0	74.8	96	—
—	—	—	—	900	85.0	—	67.0	76.1	92.9	83.6	74.2	95	—
—	—	—	767	880	84.7	—	66.4	75.7	92.7	83.1	73.6	93	—
—	—	—	757	860	84.4	—	65.9	75.3	92.5	82.7	73.1	92	—
2.25	—	—	745	840	84.1	—	65.3	74.8	92.3	82.2	72.2	91	—
—	—	—	733	820	83.8	—	64.7	74.3	92.1	81.7	71.8	90	—
—	—	—	722	800	83.4	—	64.0	73.8	91.8	81.1	71.0	88	—
2.30	—	—	712	—	—	—	—	—	—	—	—	—	—
—	—	—	710	780	83.0	—	63.3	73.3	91.5	80.4	70.2	87	—
—	—	—	698	760	82.6	—	62.5	72.6	91.2	79.7	69.4	86	—
—	—	—	684	740	82.2	—	61.8	72.1	91.0	79.1	68.6	-	—
2.35	—	—	682	737	82.2	—	61.7	72.0	91.0	79.0	68.5	84	—
—	—	—	670	720	81.8	—	61.0	71.5	90.7	78.4	67.7	83	—
—	—	—	656	700	81.3	—	60.1	70.8	90.3	77.6	66.7	-	—
2.40	—	—	653	697	81.2	—	60.0	70.7	90.2	77.5	66.5	81	—
—	—	—	674	690	81.1	—	59.7	70.5	90.1	77.2	66.2	—	—
—	—	—	638	680	80.8	—	59.2	70.1	89.8	76.8	65.7	80	—
—	—	—	630	670	80.6	—	58.8	69.8	89.7	76.4	65.3	—	—
2.45	—	—	627	667	80.5	—	58.7	69.7	89.6	76.3	65.1	79	—
2.50	—	601	—	677	80.7	—	59.1	70.0	89.8	76.8	65.7	—	—
—	—	—	601	640	79.8	—	57.3	68.7	89.0	75.1	63.5	77	—
2.55	—	578	—	640	79.8	—	57.3	68.7	89.0	75.1	63.5	—	—
—	—	—	578	615	79.1	—	56.0	67.7	88.4	73.9	62.1	75	—
2.60	—	555	—	607	78.8	—	55.6	67.4	88.1	73.5	61.6	—	—
—	—	—	555	591	78.4	—	54.7	66.7	87.8	72.7	60.6	73	210 (2095)
2.65	—	534	—	579	78.0	—	54.0	66.1	87.5	72.0	59.8	—	205 (2010)
—	—	—	534	569	77.8	—	53.5	65.8	87.2	71.6	59.2	71	202 (1981)
2.70	—	514	—	553	77.1	—	52.5	65.0	86.7	70.7	58.0	—	195 (1912)
—	—	—	514	547	76.9	—	52.1	64.7	86.5	70.3	57.6	70	193 (1893)
2.75	495	—	—	539	76.7	—	51.6	64.3	86.3	69.9	56.9	—	189 (1854)
—	—	495	—	530	76.4	—	51.1	63.9	86.0	69.5	56.2	—	186 (1824)
—	—	—	495	528	76.3	—	51.0	63.8	85.9	69.4	56.1	68	186 (1824)
2.80	477	—	—	516	75.9	—	50.3	63.2	85.6	68.7	55.2	—	181 (1775)
—	—	477	—	508	75.6	—	49.6	62.7	85.3	68.2	54.5	—	177 (1736)
—	—	—	477	508	75.6	—	49.6	62.7	85.3	68.2	54.5	66	177 (1736)
2.85	461	—	—	495	75.1	—	48.8	61.9	84.9	67.4	53.5	—	172 (1687)
—	—	461	—	491	74.9	—	48.5	61.7	84.7	67.2	53.2	—	170 (1667)
—	—	—	461	491	74.9	—	48.5	61.7	84.7	67.2	53.2	65	170 (1667)
2.90	444	—	—	474	74.3	—	47.2	61.0	84.1	66.0	51.7	—	162 (1589)
—	—	444	—	472	74.2	—	47.1	60.8	84.0	65.8	51.5	—	162 (1589)
—	—	—	444	472	74.2	—	47.1	60.8	84.0	65.8	51.5	63	162 (1589)
2.95	429	429	429	455	73.4	—	45.7	59.7	83.4	64.6	49.9	61	154 (1510)
3.00	415	415	415	440	72.8	—	44.5	58.8	82.8	63.5	48.4	59	149 (1461)
3.05	401	401	401	425	72.0	—	43.1	57.8	82.0	62.3	46.9	58	142 (1392)
3.10	388	388	388	410	71.4	—	41.8	56.8	81.4	61.1	45.3	56	136 (1334)
3.15	375	375	375	396	70.6	—	40.4	55.7	80.6	59.9	43.6	54	129 (1265)
3.20	363	363	363	383	70.0	—	39.1	54.6	80.0	58.7	42.0	52	124 (1216)
3.25	352	352	352	372	69.3	(110.0)	37.9	53.8	79.3	57.6	40.5	51	120 (1177)
3.30	341	341	341	360	68.7	(109.0)	36.6	52.8	78.6	56.4	39.1	50	115 (1128)
3.35	331	331	331	350	68.1	(108.5)	35.5	51.9	78.0	55.4	37.8	48	112 (1098)
3.40	321	321	321	339	67.5	(108.0)	34.3	51.0	77.3	54.3	36.4	47	108 (1059)
3.45	311	311	311	328	66.9	(107.5)	33.1	50.0	76.7	53.3	34.4	46	105 (1030)
3.50	302	302	302	319	66.3	(107.0)	32.1	49.3	76.1	52.2	33.8	45	103 (1010)
3.55	293	293	293	309	65.7	(106.0)	30.9	48.3	75.5	51.2	32.4	43	99 (971)
3.60	285	285	285	301	65.3	(105.5)	29.9	47.6	75.0	50.3	31.2	42	97 (951)
3.65	277	277	277	292	64.6	(104.5)	28.8	46.7	74.4	49.3	29.9	41	94 (922)
3.70	269	269	269	284	64.1	(104.0)	27.6	45.9	73.7	48.3	28.5	40	91 (892)
3.75	262	262	262	276	63.6	(103.0)	26.6	45.0	73.1	47.3	27.3	39	89 (873)
3.80	255	255	255	269	63.0	(102.0)	25.4	44.2	72.5	46.2	26.0	38	86 (843)
3.85	248	248	248	261	62.5	(101.0)	24.2	43.2	71.7	45.1	24.5	37	84 (824)
3.90	241	241	241	253	61.8	100.0	22.8	42.0	70.9	43.9	22.8	36	82 (804)
3.95	235	235	235	247	61.4	99.0	21.7	41.4	70.3	42.9	21.5	35	80 (785)
4.00	229	229	229	241	60.8	98.2	20.5	40.5	69.7	41.9	20.1	34	78 (765)
4.05	223	223	223	234	—	97.3	(18.8)	—	—	—	—	-	—
4.10	217	217	217	228	—	96.4	(17.5)	—	—	—	—	33	74 (726)
4.15	212	212	212	222	—	95.5	(16.0)	—	—	—	—	-	72 (706)
4.20	207	207	207	218	—	94.6	(15.2)	—	—	—	—	32	70 (686)
4.25	201	201	201	212	—	93.8	(13.8)	—	—	—	—	31	69 (677)
4.30	197	197	197	207	—	92.8	(12.7)	—	—	—	—	30	67 (657)
4.35	192	192	192	202	—	91.9	(11.5)	—	—	—	—	29	65 (637)
4.40	187	187	187	196	—	90.7	(10.0)	—	—	—	—	—	63 (618)
4.45	183	183	183	192	—	90.0	(9.0)	—	—	—	—	28	63 (618)
4.50	179	179	179	188	—	89.0	(8.0)	—	—	—	—	27	61 (598)
4.55	174	174	174	182	—	87.8	(6.4)	—	—	—	—	-	60 (588)
4.60	170	170	170	178	—	86.8	(5.4)	—	—	—	—	26	58 (569)
4.65	167	167	167	175	—	86.0	(4.4)	—	—	—	—	—	57 (559)
4.70	163	163	163	171	—	85.0	(3.3)	—	—	—	—	25	56 (549)
4.80	156	156	156	163	—	82.9	(0.9)	—	—	—	—	-	53 (520)
4.90	149	149	149	156	—	80.8	—	—	—	—	—	23	51 (500)
5.00	143	143	143	150	—	78.7	—	—	—	—	—	22	50 (490)
5.10	137	137	137	143	—	76.4	—	—	—	—	—	21	47 (461)
5.20	131	131	131	137	—	74.0	—	—	—	—	—	—	46 (451)
5.30	126	126	126	132	—	72.0	—	—	—	—	—	20	44 (431)
5.40	121	121	121	127	—	69.8	—	—	—	—	—	19	42 (412)
5.50	116	116	116	122	—	67.6	—	—	—	—	—	18	41 (402)
5.60	111	111	111	117	—	65.7	—	—	—	—	—	15	39 (382)

Notes:

1. The numerals parenthesized in this table are usually not used.
2. The units and values enclosed in braces ({ }) in this table are based on SI units and are shown for reference only. (1 N/mm² = 1 MPa)
3. This table is an excerpt from the JIS Iron and Steel Handbook.

Information for wrench specifications

With a view aimed at improved machinability and environment - friendly parts , NTK has conducted partial reviews on the specifications of its conventional LLR-type wrenches.

Please understand that when current products run out of stock , new specifications will be incorporated into new wrenches.

◆The following L-Type wrenches are available only as optional items:

● Standard Parts

Number	Shape
RLR-13S Old wrench No. LLR-13S	
RLR-15S Old wrench No. LLR-15S	
RLR-20S Old wrench No. LLR-20S	
LLR-25S	
LLR-28S	

● Optional

〈LLR type〉

Number	Shape
LLR-13S	
LLR-15S	
LLR-20S	

● Tightening Precautions

- Before using a wrench , make sure that the front end of the wrench and the wrench hole section of the screw to be tightened are free from plastic deformation.
- As shown in the views below , apply the wrench vertically to the screw.



- Be extra careful not to tighten the screw at a torque exceeding its guaranteed value. Overtorquing could result in wrench breakage.

For safe use of the Extra Hard Tool Product safety.

1. To use extra hard tool product.

In accordance with the Product Liability Law (PL law) that has been in effect since July 1, 1995, we affix warning labels or caution labels to the packages of the products which are covered by the law. However, we don't affix specific caution labels onto the tool itself. Therefore, please read this leaflet before using extra hard tool products and extra hard tool materials. In addition, we would like to ask you to inform your operators of the content of this leaflet as part of your safety training.

2. Basic features of extra hard tool materials

2-1. Meaning and usage of terms in this leaflet

Extra hard tool material: Generic name for tool materials such as extra hard alloys, cermet, ceramic, CBN sintering material and diamond sintering material.

Extra hard alloy : Tool material which is mainly made of WC (Carbonized tungsten)

Extra hard : Abbreviation for extra hard tool materials, or the abbreviation for extra hard alloy in the narrow sense.

Extra hard tool : Generic name of tools which are made of extra hard tool material.

2-2. Physical characteristics

Appearance: Each material is different. Example: Gray, black, gold color, etc. Odor: None

Hardness : Extra hard cermet: HV500 to 3000kg/mm², Ceramic : HV1000 to 4000kg/mm²

Hardness : CBN sintering material : HV 2000 to 5000 kg/mm², Diamond sintering material: HV8000 to 12000kg/mm²

Gravity: Extra hard: 9 to 16, cermet: 5 to 9, cerami : 2 to 7, CBN and diamond sintering material 3 to 5

2-3. Component

Carbide, nitride, carbonitride, oxide such as W, Ti, Al, Si, Ta, B, and materials that contain Co, Ni, Cr, Mo, etc. in addition to those compounds.

3. Cautions for handling extra hard tool materials

- Extra hard materials can sometimes be quite fragile, although they are normally very hard. The materials may be damaged by sharp impact or excessive tightening.
- Since extra hard materials have high specific gravity, care should be taken when handling large products or large amounts of the products which are made of those materials.
- Extra hard materials have different thermal expansion ratios from other metallic materials. Therefore, cracks may occur in the product after shrinkage fit or cold shrinkage fit because the temperature for use is significantly higher or lower than the specification temperature.
- If the extra hard material has corrosion due to liquid for grinding, lubricant or water, etc., the strength of the material will be deteriorated significantly. Be sure to store the material where it will not come in contact with liquids or water.

4. Cautions for machining extra hard tools

- Extra hard tools may lose strength significantly depending on the surface condition. Be sure to use diamonds for grinding.
- Extra hard tools may generate dust during grinding. If you inhale a great deal of the dust, it may affect your health. Please make sure to have equipment for disposal and wear protective devices such as a mask, etc. If the dust comes in contact with your bare skin gets into your eyes, wash thoroughly with water.
- When grinding the extra hard material or soldered material, heavy metal component will be included in the waste fluid. So, make sure to dispose of the waste fluid properly.
- When regrounding extra hard tools, do a post check to be sure that no cracks have occurred.
- If you use a laser or electric pen, etc. to mark the extra hard material or products, it may cause cracks. Do not make markings at places where stress will be applied.
- If electric discharge machining is conducted on the extra hard material, remnant cracks may occur on the surface which cause the material to weaken. Be sure to remove any cracks by grinding, if necessary.
- When soldering the extra hard materials, if the material temperature is much lower or higher than the melting temperature of the soldering material, it may cause defluxion or breakage of the product. Be careful about the temperature.

Cautions for using cutting tools

Objective product	Danger	Countermeasure
Cutting tools in general	◎This type of tool has very sharp blade. If you touch it directly, you may get injured.	*Wear protective gear, such as protective gloves, etc., especially when taking out the product from the case or attaching the tool to a machine,
	◎If you use it improperly or if the conditions for use are inappropriate, it may cause breakage or shattering of the tool, which may result in injury.	*Wear protective gear such as safety covers or protective glasses. *I Use within the recommended purpose of usage. Refer to the operation manual, catalogue, etc.
	◎Sudden increase of cutting resistance due to a mixture of impact and burden or excessive abrasion may cause breakage or shattering of the tool, which may result in injury.	*Wear protective gear such as safety cover or protective glasses. *Stop the machine, wear the protective gloves and use tools such as nipper or clipper, etc. to remove cutting chips.
	◎Tools or workpieces will be very hot while cutting. Therefore, if you touch them immediately after the machining, you may get burn injury.	*Wear protective gear such as protective gloves.
	◎Sparks, heat generated due to breakage while cutting, cutting chips may also cause a fire.	*Do not use the tool where there is a possibility of fire or explosion. *If you use insoluble cutting lubricant, be sure to have antifire provisions.
	◎When using the tool at high speed rotation if the whole machine including the holder of the machine is not well balanced, the tool may get broken due to tremor or vibration, which may result in injury.	*Wear protective gear such as safety cover or protective glasses. *Make sure to have a trial operation in advance in order to confirm that there is no vibration or abnormal sound.
	◎Touching burrs on the machined product directly may result in injury.	*Do not touch with bare hands.
Throw-away type (blade change type) tools in general	◎If the chip or parts are not clamped securely, those may fall down or scatter while cutting, which may cause injury.	*Clean the surface for attachment of an insert or the part for fixture of the insert completely before attaching the insert. *Make sure that the insert or the part is clamped securely using a spanner provided with the product before attachment. Also, do not use any inserts or parts other than the ones provided with the products.
	◎If the tool is tightened too tightly using a tool such as pipe, etc., the chip or tool may fall down or shatter while cutting. This is dangerous.	*Do not use a tool such as a pipe. Use the spanner which is provided with the product.
	◎When using the tool at high speed rotation, a part or chip may be thrown out by centrifugal force, which is very dangerous. Be careful about handling the tool safely.	*Use the tools only for the recommended purposes. Refer to the operation manual, catalog, or other source of information.
Cutters and other tools that are rotated for use	◎The sharp cutter blades may cause injury if you touch them directly with your hands.	*Wear protective gear such as protective gloves, etc.
	◎The tool may be deflected due to eccentric rotation or bad balance that will cause vibration, breakage or scattering of the tool, which may result in injury.	*Use the tool within the recommended rotation speed. *Check and adjust the accuracy of rotating section or balance periodically so that eccentric rotation or deflection does not occur due to abrasion of the bearings, etc.
Soldering tool	◎You may get injured due to defluxion or breakage of the chips, etc.	*Confirm that the soldering is secure before use. *Do not use under conditions which may cause the tool to reach high temperatures.
Others	◎Repeating soldering many times may cause the chip to be broken easily. This is dangerous.	*Do not use the chip which has been soldered many times because the strength will be lower.
	◎Using the tool for other than its intended purposes may cause breakage of the machine or tool. This is very dangerous.	*Use the tools only as specified.

Product Index

● Insert

Material	Grade	Page
Carbide	KM1	112
	KM3	112
CBN	B16	40
	B20	36
	B22	36
	B24	36
	B26	36
	B36	34
Ceramics	HC1	20
	HC2	30
	HC4	30
	HC6	33
	HC7	26
	HW2	20
	SP2	14
	SX1	12
	SX8	16
	SX9	18
	WA1	22
	ZC4	30
	ZC7	26
Cermet	C7X	42, 96
	C7Z	42, 96
	N20	96
	N40	96
	Q15	96
	T15	96
	T3N	96
	Z15	96
Diamond coating	UC1	43
	UC2	43
PVD coated carbide	QM1	112
	QM3	112
	TA1	112
	TA3	112
	TAS	112
	VM1	112
	ZM3	112

● Holder

Application	Page
Bearing	
● Internal Machining	186
● Outside Machining	182
● R-Chamfering	176
Boring Bar	150
End Milling	
● Gear Tooth Chamfering Tools	206
● Indexble Milling Tools	200
Grooving	
● Internal Grooving	135
● Outside Grooving	121
Milling Cutter	48
Outside Machining Holder	82
Poly-V	190
Roll Tools	168
Threading	
● Internal Threading	147
● Outside Threading	145
Tool Holders For Ceramic	
● Boring Bar	73
● External Holder	54
Tube Scarfing	196

● PARTS

Screw	226
-------	-----

● Technical Information 212



2007
2008



NTK
CUTTING TOOLS



NGK SPARK PLUGS (U.S.A), INC.
Cutting Tool Sales Office
46929 Magellan Dr., Wixom, MI 48393 U.S.A.
Tel. : +1-248-668-0100
Fax : +1-248-668-0200



NGK SPARK PLUGS (U.K.), LTD
Maylands Avenue, Hemel
Hempstead, Herts, HP24SD, U.K.
Tel. : +44 1442-281-000
Fax : +44 1442-281-080



NTK Technical Ceramics Polska Sp.z o.o.
Leg. Ul. Europejska 8
55-220 Jelcz-Laskowice
Tel. : +48 71-38 112 81
Fax : +48 71-31 823 33



**NTK CUTTING TOOLS
KOREA CO.,LTD.**
680-14 Kojan-Dong, Namdong-ku
Incheon, Korea
Tel. : +82-32-815-6763
Fax : +82-32-815-6762



NGK SPARK PLUG CO.,LTD.
**Technical Ceramics Group Cutting Tool
Overseas Sales & Marketing**
2808, Iwasaki, Komaki, Aichi
485-8510, Japan
Tel. : +81-568-76-1538
Fax : +81-568-76-1288



NGK SPARK PLUG EUROPE GmbH
Harkortstr.41
40880 Ratingen, Germany
Tel. : +49 2102 974-350
Fax : +49 2102 974-399



**NTK Cutting Tools
Italy Liaison Office**
Via delle Azalee, 15
20090 Buccinasco (MI), Italy
Tel. : +39.02.488.86.91
Fax : +39.02.488.42.717



NGK SPARK PLUGS (THAILAND) CO.,LTD.
Unit 1504 15th Floor, chartered Square Bldg,
152 North Sathorn Rd Bangrak, Bangkok
10500, Thailand
Tel. : +66-2634-5211
Fax : +66-2634-5214



NGK SPARK PLUG CO.,LTD.
Shanghai Liaison Office
Flat D, 7/F, Century Ba-shi Building, No. 398
Huai Hai Rd(M), Shanghai 200020,
THE PEOPLE'S REPUBLIC OF CHINA
Tel. : +86-21-6385-7652
Fax : +86-21-6385-3690



NGK SPARK PLUG EUROPE GMBH
NGK SPARK PLUGS(U.K.), LTD