INDEXABLE CARBIDE
TURNING AND MILLING

tmx.
tooling technologies

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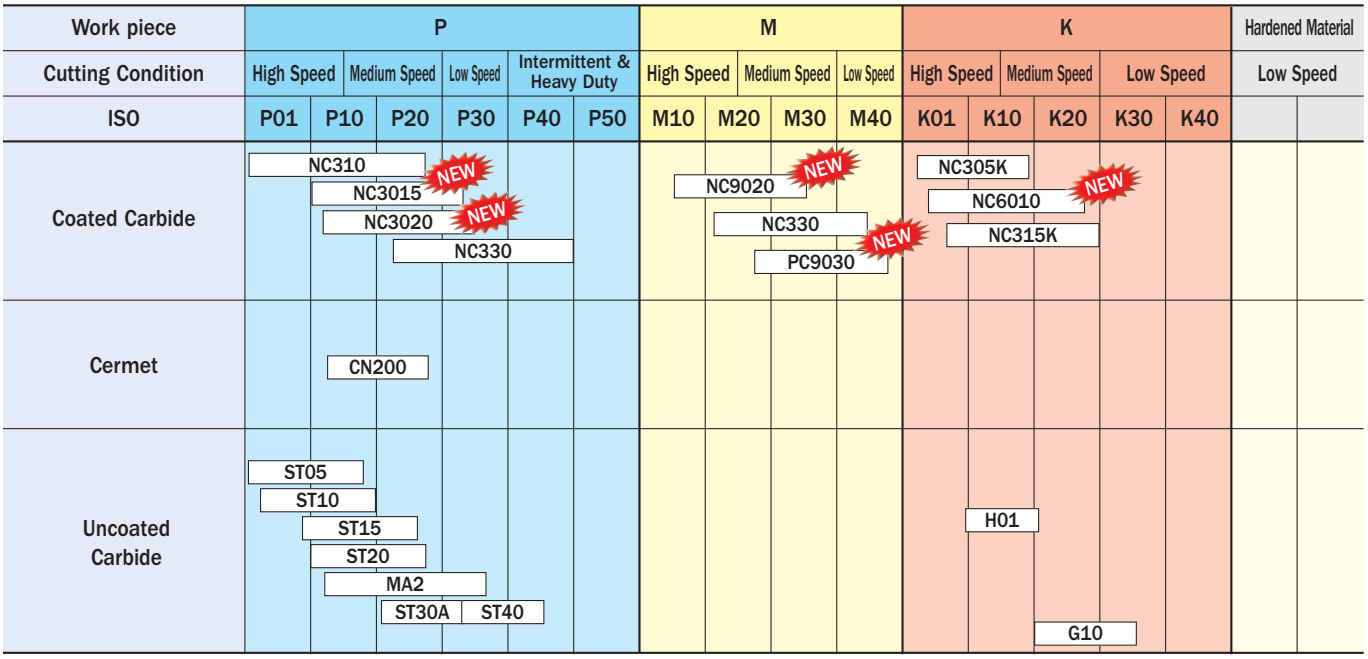
TURNING TOOLHOLDER CODE SYSTEM

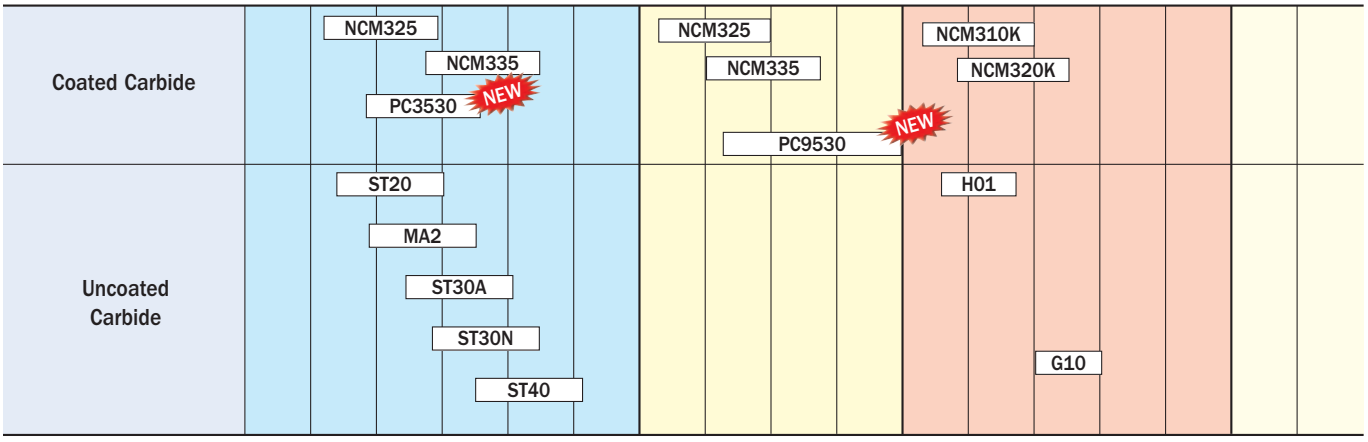
INDEXABLE TOOLS FOR TURNING

Selection of TMX Grades

Turning



Milling



Special Features of TMX Coated Carbides

TMX welcomes you to a new era in coated carbide inserts.

PVD Coated PC8000 Series has the following features:
1) Applications in Ni and Co heat-resistant alloys
2) Resists wear, notching, and built-up edge
3) Excellent chemical stability

PVD Coated PC3000 and PC9000 Series have the following features:
1) Excellent thermal stability
2) Tough and wear resistant in a broad range of speeds
3) Wide range of applications such as finishing, semi-roughing, roughing, and interrupted cutting of carbon, alloy, and stainless steels

CVD Coated NC3000 and NC300 Series have:
1) High performance cutting efficiency
2) 2 to 3 times the wear resistance of C7 carbide with the toughness of C6 carbide
3) Excellent performance in wet cutting conditions due to high resistance to thermal cracking
4) Superior resistance for plastic deformation and built-up-edge

CVD Coated NC6000 Series has the following features:
1) Grade incorporates a wear resistant film and tough carbide
2) A layered coating that facilitates lubricity and the monitoring of wear
3) Applications in cast iron

Features of TMX Coated Carbides

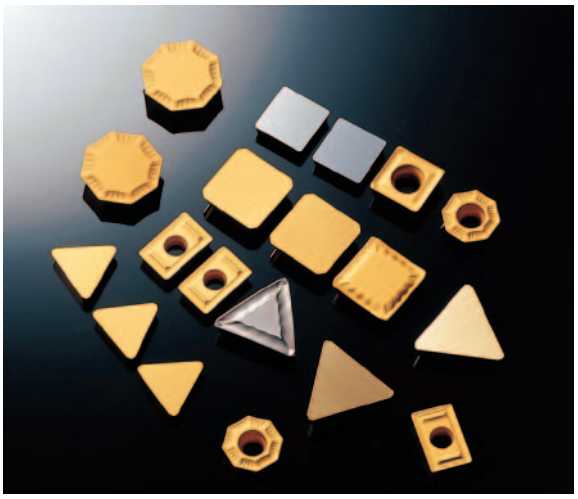
Alumina layer ($A\ell_2O_3$)
1) Excellent wear resistance at high cutting speeds.
2) Thermal stability and oxidation resistant properties deliver consistant hardness at extreme temperatures.

Titanium Carbon layer (TiC)
1) Excellent wear resistance at medium to low cutting speeds.
2) Excellent adhesion with carbide substrate.

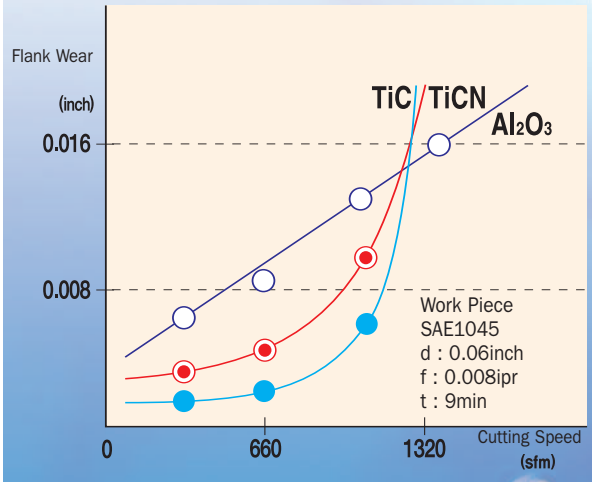
Titanium Carbonitride layer (TiCN)
1) Enhances wear resistance and toughness.

Titanium Aluminum Nitride layer (TiAlN)
1) Excellent heat and wear resistance for cutting at high speeds.
2) Exceptional performance for rough and interrupted cutting applications for carbon, alloy, and stainless steels.

Titanium-Nitride layer (TiN)
1) Excellent oxidation resistance at high temperatures.
2) Thermal shock resistant property ensures consistant performance in milling applications.



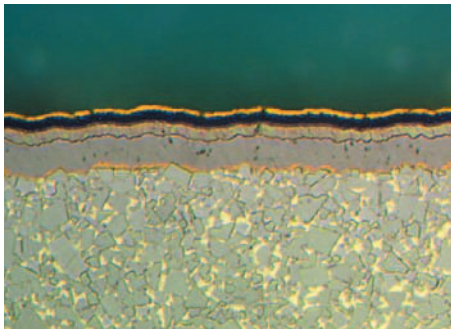
Wear Resistance



*AISI : American Iron and Steel Institute

TMX Coated Grades

1) The film's crystalline structure provides excellent wear and impact resistance.
2) High bonding strength between film and substrate from utilization of new coating technologies.



Cross-section of CVD coating

TiN	Reduces Friction
$A\ell_2O_3$	Wear Resistant, Prevents Built-up-edge
TiC	Wear Resistant
TiCN	Enhances Wear Resistance and Toughness by adopting new coating technologies.

Grade Selection

Turning

Material	Cutting conditions	Grade	cutting speed (sfm)	ISO	Application Range
Steel	Continuous	NC310	925(725 ~ 1150)	P01	NC310, NC3015 (NEW), NC3020 (NEW), NC330
		NC3015	825(650 ~ 1050)	P10	
		NC3020	725(600 ~ 975)	P20	
	Interrupted	NC3020	600(500 ~ 650)	P30	
		NC330	500(400 ~ 650	P40	
Cast Iron	Continuous	NC305K	825(500 ~ 975)	K01	NC305K, NC315K
		NC315K	725(500 ~ 875)	K10	
	Interrupted	NC315K	600(500 ~ 825)	K20	
				K30	
Stainless Steel	Continuous	NC9020	550(400 ~ 725)	M01	NC9020 (NEW), NC330
				M10	
	Interrupted	NC330	325(250 ~ 400)	M20	
				M30	

Milling

Material	Grade	cutting speed (sfm)	ISO	Application Range
Steel	NCM325	825(500 ~ 975)	P20 M20	NC325, NCM335
	NCM335	650(500 ~ 825)	P30 M30	
			P40 M40	
Cast Iron	NCM310K	825(650 ~ 975)	K10	NC310K, NCM320K
	NCM320K	650(500 ~ 825)	K20	
			K30	

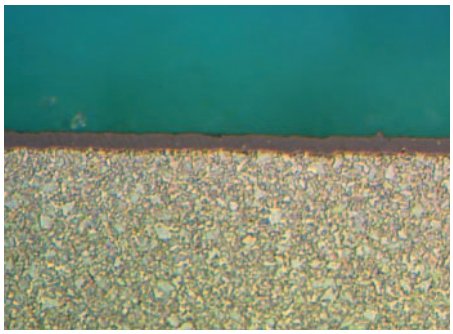
TMX CVD Coated Grades

TMX Grade	ISO	Special Features	Use
NC310	**P05 - P15**	·For turning of steel at high cutting speeds ·Optimal for high speed machining of steel due to the combination of hard substrate and CVD $A\ell_2O_3$ film ·MT-TiCN + $A\ell_2O_3$ + TiN	Turning
NEW **NC3015**	**P10 - P20**	·For turning of steel and cast iron at medium cutting speeds. ·Consistent tool life due to the combination of tough substrate and CVD film ·New MT-TiCN + $A\ell_2O_3$ + TiN	Turning
NEW **NC3020**	**P15 - P30**	·For turning of steel at medium cutting speeds ·Excellent combination of tough substrate and coating with superior chipping resistance provides stable and consistent cutting performance. ·MT-TiCN + $A\ell_2O_3$ + TiN	Turning
NC330	**P25 - P35** **M15 - M25**	·For roughing and interrupted cutting of carbon, alloy, and stainless steels at medium cutting speeds. ·Tough substrate provides wide range of applications. ·MT-TiCN + $A\ell_2O_3$ + TiN	Turning
NC305K	**K05 - K15**	·For cast iron turning at high cutting speeds. ·Hard substrate and thick CVD $A\ell_2O_3$ coating provides excellent wear resistance. ·MT-TiCN + $A\ell_2O_3$ + TiN	Turning
NC315K	K10 - K25	·For general turning of cast iron. ·Special substrate suitable for fast feed and large depths of cut. ·Thick CVD $A\ell_2O_3$ coating provides stable and consistent cutting performance. ·MT-TiCN + $A\ell_2O_3$ + TiN	Turning
NEW **NC9020**	M10 - M20	·For stainless steel turning at high cutting speeds. ·Substrate has excellent thermal properties and CVD coating with excellent chipping resistance provides longer tool life. ·MT-TiCN + $A\ell_2O_3$ + TiN	Turning
NCM325	**P20 - P30** **M20 - M30**	·For carbon, alloy, and stainless steel milling applications at high cutting speeds ·Substrate and coating combination delivers wear resistance and toughness to provide consistent tool life. ·MT-TiCN + $A\ell_2O_3$ + TiN	Milling
NCM335	**P30 - P40** **M30 - M40**	·For interrupted and rough milling of carbon, alloy, and stainless steels. ·Tough substrate provides stable tool life in severe interrupted cutting conditions. ·MT-TiCN + $A\ell_2O_3$ + TiN	Milling
NCM310K	**K05 - K15**	·For cast iron milling at high cutting speeds. ·Hard substrate and fine grain size. ·$A\ell_2O_3$ coating provides excellent wear resistance at high cutting speeds. ·MT-TiCN + $A\ell_2O_3$	Milling
NCM320K	**K15 - K25**	·For general milling of cast iron ·Tough substrate and fine grain size Al_2O_3 coating provide wide available cutting range for both dry and wet cutting. ·MT-TiCN + $A\ell_2O_3$	Milling

TMX PVD Coated Grades

Special Features

1) PVD is a thin coating applied at a low temperature. The lower application temperatures make for greater edge strength when compared to other processes. The thin coating also helps maintain cutting edge sharpness.
2) PVD coated carbide typically last 2~4 times longer than uncoated carbide cutting tools.
3) The titanium base can machine excellent surface finishes and hold close tolerances due to the low affinity to the work piece materials.



Cross-section view of PVD coating

The TMX PVD Trio

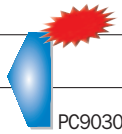
PC3530 : Steel milling grade consisting of a tough carbide based substrate and a nanotechnology TiAlN coating. PC3530 also works very well in most stainless steels.
PC9030 : Exclusively for turning stainless steels. Comprised of a tough substrate and TiAlN coating.
PC9530 : Grade for milling stainless steels. Consisting of an ultra fine grain substrate and TiAlN coating.

Grade Selection

Turning

Material	Coating	Grade	cutting speed (sfm)	ISO	Application Range
Stainless steel	TiAlN	PC9030	420(160 ~ 260)	M20	
				M30	
				M40	

Milling

Material	Coating	Grade	cutting speed (sfm)	ISO	Application Range
Steel	TiAlN	PC3530	650(500 ~ 825)	P10	
				P20	
Stainless steel	TiAlN	PC9530	420(160 ~ 260)	M20	
				M30	
				M40	

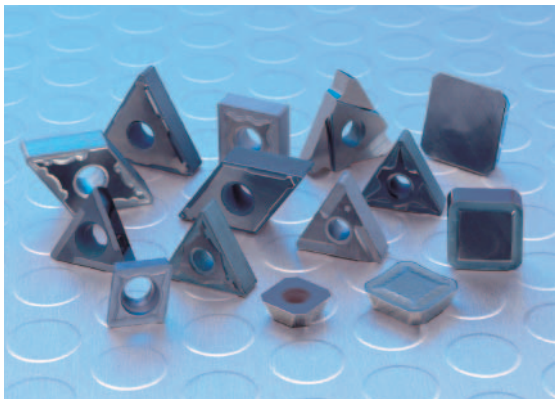
TMX PVD Coated Grades

TMX Grade	ISO	Features	Use
NEW PC3530	P10 - P25	· For milling of steel · Tough substrate with Nano-TiAlN coating provides excellent wear resistance and toughness. · Nano-TiAlN coating	Milling
NEW PC9030	M20 - M35	· For medium, rough and interrupted turning of stainless steel. · Tough sub-micron substrate with PVD TiAlN coating. Has a low coefficient of friction to prevent built-up-edge resulting in extended and consistent tool life. · TiAlN coating	Turning Threading
NEW PC9530	M35 - M45	· For medium to rough stainless steel milling · Tough sub-micron substrate provides excellent high speed cutting performance. · TiAlN coating	Milling

TMX Cermet Grades

Special Features

TMX cermet is a type of carbonitride material. Our cermet has an ultra fine micro structure containing TiN and TiCN powder as additives. It has excellent thermal stability, wear resistance and toughness.

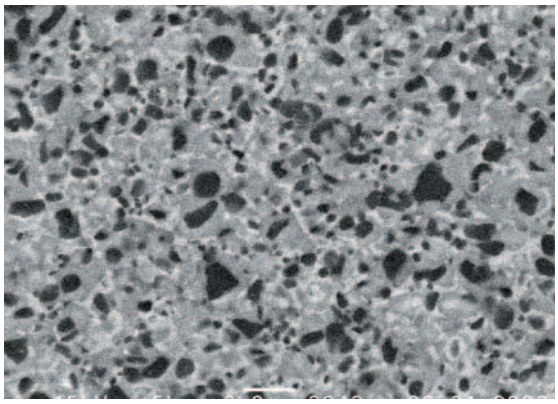


Special Advantages

Cermet, using TiCN as the main component, is harder than cemented carbide. It has a low affinity to ferrous materials at high temperatures. As a result, cermet has the following advantages:

Compared to Uncoated Carbide
1. Cermet has greater wear and crater resistance; so higher cutting speeds are possible.
2. Cermet has a low affinity to ferrous materials. This property allows for flexible cutting speeds.
3. Low affinity to other materials provides excellent surface finishes.
4. Exceptional tool life and cutter performance can be achieved at high speeds for finishing.

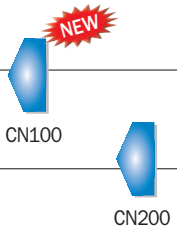
Compaired to Coated Carbide
1. Suitable for finishing.
2. Fine surface finishes can be produced.



Microstructure of Cermet

Grade Selection

Turning

Material	Cutting condition	1st choice	cutting speed (sfm)	ISO	Application Range
Steel	Finishing	CN100	750(500 - 975)	P01	
	Light to medium cutting	CN100	750(490 - 820) 650(500 - 825)	P10	
		CN200	650(425 - 825)	P20	

* CC105, CC115 IS Coated Cermet Grades.

TMX Cermet Grades

TMX Grade	ISO	Special Features	Use
NEW CN100	P05 - P15 K05 - K15	High speed medium cutting and finishing of steel and cast iron ・High efficient cermet equipped with thermal shock resistance and wear resistance.	Milling Turning
CN200	P05 - P15	Comprehensive grade can cover from roughing to finishing of steel. ・Special cermet developed with Functionally-Gradiented-Material technology.	Turning

TMX Guide for Turning Stainless Steel

· Stainless steel is known for its excellent anti-corrosive properties.
· Anti-corrosive properties are due to the chrome content.
· Most stainless steels contain 4%~10% chrome.

1 Classification & Features of Stainless Steels

1) Austenitic : The most popular stainless steel. It has the best corrosion resistance because of high Chromium and Nickel content. High Nickel content makes it more difficult to machine. The most common application of austenitic stainless steels are for food processing, food storage, chemical products, medical devices, and construction purposes. AISI 303,304 and 316 are popular examples.
2) Ferritic : It has similar Chromium content to Austenitic, but does not contain Nickel. The result is a free machining stainless steel. AISI 410, 430 and 434 are examples.
3) Martensitic : The only stainless steels capable of being heat treated. It has high carbon content. The high carbon content reduces its corrosion resistance. It is used for hardened applications. AISI 410, 420 and 432 are examples.
4) Precipitation Hardening : Chromium-Nickel alloy has improved hardness through low temperature heat treat. Excellent corrosion resistance and toughness makes it popular for aerospace applications. 17-4PH and 15-5PH are examples.

2 Stainless Steel Machining Properties

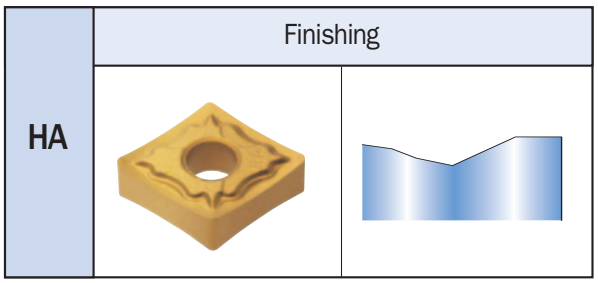
1) Work hardening causes premature tool wear and hampers chip control.
2) Low thermal conductivity causes plastic deformation of cutting edge and accelerates tool wear.
3) Built-up-edge increases micro chipping on the cutter's edge and produces poor surface finishes.
4) Chemical affinity caused by work hardening and low thermal conductivity of work piece. Accelerates wear, chipping and abnormal fractures in carbide.

3 Tips for machining Stainless Steels

1) Use a tool with higher thermal conductivity - Low thermal-conductivity of stainless steels generates a tremendous amount of heat, during the machining process, at the cutter's edge.
2) Sharp cutting edge - To control chips, it is necessary to increase rake angle and chip breaker land to reduce cutting force and prevent built up edge.
3) Optimal cutting conditions - It is important to stay close to application recommendations. Too slow or fast cutting speeds will prematurely wear the tool. Conservative feed rates will cause work hardening and decrease tool life.
4) Choose an appropriate tool - Tools for stainless steels should be tough, have excellent edge strength and high coating adhesion.

TMX Chipbreakers for Stainless Steel

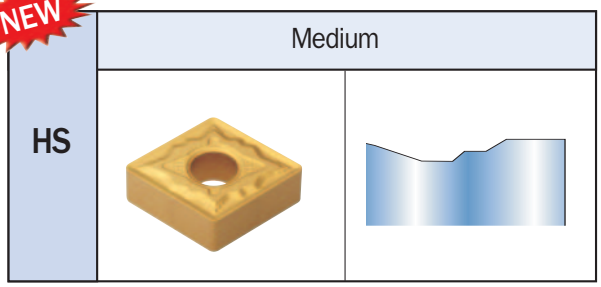
HA — Finishing



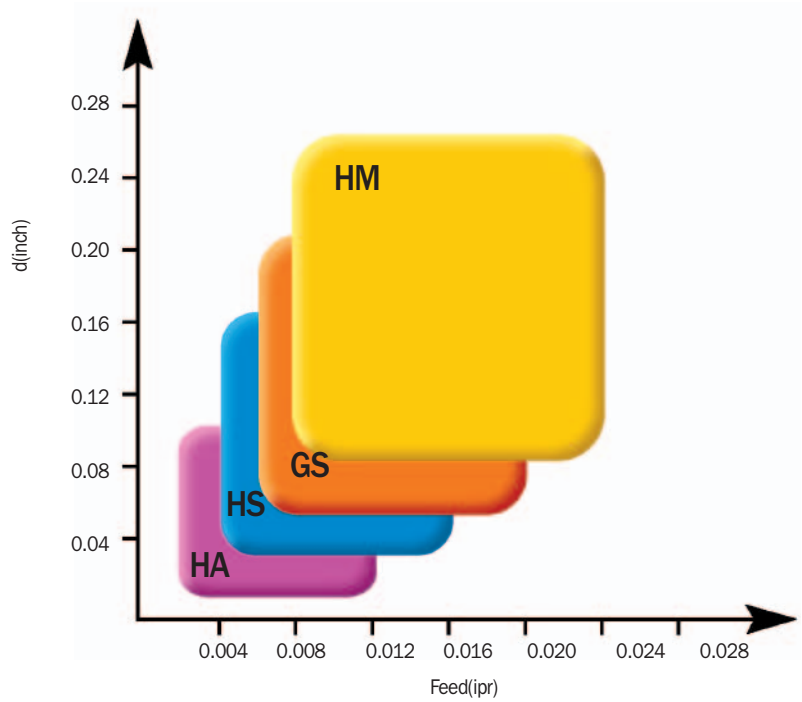
- Sharp cutting edge for shallow depths of cut
- Increased tool life through reduced friction at high cutting speeds
- Capable of machining fine finishes

HS — Medium

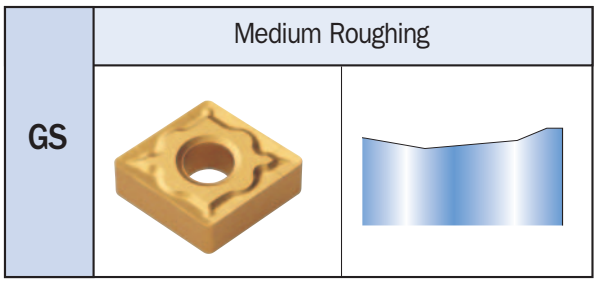
NEW



- Enhanced cutting efficiency and increased tool life due to improved chip flow.
- Extended land and positive rake angle increase wear resistance The land design also resists notching and enhances toughness

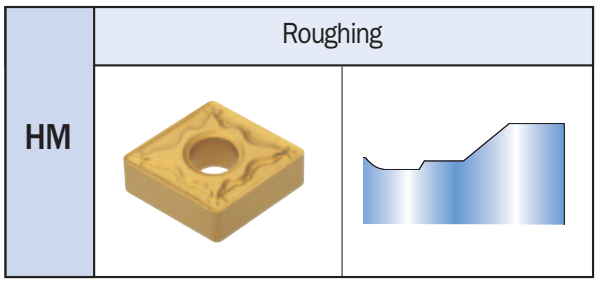


GS — Medium Roughing



- Excellent tool life for light interruption applications
- Wide chip pocket for better chip flow
- Free cutting geometry resists built-up-edge

HM — Roughing



- Chip breaker for interrupted applications
- Unique chip breaker design provides smooth chip control.
- Strong land provides excellent toughness

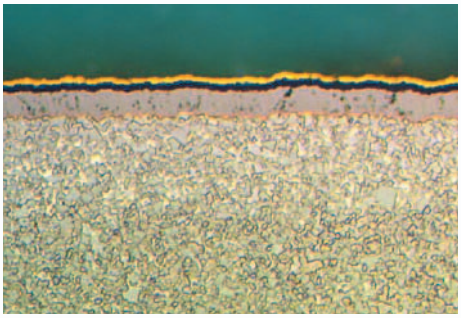
TMX's New Grades for Stainless Steel

TMX's Exclusive New Grades for Stainless Steel Machining

NEW

NC9020, stainless steel turning at high cutting speeds

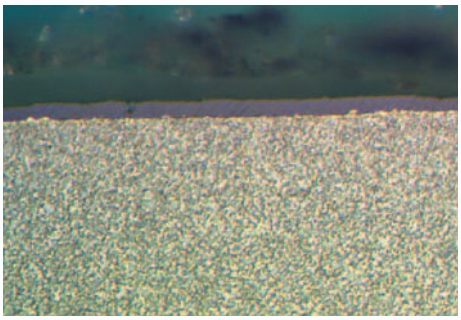
- Combines a substrate & film suitable for high-speed turning of stainless steels
- Superior cutting performance at medium cutting speeds for low-carbon and alloy steels, even in aggressive depths of cut
- Longer tool-life can be achieved due to excellent chip-resistance



NEW

PC9030, stainless steel turning at medium to low cutting speeds

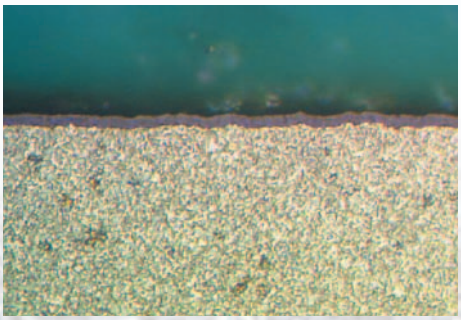
- Ultra fine carbide substrate provides toughness for medium, rough, and interrupted cutting of stainless steels
- PVD coated for enhanced chipping and film adhesion resistance during machining of ductile materials
- Enhanced surface finish and reduced burrs due to an exclusive chipbreaker for stainless steels



NEW

PC9530, stainless steel milling at low to medium cutting speeds

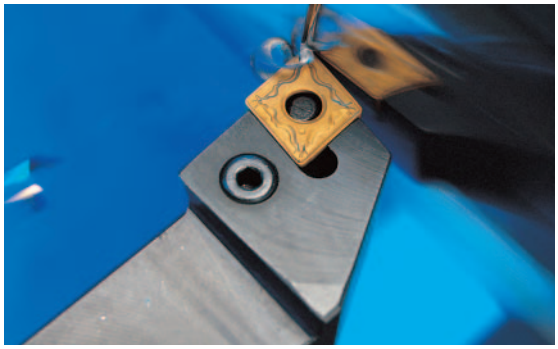
- Tough ultra-fine carbide substrate for rough or interrupted cuts
- PVD coated for better tool life in stainless and Ni-Cr steels.
- PVD coated for enhanced chipping and adhesion resistance during machining of ductile materials.
- Unique geometries improve surface finishes and limit burring.



Technical Guide for Chipbreakers

Function of Chipbreakers

Chip control is very important for productivity. Long, stringy chips will wrap or nest on tools and work pieces. Removing the chips, by hand, is dangerous and counter-productive.



Functions of chipbreakers for turning applications

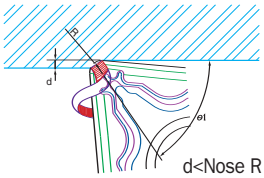
1) Make shorter chips
2) Decrease cutting force
3) Decrease down time for chip removal

Features of H-Series

1. The H-series has been designed with the HARMONY concept. Testing various depths of cuts and chipbreakers, more efficient geometries were developed. Chipbreakers have been designed to improve chip control, increase edge strength and decrease cutting force. The result is a more productive insert.

2. The "H" series is designed to work in finish, medium, and rough depths of cut. The following describes the series' function for the depth of cut

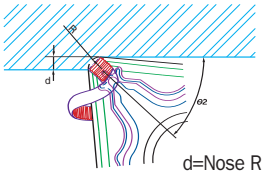
Chip flow in relation to depth of cut



d<Nose R

When the depth of cut is less than nose radius

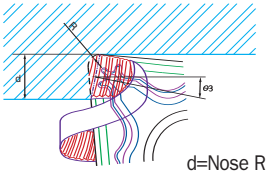
- Depth of cut 0.020~0.060inch, finish or medium-finish cut
- Main chipbreaker breaks the chip and sub finish chipbreaker controls chip flow



d=Nose R

When the depth of cut is equal to nose radius

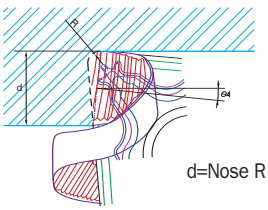
- Depth of cut 0.031~0.080inch, medium-finish cut
- Main and sub chipbreaker break the chip



d=Nose R ×4

When the depth of cut is 2~4 times the nose radius

- Depth of cut 0.06~0.18inch, medium cut
- Rough chipbreaker breaks the chip



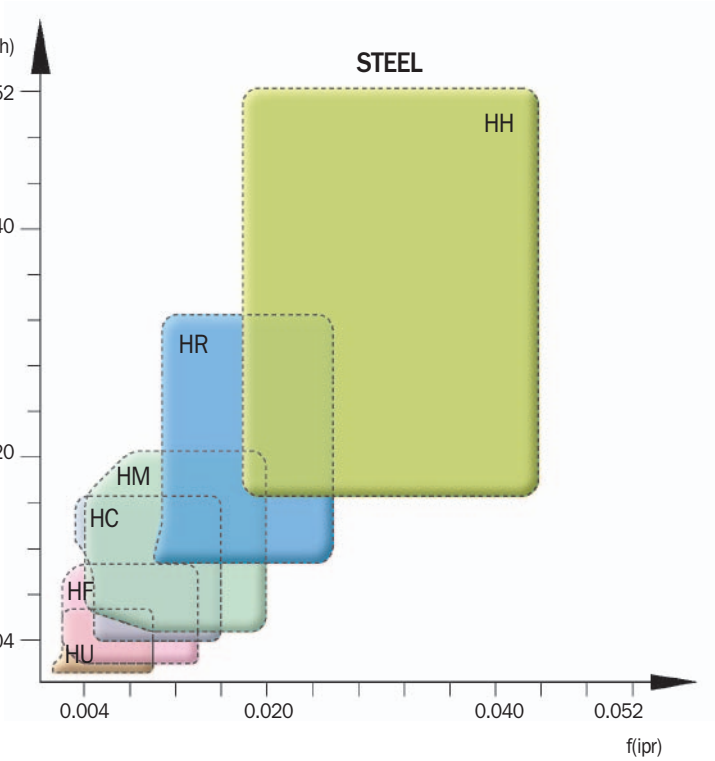
d=Nose R ×6.5

the depth of cut is 5~8 times the nose radius

- Depth of cut 0.16~0.235inch, medium-rough cutting range
- Side of rough chipbreaker breaks the chip.

Technical Guide for Chipbreakers

Application of Chipbreakers

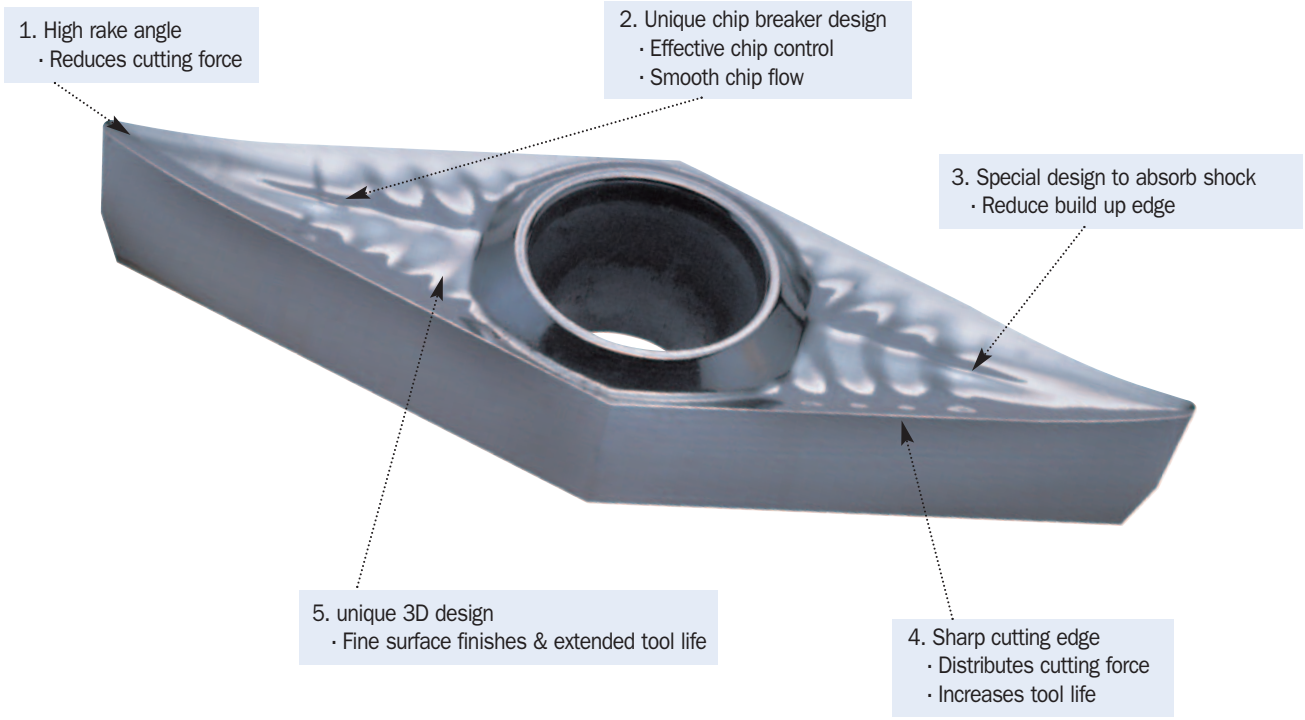


H-Series Cutting Edge Design

C/B	Cutting Edge	C/B	Cutting Edge	C/B	Cutting Edge
HU	0.04~0.06, 10 ~ 15°	HW	0.06 ~ 0.08, 1 ~ 3°	HF	0.08 ~ 0.10, 5 ~ 8°
HC	0.06~0.08, 5 ~ 7°	HM	0.04~0.06, 4 ~ 6°	HR	0.10 ~ 0.12, 2 ~ 5°
HH	0.20 ~ 0.24, 13 ~ 15°	HA	0.10 ~ 0.12, 8 ~ 10°	HS	0.10 ~ 0.12, 9 ~ 11°
HFP	0.04~0.06, 1.0 ~ 1.5°	HMP	0.04 ~ 0.06, 4 ~ 8°		

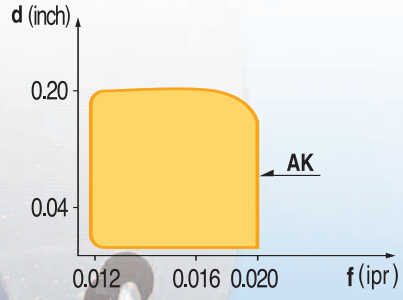
Technical Guide for Turning Aluminum

Turning Aluminum with the AK Chipbreaker



Recommended Cutting Parameters

d=0.004~0.200inch
f=0.0012~0.02ipr



Available Grades

H01 (Carbide, K10~K20)

Special Features

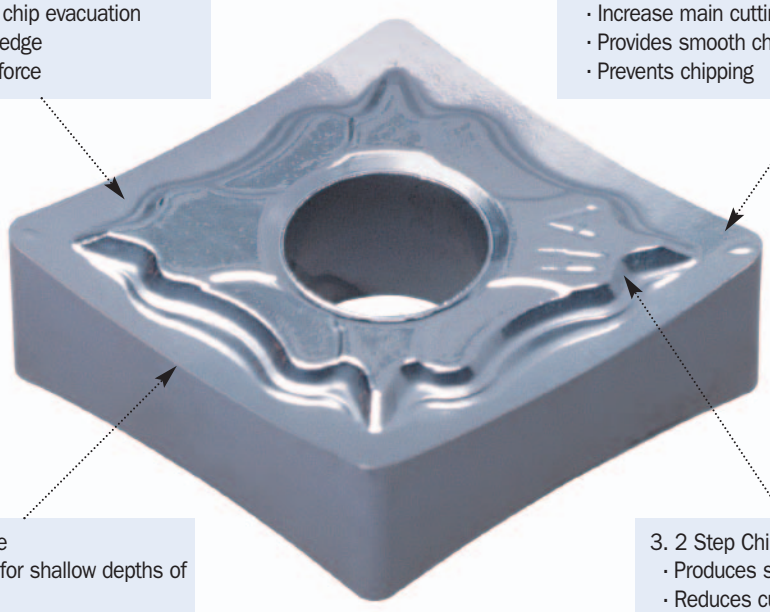
1) Unique geometry breaks chip and provides smooth chip flow. This decreases cutting force; so longer tool life can be achieved.
2) AK chip breaker has a polished face and ground periphery. The mirror-finished face prevents adhesion of work piece material to insert.

Technical Guide for Turning Aluminum

Turning Aluminum with the HA Chipbreaker

1. Wide Chip Pocket & High Rake Angle
 · Provides smooth chip evacuation
 · Prevents built-up-edge
 · Reduces cutting force

2. Reinforced Cutting Edge
 · Increase main cutting edge strength
 · Provides smooth chip flow for shallow depths of cut
 · Prevents chipping



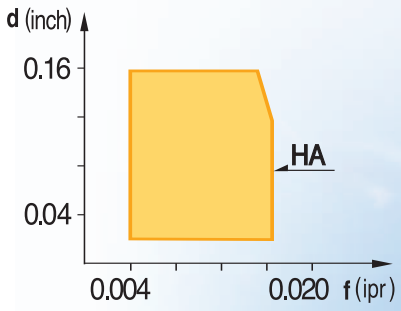
4. Curved Cutting Edge
 · Sharp cutting edge for shallow depths of cut
 · Capable of excellent surface finishes

3. 2 Step Chip Breaker
 · Produces smooth chip curl.
 · Reduces cutting force for high speed and feed turning

■ Special Features

Work piece	Hardness	Recommended Grade	Recommended Cutting Condition		
			Speed(sfm)	Feed(ipr)	Depth of cuta(inch)
Aluminum and Aluminum alloy	20°~125HB	H01	650-2650	0.004-0.016	0.020-0.040

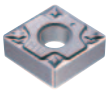
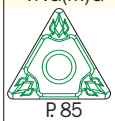
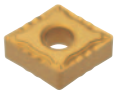
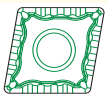
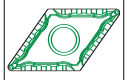
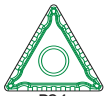
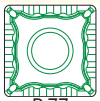
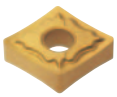
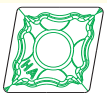
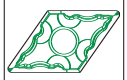
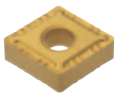
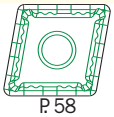
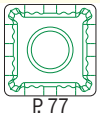
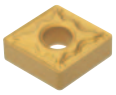
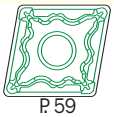
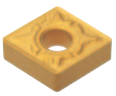
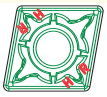
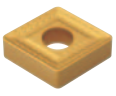
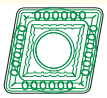
■ Recommended Cutting Conditions



Chipbreaker Recommendations

1. Work-Piece Material : SAE 12L14, SAE 1018, etc.
Low carbon steels
Hardness: under 180 HB

■ Chipbreaker, Grade, Cutting condition Recommendation

Work piece	C/B & Grade Selection				Insert shape					
	C/B & Feed		Grade & Cutting Speed		80°	80°	55°	60°	35°	90°
Depth of Cut (inch)	C/B	Feed (ipr)	Grade	Cutting Speed (sfm)	[NEGA] CN□G	[NEGA] WN□G	[NEGA] DN□G	[NEGA] TN□G	[NEGA] VN□G	[NEGA] SN□G
0.008 ~ 0.020 ~ 0.039 Ultra Finishing	HU 	0.002 ~ 0.004 ~ 0.008	CN200	925 850	CNG(M)G  P. 55		DNG(M)G  P. 64	TNG(M)G  P. 85		SNG(M)G  P. 72
0.020 ~ 0.039 ~ 0.079 Finishing	HF 	0.003 ~ 0.006 ~ 0.012	NC310 NC3015 NC3020 CN200	1025 957 875 875	CNMG  P. 59	WNMG  P. 105	DNMG  P. 67	TNMG  P.91	VNMG  P. 100	SNMG  P. 77
0.03 ~ 0.08 ~ 0.14 Medium-Finshing	HA 	0.004 ~ 0.010 ~ 0.016	NC3015 NC3020 NC330	1000 750	CNMG  P. 58	WNMG  P. 104	DNMG  P. 66	TNMG  P. 90	VNMG  P. 99	SNMG  P. 77
0.031~ 0.059 ~ 0.138 Medium-Finshing	HC 	0.004 ~ 0.008 ~ 0.014	NC310 NC3015 NC3020 CN200	975 950 825 825	CNGG  P. 58	WNMG  P. 104	DNMG  P. 67	TNMG  P. 91		SNMG  P. 77
0.059 ~ 0.098 ~ 0.197 Medium cutting, Medium-Roughing	HM 	0.006 ~ 0.01 ~ 0.02	NC310 NC3015 NC3020 NC330 CN200	875 825 750 700 725	CNMG  P. 59	WNMG  P. 105	DNMG  P. 67	TNMG  P. 91	VNMG  P. 101	SNMG  P. 78
0.100 ~ 0.160 ~ 0.280 Roughing	HR 	0.01 ~ 0.018 ~ 0.026	NC310 NC3015 NC3020 NC330	500 475 425 325	CNMG  P. 60	WNMG  P. 106	DNMG  P. 68	TNMG  P.92		SNMG  P. 78
0.197 ~ 0.280 ~ 0.440 Heavy duty	HH 	0.02 ~ 0.04 ~ 0.044	NC3015 NC3020 NC330	500 425 325	CNMM  P. 91			TNMM P. 92		SNMM P. 80
Depth of Cut (inch)	**C/B**	**Feed (ipr)**	**Grade**	**Cutting Speed (sfm)**	[POSI] CC□T	[POSI] WC□T	[POSI] DC□T	[POSI] TC□T	[POSI] VC□T VB□T	[POSI] SC□T
0.004 ~ 0.020 ~ 0.059 Finishing	HFP	0.002 ~ 0.006 ~ 0.01	NC310 NC3015 NC3020 CC105	925 850 825 825	CCGT P. 54		DCGT P. 63	TCGT P. 84	VCGT P. 97, P. 98	SCGT P. 71
0.020 ~ 0.059 ~ 0.138 Medium cutting, Medium-Roughing	HMP	0.003~ 0.008 ~ 0.016	NC310 NC3015 NC3020 CN200	850 800 750 750	CCMT P. 55		DCMT P. 63	TCMT P. 84	VBMT P. 99	SCMT P. 71
0.039~ 0.079 ~ 0.118 Medium cutting	C25	0.004 ~ 0.01 ~ 0.014	NC310 NC3015 NC3020	825 750 725	CCMT P. 54		DCMT P. 63	TCMT P. 84		SCMT P. 71

■ : 1st Recommended cutting condition

Chipbreaker Recommendations as per Workpiece

2. Work-Piece Material : SAE 4140, 4130, 31300, etc.
Medium carbon steel
Hardness : 180~260HB

■ **Chipbreaker, Grade, Cutting condition Recommendation**

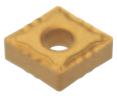
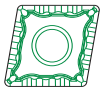
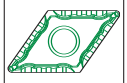
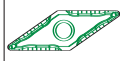
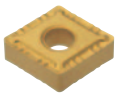
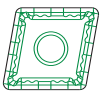
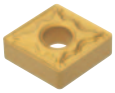
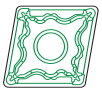
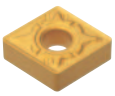
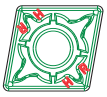
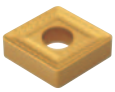
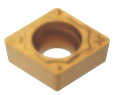
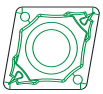
Work piece	C/B & Grade Selection				Insert shape					
	C/B & Feed		Grade & Cutting Speed		80°	80°	55°	60°	35°	90°
Depth of Cut (inch)	C/B	Feed (ipr)	Grade	Cutting Speed (sfm)	[NEGA] CN□G	[NEGA] WN□G	[NEGA] DN□G	[NEGA] TN□G	[NEGA] VN□G	[NEGA] SN□G
0.012 ~ 0.040 ~ 0.080 Ultra Fine Finishing	HW	0.004 ~ 0.012 ~ 0.020	NC310 NC3015 NC3020	990 900 820	CNG(M)G P. 60	WNMG P. 106				
0.020 ~ 0.039 ~ 0.079 Finishing	HF	0.003 ~ 0.006 ~ 0.012	NC310 NC3015 NC3020 CN200	725 650 625 600	CNMG P. 59	WNMG P.105	DNMG P. 67	TNMG P. 91	VNMG P. 100	SNMG P. 77
1.031 ~ 0.059 ~ 0.138 Medium-Finshing	HC	0.004 ~ 0.008 ~ 0.014	NC310 NC3015 NC3020 NC330 CN200	700 950 600 525 550	CNMG P. 58	WNMG P. 105	DNMG P. 67	TNMG P. 91		SNMG P. 77
0.059 ~ 0.098 ~ 0.197 General Medium	HM	0.004 ~ 0.010 ~ 0.016	NC310 NC3015 NC3020 NC330 CN200	650 600 550 500 525	CNMG P. 59	WNMG P.105	DNMG P. 67	TNMG P. 91	VNMG P. 101	SNMG P. 78
0.098 ~ 0.138 ~ 0.280 Roughing	HR	0.01 ~ 0.018 ~ 0.026	NC310 NC3015 NC3020 NC330	550 525 500 425	CNMG P. 60	WNMG P. 106	DNMG P. 68	TNMG P. 92		SNMG P. 78
0.160~ 0.280 ~ 0.520 Heavy duty	HH	0.016 ~ 0.028 ~ 0.044	NC310 NC3015 NC3020 NC330	425 400 375 300	CNMM P. 61			TNMM P. 92		SNMM P. 80
Depth of Cut (inch)	**C/B**	**Feed (ipr)**	**Grade**	**Cutting Speed (sfm)**	**[POSI] CC□T**	**[POSI] WC□T**	**[POSI] DC□T**	**[POSI] TC□T**	**[POSI] VC□T VB□T**	**[POSI] SC□T**
0.004 ~ 0.020 ~ 0.059 Finishing	HFP	0.002 ~ 0.006 ~ 0.01	NC310 NC3015 NC3020	725 650 600 650	CCGT P. 54		DCGT P. 63	TCGT P. 84	VCGT P. 97, 98	SCGT P. 71
0.020 ~ 0.059 ~ 0.138 Medium-Finishing General Medium	HMP	0.003 ~ 0.008 ~ 0.016	NC310 NC3015 NC3020 NC330 CN200	700 625 600 500 550	CCMT P. 55		DCMT P. 63	TCMT P. 84	VBMT P. 99	SCMT P. 71
0.039 ~ 0.079 ~ 0.118 Medium-Roughing	C25	0.004 ~ 0.01 ~ 0.014	NC310 NC3015 NC3020 NC330	650 600 550 500	CCMT P. 55		DCMT P. 63	TCMT P. 84		SCMT P. 71

: 1st Recommended cutting condition

Chipbreaker Recommendations as per Workpiece

3. Work-Piece Material : SAE 4140, 4130, 41300, etc.
Medium carbon steels
Hardness : 260~350HB
9000 series carbide

■ Chipbreaker, Grade, Cutting condition Recommendation

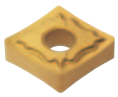
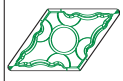
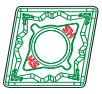
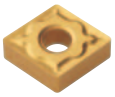
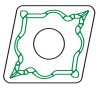
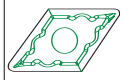
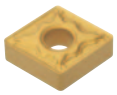
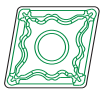
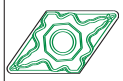
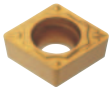
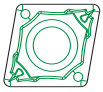
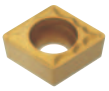
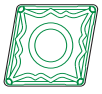
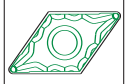
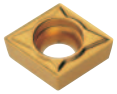
Work piece	C/B & Grade Selection				Insert shape					
	C/B & Feed		Grade & Cutting Speed		80° 	80° 	55° 	60° 	35° 	90° 
Depth of Cut (inch)	C/B	Feed (ipr)	Grade	Cutting Speed (sfm)	[NEGA] CN□G	[NEGA] WN□G	[NEGA] DN□G	[NEGA] TN□G	[NEGA] VN□G	[NEGA] SN□G
0.020 ~ 0.039 ~ 0.079 Finishing	HF 	0.003 ~ 0.006 ~ 0.012	NC310 NC3015 NC3020 CN200	425 400 375 375	CNMG  P. 59	WNMG  P. 105	DNMG  P. 67	TNMG  P. 91	VNMG  P. 100	SNMG  P. 77
0.031~ 0.059 ~ 0.138 Medium-Finshing	HC 	0.004 ~ 0.008 ~ 0.014	NC3015 NC3020 NC330 CN200	500 425 375 325	CNGG  P. 55	WNMG  P. 105	DNMG  P. 67	TNMG  P. 91		SNMG  P. 77
0.079 ~ 0.118 ~ 0.197 General Medium	HM 	0.006 ~ 0.01 ~ 0.02	NC310 NC3015 NC3020 CN200	425 400 325 300	CNMG  P. 59	WNMG  P. 105	DNMG  P. 67	TNMG  P. 91	VNMG  P. 101	SNMG  P. 78
0.1 ~ 0.14 ~ 0.24 Roughing	HR 	0.01 ~ 0.014 ~ 0.024	NC310 NC3015 NC3020 NC330	325 300 300 275	CNMG  P. 60	WNMG  P. 106	DNMG  P. 68	TNMG  P. 92		SNMG  P. 78
0.197 ~ 0.24 ~ 0.4 Heavy duty	HH 	0.02 ~ 0.024 ~ 0.04	NC310 NC3015 NC3020 NC330	300 275 275 225	CNMM  P. 61			TNMM  P. 92		SNMM  P. 80
Depth of Cut (inch)	C/B	Feed (ipr)	Grade	Cutting Speed (sfm)	[POSI] CC□T	[POSI] WC□T	[POSI] DC□T	[POSI] TC□T	[POSI] VC□T VB□T	[POSI] SC□T
0.004 ~ 0.020 ~ 0.059 Finishing	HFP 	0.002 ~ 0.006 ~ 0.01	NC310 NC3015 NC3020	425 400 375 400	CCGT  P. 54		DCGT  P. 63	TCGT  P. 84	VCGT P. 97, P. 98	SCGT P. 71
0.008 ~ 0.039 ~ 0.118 Medium-Finishing, General Medium	HMP	0.003~ 0.008 ~ 0.016	NC310 NC3015 NC3020 CN200	400 375 375 325	CCMT P. 54		DCMT P. 63	TCMT P. 84	VBMT P. 99	SCMT P. 71
0.020 ~ 0.059 ~ 0.098 Medium-Roughing	C25	0.004 ~ 0.01 ~ 0.014	NC310 NC3015 NC3020 NC330	375 325 325 300	CCMT P. 54		DCMT P. 63	TCMT P. 84		SCMT P. 71

: 1st Recommended cutting condition

Chipbreaker Recommendation as per Workpiece

2. Work-Piece Material : A2, SAE 8740, etc.
General steel
Hardness : 180~260HB

■ Chipbreaker, Grade, Cutting condition Recommendation

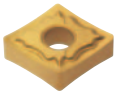
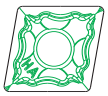
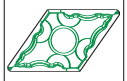
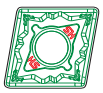
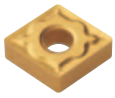
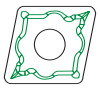
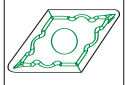
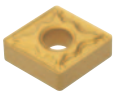
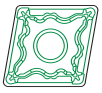
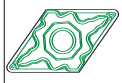
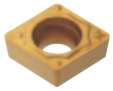
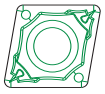
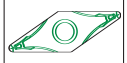
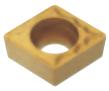
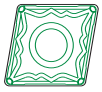
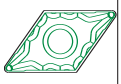
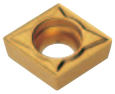
Work piece	C/B & Grade Selection				Insert shape					
	C/B & Feed		Grade & Cutting Speed		80°	80°	55°	60°	35°	90°
Depth of Cut (inch)	C/B	Feed (ipr)	Grade	Cutting Speed (sfm)	[NEGA] CN□G	[NEGA] WN□G	[NEGA] DN□G	[NEGA] TN□G	[NEGA] VN□G	[NEGA] SN□G
0.02 ~ 0.060 ~ 0.100 Medium-Finshing	HA 	0.0012 ~ 0.006 ~ 0.012	NC9020 PC9030	625 575	CNMG  P. 58	WNMG  P. 104	DNMG  P. 66	TNMG  P. 90	VNMG  P. 99	SNMG  P. 77
0.04 ~ 0.1 ~ 0.16 Medium-Cutting	HS 	0.004 ~ 0.01 ~ 0.016	NC9020 PC9030	600 525	CNG(M)G  P. 60	WNG(M)G  P.104	DNG(M)G  P. 68	TNG(M)G  P. 92	VNG(M)G  P. 101	SNG(M)G  P. 79
0.031 ~ 0.079 ~ 0.157 Medium-Finshing	GS 	0.003 ~ 0.01 ~ 0.016	NC9020 PC9030	450 560	CNMG  P. 58	WNMG  P. 104	DNMG  P. 66	TNMG  P. 90		SNMG  P. 76
0.039 ~ 0.079 ~ 0.157 General Medium	HM 	0.004 ~ 0.010 ~ 0.016	NC9020 PC9030	525 400	CNMG  P. 59	WNMG  P.105	DNMG  P. 67	TNMG  P. 91	VNMG  P. 101	SNMG  P. 78
Depth of Cut (inch)	**C/B**	**Feed (ipr)**	**Grade**	**Cutting Speed (sfm)**	[POSI] CC□T	[POSI] WC□T	[POSI] DC□T	[POSI] TC□T	[POSI] VC□T VB□T	[POSI] SC□T
0.005 ~ 0.02 ~ 0.06 Finishing	HFP 	0.002 ~ 0.006 ~ 0.01	NC9020 PC9030	600 525	CCGT  P. 54		DCGT  P. 63	TCGT  P. 84	VCGT  P. 97, 98	SCGT  P. 71
0.02 ~ 0.04 ~ 0.12 Medium-Finishing General Medium	HMP 	0.004 ~ 0.008 ~ 0.012	NC9020 PC9030	525 450	CCMT  P. 55		DCMT  P. 63	TCMT  P. 84	VBMT  P. 99	SCMT  P. 71
0.04 ~ 0.06 ~ 0.012 Medium-Roughing	C25 	0.006 ~ 0.01 ~ 0.014	NC9020 PC9030	500 525	CCMT P. 54		DCMT P. 63	TCMT P. 84		SCMT P. 71

■ : 1st Recommended cutting condition

Chipbreaker Recommendations as per Workpiece

5. Work-Piece Material: 30455, 31655, 34755, etc.
Austenitic Stainless steel
Hardness : 135~185HB

■ Chipbreaker, Grade, Cutting condition Recommendation

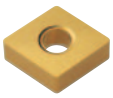
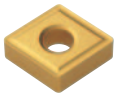
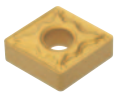
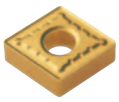
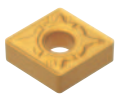
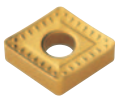
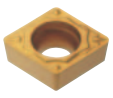
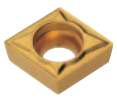
Work piece	C/B & Grade Selection				Insert shape					
	C/B & Feed		Grade & Cutting Speed		80°	80°	55°	60°	35°	90°
Depth of Cut (inch)	C/B	Feed (ipr)	Grade	Cutting Speed (sfm)	[NEGA] CN□G	[NEGA] WN□G	[NEGA] DN□G	[NEGA] TN□G	[NEGA] VN□G	[NEGA] SN□G
0.02 ~ 0.060 ~ 0.100 Medium-Finishing	HA 	0.0012 ~ 0.006 ~ 0.012	NC9020 PC9030	530 450	CNMG  P. 58	WNMG  P. 104	DNMG  P. 66	TNMG  P. 90	VNMG  P. 99	SNMG  P. 77
0.04 ~ 0.1 ~ 0.16 Medium-Cutting	HS 	0.004 ~ 0.01 ~ 0.016	NC9020 PC9030	500 425	CNMG  P. 60	WNMG  P.104	DNMG  P. 68	TNMG  P. 92	VNMG  P. 101	SNMG  P. 79
0.031 ~ 0.08 ~ 0.16 Medium-Finshing	GS 	0.004 ~ 0.008 ~ 0.016	NC9020 PC9030	450 560	CNMG  P. 58	WNMG  P. 104	DNMG  P. 66	TNMG  P. 90		SNMG  P. 76
0.04 ~ 0.08 ~ 0.16 General Medium	HM 	0.004 ~ 0.008 ~ 0.016	NC9020 PC9030	425 400	CNMG  P. 59	WNMG  P.105	DNMG  P. 67	TNMG  P. 91	VNMG  P. 101	SNMG  P. 78
Depth of Cut (inch)	**C/B**	**Feed (ipr)**	**Grade**	**Cutting Speed (sfm)**	[POSI] CC□T	[POSI] WC□T	[POSI] DC□T	[POSI] TC□T	[POSI] VC□T VB□T	[POSI] SC□T
0.005 ~ 0.02 ~ 0.06 Finishing	HFP 	0.002 ~ 0.004 ~ 0.008	NC9020 PC9030	500 425	CCGT  P. 54		DCGT  P. 63	TCGT(TPGT)  P. 84	VCGT  P. 97, 98	SCGT  P. 71
0.02 ~ 0.04 ~ 0.12 Medium-Finishing General Medium	HMP 	0.003 ~ 0.006 ~ 0.012	NC9020 PC9030	450 400	CCMT  P. 55		DCMT  P. 63	TCMT  P. 84	VBMT  P. 99	SCMT  P. 71
0.04 ~ 0.06 ~ 0.012 Medium-Roughing	C25 	0.004 ~ 0.008 ~ 0.012	NC9020 PC9030	425 350	CCMT P. 54		DCMT P. 63	TCMT P. 84		SCMT P. 71

: 1st Recommended cutting condition

Chipbreaker Recommendations as per Workpiece

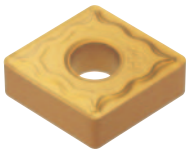
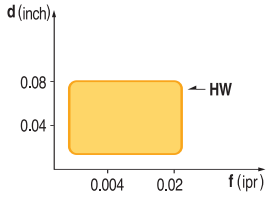
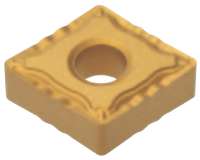
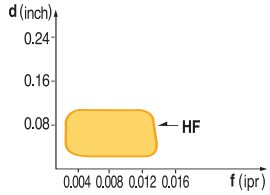
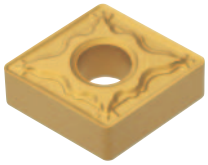
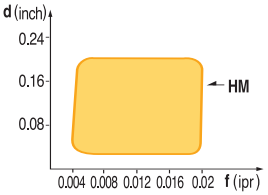
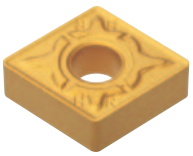
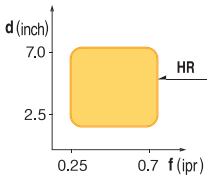
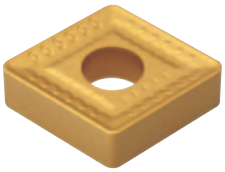
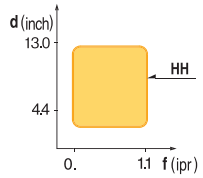
6. Work-Piece Material : No35B, No45B, 060-40-18, etc.
Gray Cast iron, Ductile Cast iron
Hardness : 135~185HB
Tensile Strength : Under 450N/ß±

■ Chipbreaker, Grade, Cutting condition Recommendation

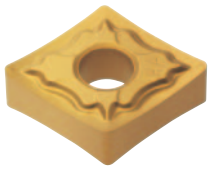
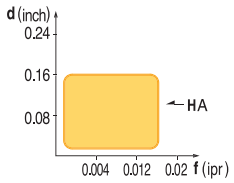
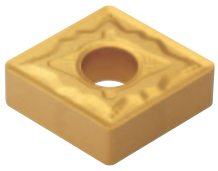
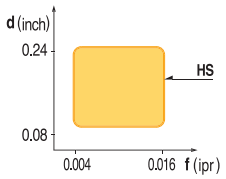
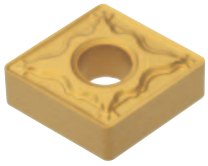
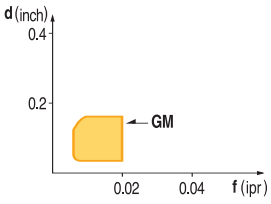
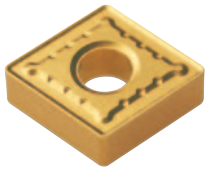
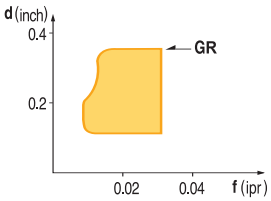
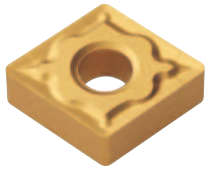
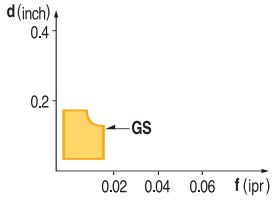
Work piece	C/B & Grade Selection				Insert shape					
	C/B & Feed		Grade & Cutting Speed		80°	80°	55°	60°	35°	90°
Depth of Cut (inch)	C/B	Feed (ipr)	Grade	Cutting Speed (sfm)	CNMG CNGG	WNMG WNGG	DNMG DNGG	TNMG TNGG	VNMG VNGG	SNMG SNGG
0.005 ~ 0.015 ~0.04 Finishing		0.002 ~ 0.004 ~ 0.02	NC305K	650 ~ 1650 ~ 2300 975	CNMA P. 55	WNMA P. 103	DNMA P. 64	TNMA P. 85, 87		SNMA P. 74
0.02 ~ 0.08 ~ 0.14 Medium-Finshing	B20 	0.004 ~ 0.008 ~ 0.012	NC305K	425~ 825 ~1150	CNMG P. 56		DNMG P. 64	TNMG P. 87	VNMG P. 99	SNMG P. 74
0.04~ 0.1 ~ 0.16 General Medium	HM 	0.006 ~ 0.012 ~ 0.02	NC305K NC315K	500 ~ 825 ~1150	CNMG P. 59	WNMG P.105	DNMG P. 67	TNMG P. 91	VNMG P. 101	SNMG P. 78
0.004 ~ 0.12 ~ 0.18 Medium-Roughing	GR 	0.008 ~ 0.014 ~ 0.02	NC305K NC315K	825 725	CNMG P. 57	WNMG P.104	DNMG P. 65	TNMG P. 89		SNMG P. 76
0.1~ 0.14 ~0.24 Roughing	HR 	0.01 ~ 0.014 ~ 0.024	NC310 NC3015 NC3020 NC330	325 300 300 275	CNMG P. 60	WNMG P. 106	DNMG P. 68	TNMG P. 92		SNMG P. 78
0.16 ~ 0.26 ~0.4 Heavy duty	GH 	0.012 ~ 0.0028 ~ 1.043	NC315K	500	CNMM P. 61					SNMM P. 79
Depth of Cut (inch)	**C/B**	**Feed (ipr)**	**Grade**	**Cutting Speed (sfm)**	[POSI] CCMT	[POSI] WCMT	[POSI] DCMT	[POSI] TCMT	[POSI] VCMT VBMT	[POSI] SCMT
0.02 ~ 0.06 ~ 0.12 Medium-Finshing	HFP 	0.003 ~ 0.008 ~ 0.016	NC305K NC315K	825 725	CCMT P. 55		DCMT P. 63	TCMT P. 84	VCMT P. 99	SCMT P. 71
0.04 ~ 0.08 ~ 0.14 Medium Cutting	C25 	0.004 ~ 0.01 ~ 0.016	NC305K NC315K	825 725	CCMT P. 54		DCMT P. 63	TCMT P. 84		SCMT P. 71

: 1st Recommended cutting condition

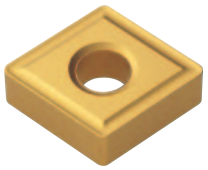
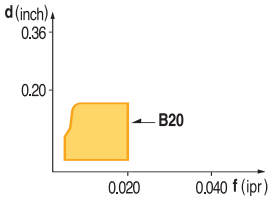
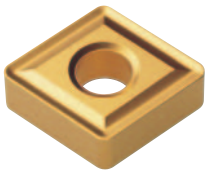
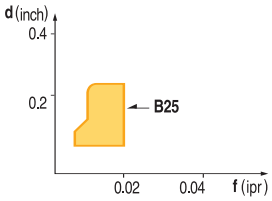
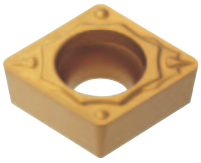
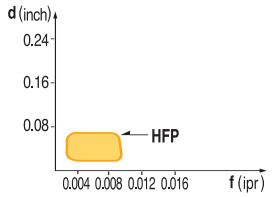
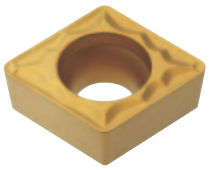
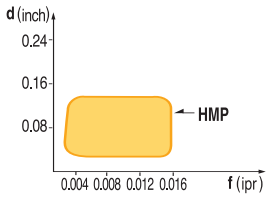
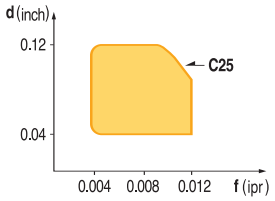
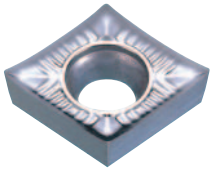
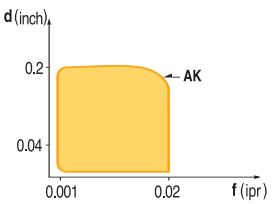
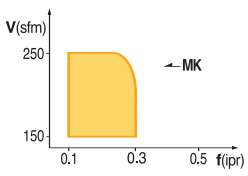
TMX Chipbreakers

	Shape	Application Range	Special Features
"H" Series	**HW** 		■ **Use: Wiper, Finish** · Reinforced chip pocket for aggressive speeds and feeds. · Wiper Geometry for excellent surface finishes at high feed rates. ■ **Recommended Cutting Conditions** d = 0.012~0.08inch f = 0.004 ~ 0.02ipr
	HF 		■ **Use: Finish** · Excellent chip control for varying depths of cut. · Special design enhances cutting edge strength. ■ **Recommended Cutting Conditions** d = 0.012 ~ 0.1inch f = 0.002 ~ 0.14ipr
	HM 		■ **Use: Medium** · All purpose chipbreaker. ■ **Recommended Cutting Conditions** d = 0.01 ~ 0.2inch f = 0.004 ~ 0.02ipr
	HR 		■ **Use: Rough** · Large depths of cut and aggressive feeds. · Interrupted cuts. ■ **Recommended Cutting Conditions** d = 0.1 ~ 0.28inch f = 0.01 ~ 0.028ipr
	HH 		■ **For Heavy duty cutting** · Specially designed toughest cutting edge provides superior cutting performance at deep depth of cut and fast feed rate. · Unique design of dot on cutting edge makes smooth chip flow and reduce cutting force. ■ **Recommended Cutting Conditions** d = 0.16 ~ 0.5inch f = 0.018 ~ 0.04ipr

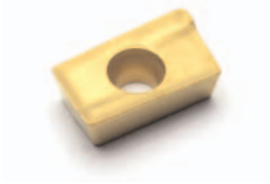
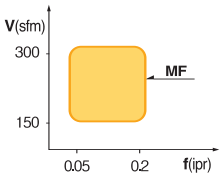
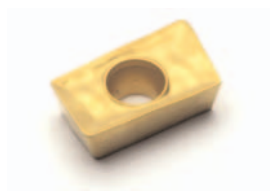
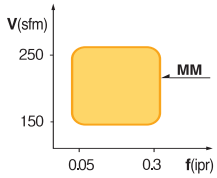
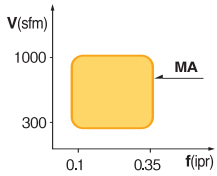
TMX Chipbreakers

	Shape	Application Range	Special Features
"H" Series	**HA** 		■ **Use: Light and Medium** · Free-cutting · Unique geometry enhances durability. ■ **Recommended Cutting Conditions** d = 0.03 ~ 0.16inch f = 0.004 ~ 0.016ipr
	HS 		■ **Use: Medium** · Designed for stainless steel and high-temp alloys · High rake angle on land increases wear resistance. ■ **Recommended Cutting Conditions** d = 0.04 ~ 0.16inch f = 0.004 ~ 0.016ipr
"G" Series	**GM** 		■ **Use: Medium** · All purpose chip breaker. · Strong cutting edge for aggressive feed rates and interrupted cuts. ■ **Recommended Cutting Conditions** d = 0.03 ~ 0.16inch f = 0.004 ~ 0.02ipr
	GR 		■ **Use: Rough** · Large depths of cut and aggressive feeds. · Interrupted cuts. ■ **Recommended Cutting Conditions** d = 0.12 ~ 0.32inch f = 0.012 ~ 0.032ipr
	GS 		■ **Use: Medium** · Designed for stainless steel and high-temp alloys. · High rake angle on land increases wear resistance. ■ **Recommended Cutting Conditions** d = 0.04 ~ 0.2inch f = 0.004 ~ 0.02ipr

TMX Chipbreakers

	Shape	Application Range	Special Features
"B" Series	**B20** 		■ **Use: Light, Medium** · Cast Iron Chipbreaker. ■ **Recommended Cutting Conditions** d = 0.06 ~ 0.16inch f = 0.006 ~ 0.02ipr
	B25 		■ **Use: General Purpose** · All purpose chipbreaker. ■ **Recommended Cutting Conditions** d = 0.08 ~ 0.24inch f = 0.01 ~ 0.02ipr
"H-Posi" Series	**HFP** 		■ **Use: Finish** · Chipbreaker for shallow depths of cut and low feed rates. · Capable of turning fine surface finishes. · Also for boring. ■ **Recommended Cutting Conditions** d = 0.004 ~ 0.06inch f = 0.002 ~ 0.01ipr
	HMP 		■ **Use: Medium** · Versatile chipbreaker. ■ **Recommended Cutting Conditions** d = 0.02 ~ 0.14inch f = 0.002 ~ 0.016ipr
"C" Series	**C25** 		■ **Use: Medium** · Interrupted cuts. · Free cutting. · ID & OD Turning. ■ **Recommended Cutting Conditions** d = 0.04 ~ 0.12inch f = 0.004 ~ 0.012ipr
"AK" Series	**AK** 		■ **Use: Aluminum Turning** · Exclusive chipbreaker for aluminum and aluminum alloys. ■ **Recommended Cutting Conditions** d = 0.04 ~ 0.2inch f = 0.001 ~ 0.02ipr
"MX" Series	**MX** 		■ **General Milling** · Excellent heat resistance. ■ **Recommended Cutting Conditions** d = 0.004 ~ 0.2inch f = 0.004 ~ 0.012ipr

TMX Chipbreakers

		Application Range	Special Features
"Future Nill" Series	**MF** 		■ **Finish Milling** · Special design for light cutting of gummy materials like stainless steel. Provides fine surface finishes and longer tool life. ■ **Recommended Cutting Conditions** d = 0.02 ~ 0.2inch f = 0.002 ~ 0.008ipr
	MM 		■ **Medium Milling** · All purpose chipbreaker design. ■ **Recommended Cutting Conditions** d = 0.04 ~ 0.2inch f = 0.002 ~ 0.012ipr
	MA 		■ **Aluminum Milling** · Suitable design for aluminum machining. Sharp, ground cutting edge and mirror-finished face prevents built up edge. ■ **Recommended Cutting Conditions** d = 0.02 ~ 0.2inch f = 0.004 ~ 0.014ipr

1 Insert Shape

			
C	D	E	K
			
L	R	S	T
			
V	W		

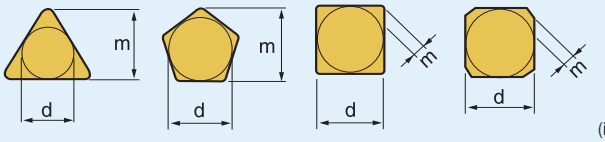
2 Clearance Angle

			
B	C	D	E
			
F	N	P	
Special			
O			

T N M G

1 2 3 4

3 Tolerance



d : theoritical diameter of inscribed circle
t : Thickness
m : see figure

(inch)

class	d	m	t
A	±0.0010	±0.0002	±0.0010
C	±0.0010	±0.0005	±0.0010
H	±0.0005	±0.0005	±0.0010
E	±0.0010	±0.0010	±0.0010
G	±0.0010	±0.0010	±0.005
J	±0.002 - ±0.006	±0.0002	±0.001
K	±0.002 - ±0.006	±0.0005	±0.001
L	±0.002 - ±0.006	±0.0010	±0.001
M	±0.002 - ±0.006	±0.003 - 0.008	±0.005
U	±0.003 - ±0.01	±0.005 - 0.015	±0.005

Tolerance on C,H,R,T,W class (exceptional)

d	Tolerance on d		Tolerance on m	
	J,K,L,M,N	U	M,N	U
1/4	±0.002	±0.003	±0.003	±0.005
3/8	±0.002	±0.003	±0.003	±0.005
1/2	±0.003	±0.005	±0.005	±0.008
5/8	±0.004	±0.007	±0.06	±0.011
3/4	±0.004	±0.007	±006	±0.011
1	±0.005	±0.01	±0.07	±0.015

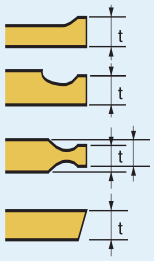
Tolerance on D class (exceptional)

d	Tolerance on d	Tolerance on m
1/4	±0.002	±0.0043
3/8	±0.002	±0.0043
1/2	±0.003	±0.006
5/8	±0.004	±0.007
3/4	±0.004	±0.007

4 Cross Section Type

	 C'Sink 70° - 90°
A	B
 C'Sink 70° - 90°	
C	F
	 C'Sink 70° - 90°
G	H
 C'Sink 70° - 90°	
J	M
	 C'Sink 40° - 60°
N	Q
	 C'Sink 40° - 60°
R	T
 C'Sink 40° - 60°	 C'Sink 40° - 60°
U	W
Special type	
X	

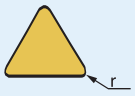
6 Height of Cutting Edge



Symbol		Height of Cutting Edge (t)	
Metric	Inch	mm	Inch
-	0.5(1)	0.79	1/32
T0	0.6	1.00	0.040
01	1(2)	1.59	1/16
T1	1.2	1.98	5.64
02	1.5(3)	2.38	3/32
03	2	3.18	1/8
T3	2.5	3.97	5/32
04	3	4.76	3/16
05	3.5	5.56	7/32
06	4	6.35	1/4
07	5	7.94	5/16
09	6	9.52	3/8
11	7	11.11	7/16
12	8	12.70	1/2

( ) Symbol for small size insert

7 Nose Corner Radius (Nose R)



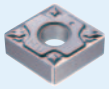
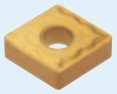
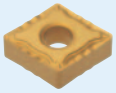
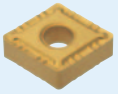
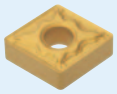
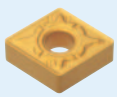
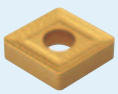
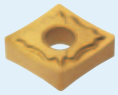
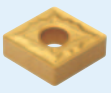
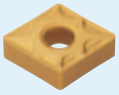
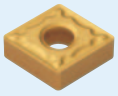
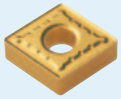
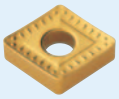
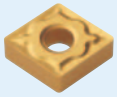
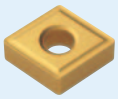
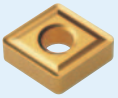
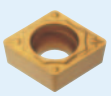
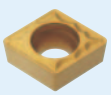
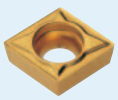
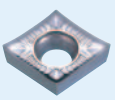
Symbol		Corner Radius	
Metric	Inch	mm	Inch
01	0	0.1	0.004
02	0.5	0.2	0.008
04	1	0.4	1/64
08	2	0.8	1/32
12	3	1.2	3/64
16	4	1.6	1/16
20	5	2.0	5/64
24	6	2.4	3/32
28	7	2.8	7/64
32	8	3.2	1/8
00	-	Round insert(Inch)	
M0	-	Round insert(Metric)	

3	3	2	HM
5	6	7	8

5 Cutting Edge Length, Diameter of Inscribed circle

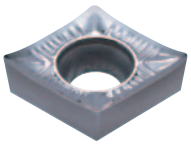
Symbol								IC
C	D	S	T	R	V	W		
Metric							Inch	d(inch)
03	04	03	06	03	-	02	1.2(5)	5/32
04	05	04	08	04	08	S3	1.5(6)	3/16
05	06	05	09	05	09	03	1.8(7)	7/32
-	-	-	-	06	-	-	-	0.236
06	07	06	11	06	11	04	2	1/4
08	09	07	13	07	13	05	2.5	5/16
-	-	-	-	08	-	-	-	0.315
09	11	09	16	09	16	06	3	3/8
-	-	-	-	10	-	-	-	0.394
11	13	11	19	11	19	07	3.5	7/16
-	-	-	-	12	-	-	-	0.472
12	15	12	22	12	22	08	4	1/2
14	17	14	24	14	24	09	4.5	9/16
16	19	15	27	15	27	10	5	5/8
-	-	-	-	16	-	-	-	0.630
17	21	17	30	17	30	11	5.5	11/16
19	23	19	33	19	33	13	6	3/4
-	-	-	-	20	-	-	-	0.787
22	27	22	38	22	38	15	7	7/8
-	-	-	-	25	-	-	-	0.984
25	31	25	44	25	44	17	8	1
32	38	31	54	31	54	21	10	1 1/4
-	-	-	-	32	-	-	-	1.260

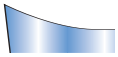
8 Chipbreaker for Turning

			
HU	HW	HF	HC
			
HM	HR	HH	HA
			
HS	GF	GM	GR
			
GH	GS	B20	B25
			
HFP	HMP	C25	AK

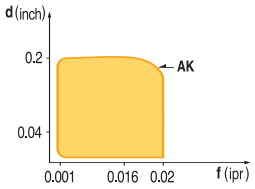
CCGT-AK 6-CCG-

C type (80°)





•Aluminum Chipbreaker

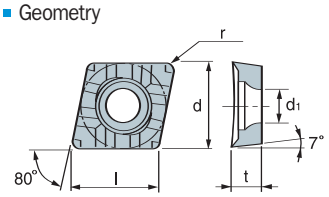


■ USE
Aluminum Turning

■ Recommendation

AK d = 0.005~0.2inch
f = 0.001~0.02ipr

■ Geometry

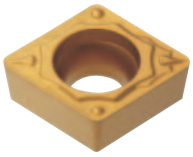


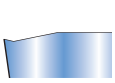
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
				NC310	NC3020	NC330	NC305K	NC315K	PC130	PC230		CN200				H01	H010	G10	ST10	l	d	t	r	d1
SCLC R/L SI-SCLC R/L SCMCN	CCGT	21.50.5-AK	060202													●				0.256	1/4	3/32	0.008	0.110
		21.51-AK	060204													●							1/64	
		21.52-AK	060208													●							1/32	
		32.50.5-AK	09T302													●				0.382	3/8	5/32	0.008	0.173
		32.51-AK	09T304													●							1/64	
		32.52-AK	09T308													●							1/32	
		430.5-AK	120402																	0.508	1/2	3/16	1/64	0.217
		431-AK	120404																				1/32	
		432-AK	120408													●								

● Stock Item

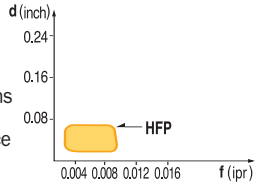
CCGT-HFP 6-CCF-

C type (80°)





•Chipbreaker for shallow depths of cut and low feed rates
•Capable of turning fine surface finishes.
•Also for fine boring.

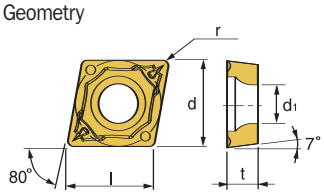


■ USE
Finish

■ Recommendation

HFP d = 0.004~0.06inch
f = 0.002~0.01ipr

■ Geometry

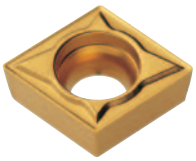


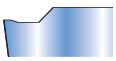
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	CN200				H01	G10	ST10		l	d	t	r	d1
SCLC R/L SI-SCLC R/L SCMCN	CCGT	21.50.5-HFP	060202					●												0.256	1/4	3/32	0.008	0.110
		21.51-HFP	060204																				1/64	
		21.52-HFP	060208																				1/32	
		32.50.5-HFP	09T302																	0.382	3/8	5/32	0.008	0.173
		32.51-HFP	09T304					●															1/64	
		32.52-HFP	09T308																				1/32	
		431-HFP	120404																	0.508	1/2	3/16	1/64	0.217
		432-HFP	120408					●															1/32	

● Stock Item

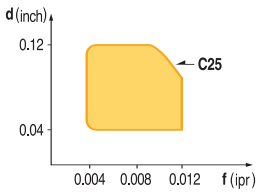
CCMT-C25 6-CCM-

C type (80°)





•Interrupted cuts.
•Free cutting.
•D & OD turning.

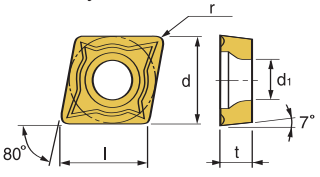


■ USE
Medium

■ Recommendation

C25 d = 0.04~0.12inch
f = 0.004~0.012ipr

■ Geometry

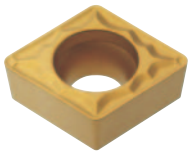


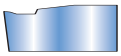
Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NC9020	NC320	NC315K	PC9030	PC8010	CN200				H01	G10	ST30		l	d	t	r	d1
SCLC R/L SI-SCLC R/L SCMCN	CCMT	21.50.5-C25	060202			●	●					●								0.256	1/4	3/32	0.008	0.110
		21.51-C25	060204	●	●	●	●	●			●	●						●	●				1/64	
		21.52-C25	060208			●	●																1/32	
		2.522-C25	080308			●	●													0.382	3/8	5/32	0.008	0.134
		32.51-C25	09T304	●	●	●	●				●	●								0.382	3/8	5/32	0.008	0.173
		32.52-C25	09T308	●	●	●	●	●			●	●											1/64	
		431-C25	120404		●	●		●			●	●						●	●				1/32	
		432-C25	120408		●	●	●	●			●	●								0.508	1/2	3/16	1/64	0.217
		433-C25	120412					●										●	●				1/32	
																							3/64	

● Stock Item

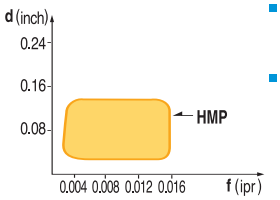
CCMT-HMP 6-CCN-

C type (80°)





•Versatile chipbreaker.

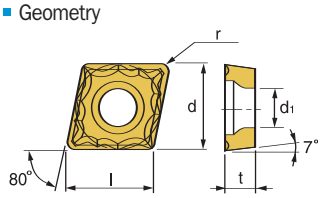


■ USE
Medium

■ Recommendation

HMP d = 0.02~0.14inch
f = 0.002~0.016ipr

■ Geometry

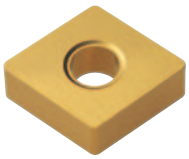


Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NC9020	NC320	NC315K	PC9030	PC8010	CN200				H01	G10	ST10	ST30	l	d	t	r	d1
SCLC R/L SI-SCLC R/L SCMCN	CCMT	21.50.5-HMP	060202	●		●	●	●			●	●	●								0.256	1/4	3/32	0.008 1/64 1/32	0.110
		21.51-HMP	060204	●	●	●	●	●			●	●	●												
		21.52-HMP	060208			●		●			●	●	●												
		32.50.5-HMP	09T302	●	●	●		●			●	●	●								0.382	3/8	5/32	0.008 1/64 1/32	0.173
		32.51-HMP	09T304	●	●	●	●	●			●	●	●												
		32.52-HMP	09T308	●	●	●	●	●			●	●													
		431-HMP	120404	●	●		●	●			●	●									0.508	1/2	3/16	1/64 1/32	0.217
		432-HMP	120408	●	●	●	●	●			●	●													

● Stock Item

CNMA 6-CMA-

C type (80°)



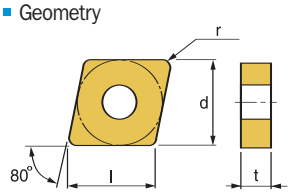
•Cast Iron Applications.

■ USE
Various

■ Recommendation

d = 0.04~0.08inch
f = 0.002~0.012ipr

■ Geometry

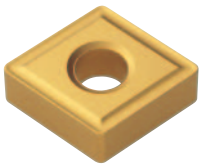


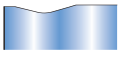
Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
				NC310	NC3020	NC330	NC325S	NC305K	NC315K	NC6010			CN200				H01	G10			l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMA	322	090308																		0.382	3/8	1/8	1/32
		431	120404																		0.508	1/2	3/16	1/64 1/32 3/64 1/16
		432	120408					●	●	●														
		433	120412					●	●	●														
		434	120416																					
		543	160612																		0.634	5/8	1/4	3/64 1/16
		544	160616																					
		642	190608																		0.760	3/4	1/4	1/32 3/64 1/16
		643	190612						●															
		644	190616																					

● Stock Item

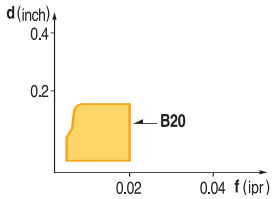
CNMG-B20 6-CNB-

C type (80°)





•Cast Iron chipbreaker.

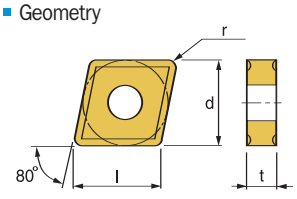


■ USE
Light & Medium

■ Recommendation

B20 d = 0.06~0.16inch
f = 0.006~0.02ipr

■ Geometry

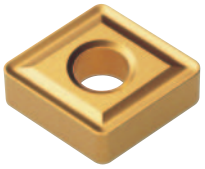


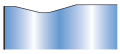
Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC305K	NC315K	NC123K	NC6010		CN200				H01	G10	ST10		l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMG	431-B20	120404					●			●										0.508	1/2	3/16	1/64 1/32 3/64
		432-B20	120408					●																
		433-B20	120412																					
		641-B20	190604																		0.760	3/4	1/4	1/64 1/32 3/64
		642-B20	190608																					
		643-B20	190612																					

● Stock Item

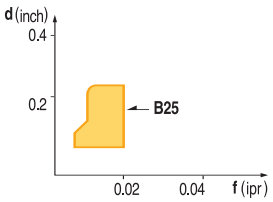
CNMG-B25 6-CNA-

C type (80°)





•All purpose chipbreaker.

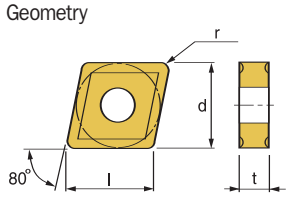


■ USE
General Purpose

■ Recommendation

B25 d = 0.08~0.235inch
f = 0.01~0.02ipr

■ Geometry

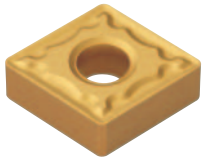


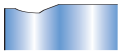
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	CN200				H01	G10	ST20	ST30	l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMG	431-B25	120404																				1/64
		432-B25	120408				●										●	●	●	0.508	1/2	3/16	1/32
		433-B25	120412				●																3/64
		542-B25	160608																	0.634	5/8	1/4	1/32
		543-B25	160612																				3/64
		641-B25	190604																				1/64
		642-B25	190608																				1/32
		643-B25	190612				●										●			0.760	3/4	1/4	3/64
		644-B25	190616																				1/16

● Stock Item

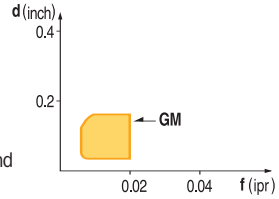
CNMG-GM 6-CNM-

C type (80°)





•All purpose chipbreaker.
•Strong cutting edge for aggressive feed rates and interrupted cuts.

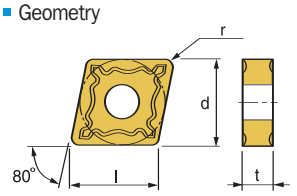


■ USE
Medium

■ Recommendation

GM d = 0.028~0.16inch
f = 0.004~0.02ipr

■ Geometry

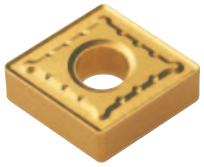


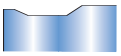
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	PC230	NC305K	NC315K		CN200				H01	G10	ST10		l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMG	321-GM	090304									●								0.382	3/8	1/8	1/64
		322-GM	090308									●											1/32
		431-GM	120404				●																1/64
		432-GM	120408	●		●	●	●												0.508	1/2	3/16	1/32
		433-GM	120412	●																			3/64
		642-GM	190608																	0.760	3/4	1/4	1/32

● Stock Item

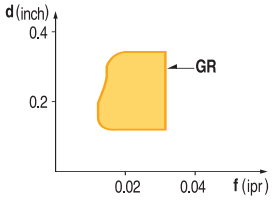
CNMG-GR 6-CNR-

C type (80°)

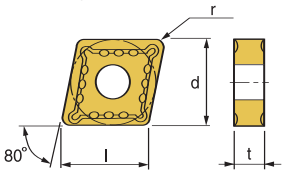




- Large depths of cut and aggressive feeds.
- Interrupted cuts.



- USE
  Rough
- Recommendation
  GR d = 0.12~0.32inch
  f = 0.012~0.032ipr
- Geometry

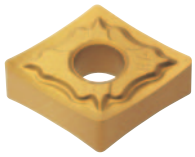


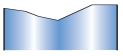
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC40	NC305K	NC315K	NC6010	CN200				H01	G10	ST10		l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMG	432-GR	120408	●	●	●	●		●	●	●									0.508	1/2	3/16	1/32
		433-GR	120412	●		●	●		●	●	●												3/64
		434-GR	120416			●	●				●												1/16
		542-GR	160608			●														0.634	5/8	1/4	1/32
		543-GR	160612			●																	3/64
		544-GR	160616																				1/16
		642-GR	190608			●	●				●									0.760	3/4	1/4	1/32
		643-GR	190612	●		●	●				●												3/64
		644-GR	190616	●		●	●																1/16
		856-GR	250724																	1.016	1	5/16	3/32
		866-GR	250924				●															3/8	3/32

● Stock Item

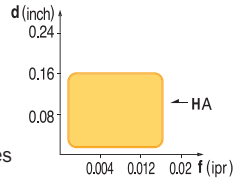
CNMG(M)-HA 6-CNJ-

C type (80°)

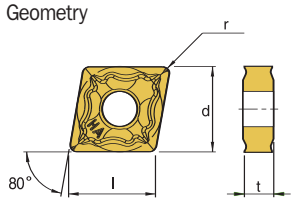




- Free cutting.
- Unique geometry enhances durability.



- USE
  Light & Medium
- Recommendation
  HA d = 0.08~0.235inch
  f = 0.01~0.02ipr
- Geometry

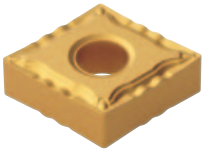


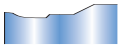
Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CT10	CN200			H01	G10	ST10		l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMG	431-HA	120404			●		●			●	●												1/64
		432-HA	120408	●		●		●			●	●									0.508	1/2	3/16	1/32
		433-HA	120412					●				●												3/64
																					0.508	1/2	3/16	1/32

● Stock Item

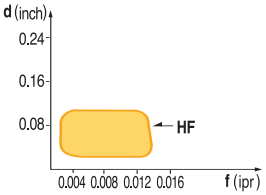
CNMG-HF 6-CNF-

C type (80°)





- Excellent chip control for varying depths of cut.
- Special design enhances cutting edge strength.

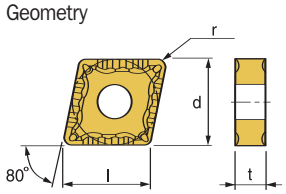


■ USE
Finishing

■ Recommendation

HF d =0.01~0.1inch
f = 0.002~0.014ipr

■ Geometry

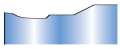


Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC305K	NC315K				CN100	CT10	CN200		H01	G10	ST10		l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMG	321-HF	090304			●															0.382	3/8	1/8	1/64
		322-HF	090308			●																		1/32
		431-HF	120404	●		●	●								●									1/64
		432-HF	120408	●	●	●	●								●						0.508	1/2	3/16	1/32
		433-HF	120412																					3/64

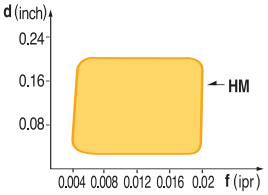
● Stock Item

CNMG-HM 6-CNH-

C type (80°)



- All purpose chipbreaker

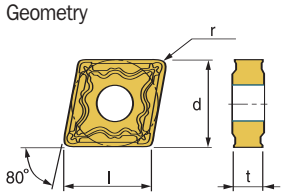


■ USE
Medium

■ Recommendation

HM d = 0.04~0.2inch
f = 0.004~0.02ipr

■ Geometry

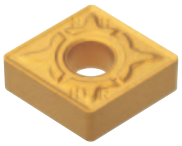


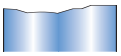
Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CN100	CT10	CN200	CN20	H01	G10	ST10		l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMG	321-HM	090304			●	●														0.382	3/8	1/8	1/64
		322-HM	090308			●																		1/32
		431-HM	120404	●	●	●	●	●			●	●												1/64
		432-HM	120408	●	●	●	●	●	●	●	●	●									0.508	1/2	3/16	1/32
		433-HM	120412			●	●	●		●	●	●												3/64
		541-HM	160604																					1/64
		542-HM	160608			●	●														0.634	5/8	1/4	1/32
		543-HM	160612				●																	3/64
		643-HM	190612			●	●														0.760	3/4	1/4	3/64

● Stock Item

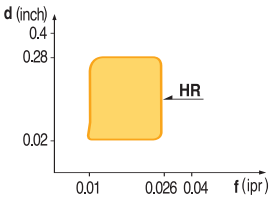
CNMG-HR 6-CNG-

C type (80°)



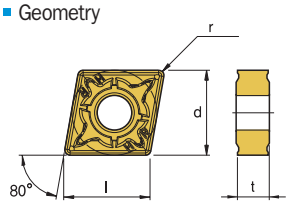


- Large depths of cut and aggressive feeds.
- Interrupted cuts.



- USE
  Rough
- Recommendation
  HR d = 0.1~0.28inch
  f = 0.01~0.026ipr

- Geometry

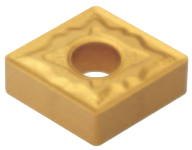


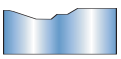
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	NC6010	CN200				H01	G10	ST10		l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMG	432-HR	120408	●	●	●	●	●				●												
		433-HR	120412	●	●	●	●	●				●									0.508	1/2	3/16	1/32 3/64
		434-HR	120416																					1/16
		542-HR	160608			●	●					●												1/32
		543-HR	160612			●	●					●									0.634	5/8	1/4	3/64
		544-HR	160616			●	●																	1/16
		546-HR	160624																					3/32
		642-HR	190608			●	●																	1/32
		643-HR	190612	●	●	●	●	●				●									0.760	3/4	1/4	3/64
		644-HR	190616			●	●	●																1/16
		646-HR	190624																					3/32
		866-HR	250924																		1.016	1	3/8	3/32

● Stock Item

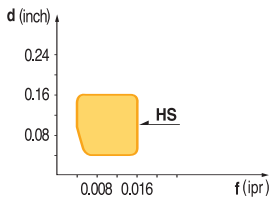
CNMG-HS 6-CNC-

C type (80°)



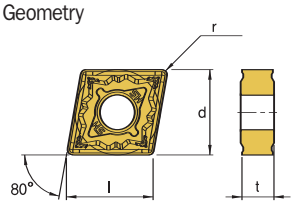


- Designed for stainless steel and high-temp alloys.
- High rake angle on land increases wear resistance.



- USE
  Medium
- Recommendation
  HS d = 0.04~0.16inch
  f = 0.004~0.016ipr

- Geometry

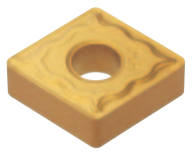


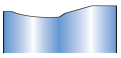
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMG	321-HS	090304																		0.382	3/8	1/8	1/64
		322-HS	090308																					1/32
		431-HS	120404					●			●	●												1/64
		432-HS	120408					●			●	●									0.508	1/2	3/16	1/32
		433-HS	120412					●			●	●												3/64
		543-HS	160612																		0.634	5/8	1/4	3/64
		544-HS	160616																					1/16
		643-HS	190612																		0.760	3/4	1/4	3/64
		644-HS	190616																					1/16

● Stock Item

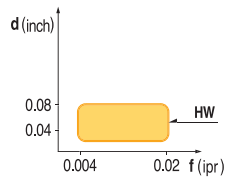
CNMG-HW 6-CNI-

C type (80°)



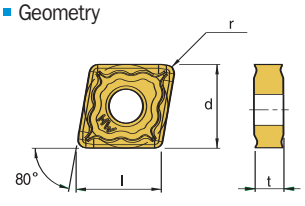


- Reinforced chip pocket for aggressive speeds and feeds.
- Wiper Geometry for excellent surface finishes at high feed rates.



- USE
  Wiper, Finish
- Recommendation
  HW d = 0.012~0.08inch
  f = 0.004~0.02ipr

- Geometry

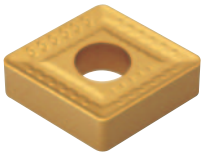


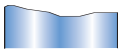
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030		CN200				H01	G10	ST10		l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMG	431-HW	120404	●		●																		1/64
		432-HW	120408	●	●	●	●	●													0.508	1/2	3/16	1/32
		433-HW	120412	●	●	●	●	●																3/64

● Stock Item

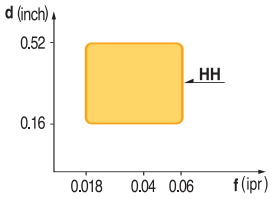
CNMM-HH 6-CMH-, 6-CMM-

C type (80°)





- Stout Geometry for extreme feeds and depth of cuts.
- Free Cutting design.

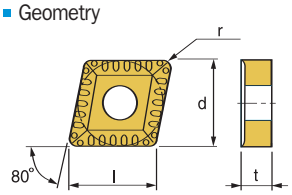


■ USE
Rough

■ Recommendation

HH d = 0.16~0.52inch
f = 0.018~0.06ipr

■ Geometry

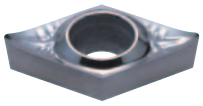


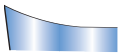
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	NC6010	CN200				H01	G10	ST10		l	d	t	r
MCLN R/L MCRN R/L SI-MCLN R/L	CNMM 544-HH	160616																		0.634	5/8	1/4	1/16
	642-HH	190608			●	●					●												1/32
	643-HH	190612				●					●									0.760	3/4	1/4	3/64
	644-HH	190616																					1/16
	646-HH	190624																					3/32
	856-HH	250724																				5/16	3/32
	866-HH	250924																		1.016	1	3/8	3/32
	868-HH	250932																				3/5	1/8

● Stock Item

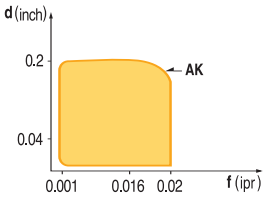
DCGT-AK 6-DCG-

D type (55°)





•Aluminum.

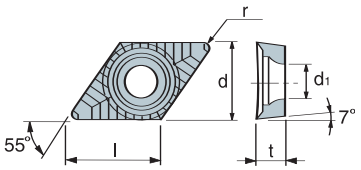


■ USE
Aluminum Turning

■ Recommendation

AK d = 0.005~0.2inch
f = 0.001~0.02ipr

■ Geometry

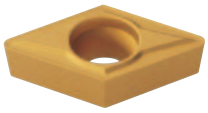


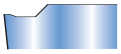
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
				NC310	NC3020	NC330	NC305K	NC315K	PC130	PC230		CN200				H01	H010	G10	ST10	l	d	t	r	d1
SDJC R/L SDPCN SI-SDUC R/L	DCGT	21.50.52-AK	070202													●				0.307	1/4	3/32	0.008 1/64	0.110
		21.51-AK	070204													●								
		32.50.5-AK	11T302													●				0.457	3/8	5/32	0.008 1/64 1/32 3/64	0.134
		32.51-AK	11T304													●								
		32.52-AK	11T308													●								
		32.53-AK	11T312																					

● Stock Item

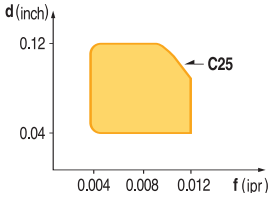
DCMT-C25 6-DCM-

D type (55°)





•Interrupted cuts.
•Free cutting.
•ID & OD turning.

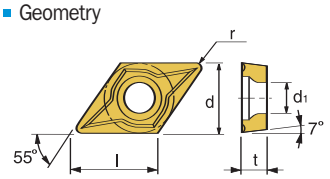


■ USE
Medium

■ Recommendation

C25 d = 0.04~0.12inch
f = 0.004~0.012ipr

■ Geometry

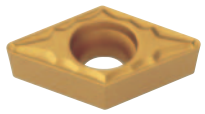


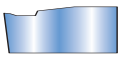
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r	d1
SDJC R/L SDPCN SI-SDUC R/L	DCMT	21.50.5-C25	070202			●	●					●											0.008	
		21.51	070204			●	●	●			●	●								0.307	1/4	3/32	1/64	0.110
		21.52	070208			●	●	●															1/32	
		32.50.5	11T302			●		●			●	●											0.008	
		32.51	11T304	●	●	●	●	●			●	●								0.457	3/8	5/32	1/64	0.173
		32.52	11T308	●	●	●	●	●				●											1/32	

● Stock Item

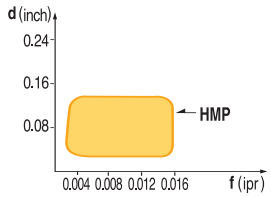
DCMT-HMP 6-DCN-

D type (55°)





•Versatile chipbreaker.

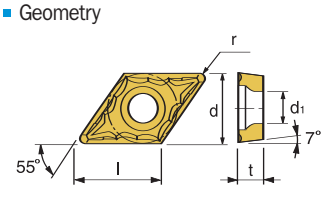


■ USE
Medium

■ Recommendation

HMP d = 0.00~0.14inch
f = 0.002~0.016ipr

■ Geometry

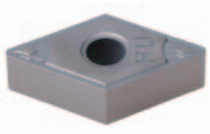


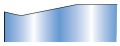
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NC9020	NC305K		PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r	d1
SDJC R/L SDPCN SI-SDUC R/L	DCMT	21.50.5-HMP	070202			●	●					●											0.008	
		21.51-HMP	070204			●	●	●				●								0.307	1/4	3/32	1/64	0.110
		21.52-HMP	070208			●	●					●											1/32	
		32.50.5-HMP	11T302	●		●																	0.008	
		32.51-HMP	11T304	●	●	●		●			●	●								0.457	3/8	5/32	1/64	0.173
		32.52-HMP	11T308			●	●	●			●	●											1/32	

● Stock Item

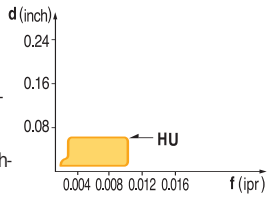
DNG(M)G-HU 6-DNV

D type (55°)





- Capable of producing fine surface finish.
- Free cutting.
- Excellent chip control for finishing depths of cut and feeds.

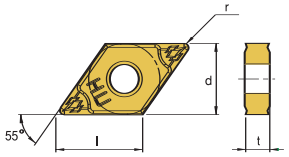


■ USE
Finish

■ Recommendation

HU d = 0.004~0.06inch
f = 0.001~0.01ipr

■ Geometry

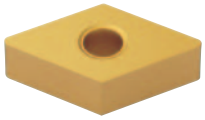


Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CN200				H1	G10E	ST10P		l	d	t	r
PDJNR/L PDNNR/L	DNGG 441-HU	150604																					
	442-HU	150608																					
	431-HU	150404									●												
	432-HU	150408									●												
	433-HU	150412																					
	441-HU	150604																					
	442-HU	150608																					
	443-HU	150612																					

● Stock Item

DNMA 6-DNA-

D type (55°)

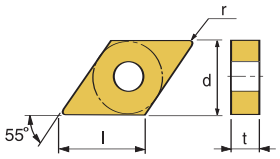


- Cast Iron applications.

■ USE
Various

■ Recommendation

■ Geometry

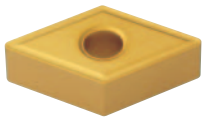


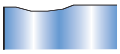
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC305K	NC315K			CN200				H1	G10E	ST10P		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMA 332	110408																	0.457	3/8	3/16	1/32
	431	150404																				1/64
	432	150408					●	●											0.610	1/2	3/16	1/32
	433	150412																				3/64
	441	150604																				1/64
	442	150608																				1/32
	443	150612																	0.610	1/2	1/4	3/64
	444	150616																				1/16
	542	190608																	0.764	5/8	1/4	1/32

● Stock Item

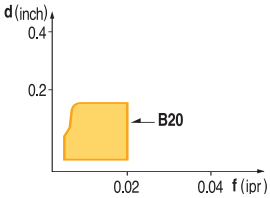
DNMG-B20 6-DNC-

D type (55°)





- Cast Iron chipbreaker.

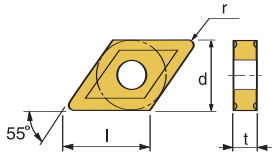


■ USE
Light & Medium

■ Recommendation

B20 d = 0.06~0.16inch
f = 0.006~0.02ipr

■ Geometry

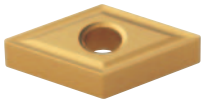


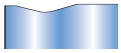
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC305K	NC315K	NC123K		CN200				H01	G10	ST10		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMG 432-B20	150408					●												0.610	1/2	3/16	1/32
	433-B20	150412					●															3/64
	442-B20	150608																	0.610	1/2	1/4	1/32
	433-B20	150612																				3/64

● Stock Item

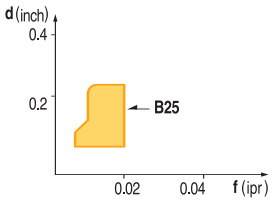
DNMG-B25 6-DNB-

D type (55°)

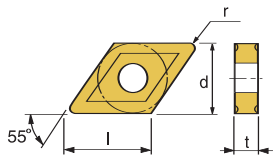




•All purpose chipbreaker.



- USE
  General Purpose
- Recommendation
  B25 d = 0.16~0.4inch
  f = 0.02~0.04ipr
- Geometry

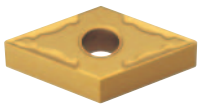


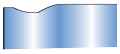
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC230	CN200				H01	G10	ST10		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMG 430.5-B25	150402																		0.610	1/2	3/16	0.008
	431-B25	150404			●																		1/64
	432-B25	150408																					1/32
	433-B25	150412			●						●												3/64
	440.5-B25	150602																		0.610	1/2	1/4	0.008
	441-B25	150604																					1/64
	442-B25	150608																					1/32
	443-B25	150612																					3/64

● Stock Item

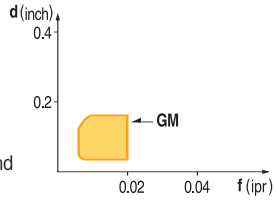
DNMG-GM 6-DNM-

D type (55°)

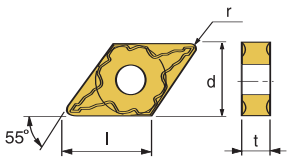




•All purpose chipbreaker.
•Strong cutting edge for aggressive feed rates and interrupted cuts.



- USE
  Medium
- Recommendation
  GM d = 0.03~0.16inch
  f = 0.004~0.02ipr
- Geometry

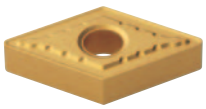


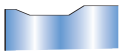
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	NC320	PC230	CN200				H01	G10	ST10		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMG 322-GM	110308																		0.457	3/8	1/8	1/32
	331-GM	110404			●															0.457	3/8	3/16	1/64
	332-GM	110408			●																		1/32
	431-GM	150404			●	●					●												1/64
	432-GM	150408			●	●					●									0.610	1/2	3/16	1/32
	433-GM	150412																					3/64
	441-GM	150604																					1/64
	442-GM	150608																		0.610	1/2	1/4	1/32
	443-GM	150612																					3/64

● Stock Item

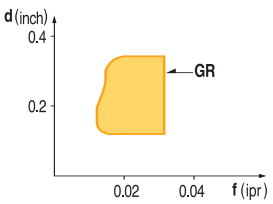
DNMG-GR 6-DNG-

D type (55°)

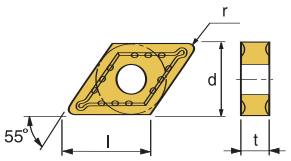




•Large depths of cut and aggressive feeds.
•Interrupted cuts.



- USE
  Rough
- Recommendation
  GR d = 0.12~0.32inch
  f = 0.012~0.032ipr
- Geometry

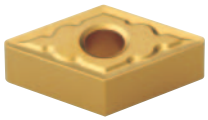


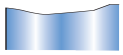
Applicable holder	Designation	ISO	Coated Carbide							Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC305K	NC315K		CN200				H01	G10	ST10		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMG 431-GR	150404																			1/64
	432-GR	150408	●		●	●												0.610	1/2	3/16	1/32
	433-GR	450412			●																3/64
	434-GR	150416																			1/16
	441-GR	150604																			1/64
	442-GR	150608																0.610	1/2	1/4	1/32
	443-GR	150612																			3/64
	444-GR	150616																			1/16

● Stock Item

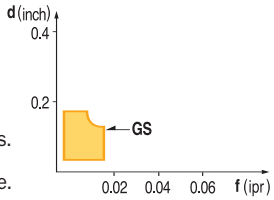
DNMG-GS 6-DNE-

D type (55°)



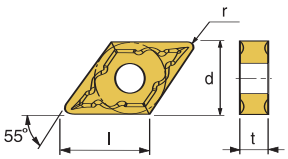


- Designed for stainless steel and high-temp alloys.
- High rake angle on land increases wear resistance.



- USE
  Medium
- Recommendation
  GS d = 0.04~0.16inch
  f = 0.004~0.016ipr

- Geometry

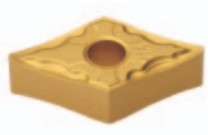


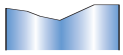
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NCM120	PC9030	NC325S	CN200				H01	G10	ST10		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMG 431-GS	150404								●									0.610	1/2	3/16	1/64
	432-GS	150408								●												1/32
	433-GS	150412																				3/64
	441-GS	150604																	0.610	1/2	1/4	1/64
	442-GS	150608																				1/32
	443-GS	150612																				3/64

● Stock Item

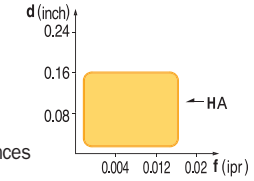
DNMG-HA 6-DNP-

D type (55°)



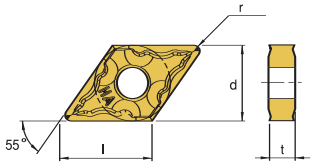


- Free Cutting .
- Unique geometry enhances durability.



- USE
  Light & Medium
- Recommendation
  HA d = 0.03~0.16inch
  f = 0.002~0.016ipr

- Geometry

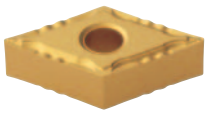


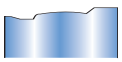
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC320	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	NC8010	CN200				H01	G10	ST10		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMG 431-HA	150404			●		●			●	●									0.610	1/2	3/16	1/64
	432-HA	150408			●		●			●	●												1/32
	441-HA	150604																		0.610	1/2	1/4	1/64
	442-HA	150608																					1/32

● Stock Item

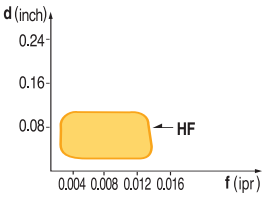
DNMG-HF 6-DNF-, 6-DNO-

D type (55°)



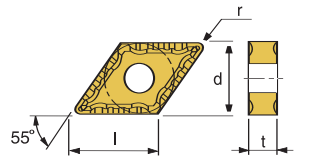


- Excellent chip control for varying depths of cut.
- Special design enhances cutting edge strength.



- USE
  Finish
- Recommendation
  HF d = 0.015~0.1inch
  f = 0.002~0.014ipr

- Geometry

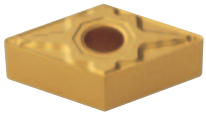


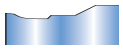
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	CN200				H01	G10	ST10		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMG 330.5-HF	110402																	0.457	3/8	3/16	0.008
	331-HF	110404	●		●																	1/64
	332-HF	110408	●		●																	1/32
	431-HF	150404	●	●	●	●					●								0.610	1/2	3/16	1/64
	432-HF	150408	●	●	●						●											1/32
	433-HF	150412																				3/64
	441-HF	150604																	0.610	1/2	1/4	1/64
	442-HF	150608																				1/32
	443-HF	150612																				3/64

● Stock Item

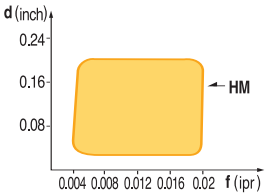
DNMG-HM 6-DNN-

D type (55°)





•All purpose chipbreaker.

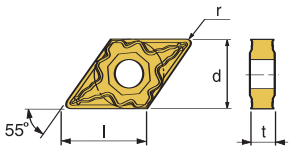


■ USE
Medium

■ Recommendation

HM d = 0.04~0.2inch
f = 0.004~0.02ipr

■ Geometry

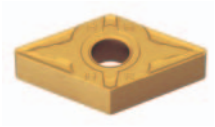


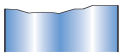
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K		PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMG 331-HM	110404			●		●			●										0.457	3/8	3/16	1/64
	332-HM	110408			●		●			●	●												1/32
	333-HM	110412			●		●			●	●												3/64
	431-HM	150404	●		●	●	●			●	●									0.610	1/2	3/16	1/64
	432-HM	150408		●	●	●	●			●	●												1/32
	433-HM	150412			●	●					●												3/64
	441-HM	150604																		0.610	1/2	1/4	1/64
	442-HM	150608																					1/32
	443-HM	150612																					3/64

● Stock Item

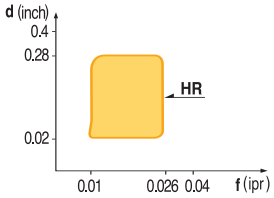
DNMG-HR 6-DNR-

D type (55°)





•Large depths of cut and aggressive feeds.
•Interrupted cuts.

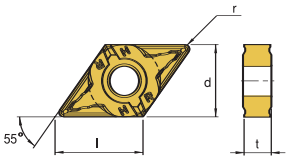


■ USE
Rough

■ Recommendation

HR d = 0.1~0.28inch
f = 0.010~0.026ipr

■ Geometry

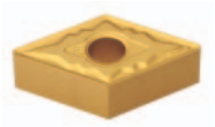


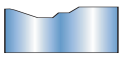
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030		CN200				H01	G10	ST10		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMG 432-HR	150408			●	●																	1/32
	433-HR	150412			●	●														0.610	1/2	3/16	3/64
	434-HR	150416																					1/16
	442-HR	150608																					1/32
	443-HR	150612																		0.610	1/2	1/4	3/64
	444-HR	150616																					1/16

● Stock Item

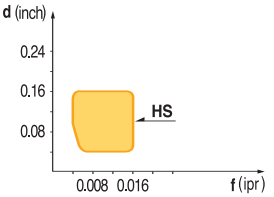
DNMG-HS 6-DNS-

D type (55°)





•Designed for Stainless Steel and high-temp alloys.
•High rake angle on land increases wear resistance.

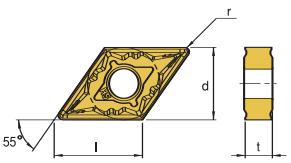


■ USE
Medium

■ Recommendation

HS d = 0.04~0.16inch
f = 0.004~0.016ipr

■ Geometry

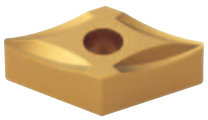


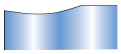
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMG 332-HS	110408																		0.457	3/8	3/16	1/32
	333-HS	110412																					3/64
	431-HS	150404																					1/64
	432-HS	150408					●			●	●									0.610	1/2	3/16	1/32
	433-HS	150412					●			●	●												3/64
	441-HS	150604																					1/64
	442-HS	150608																		0.610	1/2	1/4	1/32
	443-HS	150612																					3/64

● Stock Item

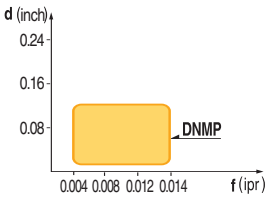
DNMP 6-DNQ-

D type (55°)





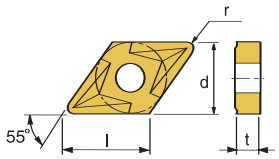
•High temp Alloy and Aluminum Rougher.



■ USE
Light

■ Recommendation

■ Geometry

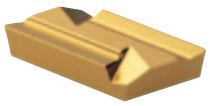


Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC305K	NC315K	NC9020			CN200				H01	G10	ST10		l	d	t	r
MDJN R/L MDPNN SI-MDUN	DNMP 432	150408			●				●											0.610	1/2	3/16	1/32 3/64
	433	150412																					
	442	150608																		0.610	1/2	1/4	1/32 3/64
	443	150612																					

● Stock Item

KNUX 6-KUL-, 6-KUR-

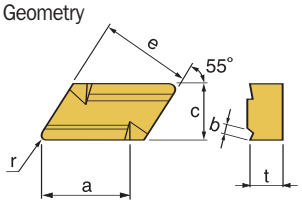
K type (55°)



■ USE

■ Recommendation

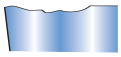
■ Geometry



Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)					
			NC310	NC3015	NC3020	NC330	NC40	NC9020	NC305K	NC315K		CN200				H01	G10	ST10		a	e	t	r	c	b
	KNUX 160405 R11					●														0.630	0.636	3/16	0.197	3/8	0.087
	160410 R11					●																	0.394		
	160405 R12					●														0.630	0.636	3/16	0.197	3/8	0.126
	160410 R12					●																	0.394		
	160405 L11					●																	0.197		
	160410 L11																			0.630	0.636	3/16	0.394	3/8	0.087
	160405 L12																			0.630	0.636	3/16	0.197	3/8	0.126
	160410 L12																						0.394		

● Stock Item

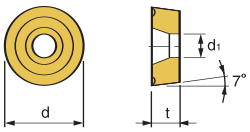
RCMX 6-RCX-



■ USE

■ Recommendation

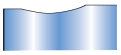
■ Geometry



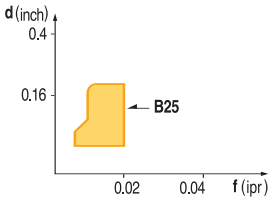
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)				
			NC310	NC3015	NC3020	NC330	NC305K	NC315K	NC315K			CN200				H01	G10	ST10		l	d	t	r	d1
	RCMX 1003M0	0.394			●	●															0.394	1/8		0.142
	1204M0	0.472			●	●															0.472	3/16		0.165
	1606M0	0.630			●	●															0.630	1/4		0.205
	2006M0	0.787																			0.787	1/4		0.256
	2507M0	0.984																			0.984	5/16		0.285
	3209M0	1.260																			1.260	3/8		0.376

● Stock Item

RNMG-B25 6-RNM-



•All purpose chipbreaker.

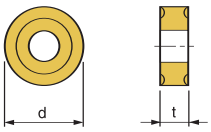


■ USE
General Cutting

■ Recommendation

B25 d = 0.16~0.4mm
f = 0.02~0.04ipr

■ Geometry

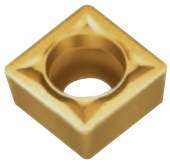


Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030		CN200				H01	G10	ST10		l	d	t	r
MRGN R/L	RNMG 32-B25	090300				●												●			3/8	1/8	
	43-B25	120400				●											●				1/2	3/16	
	53-B25	150400																			5/8	3/16	
	54-B25	150600																			5/8	1/4	
	64-B25	190600			●																3/4	1/4	
	84-B25	250600																			1	1/4	
	86-B25	250900																			1	3/8	
	106-B25	310900																			1.25	3/8	

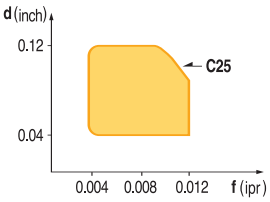
● Stock Item

SCMT-C25 6-SCM-

S type (90°)



- Interrupted cuts.
- Free cutting.
- ID & OD Turning.

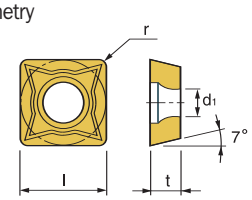


■ USE
Medium

■ Recommendation

C25 d = 0.04~0.12inch
f = 0.004~0.012ipr

■ Geometry

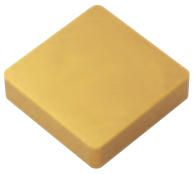


Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030		CN200				H01	G10	ST30		(l=d)	t	r	d1
SSDCN	SCMT	21.51-C25	060204				●												●		1/4	3/32	1/64	0.173
		32.51-C25	09T304			●															3/8	5/32	1/64 1/32	0.173
		32.52-C25	09T308				●																	
		431-C25	120404																		1/2	3/16	1/64 1/32	0.216
		432-C25	120408			●																		

● Stock Item

SNGN 6-SNG-

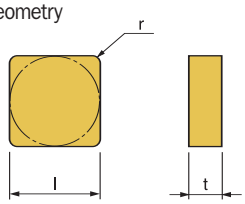
S type (90°)



■ USE

■ Recommendation

■ Geometry

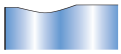


Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)		
				NC310	NC3015	NC3020	NC330	NC305K	NC315K	NC123K	NC320	CN100	CT10	CN20		ST30A	G10	ST20	ST30	(l=d)	t	r
	SNGN	321	090304																	3/8	1/8	1/64 1/32
		322	090308																			
		421	120304																	1/2	1/8	1/64 1/32 3/64
		422	120308																			
		423	120312																			
		431	120404																	1/2	3/16	1/64 1/32 3/64
		432	120408																			
		433	120412																			
		532	150408																	5/8	3/16	1/32 3/64 1/16
		533	150412																			
		534	150416																			
		633	190412																●	3/4	3/16	3/64
		634	190416																●	1	1/4	1/64
		841	250604																			

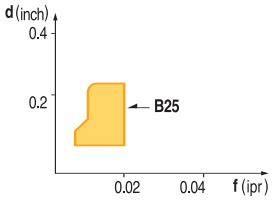
● Stock Item

SNMG-B25 6-SNM-

S type (90°)



•All purpose chipbreaker.

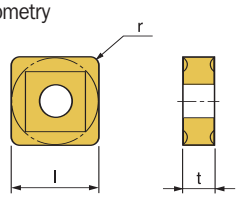


■ USE
General Purpose

■ Recommendation

B25 d = 0.08~0.235inch
f = 0.01~0.02ipr

■ Geometry

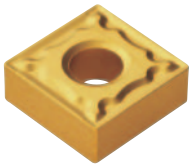


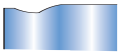
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)		
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030		CN200				H01	G10	ST20	ST30	(l=d)	t	r
MSDNN MSKN R/L MSRN R/L MSSN R/L	SNMG 322-B25	090308																●		3/8	1/8	1/32
	431-B25	120404																●		1/2	3/16	1/64
	432-B25	120408				●											●	●				1/32
	433-B25	120412				●																3/64
	434-B25	120416																				1/16
	542-B25	150608																		5/8	1/4	1/32
	543-B25	150612																				3/64
	544-B25	150616																				1/16
	642-B25	190608																		3/4	1/4	1/32
	643-B25	190612				●											●	●				3/64
	644-B25	190616																				1/16
	854-B25	250716																		1	5/16	1/16
	856-B25	250724																				3/32

● Stock Item

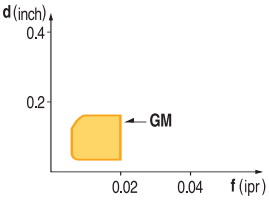
SNMG(M)-GM 6-SNN-

S type (90°)





•All purpose chipbreaker.
•Strong cutting edge for aggressive feed rates and interrupted cuts.

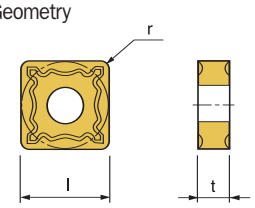


■ USE
Medium

■ Recommendation

GM d = 0.028~0.16inch
f = 0.004~0.02ipr

■ Geometry

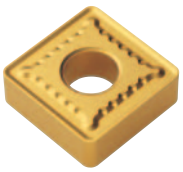


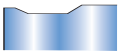
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)		
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC230	CN200				H01	G10	ST10		(l=d)	t	r
MSDNN MSKN R/L MSRN R/L MSSN R/L	SNMG 322-GM					●																1/64
	431-GM	120404																		1/2	3/16	1/32
	432-GM	120408				●					●											3/64
	433-GM	120412																		1/2	3/16	3/64
	643-GM					●																

● Stock Item

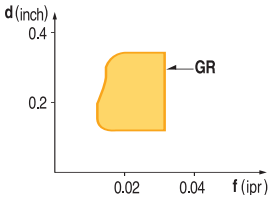
SNMG(M)-GR 6-SNR-

S type (90°)



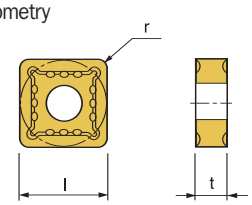


- Large depths of cut and aggressive feeds.
- Interrupted cuts.



- USE
  Rough
- Recommendation
  GR d = 0.12~0.32inch
  f = 0.012~0.032ipr

- Geometry

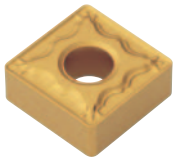


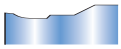
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)		
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	NC320	CN200				H01	G10	ST10		(l=d)	t	r
MSDNN MSKN R/L MSRN R/L MSSN R/L	SNMG 431-GR	120404			●															1/2	3/16	1/64
	432-GR	120408			●																	1/32
	433-GR	120412			●																	3/64
	542-GR	150608																		5/8	1/4	1/32
	543-GR	150612				●					●											3/64
	642-GR	190608																		3/4	1/4	1/32
	643-GR	190612			●																	3/64
	644-GR	190616			●																	1/16
	856-GR	250724																		1	5/16	3/32
	866-GR	250924																			3/8	3/32
	SNMM 432-GR	120408																		20/41	3/16	1/32
	433-GR	120412																				3/64
	643-GR	190612																		3/4	1/4	3/64
	644-GR	190616																				1/16

● Stock Item ○ Under preparing for stock

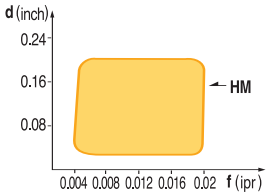
SNMG-HM 6-SNH

S type (90°)



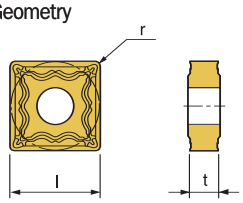


- All purpose chipbreaker



- USE
  Medium
- Recommendation
  HM d = 0.04~0.2inch
  f = 0.004~0.02ipr

- Geometry

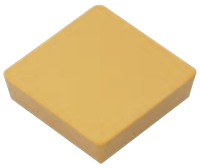


Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)		
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030		CN200				H01	G10	ST10		(l=d)	t	r
MSDNN MSKN R/L MSRN R/L MSSN R/L	SNMG 321-HM	090304																		1/2	1/8	1/64
	322-HM	090308																				1/32
	431-HM	120404																				1/64
	432-HM	120408		●																1/2	3/16	1/32
	433-HM	120412																				3/64
	643-HM	190612																		3/4	1/4	3/64

● Stock Item

SPGN 6-SPG-

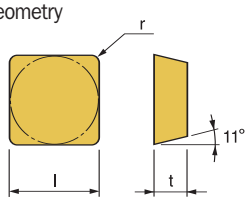
S type (90°)



■ USE

■ Recommendation

■ Geometry

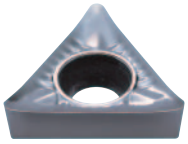


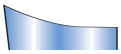
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide					(inch)		
			NC310	NC3015	NC3020	NC330	NC305K	NC315K	PC105	NC320						G10	ST30A	ST20	ST30N	ST30	(l=d)	t	r
	SPGN 2.51.50.5	070202																			5/16	3/32	0.008
	2.51.53	070208																					1/64
	321	090304																			3/8	1/8	1/64
	322	090308																●					1/32
	420.5	120302																					0.008
	421	120304				●				●													1/64
	422	120308				●										●		●		●	1/2	1/8	1/32
	423	120312				●																	3/64
	424	120316								●													1/16
	430.5	120402																			1/2	3/16	0.008
	432	120408																					1/32
	532	150408																					1/32
	533	150412																			5/8	3/16	3/64
	534	150416																					1/16
	633	190412																●		●	3/4	3/16	3/64
	634	190416																		●			1/16

● Stock Item

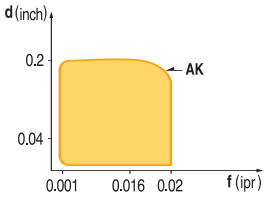
TCGT-AK 6-TCG-

T type (60°)





•Aluminum chipbreaker.

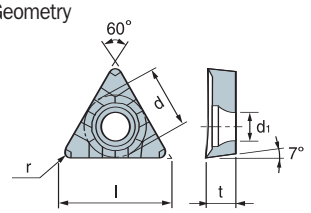


■ USE
Aluminum Turning

■ Recommendation

AK d = 0.004~0.2inch
f = 0.001~0.02ipr

■ Geometry

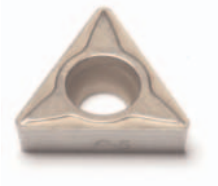


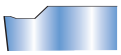
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
				NC310	NC3020	NC330	NC305K	NC315K	PC130	PC230		CN200				H01	H010	G10	ST10	l	d	t	r	d1
SI-STUC R/L STECN STFC R/L STGC R/L STJC R/L	TCGT	1.81.50.5-AK	090202																	0.378	7/32	3/32	0.008 1/64	0.098
		1.81.51-AK	090204																					
		21.50.5-AK	110202																				0.008	
		21.51-AK	110204													●				0.433	1/4	3/32	1/64	0.110
		21.52-AK	110208																				1/32	
		32.50.5-AK	16T302																				0.008	
		32.51-AK	16T304													●							1/64	
		32.52-AK	16T308													●				0.650	3/8	5/32	1/32	0.173
		32.53-AK	16T312																				3/64	
		32.54-AK	16T316																				1/16	

● Stock Item

TCMT 6-TCT-

T type (60°)



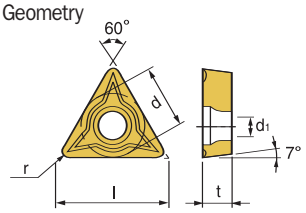


■ USE
Medium

■ Recommendation

d = 0.04~0.12inch
f = 0.004~0.12ipr

■ Geometry

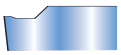


Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CN200				H01	G10	ST30		l	d	t	r	d1
SI-STUC R/L STECN STFC R/L STGC R/L STJC R/L	TCMT	32.52-C05	16T308			●												●	●		0.650	3/8	5/32	1/64 1/32	0.173

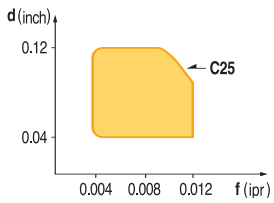
● Stock Item

TCMT-C25 6-TCM-

T type (60°)



•Interrupted cuts.
•Free cutting.
•ID & OD Turning.

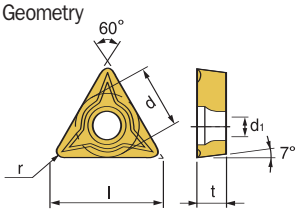


■ USE
Medium

■ Recommendation

C25 d = 0.04~0.12inch
f = 0.004~0.12ipr

■ Geometry

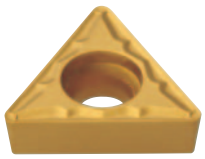


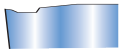
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r	d1
SI-STUC R/L STECN STFC R/L STGC R/L STJC R/L	TCMT	731-C25	090204																	0.378	7/32	3/32	1/64 1/32	0.098
		732-C25	090208																					
		21.50.5-C25	110202			●																	0.008	
		21.51-C25	110204	●	●	●	●	●			●	●								0.433	1/4	3/32	1/64	0.110
		21.52-C25	110208			●	●	●			●	●											1/32	
		32.51-C25	16T304	●	●	●	●	●			●	●								0.650	3/8	5/32	1/64	0.173
		32.52-C25	16T308	●	●	●	●	●			●	●											1/32	

● Stock Item

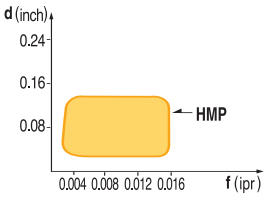
TCMT-HMP 6-TCN-

T type (60°)





•Versatile chipbreaker.

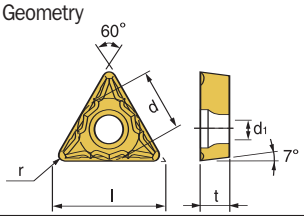


■ USE
Medium

■ Recommendation

HMP d = 0.02~0.14inch
f = 0.002~0.016ipr

■ Geometry

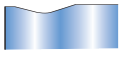


Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	PC9030	PC8010	CN100	CT10	CN200	CN20	H01	G10	ST10	ST30	l	d	t	r	d1
SI-STUC R/L STECN STFC R/L STGC R/L STJC R/L	CMT	21.50.5-HMP	110202			●				●	●			●									0.008	
		21.51-HMP	110204	●		●	●	●		●	●			●					●	0.433	1/4	3/32	1/64	0.110
		21.52-HMP	110208			●		●															1/32	
		32.51-HMP	16T304	●		●	●	●		●	●			●						0.650	3/8	5/32	1/64	0.173
		32.52-HMP	16T308	●	●	●	●	●		●	●			●					●				1/32	

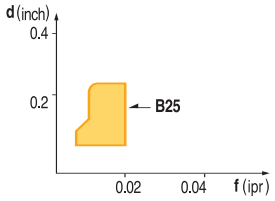
● Stock Item

TNMG-B25 6-TNM-

T type (60°)



•All purpose chipbreaker.

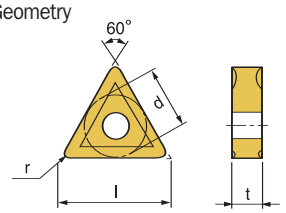


■ USE
General purpose

■ Recommendation

B25 d = 0.16~0.4inch
f = 0.020~0.04ipr

■ Geometry

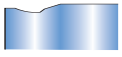


Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	CN200				G10	ST10	ST20	ST30	l	d	t	r
MTENN MTFN R/L MTGN R/L MTJN R/L SI-MTUN	TNMG	222-B25	110308																	0.433	1/4	1/8	1/32
		321-B25	160304													●			●				1/64
		322-B25	160308				●									●	●		●	0.650	1/4	1/8	1/32
		323-B25	160312													●			●				3/64
		324-B25	160316																				1/16
		331-B25	160404																●				1/64
		332-B25	160408				●												●	0.650	3/8	3/16	1/32
		333-B25	160412																				3/64
		334-B25	160416																				1/16
		431-B25	220404																				1/64
		432-B25	220408				●											●					1/32
		433-B25	220412				●												●	0.866	1/2	3/16	3/64
		434-B25	220416				●																1/16
		436-B25	220424																				3/32
		542-B25	270608				●																1/32
		543-B25	270612				●													1.083	5/8	1/4	3/64
		544-B25	270616				●									●	●		●				1/16
		654-B25	330716																	1.299	3/4	5/16	1/16
		666-B25	330924																			3/8	3/32

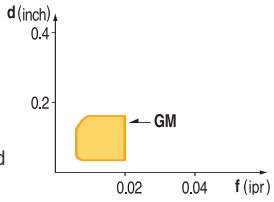
● Stock Item

TNMG(M)-GM 6-TNN-

T type (60°)

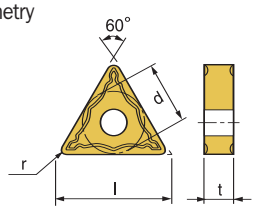


- All purpose chipbreaker.
- Strong cutting edge for aggressive feed rates and interrupted cuts.



- USE
  Medium
- Recommendation
  GM d = 0.04~0.16inch
  f = 0.08~0.02ipr

- Geometry

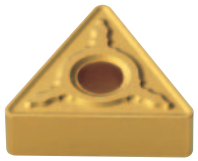


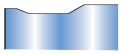
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	CN200				H01	G10	ST20	ST30	l	d	t	r
MTENN	TNMG 321-GM	160304				●													0.650	3/8	1/8	1/64
MTFN R/L	322-GM																					1/64
MTGN R/L	331-GM	160404			●	●													0.650	3/8	3/16	1/32
MTJN R/L	332-GM	160408			●	●																3/64
SI-MTUN	333-GM	160412				●																1/64
	431-GM	220404			●	●												●	0.866	1/2	3/16	1/32
	432-GM	220408			●	●												●				3/64
	433-GM	220412				●											●		0.650	3/8	3/16	3/64
	333-GM	160412																	0.866	1/2	3/16	3/64
	TNMM 433-GM	220412																				1/16
	434-GM	220416																				

● Stock Item

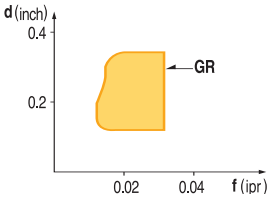
TNMG(M)-GR 6-TNR-

T type (60°)



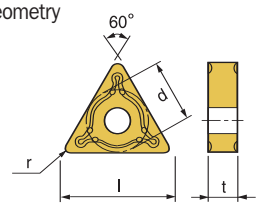


- Large depths of cut and aggressive feeds.
- Interrupted cuts.



- USE
  Rough
- Recommendation
  GR d = 0.12~0.32inch
  f = 0.012~0.032ipr

- Geometry

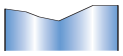


Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC305K	NC315K	NC6010		CN200				H01	G10	ST10		l	d	t	r
MTENN	TNMG 322-GR	160408																	0.650	3/8	3/16	1/32
MTFN R/L	332-GR	160412			●	●																3/64
MTGN R/L	333-GR	220408																				1/32
MTJN R/L	432-GR	220412			●	●													0.866	1/2	3/16	3/64
SI-MTUN	433-GR	220416			●	●																1/16
	434-GR	270608																				1/32
	542-GR	270612																	1.083	5/8	1/4	3/64
	543-GR	270616			●																	1/16
	544-GR	330924			●	●			●										1.299	3/4	3/8	3/32
	666-GR	220408																				1/32
	TNMM 432-GR	220412																	0.866	1/2	3/16	3/64
	433-GR	220416																				1/16
	434-GR																					

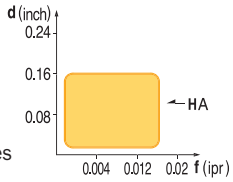
● Stock Item

TNMG-HA 6-TNJ-

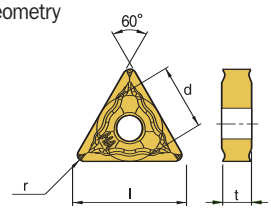
T type (60°)



- Free-Cutting.
- Unique geometry enhances durability.



- USE
  Light & Medium
- Recommendation
  HA d = 0.03~0.16inch
  f = 0.002~0.016ipr
- Geometry

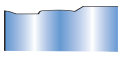


Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	CT10	CN200			H01	G10	ST10		l	d	t	r
MTENN MTFN R/L MTGN R/L MTJN R/L SI-MTUN	TNMG 321-HA						●												0.650	3/8	3/16	1/64
	331-HA	160404			●		●															1/32
	332-HA	160408			●		●			●									0.866	1/2	3/16	1/32
	432-HA	220408																				

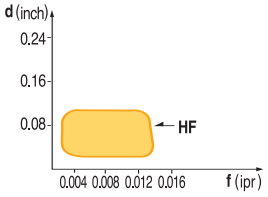
● Stock Item

TNMG-HF 6-TNF-

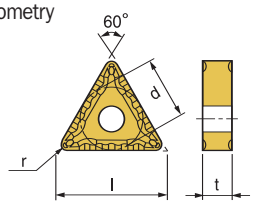
T type (60°)



- Excellent chip control for varying depths of cut.
- Special design enhances cutting edge strength.



- USE
  Finish
- Recommendation
  HF d = 0.012~0.01inch
  f = 0.002~0.014ipr
- Geometry

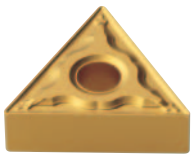


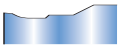
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	CN100	CT10	CN200		H01	G10	ST10		l	d	t	r
MTENN	TNMG 221-HF	110304																	0.433	1/4	1/8	1/64
MTFN R/L	331-HF	160404	●	●	●	●	●			●			●									1/64
MTGN R/L	332-HF	160408		●	●	●	●			●			●						0.650	3/8	3/16	1/32
MTJN R/L	333-HF	160412																				3/64
SI-MTUN	431-HF	220404	●	●	●	●	●			●									0.866	1/2	3/16	1/64
	432-HF	220408	●	●	●	●	●															1/32

● Stock Item

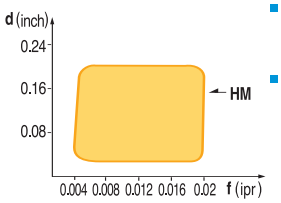
TNM(M)G-HM 6-TNH-

T type (60°)





•All purpose chipbreaker.

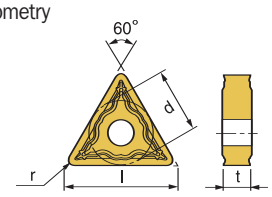


■ USE
Medium

■ Recommendation

HM d = 0.04~0.2inch
f = 0.004~0.02ipr

■ Geometry

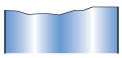


Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CN100	CT10	CN200	CN20	H01	G10	ST10		l	d	t	r
MTENN MTFN R/L MTGN R/L MTJN R/L SI-MTUN	TNMG	321-HM				●															0.433	1/4	1/8	1/32
		331-HM	160404	●		●	●					●												1/64
		332-HM	160408	●	●	●	●	●			●	●									0.650	3/8	3/16	1/32
		333-HM	160412			●	●					●												3/64
		431-HM	220404	●	●	●	●	●				●												1/64
		432-HM	220408		●	●	●	●			●	●									0.866	1/2	3/16	1/32
		433-HM	220412			●	●	●				●												3/64
		332-HM	160408																		0.650	3/8	3/16	1/32
		432-HM	220408																		0.866	1/2	3/16	1/32

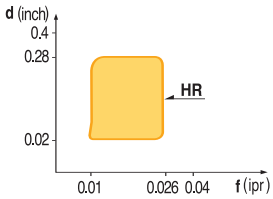
● Stock Item

TNMG-HR 6-TNG-

T type (60°)



•Large depths of cut and aggressive feeds.
•Interrupted cuts.

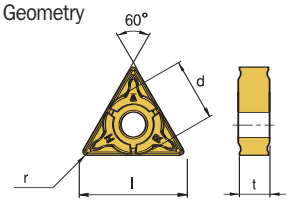


■ USE
Rough

■ Recommendation

HR d = 0.1~0.28inch
f = 0.010~0.026ipr

■ Geometry

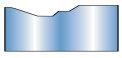


Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	NC6010	CN100	CT10	CN200	CN200	H01	G10	ST10		l	d	t	r
MTENN MTFN R/L MTGN R/L MTJN R/L SI-MTUN	TNMG	332-HR	160408			●	●					●									0.650	3/8	3/16	1/32
		333-HR	160412	●		●	●					●												3/64
		432-HR	220408	●		●	●														0.866	1/2	3/16	1/32
		433-HR	220412	●		●	●																	3/64
		434-HR	220416																					1/16
		542-HR	270608																		1.083	5/8	1/4	1/32
		543-HR	270612																					3/64
		548-HR	270632																					1/8
		644-HR				●	●					●									1.299	3/4	5/16	1/16
		666-HR	330924			●	●					●											3/8	3/32

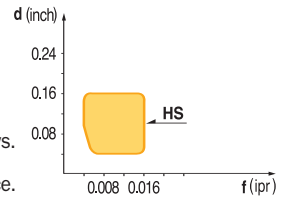
● Stock Item

TNMG-HS 6-TNC-

T type (60°)



•Designed for stainless steel and high-temp alloys.
•High rake angle on land increases wear resistance.

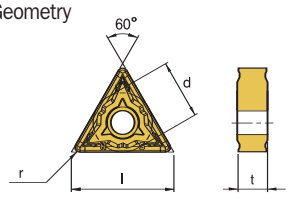


■ USE
Medium

■ Recommendation

HS d = 0.04~0.16inch
f = 0.004~0.016ipr

■ Geometry



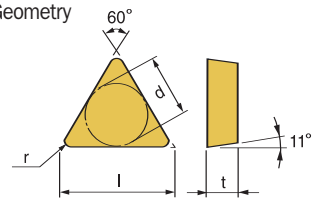
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CT10	CN200			H01	G10	ST10		l	d	t	r
MTENN MTFN R/L MTGN R/L MTJN R/L SI-MTUN	TNMG	331-HS	160404																					1/64
		332-HS	160408					●			●	●									0.650	3/8	3/16	1/32
		333-HS	160412					●			●	●												3/64
		432-HS	220408					●			●	●									0.866	1/2	3/16	1/32
		433-HS	220412					●			●													3/64

● Stock Item

TPGN 6-TPG-

T type (60°)

- USE
  Finish
- Recommendation
  d = 0.04~0.16inch
  f = 0.08~0.02ipr
- Geometry



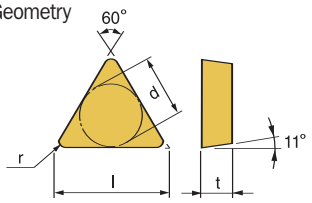
Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NCM325	NC305K	NC315K	NC320		CT10	CN200	CN20	CN30	ST30A	G10	ST20	ST30	l	d	t	r
SI-CTFPR	TPGN	212	110208																	●	0.433	1/4	1/8	1/64
		221	110304				●												●	●				1/32
		222	110308				●											●						0.008
		320.5	160302																					1/64
		321	160304			●	●											●	●	●	0.650	3/8	1/8	1/32
		322	160308			●	●											●	●	●				3/64
		323	160312				●													●				1/16
		324	160316			●	●												●	●				1/64
		431	220404				●												●		0.866	1/2	3/16	1/32
		432	220408				●												●	●				3/64
		433	220412															●						9/77
		437.6	220430																					

● Stock Item

TPUN 6-TPU-

T type (60°)

- USE
  Finish
- Recommendation
  d = 0.04~0.16inch
  f = 0.08~0.02ipr
- Geometry

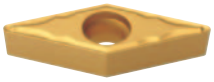


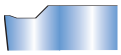
Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NCM325	NC305K	NC315K	NC320		CT10	CN200	CN20	CN30	ST30A	G10	ST20	ST30	l	d	t	r
SI-CTFPR	TPGN	212	110208															●		●	0.433	1/4	1/8	1/64
		221	110304																●	●				1/32
		222	110308								●								●					0.008
		320.5	160302																					1/64
		321	160304				●				●							●	●	●	0.650	3/8	1/8	1/32
		322	160308				●				●							●	●	●				3/64
		323	160312																	●				1/16
		324	160316																					1/64
		431	220404																		0.866	1/2	3/16	1/32
		432	220408								●							●	●	●				3/64
		433	220412				●												●	●				9/77
		437.6	220430																					
		434																●						

● Stock Item

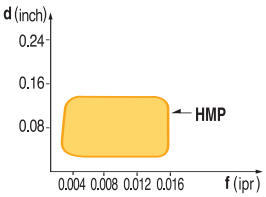
VBMT-HMP 6-VBM-, 6-VCN-

V type (35°)





• Versatile chipbreaker.

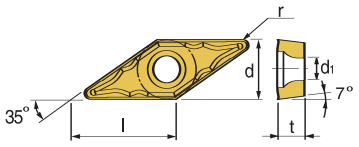


■ USE
Medium

■ Recommendation

HMP d = 0.02~0.14inch
f = 0.002~0.016ipr

■ Geometry

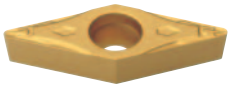


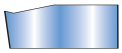
Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030		CN100	CT10	CN200		H01	G10	ST10		l	d	t	r	d_1
	VBMT	21.51-HMP	110204																		0.437	1/4	1/8	1/64	0.110
		221-HMP	110304																		0.437	1/4	3/16	1/64 1/32	0.134
		222-HMP	110308																						
		331-HMP	160404	●	●																0.650	3/8	3/16	1/64 1/32	0.173
		332-HMP	160408	●	●																				

● Stock Item

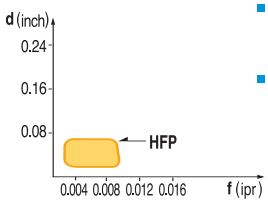
VCGT-HFP 6-VCG-

V type (35°)





• Chipbreaker for shallow depths of cut and low feed rates.
• Capable of turning fine surface finishes.
• Also for boring.

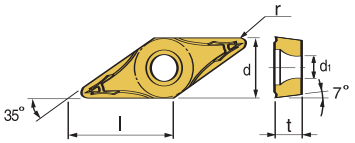


■ USE
Finish

■ Recommendation

HFP d = 0.005~0.06inch
f = 0.002~0.01ipr

■ Geometry

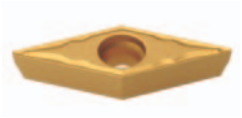


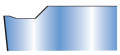
Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r	d_1
SVJC R/L SI-SVUC R/L	VCGT	220.5-HFP	110302																					0.008	
		221-HFP	110304		●	●		●			●						●				0.433	1/4	1/8	1/64 1/32	0.134
		222-HFP	110308																						
		331-HFP	160404		●	●		●			●	●					●				0.653	3/8	3/16	1/64 1/32	0.173
		332-HFP	160408																						

● Stock Item

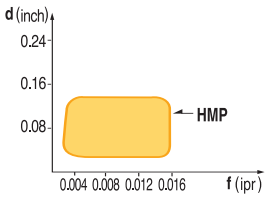
VCMT-HMP 6-VMC-

V type (35°)





•Versatile chipbreaker.

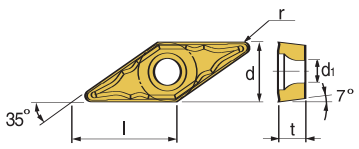


■ USE
Medium

■ Recommendation

HMP d = 0.02~0.14inch
f = 0.002~0.016ipr

■ Geometry

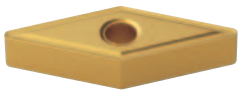


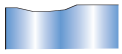
Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r	d_1
SVJC R/L SI-SVUC R/L	VCMT	331-HMP 332-HMP	160404 160408			● ●		● ●			● ●	● ●									0.650	3/8	3/16	0.016 0.031	0.173

● Stock Item

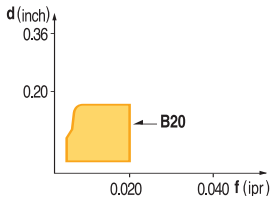
VNMG-B20 6-VNO-

V type (35°)





•Cast Iron chipbreaker.

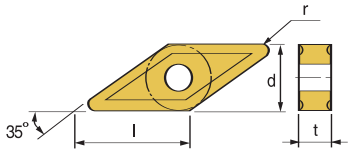


■ USE
Light & Medium

■ Recommendation

B20 d = 0.06~0.16inch
f = 0.006~0.02ipr

■ Geometry

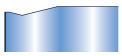


Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
				NC310	NC3015	NC3020	NC330	NC305K	NC315K				CN200				H01	G10	ST10		l	d	t	r
MVJN R/L MVVN R/L SI-MVUN	VNMG	331-B20 332-B20 431-B20 432-B20	160404 160408 220404 220408			● 	● 														0.654 0.791	3/8 1/2	3/16 3/16	1/64 1/32 1/64 1/32

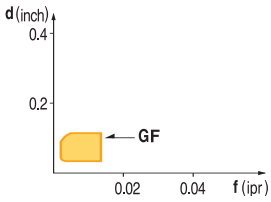
● Stock Item

VNMG-GF 6-VNF-

V type (35°)



- Excellent chip control for varying depths of cut.
- Special design enhances cutting edge strength.

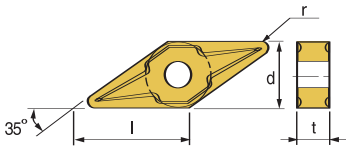


■ USE
Finish

■ Recommendation

GF d = 0.02~0.08inch
f = 0.002~0.012ipr

■ Geometry

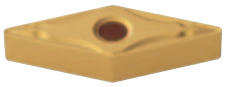


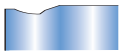
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	CN200				H01	G10	ST10		l	d	t	r
MVJN R/L MVVN R/L SI-MVUN	VNMG 331-GF 332-GF	160404 160408	●		●	●													0.653	3/8	3/16	1/64 1/32

● Stock Item

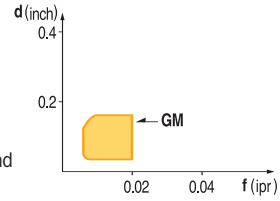
VNMG-GM 6-VNG-

V type (35°)





- All purpose chipbreaker.
- Strong cutting edge for aggressive feed rates and interrupted cuts.

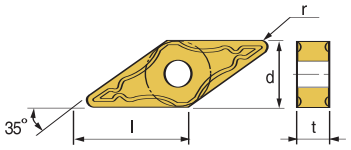


■ USE
Medium

■ Recommendation

GM d = 0.025~0.16inch
f = 0.004~0.02ipr

■ Geometry

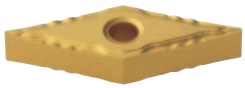


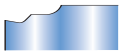
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC230	CN200				H01	G10	ST10		l	d	t	r
MVJN R/L MVVN R/L SI-MVUN	VNMG 331-GM 332-GM	160404 160408			● ●	● ●				●									0.653	3/8	3/16	1/64 1/32

● Stock Item ○ Under preparing for stock

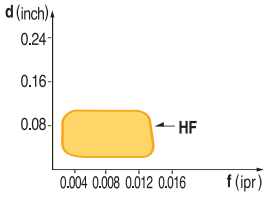
VNMG-HF 6-VNN-

V type (35°)





- Excellent chip control for varying depths of cut.
- Special design enhances cutting edge strength.

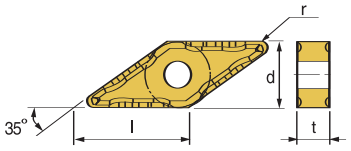


■ USE
Finish

■ Recommendation

HF d = 0.015~0.1inch
f = 0.002~0.014ipr

■ Geometry

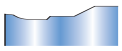


Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC0315	NC3020	NC330	NC305K	NC315K	PC9030	NC9020	CN200				H01	G10	ST10		l	d	t	r
MVJN R/L MVVN R/L SI-MVUN	VNMG 330.5-HF 331-HF 332-HF 333-HF	160402 160404 160408 160412	● ●	● ●	● ● ●	● ●			● ●	● ● ●	● ●								0.654	3/8	3/16	0.008 1/64 1/32 3/64

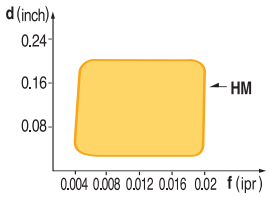
● Stock Item

VNMG-HM 6-VNM-

V type (35°)



•All purpose chipbreaker.

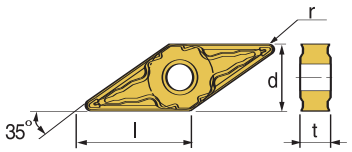


■ USE
Medium

■ Recommendation

HM d = 0.04~0.2inch
f = 0.004~0.02ipr

■ Geometry

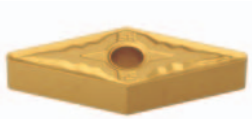


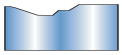
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r
MVJN R/L MVVN R/L SI-MVUN	VNMG 331-HM	160404			●	●	●		●	●												1/64
	332-HM	160408		●	●	●	●		●	●									0.653	3/8	3/16	1/32
	333-HM	160412		●	●	●	●		●	●												3/64
	431-HM	220404		●															0.870	1/2	3/16	1/64
	432-HM	220408		●																		1/32

● Stock Item

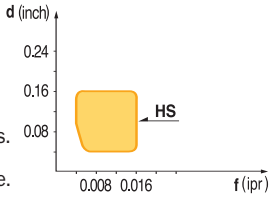
VNMG-HS 6-VNS-, 6-VNC-

V type (35°)





•Designed for stainless steel and high-temp alloys.
•High rake angle on land increases wear resistance.

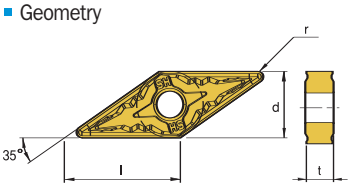


■ USE
Medium

■ Recommendation

HS d = 0.04~0.16inch
f = 0.004~0.16ipr

■ Geometry

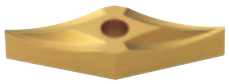


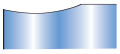
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r
MVJN R/L MVVN R/L SI-MVUN	VNMG 331-HS	160404																	0.654	3/8	3/16	1/64
	332-HS	160408								●	●											1/32

● Stock Item

VNMP 6-VNP-

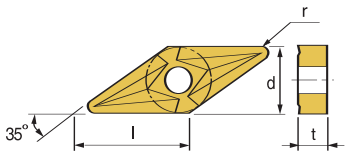
V type (35°)





- High temp alloy and Aluminum rougher.

- USE
- Recommendation
- Geometry

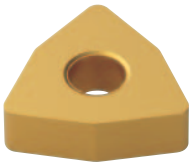


Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC305K	NC315K	NC9020	PC9030	CN200				H01	G10	ST10		l	d	t	r
MVJN R/L MVVN R/L SI-MVUN	VNMP 331 332	160404 160408			● ●	● ●			● ●										0.654	3/8	3/16	1/64 1/32

● Stock Item

WNMA 6-WNA-

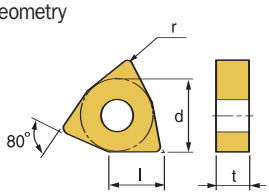
W type (80°)



- Cast Iron applications

- USE
  Various
- Recommendation

- Geometry

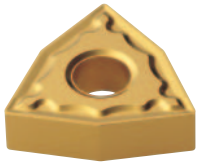


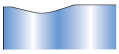
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC305K	NC315K	NC123K			CN200				H01	G10	ST10		l	d	t	r
MWLN R/L SI-MWLN R/L	WNMA 331	060404																		0.256	3/8	3/16	1/64
	332	060408																					1/32
	432	080408					●	●												0.343	1/2	3/16	1/32
	433	080412					●	●															3/64

● Stock Item

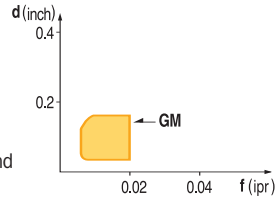
WNMG-GM 6-WNM-

W type (80°)





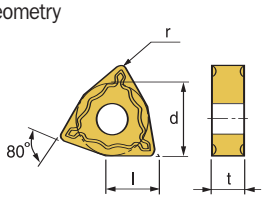
- All purpose chipbreaker.
- Strong cutting edge for aggressive feed rates and interrupted cuts.



- USE
  Medium
- Recommendation

GM d = 0.025~0.16inch
f = 0.004~0.02ipr

- Geometry

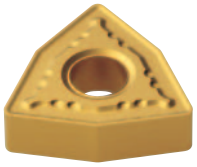


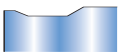
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030		CN200				H01	G10	ST10		l	d	t	r
MWLN R/L SI-MWLN R/L	WNMG 331-GM	060404	●		●															0.256	3/8	3/16	1/64
	332-GM	060408	●			●																	1/32
	431-GM	080404			●	●														0.343	1/2	3/16	1/64
	432-GM	080408	●		●	●																	1/32
	433-GM	080412	●																				3/64

● Stock Item

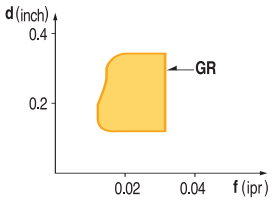
WNMG-GR 6-WNR-

W type (80°)





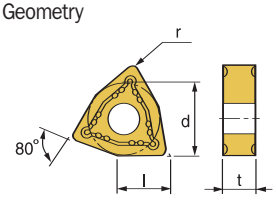
- Large depths of cut and aggressive feeds.
- Interrupted cuts.



- USE
  Rough
- Recommendation

GR d = 0.12~0.315inch
f = 0.012~0.031ipr

- Geometry

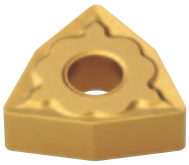


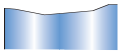
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC305K	NC315K				CN200				H01	G10	ST10		l	d	t	r
MWLN R/L SI-MWLN R/L	WNMG 432-GR	080408	●		●	●		●															1/32
	433-GR	080412	●			●														0.343	1/2	3/16	3/64
	434-GR	080416																					1/16

● Stock Item

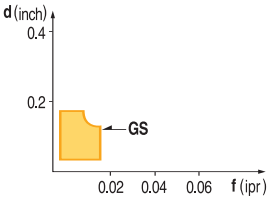
WNMG-GS 6-WNS-

W type (80°)



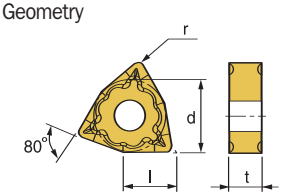


- Exclusive chipbreaker for stainless steel.



- USE
  Stainless Steel
- Recommendation
  GS d = 0.04~0.16inch
  f = 0.004~0.016ipr

- Geometry

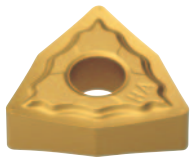


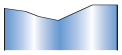
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	NC325S	CN200				H01	G10	ST10		l	d	t	r
MWLN R/L SI-MWLN R/L	WNMG 331-GS	060404									●									0.256	3/8	3/16	1/64
	332-GS	060408									●												1/32
	431-GS	080404																		0.343	1/2	3/16	1/64
	432-GS	080408									●												1/32
	433-GS	080412																					3/64

● Stock Item

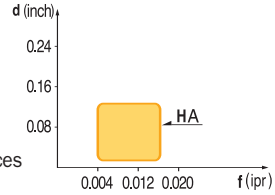
WNMG-HA 6-WNJ-

W type (80°)



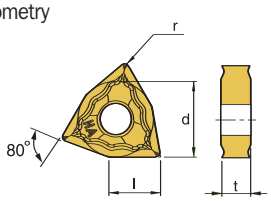


- Free Cutting.
- Unique geometry enhances durability.



- USE
  Light & Medium
- Recommendation
  HA d = 0.32~0.14inch
  f = 0.004~0.016ipr

- Geometry

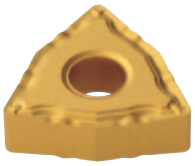


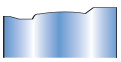
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K		PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r
MWLN R/L SI-MWLN R/L	WNMG 331-HA	060404					●			●	●									0.256	3/8	3/16	1/64
	332-HA	060408					●			●	●												1/32
	431-HA	080404			●		●			●	●									0.343	1/2	3/16	1/64
	432-HA	080408			●		●			●	●												1/32
	433-HA	080412																					3/64

● Stock Item

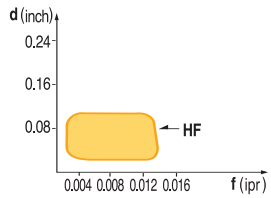
WNMG-HF 6-WNF-

W type (80°)



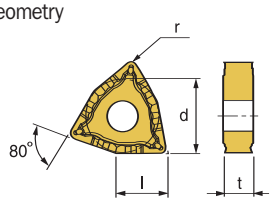


- Excellent chip control at varying depths of cut.
- Special design enhances cutting edge strength.



- USE
  Finish
- Recommendation
  HF d = 0.01~0.1inch
  f = 0.002~0.014ipr

- Geometry

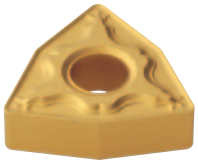


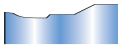
Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030		CN200				H01	G10	ST10		l	d	t	r
MWLN R/L SI-MWLN R/L	WNMG 331-HF	060404	●	●	●		●													0.256	3/8	3/16	1/64
	332-HF	060408		●	●	●	●																1/32
	333-HF	060412																					3/64
	431-HF	080404	●	●	●	●	●					●								0.343	1/2	3/16	1/64
	432-HF	080408	●	●	●	●	●			●		●											1/32

● Stock Item

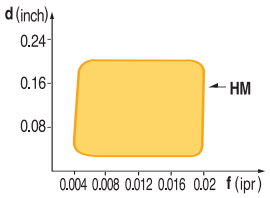
WNMG-HM 6-WNH-

W type (80°)





•All purpose chipbreaker.

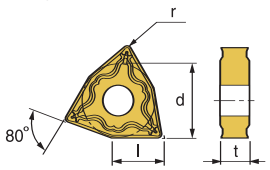


■ USE
Medium

■ Recommendation

HM d = 0.04~0.2inch
f = 0.004~0.02ipr

■ Geometry

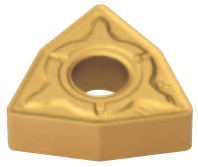


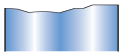
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K		PC9030	PC8010	CN200				H01	G10	ST10		l	d	t	r
MWLN R/L SI-MWLN R/L	WNMG 331-HM	060404	●	●	●		●				●												1/64
	332-HM	060408	●	●	●	●	●			●	●									0.256	3/8	3/16	1/32
	333-HM	060412		●	●		●				●												3/64
	431-HM	080404	●	●	●		●			●													1/64
	432-HM	080408	●	●	●	●	●			●	●									0.343	1/2	3/16	1/32
	433-HM	080412	●		●	●					●												3/64

● Stock Item

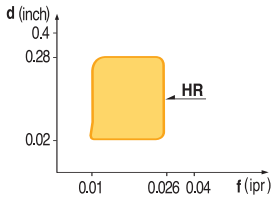
WNMG-HR 6-WNG-

W type (80°)





•Large depths of cut and aggressive feeds.
•Interrupted cuts.

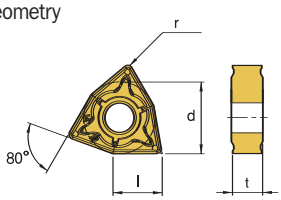


■ USE
Rough

■ Recommendation

HR d = 0.1~0.28inch
f = 0.010~0.026ipr

■ Geometry

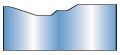


Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030		CT10	CN200			H01	G10	ST10		l	d	t	r
MWLN R/L SI-MWLN R/L	WNMG 332-HR	060408																		0.256	3/8	3/16	1/32
	333-HR	060412																					3/64
	432-HR	080408		●			●																1/32
	433-HR	080412																		0.343	1/2	3/16	3/64
	434-HR	080416																					1/16

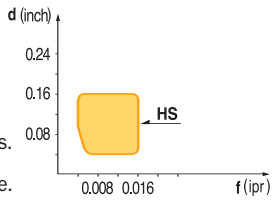
● Stock Item

WNMG-HS 6-WNC-

W type (80°)



•Designed for stainless steel and high-temp alloys.
•High rake angle on land increases wear resistance.

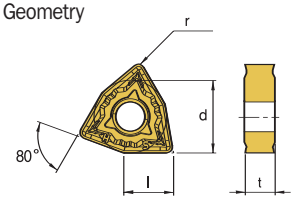


■ USE
Medium

■ Recommendation

HS d = 0.04~0.16inch
f = 0.004~0.016ipr

■ Geometry

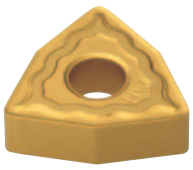


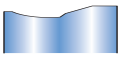
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030	PC8010	CT10	CN200			H01	G10	ST10		l	d	t	r
MWLN R/L SI-MWLN R/L	WNMG 331	060404																					1/64
	332-HS	060408																		0.256	3/8	3/16	1/32
	333-HS	060412																					3/64
	431-HS	080404																					1/64
	432-HS	080408					●			●	●									0.343	1/21	3/16	1/32
	433-HS	080412																					3/64

● Stock Item

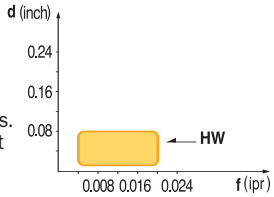
WNMG-HW 6-WNN-

W type (80°)





- Reinforced chip pocket for aggressive speeds and feeds.
- Wiper Geometry for excellent surface finishes at high feed rates.

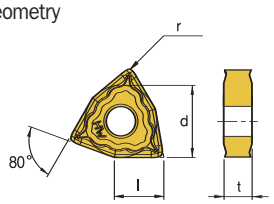


■ USE
Wiper, Finish

■ Recommendation

HW d = 0.012~0.08inch
f = 0.004~0.02ipr

■ Geometry

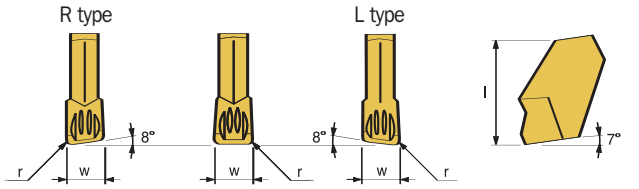


Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)			
			NC310	NC3015	NC3020	NC330	NC9020	NC305K	NC315K	PC9030		CT10	CN200	CN20		H01	G10	ST10		l	d	t	r
MWLN R/L SI-MWLN R/L	WNMG 332-HW	060408			●															0.256	3/8	3/16	1/32
	432-HW	080408			●															0.343	1/2	3/16	1/32

● Stock Item

GTN 6-GTN- Parting

- USE
- Geometry
- Recommendation



b = ±0.1

Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)		
				NC310	NC330	NC3020	NC315K	NC9020				CN20	CN30			ST30A	ST20	ST10	G10	w	l	t
	GTN	20 20R 20L			●	●		●									●			0.087	0.366	0.008
		30 30R 30L 30H			●	●		●									●			0.122	0.445	0.008
		40 40R 40L 40H			●	●		●									●			1.161	0.445	0.009
		50 50R 50L			●	●		●									●			0.201	0.449	0.011
		60 60R 60L			●	●		●									●		●	0.252	0.449	0.014

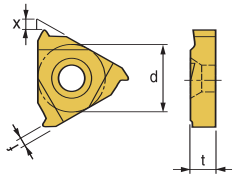
● Stock Item

ECTR 6-ECT- Standard Type (3000 Type)

■ USE

■ Recommendation

■ Geometry



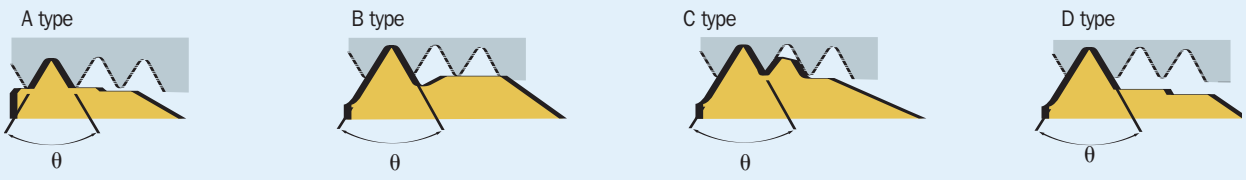
d = 9.525
t = 3.6

Applicable holder	Designation	ISO	Coated Carbide						Cermet				Uncoated Carbide				(inch)				
			NC330	PC130	PC230	PC9030			CN20	CN30			ST30A	ST20	ST10	G10	Pitch	f	θ	x	Cutting edge type
	ECTR 3100																1.00	0.039		0.051	B
	3125																1.25	0.039		0.051	B
	3150																1.50	0.039		0.051	A
	3175																1.75	0.039		0.051	A
	3200			●													2.00	0.039	60°	0.051	A
	3250																2.50	0.059		0.059	A
	3300																3.00	0.059		0.059	A
	3150F			●													0.5~1.5	0.039		0.051	D
	3300F			●													1.5~3.0	0.059		0.059	D

Applicable holder	Designation	ISO	Coated Carbide						Cermet				Uncoated Carbide				(inch)				
			NC330	PC130	PC230	PC9030			CN20	CN30			ST30A	ST20	ST10	G10	Pitch	f	θ	x	Cutting edge type
	ECTR 3028UN			●													28	0.039		0.051	B
	3024UN																24	0.039		0.051	B
	3020UN																20	0.039		0.051	A
	3018UN																18	0.039		0.051	A
	3016UN																16	0.039		0.051	A
	3014UN																14	0.047		0.051	A
	3012UN																12	0.047	60°	0.051	A
	3011UN																11	0.047		0.051	A
	3010UN			●													10	0.059		0.059	A
	3009UN																09	0.059		0.059	A
	3008UN																08	0.059		0.059	A
	3028UNF																28~14	0.039		0.051	D
	3014UNF			●													14~08	0.059		0.059	D
	ECTR 3028W																28	0.039		0.051	B
	3020W																20	0.039		0.051	A
	3019W																19	0.039		0.051	A
	3016W																16	0.039		0.051	A
	3014W																14	0.047		0.051	A
	3012W																12	0.047	55°	0.059	A
	3011W																11	0.059		0.059	A
	3010W																10	0.059		0.059	A
	3009W																09	0.059		0.059	A
	3008W																08	0.059		0.059	A
	3028WF																28~14	0.059		0.059	D
	3014WF																14~08	0.059		0.059	D

● Stock Item

■ Cutting edge type

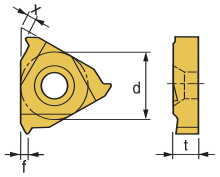


ICTR 6-ICT- Standard Type (3000 Type)

■ USE

■ Recommendation

■ Geometry



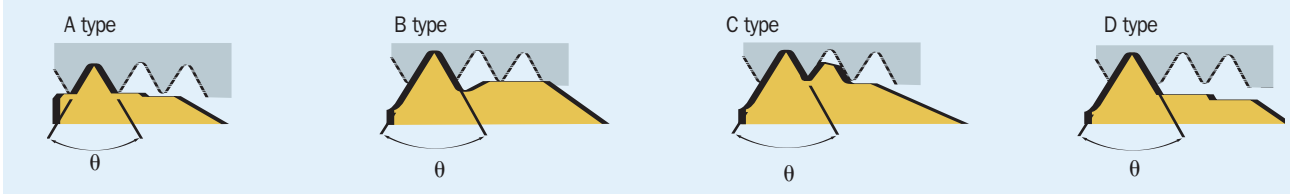
d = 9.525
t = 3.6

Applicable holder	Designation	ISO	Coated Carbide						Cermet				Uncoated Carbide				(inch)				
			NC330	PC130	PC230	PC9030			CN20	CN30			ST30A	ST20	ST10	G10	Pitch	f	θ	x	Cutting edge type
	ICTR 3100			●													1.00	0.039		0.051	B
	3125			●					●								1.25	0.039		0.051	B
	3150			●					●								1.50	0.039		0.051	A
	3175			●					●								1.75	0.039		0.051	A
	3200			●					●								2.00	0.039	60°	0.051	A
	3250			●													2.50	0.059		0.059	A
	3300			●					●								3.00	0.059		0.059	A
	3150F			●					●								0.5~1.5	0.039		0.051	D
	3300F			●					●								1.5~3.0	0.059		0.059	D

Applicable holder	Designation	ISO	Coated Carbide						Cermet				Uncoated Carbide				(inch)				
			NC330	PC130	PC230	PC9030			CN20	CN30			ST30A	ST20	ST10	G10	Pitch	f	θ	x	Cutting edge type
	ICTR 3028UN																28	0.039		0.051	B
	3024UN			●								●					24	0.039		0.051	B
	3020UN			●								●					20	0.039		0.051	A
	3018UN			●													18	0.039		0.051	A
	3016UN			●													16	0.039		0.051	A
	3014UN			●								●					14	0.039		0.051	A
	3012UN			●								●					12	0.047	60°	0.051	A
	3011UN																11	0.047		0.051	A
	3010UN																10	0.059		0.059	A
	3009UN																09	0.059		0.059	A
	3008UN																08	0.059		0.059	A
	3028UNF			●								●					28~14	0.039		0.051	D
	3014UNF																14~08	0.059		0.059	D
	ICTR 3028W																28	0.039		0.051	B
	3020W																20	0.039		0.051	A
	3019W			●								●					19	0.039		0.051	A
	3016W																16	0.039		0.051	A
	3014W			●								●					14	0.047		0.051	A
	3012W																12	0.047	60°	0.051	A
	3011W			●								●					11	0.059		0.059	A
	3010W																10	0.059		0.059	A
	3009W																09	0.059		0.059	A
	3008W																08	0.059		0.059	A
	3028WF																28~14	0.039		0.051	D
	3014WF																14~08	0.059		0.059	D

● Stock Item

■ Cutting edge type



1 Insert Shape

			
C	D	H	L
			
O	R	S	T
			
V	W		

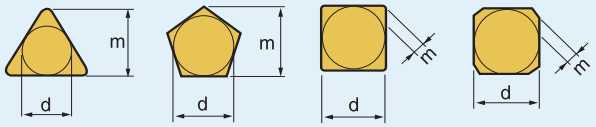
2 Clearance Angle

		
A	B	C
		
D	E	F
		
G	N	P

1	2	3	4	5
S	P	K	R	4

(mm)

3 Tolerance



d : Inscribed Circle
t : Thickness
m: refer to figure

(inch)

class	d	m	t
A	±0.0010	±0.0002	±0.0010
C	±0.0010	±0.0005	±0.0010
H	±0.0005	±0.0005	±0.0010
E	±0.0010	±0.0010	±0.0010
G	±0.0010	±0.0010	±0.005
J	±0.002 - ±0.006	±0.0002	±0.0010
K	±0.002 - ±0.006	±0.0005	±0.0010
L	±0.002 - ±0.006	±0.0010	±0.0010
M	±0.002 - ±0.006	±0.003 - 0.008	±0.005
U	±0.003 - ±0.01	±0.005 - 0.015	±0.005

■ Tolerance on C,H,R,T,W class (exceptional)

d	Tolerance on d		Tolerance on m	
	J,K,L,M,N	U	M,N	U
1/4	±0.002	±0.003	±0.003	±0.005
3/8	±0.002	±0.003	±0.003	±0.005
1/2	±0.003	±0.005	±0.005	±0.008
5/8	±0.004	±0.007	±0.06	±0.01
3/4	±0.004	±0.007	±006	±0.011
1	±0.005	±0.01	±0.07	±0.015

■ Tolerance on D class (exceptional)

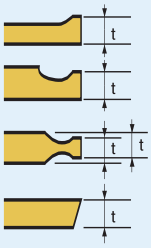
d	Tolerance on d	Tolerance on m
1/4	±0.002	±0.0043
3/8	±0.002	±0.0043
1/2	±0.003	±0.006
5/8	±0.004	±0.007
3/4	±0.004	±0.007

4 Cross Section Type

	 C'Sink 70° - 90°
A	B
 C'Sink 70° - 90°	
C	F
	 C'Sink 70° - 90°
G	H
 C'Sink 70° - 90°	
J	M
	 C'Sink 40° - 60°
N	Q
	 C'Sink 40° - 60°
R	T
 C'Sink 40° - 60°	 C'Sink 40° - 60°
U	W
Special type	
X	

Nose Corner Radius (Nose R)

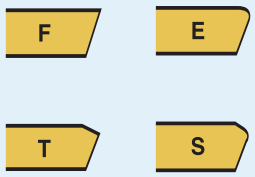
6 Height of Cutting Edge



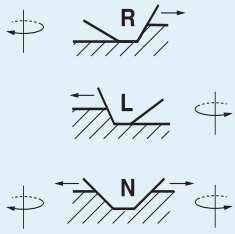
Symbol		Height of Cutting Edge (t)	
Metric	Inch	mm	Inch
-	0.5(1)	0.79	1/32
T0	0.6	1.00	0.040
01	1(2)	1.59	1/16
T1	1.2	1.98	5.64
02	1.5(3)	2.38	3/32
03	2	3.18	1/8
T3	2.5	3.97	5/32
04	3	4.76	3/16
05	3.5	5.56	7/32
06	4	6.35	1/4
07	5	7.94	5/16
09	6	9.52	3/8
11	7	11.11	7/16
12	8	12.70	1/2

∗( ) Symbol for small size insert

8 Edge Preparation



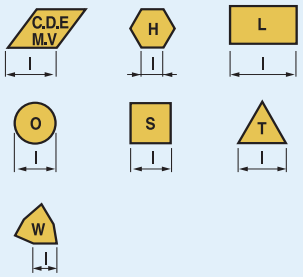
9 Hand of Tool



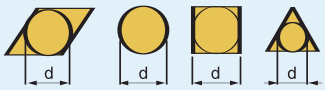
3	ED 2	S	R	MX
6	7	8	9	10

5 Cutting Edge Length, Diameter of Inscribed circle

■Metric System



■Metric System



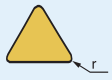
Use 1/32″ unit for a insert having smaller I.C under 1/4″
Use 1/8″ unit for a insert having larger I.C over 1/4″

∗ Indicate Cutting edge length in case of tetragon & rhombus

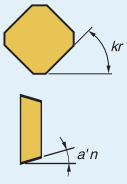
■Cross over chart for Meetic and Inch system

	06	09	11	16	22	27	33	44
	03	05	06	09	12	15	19	25
55°	04	06	07	11	15	19	23	31
80°	03	05	06	09	12	16	19	25
Inscribed Circle	5/32″	7/32″	1/4″	3/8″	1/2″	5/8″	3/4″	1″
Inch system	5	7	2(8)	3	4	5	6	8

7 Nose Corner Radius (Nose R)

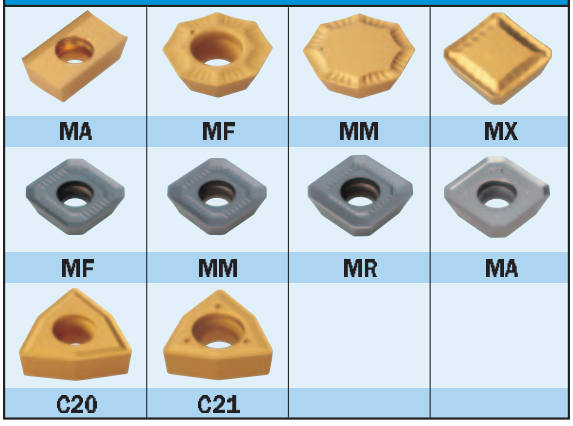


r		Symbol		r		Symbol	
mm	Inch	mm	Inch	mm	Inch	mm	Inch
00	0	0.0		12	3	1.2	3/64
02		0.2		15		1.5	
04	1	0.4	1/64	16	4	1.6	4/64
05		0.5		24	6	2.4	6/64
08	2	0.8	2/64	32	8	3.2	8/64
10		1.0		40		4.0	



Parallel Land	Relief Angle	
kr	a'n	
A-45°	A-3°	F-25°
D-60°	B-5°	G-30°
E-75°	C-7°	N-0°
F-85°	D-15°	P-11°
P-90°	E-20°	
Z-Special		

10 Chipbreaker for Milling

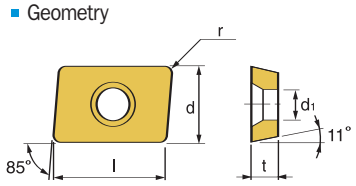


ADKT 6-ADK-, 6-ADH-

■ USE

■ Recommendation

■ Geometry



Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(mm)				
			NCM325	NCM335	PC130	PC230	PC3530	PC215K	PC9530		CN20	CN30			ST30A	ST20	G10		l	d	t	r	d_1
	ADKT 1505PDSR-MM 1505PSDR-KH		●				● ●		●										0.646	3/8	3/16	1/32	0.173

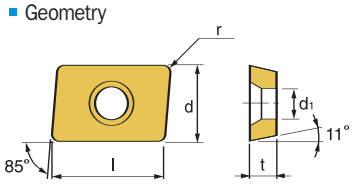
● Stock Item

APKT-KH 6-APK-

■ USE

■ Recommendation

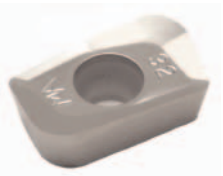
■ Geometry



Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(mm)				
			NCM325	NCM335	PC130	PC230	PC3530	PC215K			CN20	CN30			ST30A	ST20	G10		l	d	t	r	d_1
6-958- 6-941- 6-955- 6-956- 6-954-	APKT 1604PDSR			●			●												0.646	3/8	3/16	1/32	0.173

● Stock Item

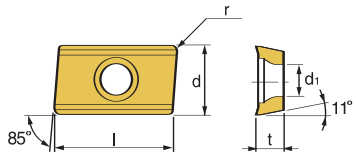
APKT-MA 6-APM-



■ USE

■ Recommendation

■ Geometry



Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(mm)				
			NCM325	NCM335	PC130	PC230	PC215K				CN20	CN30			ST30A	H01	G10		l	d	t	r	d_1
6-958- 6-941- 6-955- 6-956- 6-954-	APKT 1035PDFR 1604PDFR 160402 160404 160432 - MA															● ● ● ●			0.646	3/8	3/16	.020 0.008 .015 .125	0.173

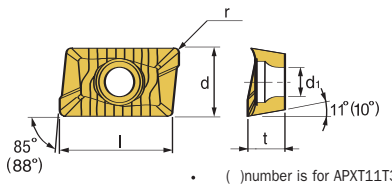
● Stock Item

APKT 6-APF-, 6-APK-, 6-APT-

■ USE

■ Recommendation

■ Geometry



• ( )number is for APXT11T3□□□

Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
			NCM120	NCM325	NCM335	NCM320K			PC3530	PC9530	CN20	CN30			ST30A	ST20	H01		l	d	t	r	d_1
6-958- 6-941- 6-955- 6-956- 6-954-	APKT 1604PDSR-KH				●				●										0.650	0.376	0.227	1/32	0.175
	1604PDSR-MF			●		●			●	●													
	1604PDSR-MM			●					●	●													

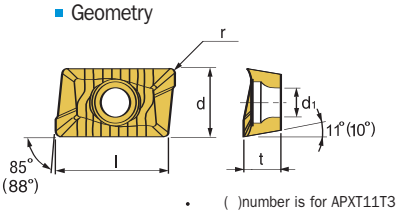
● Stock Item

APXT 6-APX-

■ USE

■ Recommendation

■ Geometry



• ( )number is for APXT11T3□□□

Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
			NCM120	NCM325	NCM335	NCM320K	PC240	PC3530	PC9530	PC215K	CN20	CN30			ST30A	ST20	G10		l	d	t	r	d_1
6-958- 6-941- 6-955- 6-956- 6-954-	APXT 1035PDSR-MM			●	●			●	●										0.407	0.263	0.12	0.020	
	103508PDSR-MM							●														0.020	
	103516PDSR-MM							●														0.020	
	11T3PDSR-MM			●															0.445	0.260	0.142	3/64	0.112
	1604PDSR-MF																		0.650	0.376	0.227	1/16	0.175
	1604PDSR-MM			●	●			●	●													3/32	
	160416R-MM			●				●	●													0.020	
	160432R-MM			●				●	●													4/57	
	160432L-MM							●														4/57	

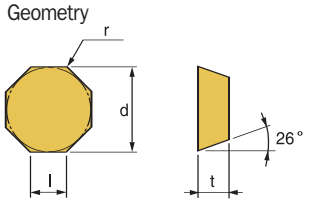
● Stock Item

OFCN 6-OFN-

■ USE

■ Recommendation

■ Geometry



Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NCM325	NCM335	PC130	PC230	PC215K				CN20	CN30			ST30A	ST20	G10		l	d	t	r
	OFCN 0704SN 0704FN																		0.291	0.291	3/16	0.020
	070408SN 070408FN		●																0.291	0.709	3/16	0.031

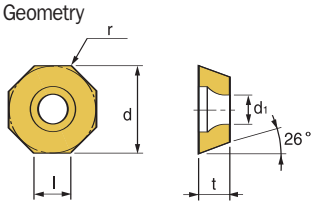
● Stock Item

OFCW 6-OFW-

■ USE

■ Recommendation

■ Geometry



Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
			NCM325	NCM335	PC130	PC230	PC215K				CN20	CN30			ST30A	ST20	G10		l	d	t	r	d_1
6-970-	OFCW 05T3SN 05T3FN 05T308FN		●																0.205	1/2	5/32	0.020	0.173

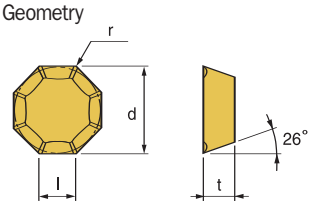
● Stock Item

OFKR-MF, MM, MA 6-OFR-

■ USE

■ Recommendation

■ Geometry

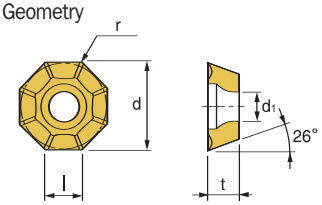


Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NCM325	NCM335	NCM320K	PC130	PC3530	PC9530			CN20	CN30			ST30A	ST20	G10	H01	l	d	t	r
	OFKR 0704SN-MF 070408SN-MF																		0.205	0.709	3/16	0.020 0.031
	0704SN-MM 070408SN-MM		●				●												0.291	0.709	3/16	0.020 0.031
	0704FN-MA 0704EN-MA 070408SN-MA																	●	0.291	0.709	3/16	0.020 0.020

● Stock Item

OFKT-MF, MM, MA 6-OFT-

- USE
- Recommendation
- Geometry



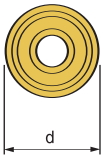
Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
				NCM325	NCM335	PC130	PC230	PC215K	PC3530	PC9530		CN20	CN30			ST30A	H01	G10		l	d	t	r	d_1
6-970-	OFKT	05T3SN-MF 05T308SN-MF																		0.205	1/2	5/32	0.020 0.031	0.173
		05T3SN-MM 05T308SN-MM		●	●				●	●										0.205	1/2	5/32	0.020 0.031	0.173
		05T3FN-MA 05T3EN-MA																		0.205	1/2	5/32	0.020 0.020	0.173
		07045N-MM		●																0.291	0.709	3/16	0.020	0.228
		0704EN-MA 0704FN-MA 0704-MA															●			0.291	0.709	3/16	0.020 0.020	0.228

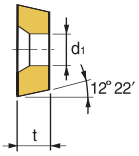
● Stock Item

RPHT-X197 6-RPT

■ USE ■ Geometry

■ Recommendation





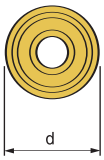
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)		
			NCM325	NCM335	PC130	PC230	PC215K				CN20	CN30			ST30A	ST20	G10		d	t	d_1
	RPHT 0803M0		●																5/16	1/8	.135
	10T3M0		●																.394	5/32	.175

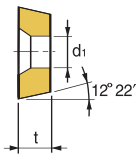
● Stock Item

RPMM 6-RPM-

■ USE ■ Geometry

■ Recommendation

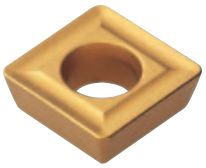




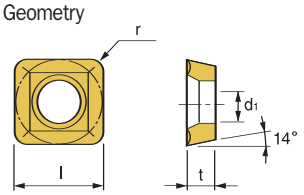
Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)		
			NCM325	NCM335	PC130	PC230	PC215K				CN20	CN30			ST30A	ST20	G10		d	t	d_1
	RPMM 120400		●												●				1/2	3/16	0.216
	1204ENN																				

● Stock Item

SDMT 6-SDM-



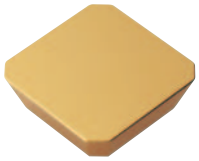
- USE
- Recommendation
- Geometry



Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
			NCM325	NCM335	PC210F	PC230	PC215K				CN20	CN30			ST30A	ST20	G10		l(=d)	t	r	d_1
	SDMT 322	090308	●																3/8	1/8	1/32	0.173

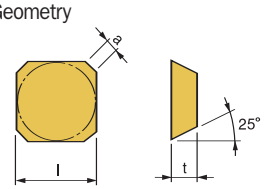
● Stock Item

SEAN, SECN, SEKN 6-SEA-, 6-SEC-, 6-SEK-



■ USE ■ Geometry

■ Recommendation



Applicable holder	Designation	ISO	Coated Carbide									Cermet			Uncoated Carbide				(inch)		
			NCM25P	NCM325	NCM335	NCM310K	NCM320K	PC3530	PC9530			CN20	CN30		ST30A	H01	G10	ST20	l(=d)	t	a
6-923- 6-924- 6-925-	SEAN 42A SECN 42A SEKN 42AFEN 42AFN 42AFSN 42AFTN-S20	1203 1203 1203 1203 1203 1203		●				●	●						●		● ● ●	● ● ●	1/2	1/8	0.091
	53AFFN 53AFTN 53AFEN 53AFN	1504 1504 1504 1504		●				●											5/8	3/16	0.094

● Stock Item

SEHT-45 6-SEH-

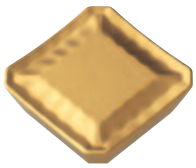
■ USE ■ Geometry

■ Recommendation

Applicable holder	Designation	ISO	Coated Carbide									Cermet			Uncoated Carbide				(inch)		
			NCM25P	NCM325	NCM335	NCM310K	NCM320K	PC3530	PC9530			CN20	CN30		ST30	H01	G10	ST20	l(=d)	t	a
6-963-	SEHT 1204AFTN-45			●											●		●				

● Stock Item

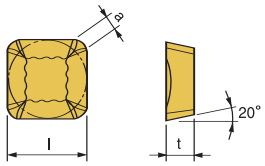
SEKR-MX(MF1) 6-SEK-, 6-SER-



■ USE

■ Recommendation

■ Geometry



Applicable holder	Designation	ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)		
			NCM120	NCM325	NCM335	NCM25P	PC130	PC230	PC9530	PC3530	CN20	CN30			MA2	ST20	G10		l(=d)	t	a
	SECR 42AFSN - MX	1203																			
	SEKR 42AFSN - MX	1203		●	●				●	●									1/2	1/8	0.091
	42AFSN - MF1	1204																			
	43AFSN - MX	1203																	1/2	3/16	0.091
	53AFSN - MX	1504		●						●									5/8	3/16	0.091

● Stock Item

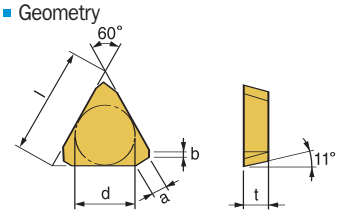
TPCN 6-TPK-

while supplies last

■ USE

■ Recommendation

■ Geometry



Applicable holder	Designation		ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)				
				NCM325	NCM335	NCM25K	NCM310K	NCM320K	PC130	PC230	PC3530	PC9530	CN20	CN30			ST30A	ST20	G10	ST30	l	d	t	a	b
6-902-	TPCN	22PPN	1103																		0.433	1/4	1/8	0.028	0.028
		22PPTN	1103																						
		32PPN	1603																						
		32PPTN	1603																						
		32PPR	1603	●														●			0.650	3/8	1/8	0.047	
		32PPTR	1603																		0.039~0.047				
		32PDR	1603																						
		32PDSR	1603																						
		43PPN	2204																						
		43PPTN	2204																						
		43PDR	2204														●								
		43PDTR	2204																		0.866	1/2	3/16	0.05~0.055	
		43PDSR	2204																		0.028~0.05				
		43PPR	2204	●														●	●	●					

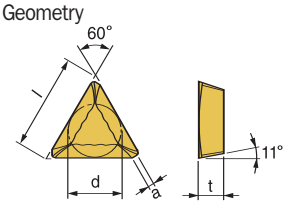
● Stock Item

TPMR 6-TPM-

■ USE

■ Recommendation

■ Geometry



Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)			
				NC330	NCM335	PC130	PC230	PC215K				CN20	CN30			ST10	ST20	G10		l(=d)	t	r	R
	TPMR	221	110304	●													●	●					
		222	110308														●	●					
		321	160304	●													●	●		0.650	3/8	1/8	3/64
		322	160308	●												●	●	●					
		323	160312															●					
																				0.866	1/2	3/16	0.055

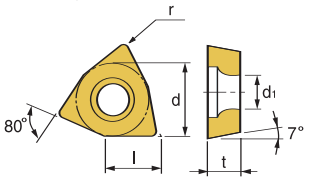
● Stock Item

WCMT-C20 6-WCM-

■ USE

■ Recommendation

■ Geometry



Applicable holder	Designation		ISO	Coated Carbide								Cermet				Uncoated Carbide				(inch)				
				NC310	NC3015	NC3020	NC330	NCM25P	NCM325	NC305K	NC315K	PC3530	CN20	CN30			H01	G10	ST10		l	d	t	r	d_1
6-661- 6-660-	WCMT	1.81.52-C20	030208						●												0.149	7/32	3/32	1/32	0.110
		21.52-C20	040208						●												0.169	1/4	3/32	1/32	0.118
		2.522-C20	050308						●												0.212	5/16	1/8	1/32	0.134
		32.52-C20	06T308						●												0.256	3/8	5/32	1/32	0.157
		432-C20	080408						●												0.342	1/2	3/16	1/32	0.169
		433-C20	080412																					3/64	

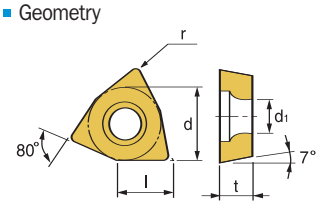
● Stock Item

WCMT-C21

■ USE

■ Recommendation

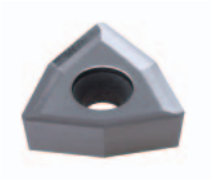
■ Geometry



Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)				
			NC310	NC3015	NC3020	NC330	NCM25P	NCM325	NC305K	NC310K	PC3530	CT10	CN200	CN20		H01	G10	ST10		l	d	t	r	d1
6-660- 6-661-	WCMT 1.81.51-C21	030204																		0.149	7/32	3/32	1/64	0.098
	21.51-C21	040204																		0.169	1/4	3/32	1/64	0.110
	432-C21	040208																		0.169	1/4	3/32	1/32	0.110
	432-C21	080408																		0.342	1/2	3/16	1/32	0.169

● Stock Item

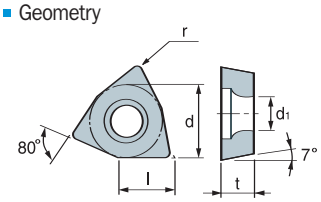
WCKT-DA



■ USE

■ Recommendation

■ Geometry



Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)				
			NC310	NC3015	NC3020	NC330	NCM25P	NCM325	NC305K	NC310K	PC3530	CT10	CN200	CN20		H01	G10	ST10		l	d	t	r	d1
6-660- 6-661-	WCK 030208-DA																			0.149	7/32	3/32	1/32	0.110
	040208-DA																			0.169	1/4	3/32	1/32	0.118
	050308-DA																			0.212	5/16	1/8	1/32	0.134
	06T308-DA																			0.256	3/8	5/32	1/32	0.157
	080408-DA																			0.342	1/2	3/16	1/32	0.169

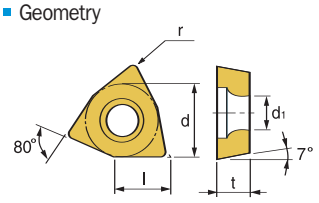
● Stock Item

WCMT-DS(P)

■ USE

■ Recommendation

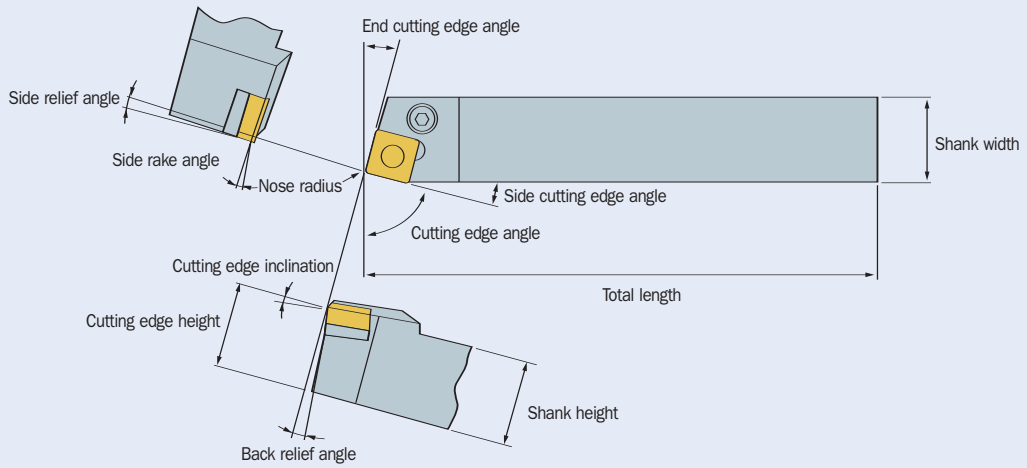
■ Geometry



Applicable holder	Designation	ISO	Coated Carbide									Cermet				Uncoated Carbide				(inch)				
			NC310	NC3015	NC3020	NC330	NCM25P	NCM325	NC305K	NC315K	NC123K	CT10	CN200	CN20		H01	G10	ST10		l	d	t	r	d1
6-660- 6-661-	WCM 030204-DSP																			0.149	7/32	3/32	1/64	0.098
	040204-DSP																			0.169	1/4	3/32	1/64	0.110
	050308-DS																			0.212	5/16	1/8	1/32	0.134
	06T308-DS																			0.256	3/8	5/32	1/32	0.157
	080408-DS																			0.342	1/2	3/16	1/32	0.169
	080412-DS																			0.342	1/2	3/16	3/64	0.169

● Stock Item

Toolholder Terminology



Cutting Formulas

Cutting Speed

$$V = \frac{\pi \cdot D \cdot N\ (sfm)}{12}$$

- V : Cutting speed (sfm)
- D : Workpiece diameter (inch)
- N : Revolutions per minute (rpm)
- π : Pi (3.14)

Feed

$$f = \frac{F}{N}\ (ipr)$$

- f : Feed per one revolution (ipr)
- F : feed per minute (ipm)
- N : Revolutions per minute (rpm)

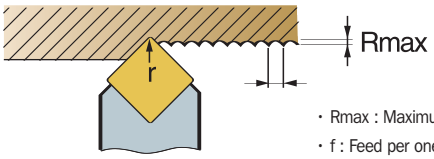
Surface finish roughness

- Theoretical surface roughness

$$Rmax = \frac{f^2}{8r} 1000(\mu)$$

- actual surface roughness

Steel : Rmax × (1.5~3)
Cast iron : Rmax × (3~5)

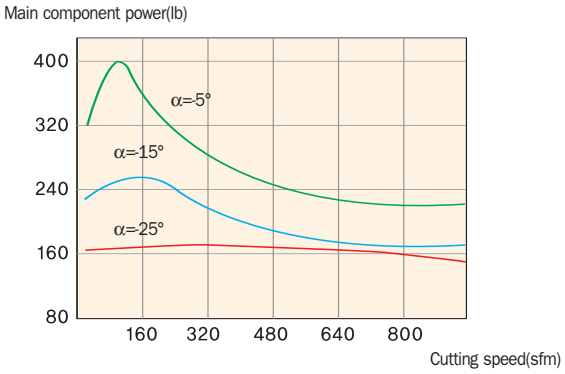


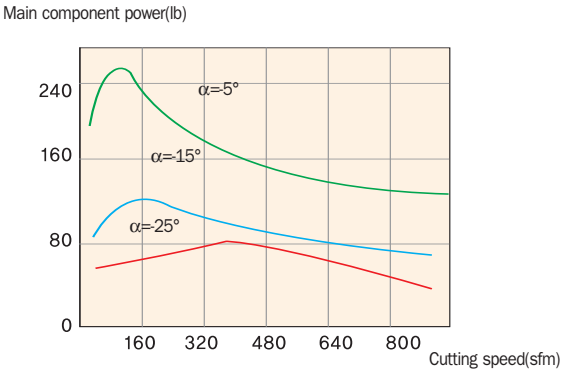
- Rmax : Maximum height roughness (μ)
- f : Feed per one revolution (ipr)
- r : Nose radius

Cutting edge geometry and its effect

Rake angle(α)

Rake angle has a tremendous influence on the cutting resistance, chip control and tool life.





Effect

1. A 1 degree increase in rake angle results in a 1% decrease in cutting power consumption.
2. As the rake angle increases the cutting edge weakens.

Application

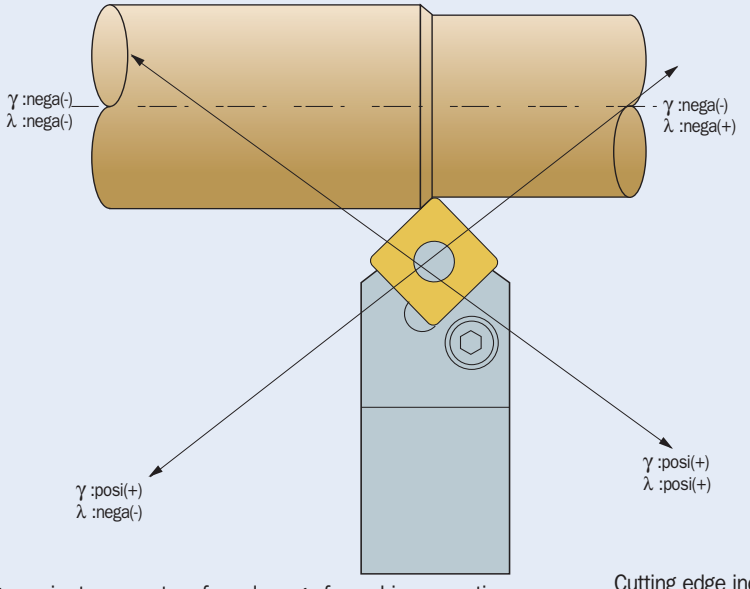
1. Hard work-piece.
2. When a robust cutting edge is required.

→Low rake angle

1. Soft work-piece.
2. Free cutting material.

→High rake angle

Rake angle and chip direction



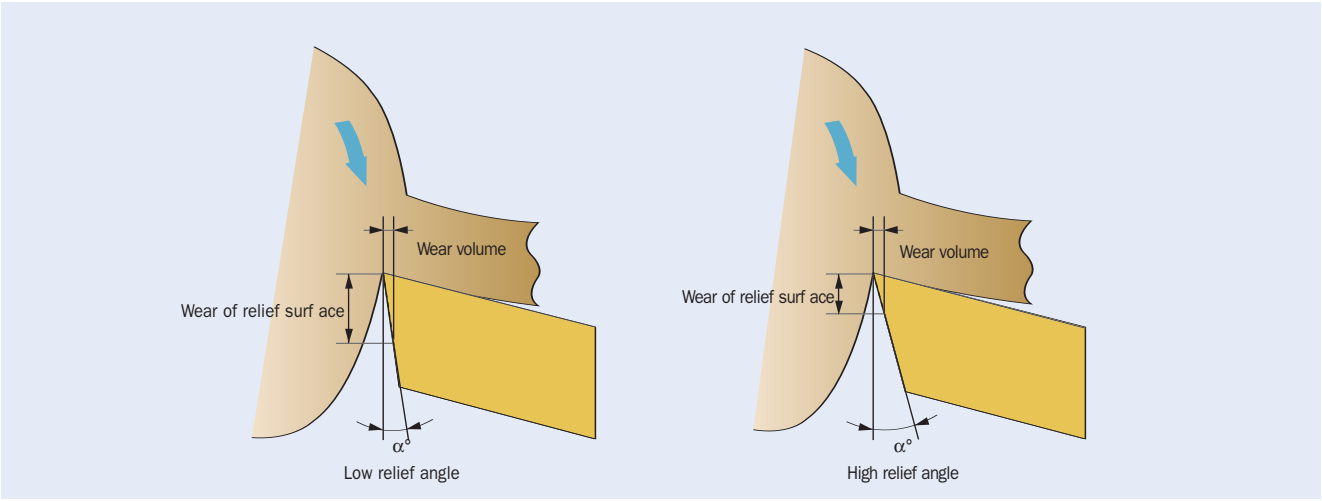
Avoid choosing <nega,posi>, to prevent surface damage from chip evacuation.

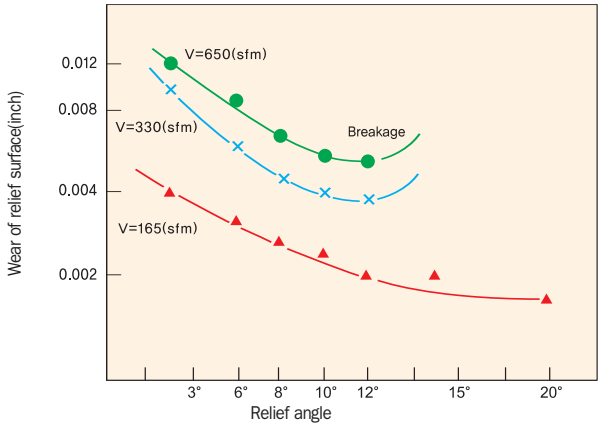
Cutting edge inclination : γ
Side rake angle : λ

Relief angle

Reduces friction between work-piece and insert.

The relationship between relief angle and wear.





- Work-piece : 8740
- Grade : P20
- d : 0.04inch
- f : 0.013ipr
- T : 20minutes

Effect

1. Greater relief angle will decrease the wear of the relief surface.
2. Greater relief angles result in weaker cutting edges.
3. Inadequate relief angle will result in chatter.

Application

1. Hard work-piece
2. When a robust cutting edge is required.

➡Low relief angle

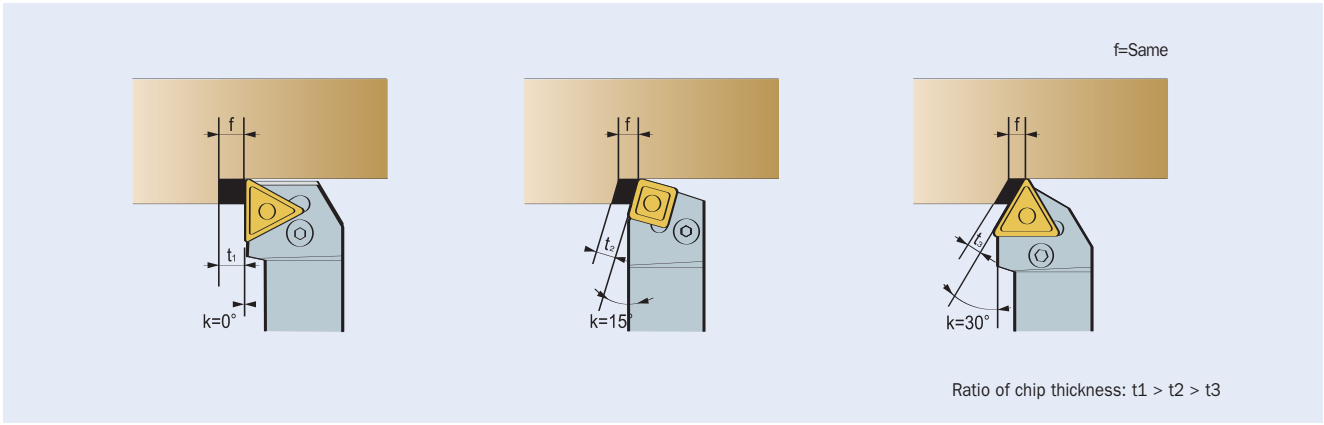
1. Soft work-piece
2. Work-hardening materials

➡High relief angle

Lead angle, side cutting angle

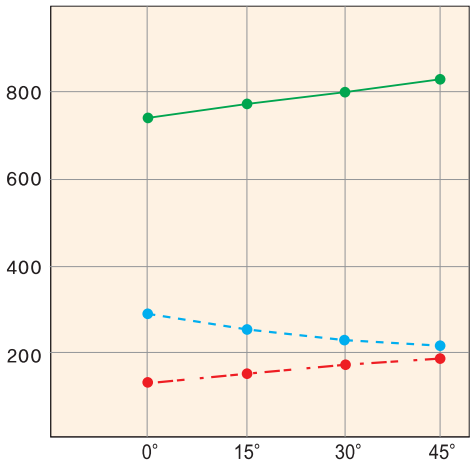
Lead angle has a large influence on chip control and cutting force.

Relationship between side cutting edge angle and chip thickness



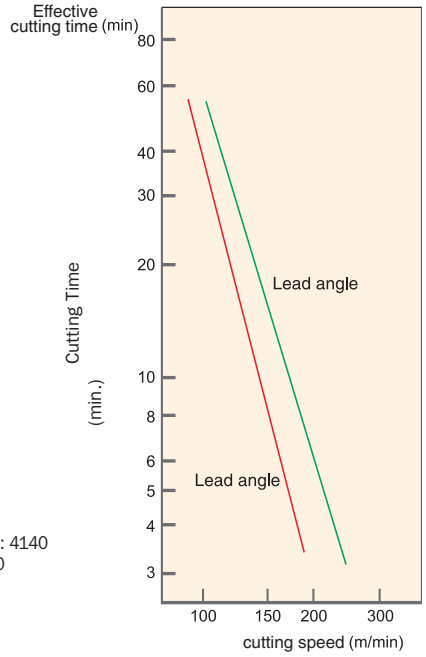
Ratio of chip thickness: t1 > t2 > t3

Side edge angle and three component forces



- Work-piece : 4140(Hв280)
- Grade : TNGA433
- V = 300sfm
- d = 0.16inch
- f = 0.018iprs

Relationship between side cutting edge angle and tool life



- Work-piece : 4140
- Grade : P20
- d : 12inch
- f :0.008ipr

Effect

1. Greater lead angles increase tool life.
2. Greater lead angles may cause deflection in parts with a large length to diameter ratio.

Application

1. Finishing with small depths of cut
2. Large length to diameter ratio

➡Low lead angle

1. Solid and high calorific power work-piece
2. Rough cutting with beg diameter work-piece

➡High lead angle

End cutting angle

Facilitates the reduction of friction between tool and material to improve surface finish.

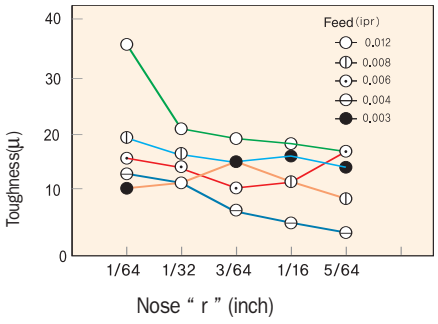
Effect

1. Small end cutting angles improve strength but increases heat do to friction.
2. Small end cutting angle creates chatter.

Nose radius

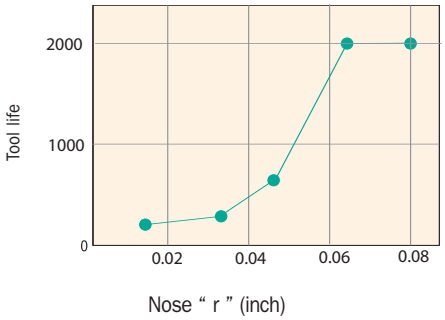
Nose radius influences cutting pressure and surface finish.
Two to three times the radius feed rate is possible.

Nose radius and surface finish roughness



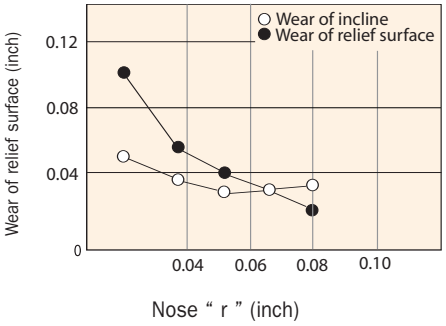
- Work-piece : 9840, Ha200
- Grand : P20
- V = 400sfm,d=0.02inch

Nose radius and tool life



- Work-piece : 4140, HB280
- Grand : P10
- V = 330sfm,d=0.02inch
- f =0.013ipr.

Nose radius and wear of tool



- Work-piece : 9840, HB200
- Grand : P10
- V = 450sfm,d=0.08inch
- f = 0.008ipr.T = 10min

Nose "r" effect

1. Large radii produce finer surface finishes relative to feed.
2. The larger the radius the stronger the edge.
3. Large radii decreases incline wear.
4. Large radii can also create chatter.

Application

1. Small depths of cut, for finishing.
2. Large length to diameter ratio.
3. For low build quality machines (light duty).

→ Small nose ' r '

1. When a strong edge is required for interrupted cuts.
2. For heavy duty machining.
3. For high build quality machines.

→ Big nose ' r '

Selection of Tools

There are many factors in selecting the appropriate tool. Keep the following in mind.

Selection of insert and tool holder

A : Basic factors

- Material
- Shape
- Size
- Lathe condition to be used (rigidity, years in service, etc)
- Hardness
- Surface condition
- Surface finish required
- Lathe type
- Horse power
- Workholding

B : Application

① Select tool allowing the largest approach angle.
② Select the largest shank.
③ Select the largest depth of cut within the limits cutting conditions.
④ Select the largest nose radius.
⑤ Use appropriate depths of cut and feeds within the effective range of chipbreaker.
⑥ Select the smallest geometry insert considering cutting speed and conditions.
⑦ Select most rigid insert geometry available.
⑧ Select the highest feed within the limits of cutting conditions.

Reading Tool Life

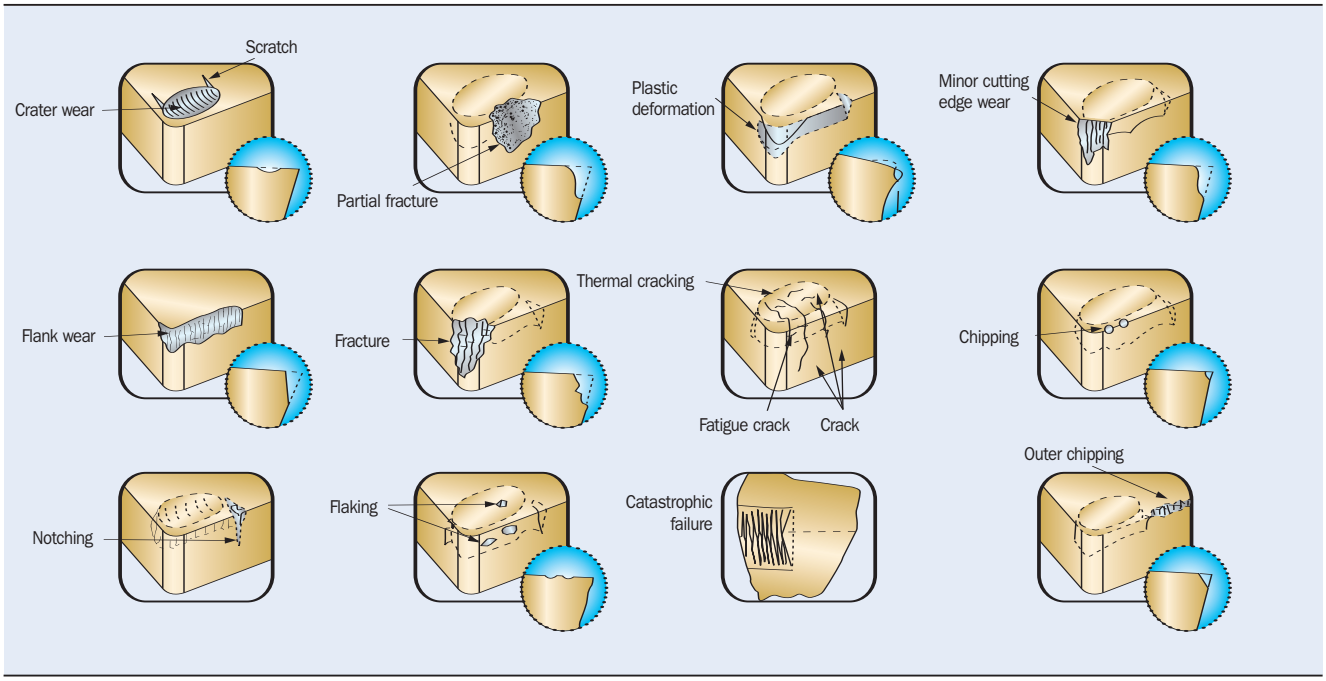
KS B0813

Flank Wear	0.08inch	Finishing, non-ferrous alloy
	0.016inch	Alloy steel
	0.028inch	General conditions, cast iron
	0.04~0.05inch	Roughing, cast iron
Depth of Wear	In general 0.002~0.004inch	

ISO

Judgement on usability	Application
Complete wear	High speed tool steel
Relief face wear V_B = 0.012inch	In generation of even wear of relief face (tungsten, ceramic, etc)
VBmax = 0.02inch	In generation of uneven wear of relief face
Rake face wear K_T = 0.002+0.012inch (f:ipr)	Tungsten carbide
Surface finish 1, 1.6, 2.5, 4, 6.3, 10μmRa	In case of surface finish required

Forms of Tool Failure



Tool Failure

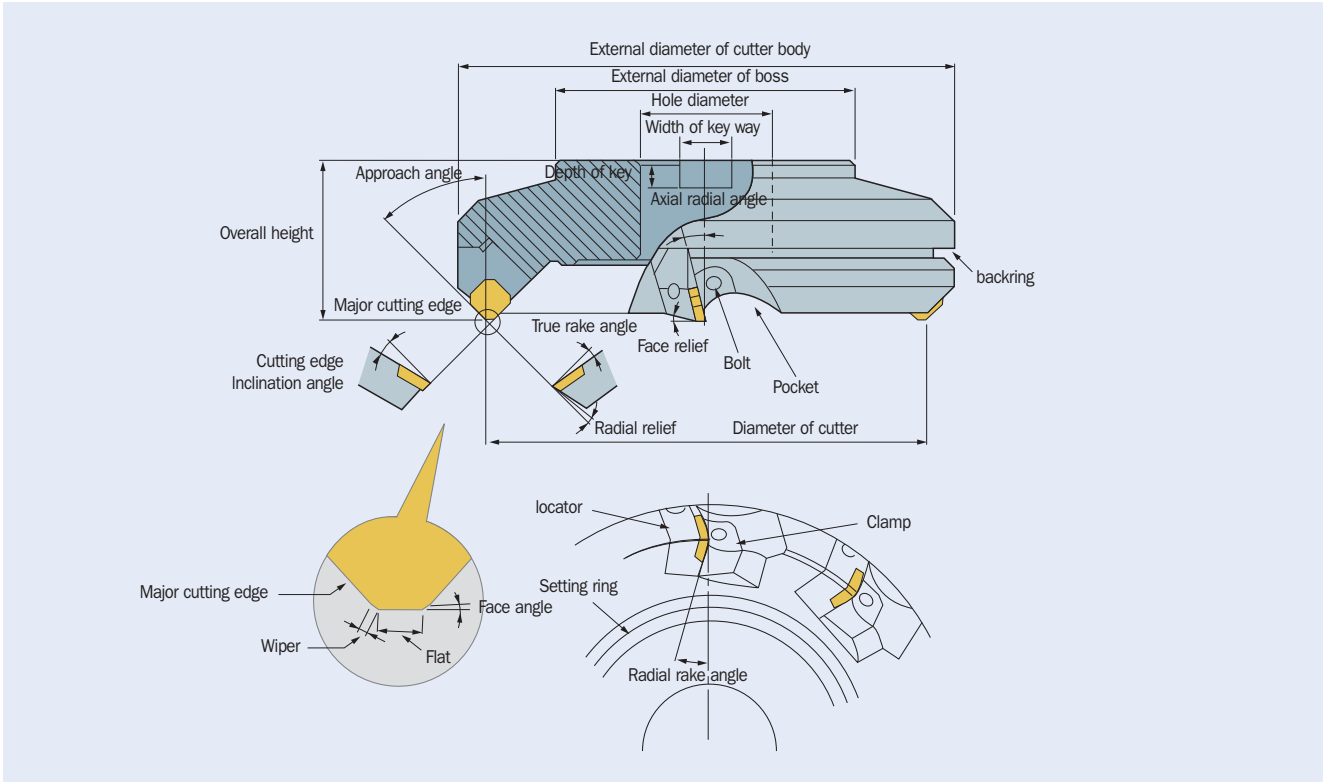
Failure		Explanation
Wear	Flank wear	Mechanical wear due to the friction of relief face and workpiece (normal).
	Crater wear	Thermal wear due to friction of chip and rake face at high pressure or temperature.(It mainly occurs in steels, cast steels and ductile cast irons that produce long stringy chips.)
	Notching	Notching occurs on the border land between workpiece and tool (end cutting edge and side cutting edge)
	Edge wear	When the work piece hardness is greater than the tool, it occurs on the edge.
Chipping		Small cutting edge fractures due to mechanical impact, thermal impact and built up edge.
Partial fracture		Big cutting edge fractures.
Catastrophic failure		Catastrophic failure.
Flaking		Flaking off by scratching or cracking of the rake and relief faces
Plastic deformation		Depression of cutting edge due to softening of carbide through intense heat and pressure.
Cracks	Thermal cracking	Thermal cracking often occurs on the rake angle. At first, it is generated to the vertical direction and then makes progress in a paralell direction creating more cracks. The result is loss of cabide in a u shape.
	Fatigue cracking	Fatigue cracking occurs in parallel with cutting edges, mechanical stress is repeatedly introduced through impact or interrupted cut.

Turning Trouble Shooting

Problems	Cause	Solution													
		Cutting conditions				Tool shape						Grade		Miscellaneous	
		Cutting Speed	Feed rate	Depth of cut	Cutting fluid	Rake angle	Relief angle	Side cutting edge angle	End cutting edge angle	Nose radius	Honning	Toughness	Hardness	Overhang	Mechanical rigidity
Flank wear	· Improper cutting condition · Improper tool grade	↓	↑		○	↑				↑			↑		↑
Crater wear	· Improper cutting conditions · Improper tool grade · Insufficient coolant	↓	↓	↓	○	↑							↓		↑
Chipping	· Improper cutting conditions · Incorrect setting · Chatter · Built-up edge	↑	↓			↓				↑	↑	↑			
Breakage	· Increase of chipping · Improper tool selection · Excessive feed		↓	↓							↑	↑		↓	
Thermal cracks	· Improper cutting conditions · Improper tool grade	↓	↓	↓										↑	
Poor surface finish	· Use of worn inserts · Improper cutting fluid · Improper insert shapes	↑	↓	↓	○	↑							↓	↑	
Chattering	· Insufficient mechanical power · Excessive overhang · Improper cutting conditions · Excessive nose radius	◉	↑	↓										↓	↑
Burr	· Insufficient mechanical power · Improper cutting conditions · Excessive overhang · Excessive nose radius	◉	↑	↓						↓				↓	↑
Plastic Deformation	· Improper cutting conditions	↓	↓	↓			↑			↓					

↑ : Increase ↓ : Decrease ○ : Application ◉ : Proper application

Milling Terminology



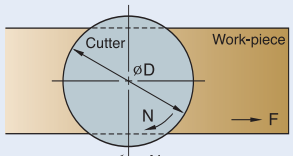
Terminology and function of cutting edge angle

	Title	Symbol	Function	Effects
1	Rake angle-axis direction	A.R	Chip flow, deposit.	
2	Rake angle-reverse direction	R.R	Effect on thrust.	
3	Major cutting edge angle	A.A	Depth of cut, chip flow.	In case of large angle - reduce the depth of cut and cutting resistance.
4	Real rake angle	T.A	Actual rake angle.	
5	Cutting edge inclination angle	I.A	Chip flow.	Large angle - Free chip flow, low cutting forces.
6	Front rake angle	F.A	Toughness.	Small angles increase toughness.
7	Relief angle		Effect on Strength, tool life and chattering.	

Cutting Formulas

Cutting speed

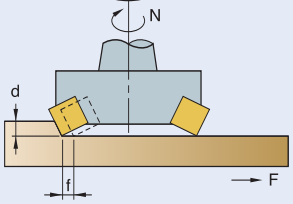
$$V = \frac{\pi \cdot D \cdot N}{12} \text{ (sfm)}$$



- V:Cutting speed (sfm)
- D:Cutter diameter (inch)
- N:Revolution per a minute (rpm)
- π:Pi (3.14)

Feed

$$f = \frac{F}{Z \cdot N} \text{ (ipr)}$$



- fz:Inch per tooth (ipt)
- F:Inch per minute (ipm)
- Z:Number of teeth
- N:Revolutions per a minute (rpm)

Power requirements

$$W = \frac{Q \times Ks}{60 \times 120 \times \eta} \text{ (Kw)}$$

$$H = \frac{W}{0.75} \text{ (Kw)}$$

$$W = \frac{L \times F \times d}{1000} \text{ (Kw)}$$

- W : Power requirement (kw)
- H : Horsepower requirement (hp)
- Q : Chip removal rate (cm3 /min)
- L : Width of cut (mm)
- F : Feed per a minute (mm/min)
- d : Depth of cut (mm)
- Ks: Specific cutting resistance (kg/mm2)
- η : Mechanical efficiency

Milling Trouble Shooting

Problems	Cause	Solution										
		Cutting conditions				Tool shape					Grade	
		Cutting speed	Depth of cut	Feed rate	Cutting fluid	Rake angle	Relief angle	Approach angle	Chatter	Nose radius	Toughness	Hardness
Flank wear	· Improper tool grade · Improper cutting conditions · Chattering	↓		↑			↑	↓		↑		↑
Crater wear	· Improper tool grade · Improper cutting conditions	↓	↓	↓	○	↑				↓		↑
Chipping	· Insufficient edge strength · Excessive feed · Excessive cutting load			↓		↓	↓	↓		↑	↑	
Built-up edge	· Improper cutting conditions · Improper edge type · Improper tool grade	↑	↓	↑	○	↑				↓		
Chatter	· Improper cutting conditions · Lack of teeth for cut · Improper cutting edge type · Poor chip control · Insufficient workholding		↓	↓		↑		↑	↓	↓		
Poor surface finish	· Built-up edge · Improper cutting conditions · Chattering · Poor chip control	↑	↓	↓	○	↑			↓	↑		
Thermal cracking	· Improper cutting conditions · Improper tool grade	↓	↓	↓	◉	↑				↑	↑	
Breakage	· Improper tool grade · Excessive cutting load · Poor chip control · Chattering · Excessive overhang		↓	↓	○						↑	

↑ : Increase ↓ : Decrease ○ : Application ◉ : Proper application

HARDNESS CROSSOVER CHART

Vickers 50kgb HV	Brinnell, 3000kgb HB		Rockwell				Shore	Tensile strength (Approximate) MPa (1)
	Standard 10mm	Carbide 10mm	A Scale 60kgb Diamond Grain HRA	B Scale 100kgb 1/16in Ball HRB	C Scale 150kgb Diamond Grain HRC	D Scale 100kgb Diamond Grain HRD	HS	
940	-	-	85.6	-	68.0	76.9	97	
920	-	-	85.3	-	67.5	76.5	96	
900	-	-	85.0	-	67.0	76.1	95	
880	-	(767)	84.7	-	66.4	75.7	93	
860	-	(757)	84.4	-	65.9	75.3	92	
840	-	(745)	84.1	-	65.3	74.8	91	
820	-	(733)	83.8	-	64.7	74.3	90	
800	-	(722)	83.4	-	64.0	74.8	88	
780	-	(710)	83.0	-	63.3	73.3	87	
760	-	(698)	82.6	-	62.5	72.6	86	
740	-	(684)	82.2	-	61.8	72.1	84	
720	-	(670)	81.8	-	61.0	71.5	83	
700	-	(656)	81.3	-	60.1	70.8	81	
690	-	(647)	81.1	-	59.7	70.5	-	
680	-	(638)	80.8	-	59.2	70.1	80	
670	-	630	80.6	-	58.8	69.8	-	
660	-	620	80.3	-	58.3	69.4	79	
650	-	611	80.0	-	57.8	69.0	-	
640	-	601	79.8	-	57.3	68.7	77	
630	-	591	79.5	-	56.8	68.3	-	
620	-	582	79.2	-	56.3	67.9	75	
610	-	573	78.9	-	55.7	67.5	-	
600	-	564	78.6	-	55.2	67.0	74	
590	-	554	78.4	-	54.7	66.7	-	2055
580	-	545	78.0	-	54.1	66.2	72	2020
570	-	535	77.8	-	53.6	65.8	-	1985
560	-	525	77.4	-	53.0	65.4	71	1950
550	(505)	517	77.0	-	52.3	64.8	-	1905
540	(496)	507	76.7	-	51.7	64.4	69	1860
530	(488)	497	76.4	-	51.1	63.9	-	1825
520	(480)	488	76.1	-	50.5	63.5	67	1795
510	(473)	479	75.7	-	49.8	62.9	-	1750
500	(465)	471	75.3	-	49.1	62.2	66	1705
490	(456)	460	74.9	-	48.4	61.6	-	1660
480	488	452	74.5	-	47.7	61.3	64	1620
470	441	442	74.1	-	46.9	60.7	-	1570
460	433	433	73.6	-	46.1	60.1	62	1530
450	425	425	73.3	-	45.3	59.4	-	1495
440	415	415	72.8	-	44.5	58.8	59	1460
430	405	405	72.3	-	43.6	58.2	-	1410
420	397	397	71.8	-	42.7	57.5	57	1370
410	388	388	71.4	-	41.8	56.8	-	1330
400	379	379	70.8	-	40.8	56.0	55	1290
390	369	369	70.3	-	39.8	55.2	-	1240
380	360	360	69.8	(100.0)	38.8	54.4	52	1205
370	350	350	69.2	-	37.7	53.6	-	1170
360	341	341	68.7	(109.0)	36.6	52.8	50	1130
350	331	331	68.1	-	35.5	51.9	-	1095
340	322	322	67.6	(108.0)	34.4	51.1	47	1070
330	313	313	67.0	-	33.3	50.2	-	1035

Vickers 50kgb HV	Brinnell, 3000kgb HB		Rockwell				Shore	Tensile strength (Approximate) MPa (1)
	Standard 10mm	Carbide 10mm	A Scale 60kgb Diamond Grain HRA	B Scale 100kgb 1/16in Ball HRB	C Scale 150kgb Diamond Grain HRC	D Scale 100kgb Diamond Grain HRD	HS	
320	303	303	66.4	(107.0)	32.2	49.4	45	1005
310	294	294	65.8	-	31.0	48.4	-	980
300	284	284	65.2	(105.5)	29.8	47.5	42	950
295	280	280	64.8	-	29.2	47.1	-	935
290	275	275	64.5	(104.5)	28.5	46.5	41	915
285	270	270	64.2	-	27.8	46.0	-	905
280	265	265	63.8	(103.5)	27.1	45.3	40	890
275	261	261	63.5	-	26.4	44.9	-	875
270	256	256	63.1	(102.0)	25.6	44.3	38	855
265	252	252	62.7	-	24.8	43.7	-	840
260	247	247	62.4	(101.0)	24.0	43.1	37	825
255	243	243	62.0	-	23.1	42.2	-	805
250	238	238	61.6	99.5	22.2	41.7	36	795
245	233	233	61.2	-	21.3	41.1	-	780
240	228	228	60.7	98.1	20.3	40.3	34	765
230	219	219	-	96.7	(18.0)	-	33	730
220	209	209	-	95.0	(15.7)	-	32	695
210	200	200	-	93.4	(13.4)	-	30	670
200	190	190	-	91.5	(11.0)	-	29	635
190	181	181	-	89.5	(8.5)	-	28	605
180	171	171	-	87.1	(6.0)	-	26	580
170	162	162	-	85.0	(3.0)	-	25	545
160	152	152	-	81.7	(0.0)	-	24	515
150	143	143	-	78.7	-	-	22	490
140	133	133	-	75.0	-	-	21	455
130	124	124	-	71.2	-	-	20	425
120	114	114	-	66.7	-	-	-	390
110	105	105	-	62.3	-	-	-	-
100	95	95	-	56.2	-	-	-	-
95	90	90	-	52.0	-	-	-	-
90	86	86	-	48.0	-	-	-	-
85	81	81	-	41.0	-	-	-	-

Remark (1) 1MPa=1N/mm^2

(2) ( ) reference only.

ISO	Korea	United Kingdom	America	German	Spain	Italy	Sweden	France	Japan
	KS	BS	AISI/SAE	DIN	UNF	UNI	SS	AFNOR	JIS
P Steels	**Carbon steel**								
	SM15C	080M15	1015	Ck15	C15K	C16	1370	XC12	S15C
	SM25C	-	1025	Ck25	-		-	-	S25C
	SM35C	060A35	1035	C135	-	C36	1572	XC38TS	S35C
	SM45C	080M46	1045	Ck45	C45K	C45	1672	XC42	S45C
	SM50C	060A52	1050	Cf53	-	C53	1674	XC48TS	S50C
	SM55C	070M55	1055	Ck55	C55K	C5	-	XC55	S55C
	SM58C	080A62	1060	Ck60	-	C60	1678	XC60	S58C
	-	212M36	1140	35S20	F210G	-	1957	35MF4	-
	SCMn1	150M28	1330	28Mn6	-	-	-	20M5	SCMn1
	-	230M07	1215	9SMn36	12SMn35	CF9SMn36	-	S300	-
	SMn438(H)	-	1355	36Mn5	36Mn5	-	2120	40M5	SMn738(H)
	sum22	230M07	1213	9SMn28	11SMn28	CF9SMn28	1912	S250	sum22
	Low alloy steels								
	SNC815	655M13;	3310:3415	14NiCr14	-	-	-	12NC15	SNC815(H)
	SNC415	-	3415	14NiCr10	15NiCr11	16NiCr11	-	14NC11	SNC415(H)
	SNC236	640A35	3435	36NiCr6	-	-	-	35NC6	SNC236
	SCM420;SCM430	1717DS110	41300	25CrMo4	55Cr3	25CrMo(KB)	2225	25CD4	SCM420;SCM430
	SCM432;SCCRM3	708A37	4137:4135	34CrMo4	34CrMo4	35CrMo4	2234	35CD4	SCM432;SCCRM3
	SCM415	-	-	15CrMo5	12CrMo4	-	2216	12CD4	SCM415(H)
	SCM440	708M40	4140	42CrMo4	42CrMo4	42CrMo4	2244	42CD4	SCM440(H)
	SCM440	708M40	4140;4142	41CrMo4	42CrMo4	41CrMo4	2244	42CD4TS	SCM440
	-	820A16	-	17CrNiMo6	14NiCrMo13	-	-	18NCD6	-
	- SCMnH1	1503-245-420	4520	16Mo5	16Mo5	16Mo5	-	-	-
	SCr415	Z120M12	-	G-X120Mn12	X120Mn12	XG120Mn12	-	Z120M12	SCMnH/1
	-	523M15	5015	15Cr3	-	-	-	12C3	SCr415(H)
	SCr430	(527M20)	5115	16MnCr5	16MnCr5	16MnCr5	2511	16MC5	-
	SCr440	530A32	5132	34Cr4	35Cr4	34Cr4(KB)	-	32C4	SCr430(H)
	SPS	530M40	3140	41Cr4	42Cr4	41Cr4	-	42C4	SCr440(H)
	SPS9	735A50	6150	50CrV4	51CrV4	50CrV4	2230	50CA4	SUP10
	-	527A60	5155	55Cr3	-	-	-	55Cr3	SUP9(A)
	SNCM220	905M39	-	41CrAlMo7	41CrAlMo7	41CrAlMo7	2940	40CAD6, 12	-
	SNCM240	805M20	8620	21NiCrMo22	20NiCrMo2	20NiCrMo2	2506	30NCD2	SNCM22(H)
	-	311-Type7	8740	40NiCrMo22	40NiCrMo2	40NiCrMo2(KB)	-	-	SNCM240
	-	250A53	9255	55Si7	56Si7	55Si8	2085	55S7	-
	SU2	816M40	9840	36CrNiMo4	35NiCrMo4	38NiCrMo4(KB)	-	40NCD3	-
	SUM22L	534A99	52100	100Cr6	F.131	100Cr6	2258	100C6	SU2
	-	-	12L13	9SMnPb28	11SMnPb28	CF9SMnPb28	1914	S250Pb	SUM22L
	-	-	12L14	-SMnPb36	12SMnPb35	CF9SMnPb36	1926	S300Pb	-
	-	150-620Gr27	ASTM A182	13CrMo4 4	14CrMo45	14CrMo4 5	-	15CD3.5	-
	-	1501-622	ASTM A182	10CrMo9 10	TU.H	12CrMo9, 10	2218	12CD9, 10	-
	-	-	ASTM A350LF5	14Ni6	15Ni6	14Ni6	-	16N6	-
	-	1501-240	ASTM A204Gr.A	15Mo3	16Mo3	16Mo3KW	2912	15D3	-
		722M24	-	32CrMo12	F124.A	32Crmo12	2240	30CD12	-
			32CrMo12						
	High alloy steels								
	STS12	BD3		X210Cr12	X210Cr12	X210CrMoV13KU	-	Z200C12	SKD1
	-		D3	Z100CnMoV51Z100CDV5	BA2	2260	Z100CnMoV51	Z100CnMoV51KU	SKD12
	STD61	-	A2	X210CrW12	X210CrW12	X215CRW121KU	2312	-	SKD2
	-	BH13	-	X40CrMoV51	X40CrMoV5	X35CrMoVKU	2242	Z40CDV5	SKD5
	STS31	BH21	H13	X30WCrV93	X30WCrV9	X28W09KU	-	Z30WCV9	SKS31
	STS43	-	H21	105WCr6	05WCr5	3KU	2140	105WC13	SKS43
	STF4	BW2	-	100VI	-	-	-	Y105V	SKT4
	-	-	W210	55NiCrMoV6	F.520.S	-	-	55NCDV7	SUH1
		401S45	L6	X45GrSi93	F322	10WCr6	-	Z45CS9	SKH55
	SKH55		HW3						
	SKH3	-		S6-5-2-5	HS6-5-2-5	-	2723	Z85WDKCV2723	SKH3
	SKH51	BT4	-	S18-1-2-5	HS18-1-1-5	X78WCo1805KU	-	Z80WKCV	SKH9
	-	BM2	T4	S6-5-2	HS6-5-2	X82WMo0650KU	-2722	Z85WDCV	
	SKH2	-	M2	M7	HS2-9-2	Z100WCWVHS2-9-2	2782	S2-9-2	
	-	BT1	-	S18-0-1	HS18-0-1	X75W18KU	-	Z08WCV	SKH2
		BS1	T1S1	45WCrV7	45WCrSi8	45WCrV8KU	2710	-	-

ISO	Korea	United Kingdom	America	German	Spain	Italy	Sweden	France	Japan
	KS	BS	AISI/SAE	DIN	UNF	UNI	SS	AFNOR	JIS
M Stainless Steels	**Austenite range**								
	STS301	-	301	X12CrNi177	-	2331	F.3517	Z12CN17.07X12CrNi1707	SUS301
	STS303	-	303	X12CrNiS188Z10CNF18.09	-	2346	F.3517	X10CrNiS18.09	SUS303
	-		304	X5CrNi189	304S31	X5CrNi18	2332/2333F.3551	Z6CN18.09	SUS304
	STS304	304S15	304	X5CrNi189	F.3551	X5CrNi1810	2332	Z6CN18.09	SUS304
	STS304L		-	Z3CN19.10	304C12	2333	-	-	SUS304L-
	SSC16		304LX2CrNi1819	Z2CrNi1810	304S12	2352	F.3503	X2CrNi1011	SCS16
	STS304L	304S62	304LN	X2CrNiN,1810	-	-	2371	Z2CN1810	NSUS304LN
	STR31		HW3X45CrSi93	Z45CS9	401S45	-	SF322	X45CrSi8	SUH1
	STR309	-	309	X15CrNiSi	-	-	-	Z15CNS2012	SUH309
	STR310	310S24	310S	X12CrNi2521	F.332	X60CrNi2520	2361	Z12CN2520	SUD310
	STS316		316	X5CrNiMo1810	346S16	X5CrNiMo17122347	F.3543	Z6CND1711	SUS316
	STS316LN	-	316LN	X2CrNiMoN	-	-	2375	Z2CND1713	SUS316LN
	STS316L	-	1812	-	-	-	-	-	SUS316L-
	SSC16		316LXCrNiMo	Z2cndCND1712	316S13	2353	-	X2CrNiMo1712	SCS16
	-	320S17	316Ti	Z2CND1915	F.3535	X6CrNiMoTi1712	2350	Z6VDT17.12	-
	STS317L		X2CrNiMo	z2CND1915	317S12	2367	-	X2CrNiMo1816	317L
	-	-	X10CrNi	Z6CNDNb	-	-	-	X6CrNiMoMoNb	318
	-	-	S32304	X2CrNiN,234	-	-	2327	Z2CN23-04AZ	-
		-	S32900	X8CrNiMo.275	-	-	2324	-	-
	-	-	S31803	X2CrNiMoN	-	-	2377	Z2CND22-0503	-
	STS321	351S12	320	X10CrNiTi	F.3553	X6CrNiTi1811	2337	Z6CNT18.10	SUS321
	STS347		347	X10CrNiNb	347S17	X6CrNiNb18.112338	F.3552	Z6CNNb18.10	SUS347
	STS12	BA2	A2	Z100CnMoV51	Z100CnMoV51	Z100CnMoV51KU	2260	Z100CDV5	SKD12
	Ferrite range Martensite range								
	STS403	403S17	403	X7Cr13	F.3110	X6Cr13	2301	Z6C13	SUS403
	STS405	403S17	405	X10CrA113	F.311	X10CrA112	-	Z10C13	SUS405
	STS410	410S21	410	X10Cr13	F.3401	X12Cr13	2302	Z10C14	SUS410
	STS420J2	420S45	-	X46Cr13	F.3405	X40Cr145	2304	Z4CM	SUS420J2
	STS430	430S15	430	X8Cr17	F.3113	X8Cr17	2320	ZBC17	SUS430
	STS430F	-	430F	X12CrMoS17	F.3117	X10CrS17	2383	Z10CF17	SUS430F
	STS431	431S29	431	X22CrNi17	F33427	X16CrNi16	2321	Z15CNi6.02	SUS431
	STS434	434S17	434	X6CrMo17	-	ZX8CrMo17	2325	ZBCD17.01	SUS434
	STR446	-	446	X10CrA124	-	X16Cr26	2322	Z10CAC24	SUH446
	SSC5	425C11	-	X5CrNi134	-	-	-	Z4CND13.4M	SCS5
	STR35,STR36	349S54	EV8	X53CrMnNiN	-	X53CrMnNiNN	-	Z52CMN21.09	SUH35,SUH36
	STR4	443S65	HNW6	X80CrNiSi20	F.320B	X80CrSiNi20	-	Z80CSN20.02	SUH4
	Heat resisting alloys								
	HRSC15	330C11	-	G-X40NiCrSi	-	XG50NiCr	-	-	SCH15
	STR330	-	X12NiCrSi	-	-	-	-	Z12NCS35.16	SUH330330
	-	3072-76	4676	NiCu30Al	-	-	-	-	-
	-	-	5390A	-	-	-	-	NC22FeD	-
	-	3146-3	5391	S-NiCr13A16MoNb	-	-	-	NC12D	-
	-	HR8	5383	NiCr19Fe19NbMo	-	-	-	NC19rNB	-
	-	-	5537C	CoCr20W15Ni	-	-	-	KC20WN	-
	-	-	5660	NiFe35Cr14MoTi	-	-	-	ZSNCDT42	-
		-	5666	NiCr22Mo9Nb	-	-	-	NC22FeDNB	-
	-	-	AMS5397	NiCr15Cr10MoATi	-	-	-	-	-
	-	-	AMS5399	NiCr19Co11MoTi	-	-	-	NC19KDT	-
	-	-	AMS5544	NiCr19Fe19NbMo	-	-	-	NC20K14	-
	-	-	AMS5772	CoCr22W14Ni	-	-	-	KC22WN	-
	-	TA10-13/TA28	AMSR56400	TiAl6V4	-	-	-	T-A6V	-
	-	TA14/17	AMSR54520	TiAl5Sn2.5	-	-	-	T-A5E	-

ISO	Korea	United Kingdom	America	German	Spain	Italy	Sweden	France	Japan
	KS	BS	AISI/SAE	DIN	UNF	UNI	SS	AFNOR	JIS
K Cast iron	**Gray cast iron**								
	GC100	-	No20B	GG10	-	G10	0110	Ft10D	FC100
	GC150	Grade150	No25B	GG15	-	G14	0115	Ft15D	FC150
	GC200	Grade220	No30B	GG20	-	G20	0120	Ft20D	FC200
	GC250	Grade260	No35B	GG25	-	G25	0125	Ft25D	FC250
	GC300	Grade300	GNo45B	GG30	-	G30	0130	Ft30D	FC300
	GC350	Grade350	No50B	GG35	-	G35	0135	Ft35D	FC350
	GCD400	SNG420/12	060-40-18	GGG40	-	GS400-12	0717-02	FCS400-12	FCD40
	GCD500	SNG500/7	80-55-06	GGG50	-	GS500/7	0727-02	HGS500-7	FCD500
	GCD600	SNG600/3	-	GGG60	-	GS600/3	0732-03	FGS600-3	FCD600
	GCD700	SNG700/2	100-70-03	GGG70	-	GS700/2	0737-01	FGS700-2	FCD700
	Ductile cast iron								
	-	B340/12	32510	GTS-35	-	-	0815	MN35-10	-
	-	P440/7	40010	GTS-45	-	-	0852	-	-
Aluminium	-	P510/4	50005	GTS-55	-	-	0854	MP50-5	-
	-	P570/3	70003	GTS-65	-	-	0858	MP60-3	-
	Aluminium alloy								
	-	LM6	A413.2	G-AlSi12	-	-	4261	-	-
	-	LM9	A360.2	G-AlSi10Mg(Cu)	-	-	4253	-	-
	-	LM20	A413.1	G-AlSi12(Cu)	-	-	4260	-	-
	-	LM24	A380.1	GD-AlSi8Cu	-	-	4250	3-	-
	-	-	A413.0	GD-AlSi12	-	-	4247	-	-

Grade Selection

Material	Class of symbol	Grade	Hardness	Work-piece	Application	Working conditions	High performance direction	
							Cutting condition	Quality of tip
P	P01	ST05	92.0 and over 120 and over	Steels, Cast steels	Precision turning, precision boring	Continuous cutting conditions at high speeds	Cutting Speed / Feed Speed	Hardness / Toughness
	P10	ST10	91.5 and over 150 and over	Steels, Cast steels	Turning, Copy machining, Threading, Finish milling	Continuous cutting conditions at high speeds		
	P20	ST20	91.0 and over 165 and over	Steels, Cast steels, Malleable cast iron	Turning, Copy machining, Milling	Semi-continuous cutting conditions at medium speeds		
	P30	ST30A ST30E	89.5 and over 175 and over	Steels, Cast steels, Malleable cast iron	Turning, Milling	Interrupted cutting conditions.		
M	M10	U10	91.5 and over 140 and over	Steels, Cast steels, Cast iron	Turning, Milling	Continuous cutting conditions at high speeds		
	M20	U2	90.5 and over 170 and over	Steels, Cast steels, Cast iron	Turning, Milling	Continuous cutting conditions at high speeds	Cutting Speed / Feed Speed	Hardness / Toughness
				Hadfield, Steels, Austenite Steels, Special cast iron	Turning, Milling	Continuous cutting conditions at high speeds		
	M40	U40	88.5 and over 220 and over	Steels, Cast steels, Cast iron, Austenite steels, Special cast iron, Heat resisting alloy	Turning, Milling Planing, Cutting-off	Continuous cutting conditions at high speeds		
K	K01	H02	92.5 and over 130 and over	Cast iron	Precision Turning, Precision boring, Surface finish milling	Continuous cutting conditions at high speeds.	Cutting Speed / Feed Speed	Hardness / Toughness
				High hardness cast iron, Quenched steels	Turning			
				Black lead, Hard paper, Ceramic High Si-Al				
	K10	H01	92.0 and over 140 and over	Cast iron, Malleable cast iron	Turning, Milling, boring, Reamer	Continuous cutting conditions at meduim speeds		
				Quenched steels	Turning			
				Si-Al alloy, High hardness copper, Glass, Ceramic, Hard rubber, Hard paper, Synthetic resin				
	K20	G10 G2	90.0 and over 160 and over	Cast iron(Hb200 and below)	Turning, Milling, Planing, boring, Reamer, Broach	Semi-continuous cutting conditions at medium speeds		
	K30	G3	89.0 and over 210 and over	Low hardness cast iron, Copper, Aluminium	Turning, Milling, Planing, copy maching	Interrupted cutting conditions.		

Application range of TMX grades

ISO		Coated Carbide		Uncoated Carbide		Cermet	
		Turning	Milling	Turning	Milling	Turning	Milling
P	P01	NC310, NC3015				CN100	
	P10	NC3020	NCM325, PC3530, PC230			CN200	
	P20	NC330					
	P30		PC130				
	P40		NCM335				
M	M01						
	M10	NC9020	NCM325				
	M20	PC9030, NC330	PC9530, NCM335				
	M30						
	M40						
K	K01	NC305K	NCM310K				
	K10	NC315K	PC205K, PC215K	H01	H01		
	K20		NCM320K				
	K30						
	K40						
Z	Z10						
	Z20						

Crossover Chart for Turning

APPLICATION			TMX Main	TMX Sub	SUMITOMO	SANDVIK	KENNAMETAL	KYOCERA	MITSUBISHI	ISCAR	TOSHIBA	SECO	WALTER	DIJET
NEGATIVE	STEELS	EXTREME FINISHING	HU		FA	QF	FF	GP DP CF	FH	SF	TF	FF1 F1, F2		F1 FA
		FINISHING	HF	GF	SU, SK SP LU	PF	FN FP FW	CQ HQ	SH	NF	TS, AS 11 17	MF2	NF NF3 NF5	FT UA
		MEDIUM FINISHING	HC	HM	SX UU	SM		CQ HQ	SH	NF RF LF	MJ	MF1	NS4 NS8	GP UR PF
		MEDIUM ROUGHING	HM	GM	GU UX UG	PM QM	MN MP MW	GS HS CS	MA MH	TF PP	TM	M3 MR3	NM, NM4 NM5, NM6 NM7	UB GG
		ROUGHING	HR	GR	MU MX	PR	RN CT	GT HT ★	GH	NR	TH	MR4 M5 MR7	NR5 NR7	UD
		HEAVY	GH HH		HG MP HP	HR	RH SP HP	HX	HZ, HV HH HX	TNM	TU 57 65	RR9 R4		UC
		WIPER	HW		LUW GUW	WF WM WR	MW FW	WQ	MW SW	WF WG	ASW	M3 M5	NF, PF NM, PM	
	GENERAL		B25	GR	UZ	23	MG	★	MT, MV	GN				GN
	STAINLESS STEEL MILD STEEL		HA HS GS	HM GR	SU, EX MU, FL (GU)	MF MM, QM MR	FF, FW FP, MP MW, RN	GU, HU XP, XQ XS	FS, FJ SH, MJ MS, GJ GH	PP TF	TF SS SA TU, MS	MF1 MF3 M5	NS4 NM4 NR7	SF
	CAST IRON		GR	B20 B25 HR	UZ UX ★	KF KM, QM KR, QR	FF, FW MP, MW RN	GC ★ ZS	★ ★	GN	★ 33, CM ★	MF3 M5	NS4, NS8 ★ NM4	
	ALUMINIUM		HA				F GP MS	AH		PP				
POSITIVE	STEEL CAST IRON	FINISHING	HFP	C05	FP FK	PF KF	MT-UF MT-LF GT-LF	GP DP HQ	FV SQ	⁰⁄ SM	01 PF	F1	PF4 PF5	FT
		MEDIUM FINISHING	HMP		SJ, SU SK	(PM) (KM)	MF	XQ HQ	R/L R/L-F	14, SM 17, 19	PS 23 PM	F1 F2	PS4 PS5	
		MEDIUM ROUGHING	C25	HMP	SF MU	(PR) (KR)	MT-MF GM	★ G	MV MQ ★	19	24 ★	F2	PM2, PM5 (PR5)	
	ALUMINIUM& ALLOY		AK		AG	AL	HP	A3		AS	PP	AI		ALU ACB
	STAINLESS STEEL MILD STEEL		HMP	AK	MU	MF, MM MR	LF	(XQ)	FV ★	14, SM 17, 19	SS		PS4 PM5	
	INDEXABLE DRILLIN-DEXABLE		C20 DS, DA DM	C21	S04 R06	51, 53 56, 58		★ SU, SP		SW, GF GG, DT		C1, P1 85, 86		

★No Name ★Simple Type

TURNING

ISO		TMX			SUMITOMO			KYOCERA			ISCAR			SANDVIK			SECO			KENNAMETAL			TOSHIBA			MITSUBISHI			HITACHI			VALENITE			WALTER			NTK			DIJET		
		TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET	TUNGSTEN CARBIDE	COATED	CERMET
	P		NC310 NC3015 NC3020 NC330	CN100 CT10 CC115P CN200 CN20	ST10P ST20E A30 ST40E	AC700G AC900G AC2000 New AC2000 AC3000	T110A T2000ZP T1200A T3000ZP T130A CN8000		CR7015 CR7025 CA5025	TN30 PV30P PV60P TN60 PV7020P TN6020 TN90	IC70 IC50M IC54	IC507 IC9015 IC9025 IC3028P	IC20N IC520NP IC30NP IC40T IC530NP	S1P SMA SM30 S30T S6	GC4005 GC4015 GC4025 GC4035	CT5005 CT5015 CT525 GC1525P	TTX TTM TTR	TP100 TP1000 TP200 TP2000 TP300	CM C15M	K45 KM K420	KC9010 KC9125 KC9025 KC8050 KC935 KC9040 KC9045	HT2 K125 HTX PS5 KT175	TX10S TX20 TX30 TX40	T9005 T9015 T9025 T9035 TD930	NS520 GT530P NS530 NS540 N308	UE6005 ST10T ST20T UTi20T	NX1010 UC6010 UE6020 UC6025 UE6035	SRN5 NX2525 AP25NP UP35NP NX335	GM8015 WS20B EX35 EX40 EX45	CH350 GM8020 GM8035	S1F CZ25P CH530 CH550 CH570	SV305 VC6 VC5 VC56	SV310 SV325 SV330	VC83	WAP10 WAP20 WAP30			T3N ZM3P KM3P CP5	T15 N20 C30 N40		JC110V	LN10 JC215V JC325V JC450	CX50 CX75 CX90 CX99
	M		NC9020 NC330 PC9030P	CN200	U10E U2 A30 A40	AC304 AC3000	T1200A		CA6015 CA5045 PR905P PR915P PR930P	PV60P TN60 TN6020 TN90 PV90P	IC08 IC28	IC9025 IC3028P		H13A H10F	GC2015 GC2025 GC2035	CT525 GC1525P	AT10 AT15 TTR	TP400 CP50P		K313 K68 K420	KC9150 KC9215 KC5010P KC9245 KC5025P	K125 PS5 KT175 KZ205	TU10 TU20 TU40	T6020 T6030	NS520 NS530 NS540	UTi20T	US7020 UP20MP US735	AP25NP NX2525	WAM10B	GM25 US735		VC27 EX35	GX30		VC28	WAM20		KM3P			JC5003 JC110V JC5015	LN10 CX75 CX99
	K	H01 G10	NC305K NC6010 NC315K		H1 G10E	AC300G EH510P AC500G EH520ZP AC700G	T110A T1200A	KW10H	CA4010 CR7015 PR610P	TN30 PV30P	IC4 IC20 IC28	IC9015 IC428 IC4050		H1P H10F H13A	GC3005 GC3205 GC3210 GC3015 GC3215 GC3025	CT515	THM THR	TX100 TX150		K313 K68 K1	KC9315 KC9325 KC7310P KC7315P	HTX	TH03 TH10 KS20	T5010 T1015 T5020	NS520	HTi05T HT110T HT120T UTi20T	UC5005 GP10HP UC5015 UP10HP UC6010	NX1010 AP25NP NX2525	WH05 W10 WH20	GM3005 GM8015		VC3 VC2 VC1	SV405 SV415 SV515			WTA13 WTA33			CP2 CP5	T15		JC105V JC110V JC215V	LN10 CX75

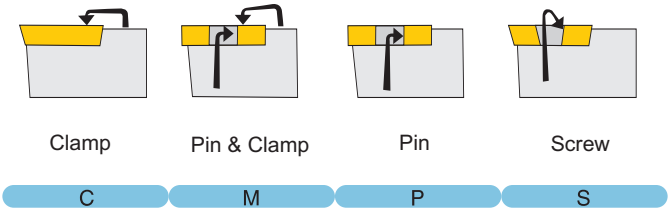
MILLING

ISO		COATED	CERMET	COATED	CERMET	COATED	CERMET	COATED	CERMET	COATED	CERMET	COATED	CERMET	COATED	CERMET	COATED	CERMET	COATED	CERMET	COATED	CERMET	COATED	CERMET	COATED	CERMET	COATED	CERMET
	P	NCM325 PC3530P NCM335	CN100	AC230 ACZ330P	T12A T1200A T250A	PR630P PR730P PR830P	TN60 TN100M TC60M	IC520M IC635 IC950P IC908P IC1008P	IC30N	GC1015P GC1025P GC4020 GC4030 GC1120P GC4040		T20M T25M CP200P T200M CP300P T350M		KC725MP KC792M KC935M	KT175 HT2 HT5 KZ205 KT195M	T325 AH330P T3030 AH740P	AT520P NS540 AT530P GT530P	F7030 GP20MP AP20MP	V45N NX2525 NX55 NX4545	CY150P CY250P	CH550 CH570	SV935P SM245		WQM15 WTL41 WQM25 WTL71 WQM35		QM3	C50	JC5003 JC730V JC5030 JC5010 JC5040	
	M	NCM335 PC9530P		EH510ZP EH520ZP ACZ350	T250A	PR660P PR730P PR830P	TN100M TC60M	IC908P IC328P IC928P		GC1005P GC2030 GC2040	CT520 CT530	CP200P CP50P		KC9240 KC705MP	KT175 KZ205 HT5 KT195M HT7	T325 AH140P	AT520P AT530P GT530P	VP15TFP VP20RTP		HC844P				WQM25					
	K	NCM310K PC205KP NCM320K PC215KP		AC211 ACZ310P		PR510P	TN60	IC4050 IC907P IC910P		GC3020 GC1020P GC3040		T15M		KC915M KC992M KC709MP	HT5	T1015 T1020 AH110P AH120P	AT520P AT530P GT530P	F5010 AP10HP		CY10HP		V01 VN8		WTA11 WTA21				JC5003 JC6000 J0610 JC5015	

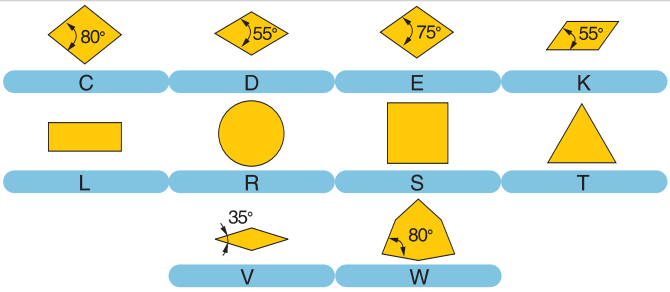
* Coated P : PVD
Cermet P : cermet+PVD

Grade Crossover Chart

Clamping System

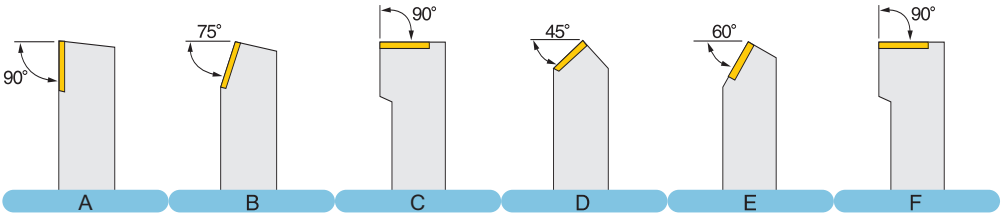


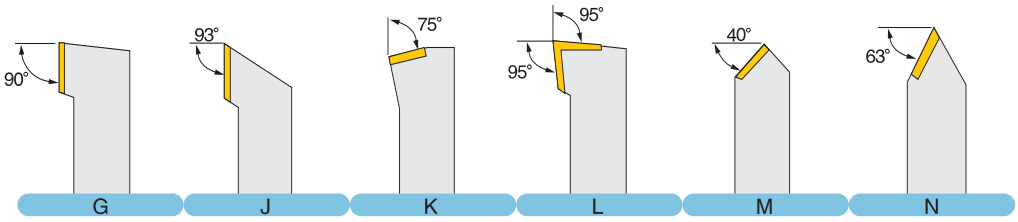
Insert Shape

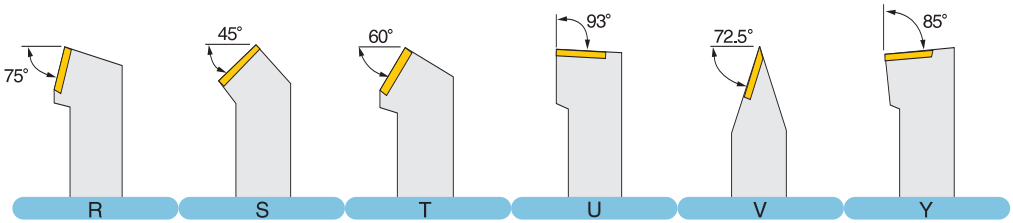


M C L N R

Holder Style

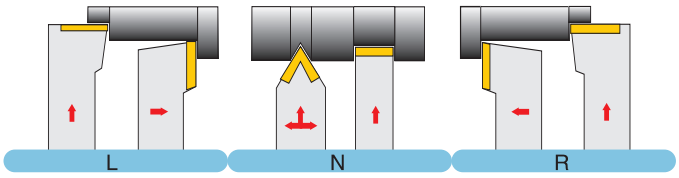






Insert Relief Angle

Hand of Tool



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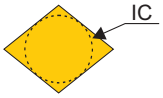
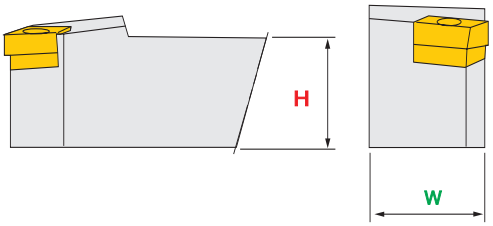


Insert IC	
1.2 = 5/32"	3 = 3/8"
1.5 = 3/16"	4 = 1/2"
1.8 = 7/32"	5 = 5/8"
2 = 1/4"	6 = 3/4"
2.5 = 5/16"	8 = 1"
	10 = 1 1/4"

16 – 3 D

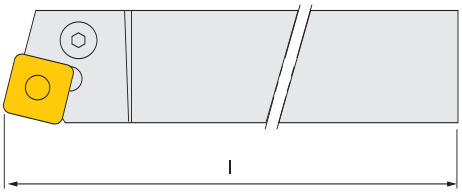
Shank Size



Square shank size in 1/16" increments
OR
1st digit = **W** in 1/8" increments
2nd digit = **H** in 1/4" increments

Common Shank Sizes		
5	=	5/16 x 5/16
6	=	3/8 x 3/8
8	=	1/2 x 1/2
10	=	5/8 x 5/8
12	=	3/4 x 3/4
16	=	1 x 1
85	=	1-1/4 x 1
20	=	1-1/4 x 1-1/4
24	=	1-1/2 x 1-1/2
86	=	1-1/2 x 1
32	=	2 x 2

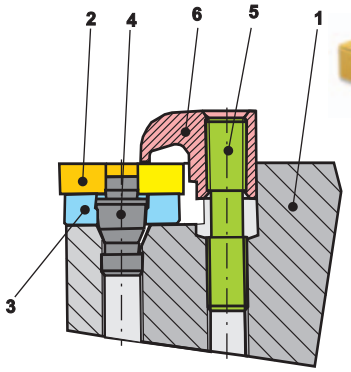
Total Length of Holder

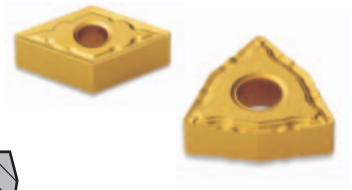


Length in inches		
J	=	3.5
A	=	4
B	=	4.5
C	=	5
D	=	6
E	=	7
F	=	8

Mounting Systems

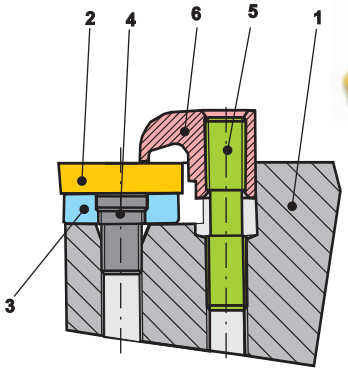
Combination Pin & Clamp "M" System





1—Toolholder
2—Insert
3—Shim (Seat)
4—Lock Pin
5—Clamp Screw
6—Clamp

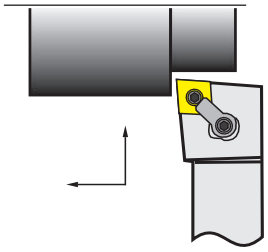
Combination Screw & Clamp "C" System



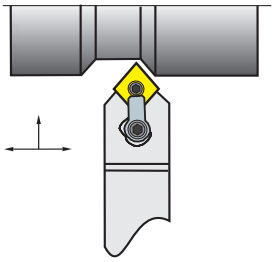
1—Toolholder
2—Insert
3—Shim (Seat)
4—Lock Pin
5—Clamp Screw
6—Clamp

Styles

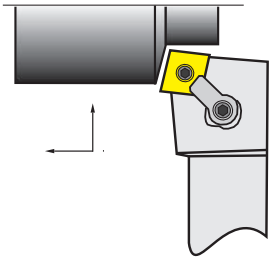
MC.. CNM.. style inserts



5° End or Side Cutting Edge
MCLNR/L
6-710-

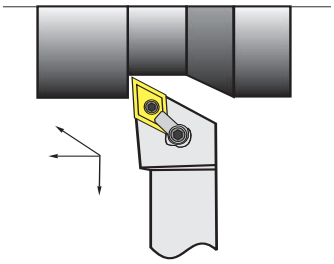


40° Side Cutting Edge Angle
MCMNN
6-711-

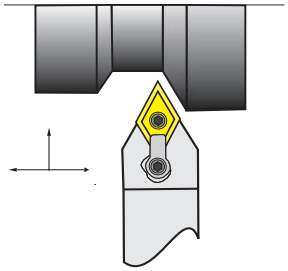


15° Side Cutting Edge Angle
MCRNR/L
6-712-

MC.. DNM.. style inserts

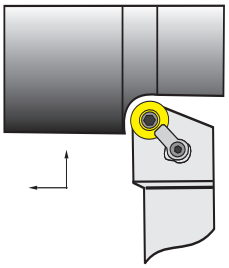


3° Side Cutting Edge Angle
MDJNNR/L
6-715-



27.5° Side Cutting Edge Angle
MDPNN
6-714-

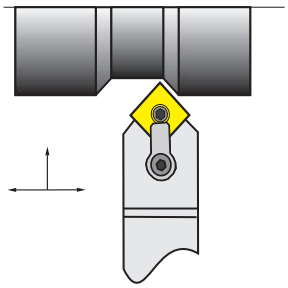
MC.. DNM.. style inserts



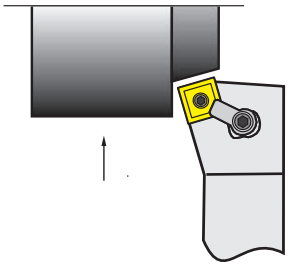
0° End or Side Cutting Edge Angle
MRGNR/L
6-700-

Styles (Continued)

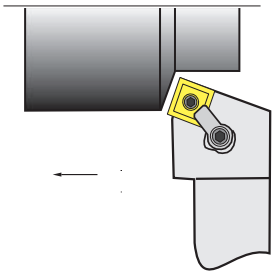
MC.. SNM.. style inserts



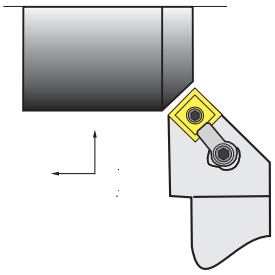
45° Side Cutting Edge Angle
MSDNN
6-734-



15° End Cutting Edge Angle
MSKNR/L
6-737-

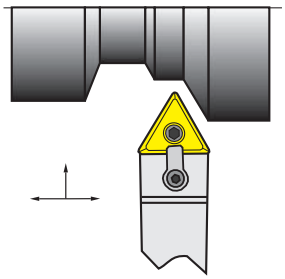


15° Side Cutting Edge Angle
MSRNR/L
6-736-

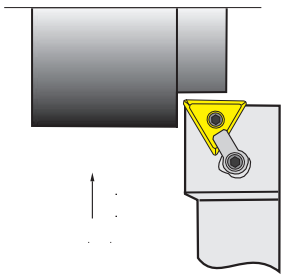


45° Side Cutting Edge Angle
MSSNR/L
6-735-

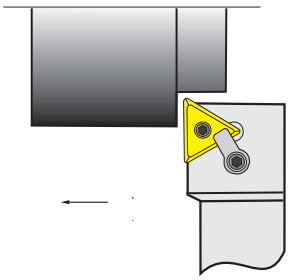
MT.. TNM.. style inserts



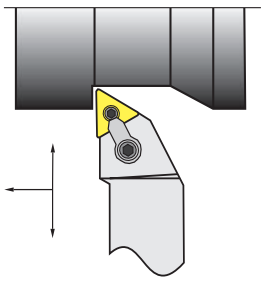
30° Side Cutting Edge Angle
MTENN
6-741-



0° End Cutting Edge Angle
MTFNR/L
6-746-

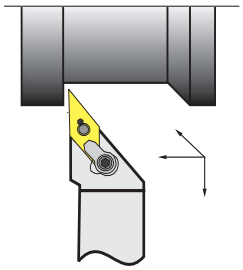


0° Side Cutting Edge Angle
MTGNR/L
6-742-

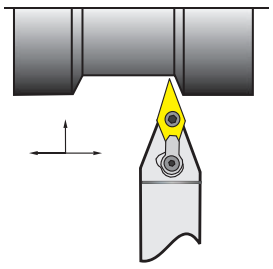


3° Side Cutting Edge Angle
MTJNR/L
6-740-

MV.. VNM.. style inserts

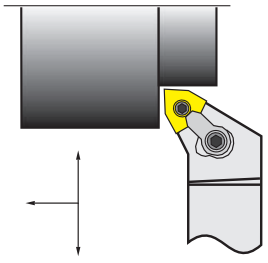


3° Side Cutting Edge Angle
MVJNR/L
6-755-



17.5° Side Cutting Edge Angle
MVVNN
6-754-

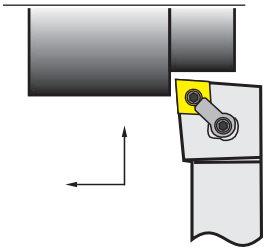
MW.. WNM.. style inserts

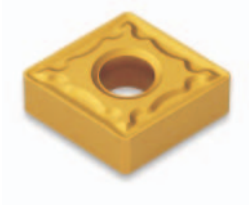


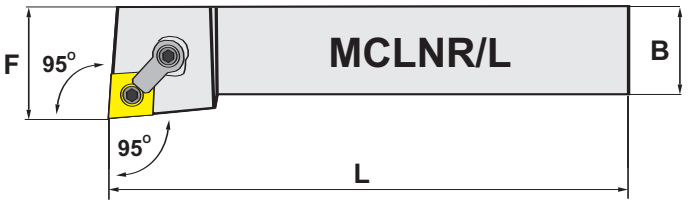
5° End or Side Cutting Edge Angle
MWLNR/L
6-750-

MCLN R/L Toolholders

System M & C for negative 80° diamond CNM... inserts.







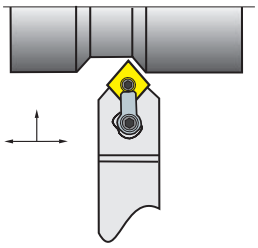
5° End or Side Cutting Edge Angle.

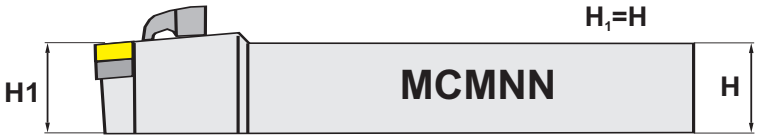
Style	Shank H = B	OAL L	Head F	CNM... Insert	Code No.: 6-710-			Spare Parts Code No. 6-998-					
					Toolholders		Sets	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
					RH	LH	RH						
MCLNR/L 12-4B	3/4	4-1/2	1.0	432	012R	012L	512R	-6009 ICSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153
MCLNR/L 16-4D	1	6	1.25		016R	016L	516R						
MCLNR/L 20-4D	1-1/4	6	1.50		020R	020L	–						
MCLNR/L 24-4D	1-1/2	6	2		024R	024L	–						
MCLNR/L 16-5D	1	6	1.25	543	116R	116L	–	-6015 ICSN-533	-6545*	-6270 NL-58	-6411 CL-12	-6531 XNS-510	-153 & -159
MCLNR/L 20-5D	1-1/4		1.50		120R	120L	–						
MCLNR/L 24-5D	1-1/2		2		124R	124L	–						
MCLNR/L 16-6D	1	6	1.25	643	216R	216L	–	-6020 ICSN-633	-6547*	-6275 NL-68			150 & -159
MCLNR/L 20-6D	1-1/4	6	1.50		220R	220L	–						
MCLNR/L 24-6E	1-1/2	7	2		224R	224L	–						

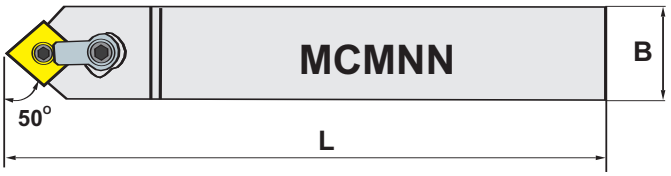
Sets include Holder and 10 TiN coated inserts.
***Screws for system C only**

MCMNN Toolholders

System M & C for negative 80° diamond CNM... inserts.







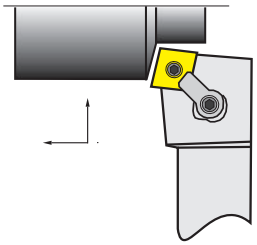
40° Side Cutting Edge Angle.

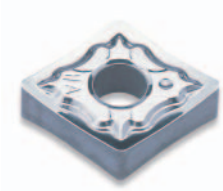
Style	Shank H = B	OAL L	CNM... Insert	Toolholders	Spare Parts Code No. 6-998-					
				Code No.	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MCMNN 16-4D	1	6	432	6-711-016	-6009 ICSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153
MCMNN 20-5D	1-1/4	6	543	6-711-120	-6015 ICSN-533	-6545*	-6270 NL-58	-6411 CL-12	-6531 XNS-510	-153 & -159
MCMNN 20-6D	1-1/4	6	643	6-711-220	-6020 ICSN-633	-6547*	-6275 NL-68			156 & -159

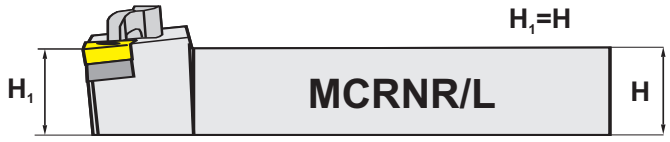
***Screws for system C only**

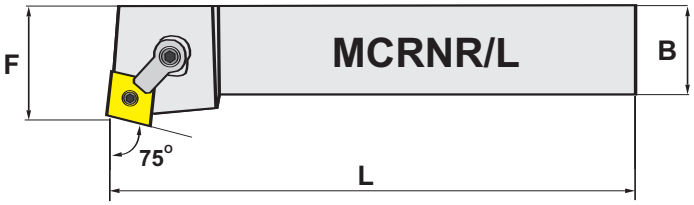
MCRN R/L Toolholders

System M & C for negative 80° diamond CNM... inserts.









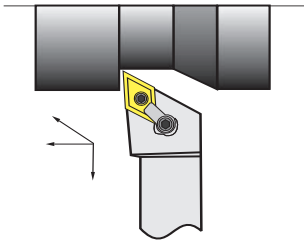
15° Side Cutting Edge Angle.

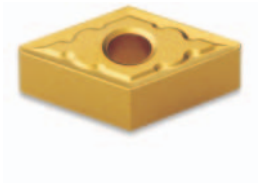
Style	Shank H = B	OALL	Head	CNM... Insert F	Toolholders		Spare Parts Code No. 6-998-					
					Code RH	Code LH	Shim	Shim Screw	Loc Pin	Clamp	Clamp Screw	Hex Key
MCRNR/L 16-4D	1	6	1.25	432	6-712-016R	6-712-016L	-6009 ICSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153
MCRNR/L 20-5D	1-1/4		1.50	543	6-712-120R	6-712-120L	-6015 ICSN-533	-6545*	-6270 NL-58	-6411 CL-12	-6531 XNS-510	-153 & -159
MCRNR/L 20-6D	1-1/4		1.50	643	6-712-220R	6-712-220L	-6020 ICSN-633	-6547*	-6275 NL-68			156 & -159

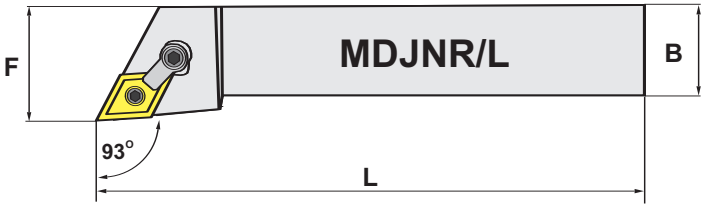
*Screws for system C only

MDJN R/L Toolholders

System M & C for negative 55° diamond DNM... inserts.







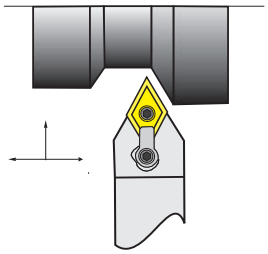
3° Side Cutting Edge Angle.

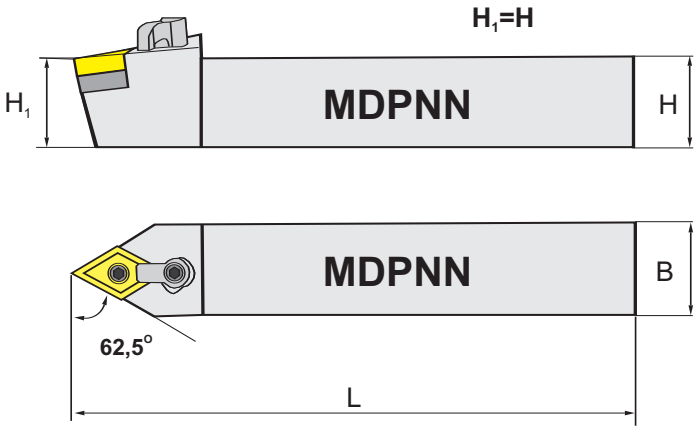
Style	Shank		OAL L	Head F	DNM... Insert	Toolholders		Spare Parts Code No. 6-998-					
	H	B				Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MDJNR/L 12-4B	3/4	3/4	4-1/2	1.00	432	6-715-124R	6-715-124L	-6081 IDSN-433	-6543*	-6265 NL-46	-6411 CL-12	-6531 XNS-510	-150 & -159
MDJNR/L 16-4D	1	1	6	1.25		6-715-165R	6-715-165L						
MDJNR/L 20-4D	1-1/4	1-1/4	6	1.50		6-715-204R	6-715-204L						
MDJNR/L 24-4D	1-1/2	1-1/2	6	2.00		6-715-244R	6-715-244L						
MDJNR/L 85-4D	1-1/4	1	6	1.25		6-715-285R	6-715-285L						
MDJNR/L 16-5D	1	1	6	1.25	543	6-715-416R	6-715-416L	-6086 IDSN-533	-6545*	-6270 NL-58"			-153 & -159
MDJNR/L 20-5D	1-1/4	1-1/4	6	1.50		6-715-420R	6-715-420L						
MDJNR/L 24-5D	1-1/2	1-1/2	6	2.00		6-715-424R	6-715-424L						
MDJNR/L 86-5E	1-1/2	1	7	1.25		6-715-486R	6-715-486L						

*Screws for system C only

MDPNN Toolholders

System M & C for negative 55° diamond DNM... inserts.





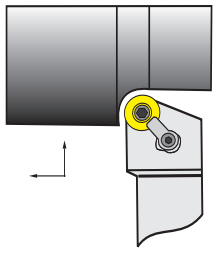
27.5° Side Cutting Edge Angle.

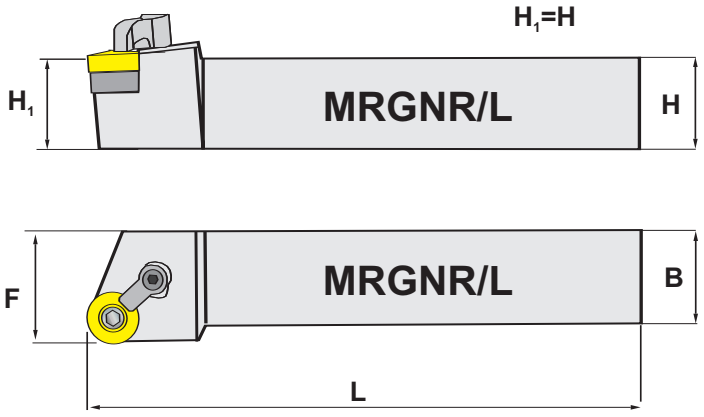
Style	Shank H = B	OAL L	DNM... Insert	Toolholders Code No.	Spare Parts Code No. 6-998- Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MDPNN 16-4D MDPNN 20-4D	1 1-1/4	6	432	6-714-165 6-714-204	-6081 IDSN-433	-6543*	-6265 NL-46	-6411 CL-12	-6531 XNS-510	-150 & -159
MDPNN 20-5D MDPNN 24-5D	1-1/4 1-1/2	6	543	6-714-320 6-714-324	-6086 IDSN-533	-6545*	-6270 NL-58			-153 & -159

*Screws for system C only

MRGN R/L Toolholders

System M & C for negative round RNM... inserts.





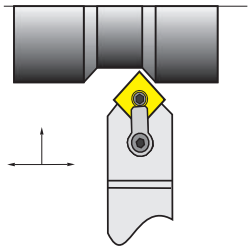
0° Side & End Cutting Edge Angle.

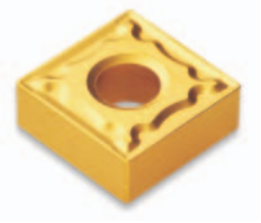
Style	Shank H = B	OAL L	Head F	RNM... insert	Toolholders Code RH	Code LH	Spare Parts Code No. 6-998- Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MRGNR/L 12-3B MRGNR/L 16-3D	3/4 1	4.5 6	1 1-1/4	32	6-700-012R 6-700-016R	6-700-012L 6-700-016L	-6122 IRSN-32	-6541*	-6254 NL-34	-6405 CL-06	-6515 XNS-37	-147 & -150
MRGNR/L 12-4B MRGNR/L 16-4D MRGNR/L 20-4D	3/4 1 1-1/4	4.5 6 6	1 1-1/4 1-1/2	43	6-700-112R 6-700-116R 6-700-204R	6-700-112L 6-700-116L 6-700-204L	-6123 IRSN-43	6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153

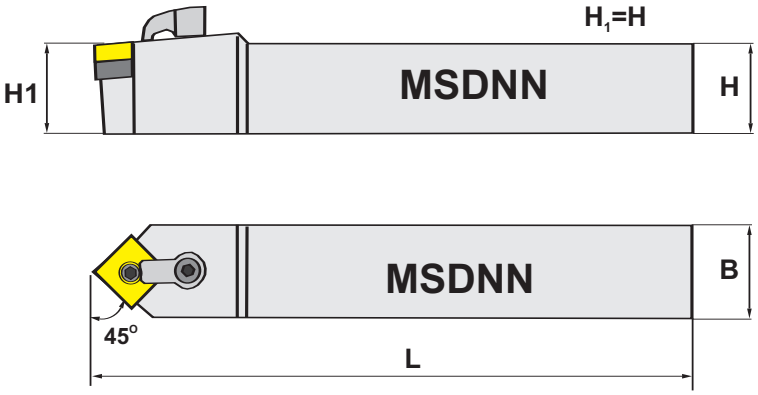
*Screws for system C only

MSDNN Toolholders

System M & C for negative square SNM... inserts.







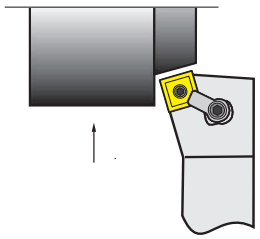
45° Side Cutting Edge Angle.

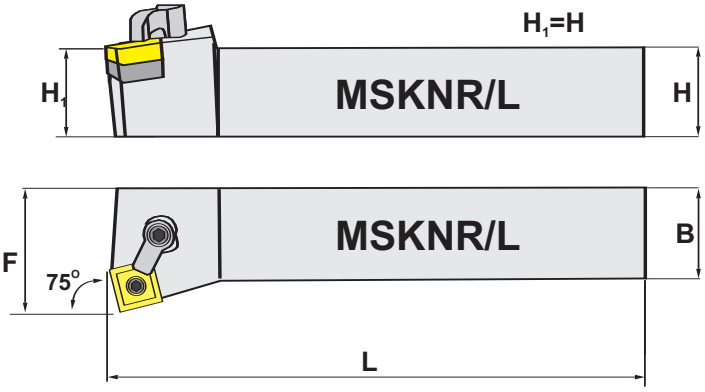
Style	Shank		OAL	SNM... Insert	Toolholders	Spare Parts Code No. 6-998-					
	B	H	L		Code No.	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MSDNN 12-4B	3/4	3/4	4.5	432	6-734-412	-6100 ISSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153
MSDNN 16-4D	1	1	6		6-734-416						
MSDNN 85-4D	1	1-1/4	6		6-734-485						
MSDNN 16-5D	1	1	6	543	6-734-516	-6108 ISSN-533	-6545*	-6270 NL-58	-6411 CL-12	-6531 XNS-510	-153 & -159
MSDNN 20-5D	1-1/4	1-1/4	6		6-734-520						
MSDNN 85-5D	1	1-1/4	6		6-734-585						
MSDNN 86-5E	1	1-1/2	7		6-734-586						
MSDNN 16-6D	1	1	6	643	6-734-616	-6113 ISSN-633	-6547*	-6275 NL-68			156 & -159
MSDNN 20-6D	1-1/4	1-1/4	6		6-734-620						
MSDNN 24-6E	1-1/2	1-1/2	7		6-734-624						
MSDNN 85-6D	1	1-1/4	6		6-734-685						
MSDNN 86-6E	1	1-1/2	7		6-734-686						

*Screws for system C only

MSKN R/L Toolholders

System M & C for negative square SNM... inserts.





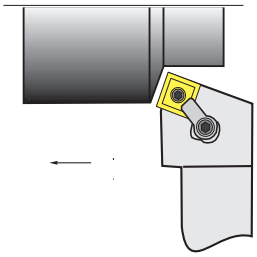
15° End Cutting Edge Angle.

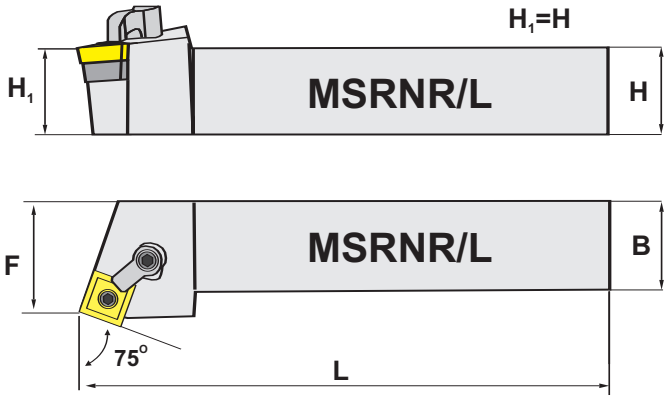
Style	Shank H = B	OAL L	Head F	SNM... Insert	Toolholders		Spare Parts Code No. 6-998-					
					Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MSKNR/L 12-4B	3/4	4.5	1	432	6-737-012R	6-737-012L	-6100 ISSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153
MSKNR/L 16-4D	1	6	1-1/4		6-737-016R	6-737-016L						
MSKNR/L 16-5D	1	6	1-1/4	543	6-737-116R	6-737-116L	-6108 ISSN-533	-6545*	-6270 NL-58	-6411 CL-12	-6531 XNS-510	-153 & -159
MSKNR/L 20-5D	1-1/4		1-1/2		6-737-120R	6-737-120L						
MSKNR/L 20-6D	1-1/4	6	1-1/2	643	6-737-220R	6-737-220L	-6113 ISSN-633	-6547*	-6275 NL-68			156 & -159
MSKNR/L 24-6E	1-1/2	7	2		6-737-224R	6-737-224L						

*Screws for system C only

MSRN R/L Toolholders

System M & C for negative square SNM... inserts.





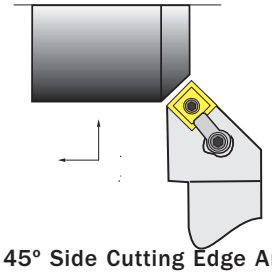
15° Side Cutting Edge Angle.

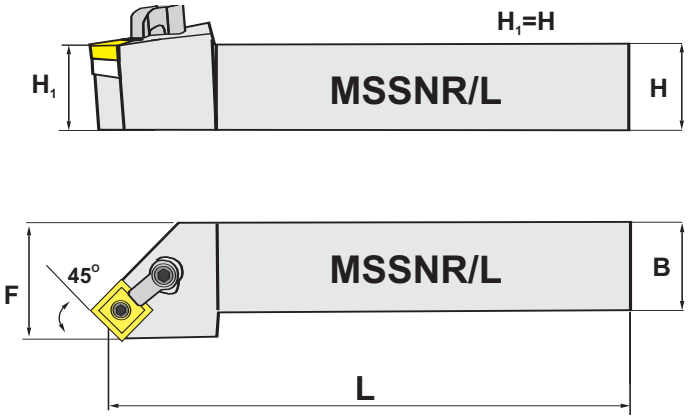
Style	Shank H = B	OAL L	Head F	SNM... Insert	Toolholders		Spare Parts Code No. 6-998-					
					Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MSRNR/L 12-4B MSRNR/L 16-4D MSRNR/L 20-4D	3/4 1 1-1/4	4.5 6 6	.880 1.130 1.350	432	6-736-124R 6-736-165R 6-736-204R	6-736-124L 6-736-165L 6-736-204L	-6100 ISSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153
MSRNR/L 16-5D MSRNR/L 20-5D	1 1-1/4	6	1.103 1.353	543	6-736-316R 6-736-320R	6-736-316L 6-736-320L	-6108 ISSN-533	-6545*	-6270 NL-58	-6411 CL-12	-6531 XNS-510	-153 & -159
MSRNR/L 16-6D MSRNR/L 20-6D MSRNR/L 24-6E	1 1-1/4 1-1/2	6 6 7	1.071 1.315 1.821	643	6-736-416R 6-736-420R 6-736-424R	6-736-416L 6-736-420L 6-736-424L	-6113 ISSN-633	-6547*	-6275 NL-68			156 & -159

*Screws for system C only

MSSN R/L Toolholders

System M & C for negative square SNM... inserts.





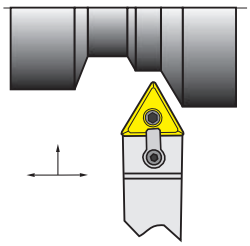
45° Side Cutting Edge Angle.

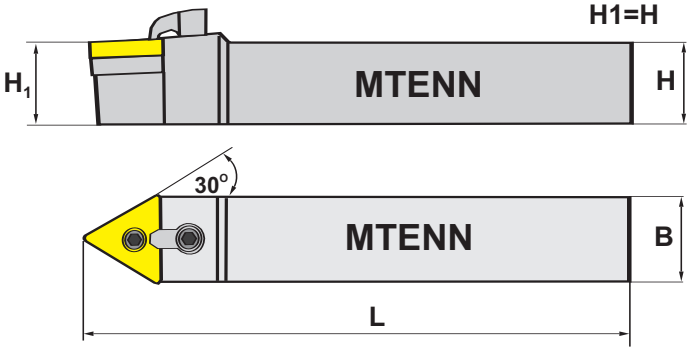
Style	Shank H = B	OAL L	Head F	SNM... Insert	Toolholders		Spare Parts Code No. 6-998-					
					Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MSSNR/L 12-4B MSSNR/L 16-4D	3/4 1	4-1/2 6	0.675 0.925	432	6-735-124R 6-735-165R	6-735-124L 6-735-165L	-6100 ISSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153
MSSNR/L 16-5D MSSNR/L 20-5D	1 1-1/4	6	.847 1.090	543	6-735-216R 6-735-220R	6-735-216L 6-735-220L	-6108 ISSN-533	-6545*	-6270 NL-58	-6411 CL-12	-6531 XNS-510	-153 & -159
MSSNR/L 20-6D MSSNR/L 24-6E	1-1/4 1-1/2	6 7	1.011 1.492	643	6-735-320R 6-735-324R	6-735-320L 6-735-324L	-6113 ISSN-633	-6547*	-6275 NL-68			

*Screws for system C only

MTENN Toolholders

System M & C for negative 60° triangle TNM... inserts.





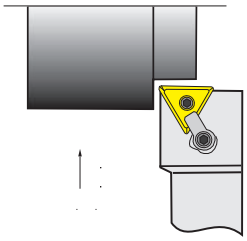
45° Side Cutting Edge Angle.

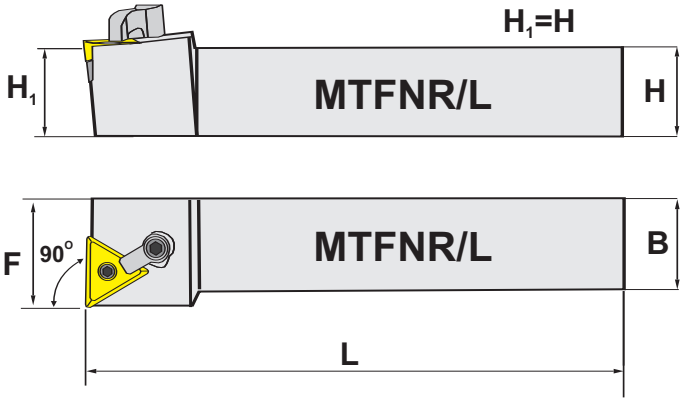
Style	Shank H = B	Head F	OAL L	TNM... Insert	Toolholder Code RH	Spare Parts Code No. 6-998- Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MTENN 10-3B	5/8	5/8	4.5	332	6-741-310	-6053 ITSN-333	-6541*	-6255 NL-34L	-6405 CL-06	-6515 XNS-37	-147 & -150
MTENN 12-3B	3/4	3/4	4.5		6-741-312						
MTENN 64-3D	3/4	1	6		6-741-364						
MTENN 12-4B	3/4	3/4	4.5	432	6-741-412	-6060 ITSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153
MTENN 16-4D	1	1	6		6-741-416						
MTENN 85-4D	1	1-1/4	6		6-741-485						
MTENN 86-4E	1	1-1/2	7		6-741-486						
MTENN 16-5D	1	1	6	543	6-741-516	-6070 ITSN-533	-6547*	-6270 NL-58			-153
MTENN 20-5D	1-1/4	1-1/4	6		6-741-520						
MTENN 24-5E	1-1/2	1-1/2	7		6-741-524						
MTENN 86-5E	1	1-1/2	7		6-741-585						

*Screws for system C only

MTFN R/L Toolholders

System M & C for negative 60° triangle TNM... inserts.





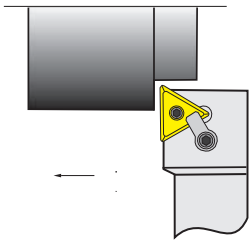
15° End Cutting Edge Angle.

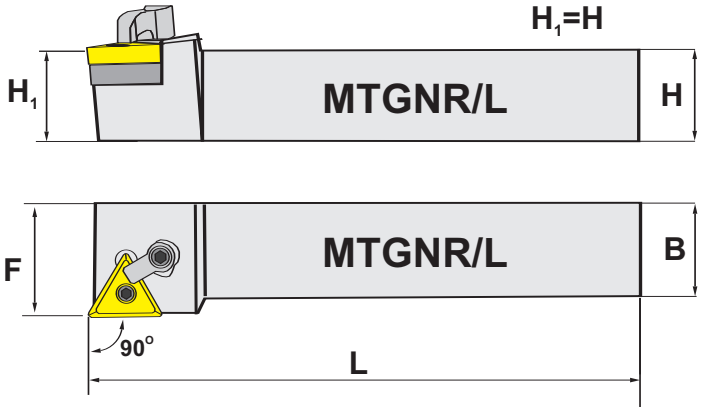
Style	Shank H = B	OAL L	Head F	TNM... Insert	Toolholders Code RH	Code LH	Spare Parts Code No. 6-998- Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MTFNR/L 12-3B	3/4	4.5	1	332	6-746-012R	6-746-012L	-6053 ITSN-333	-6541*	-6255 NL-34L	-6405 CL-6	-6515 XNS-37	-147 & -150
MTFNR/L 16-3D	1	6	1-1/4		6-746-016R	6-746-016L						
MTFNR/L 16-4D	1	6	1-1/4	432	6-746-216R	6-746-216L	-6060 ITSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153
MTFNR/L 20-4D	1-1/4		1-1/2		6-746-220R	6-746-220L						
MTFNR/L 20-5D	1-1/4	6	1-1/2	543	6-746-320R	6-746-320L	-6070 ITSN-533	-6545*	-6270 NL-58			-153

*Screws for system C only

MTGN R/L Toolholders

System M & C for negative 60° triangle TNM... inserts.





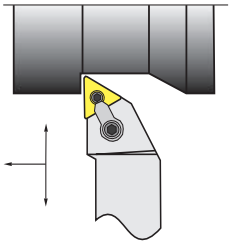
0° Side Cutting Edge Angle.

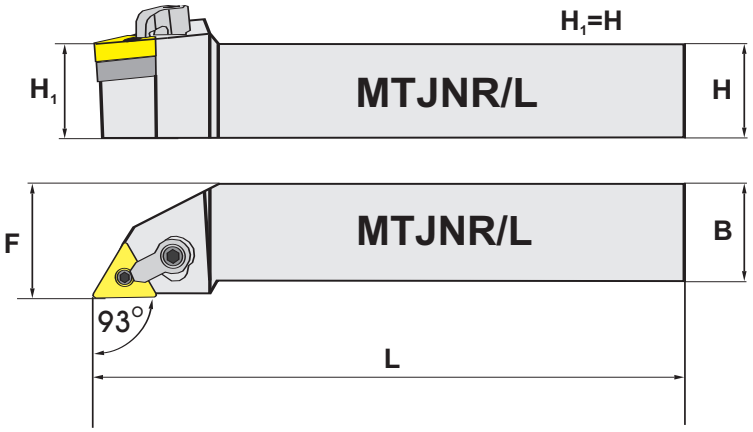
Style	Shank H = B	OAL L	Head F	TNM... Insert	Toolholders		Spare Parts Code No. 6-998-					
					Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MTGNR/L 12-3B MTGNR/L 16-3D	3/4 1	4.5 6	1 1-1/4	332	6-742-012R 6-742-016R	6-742-012L 6-742-016L	-6053 ITSN-333	-6541*	-6255 NL-34L	-6405 CL-6	-6515 XNS-37	-147 & -150
MTGNR/L 16-4D MTGNR/L 20-4D	1 1-1/4	6	1-1/4 1-1/2	432	6-742-216R 6-742-220R	6-742-216L 6-742-220L	-6060 ITSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153
MTGNR/L 20-5D	1-1/4	6	1-1/2	543	6-742-320R	6-742-320L	-6070 ITSN-533	-6545*	-6270 NL-58			-153

*Screws for system C only

MTJN R/L Toolholders

System M & C for negative 60° triangle TNM... inserts.





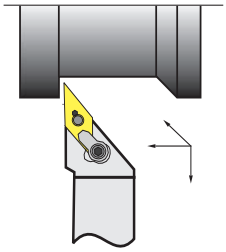
45° Side Cutting Edge Angle.

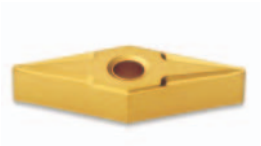
Style	Shank		OAL L	Head F	TNM... Insert	Toolholders		Spare parts Code No. 6-998-					
	H	B				Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MTJNR/L 10-3B MTJNR/L 12-3B MTJNR/L 16-3D	5/8 3/4 1	5/8 3/4 1	4-1/2 4-1/2 6	.675 1.000 1.250	332	6-740-010R 6-740-012R 6-740-016R	6-740-010L 6-740-012L 6-740-016L	-6053 ITSN-333	-6541*	-6255 NL-34L	-6405 CL-6	-6515 XNS-37	-147 & -150
MTJNR/L 16-4D MTJNR/L 20-4D	1 1-1/4	1 1-1/4	6	1.250	432	6-740-116R 6-740-120R	6-740-116L 6-740-120L	-6060 ITSN-433	-6543*	-6265 NL-46	-6411 CL-20	-6520 XNS-48	-150 & -159
MTJNR/L 16-5D MTJNR/L 20-5D MTJNR/L 24-5D MTJNR/L 24-5E MTJNR/L 85-5D MTJNR/L 86-5E	1 1-1/4 1-1/2 1-1/2 1 1	1 1-1/4 1-1/2 1-1/2 1-1/4 1-1/2	6 6 6 7 6 7	1.250 1.500 2.000 2.000 1.250 1.250	543	6-740-216R 6-740-220R 6-740-224R 6-740-226R 6-740-230R 6-740-235R	6-740-216L 6-740-220L 6-740-224L 6-740-226L 6-740-230L 6-740-235L	-6070 ITSN-533	-6545*	-6270 NL-58	-6411 CL-20	-6520 XNS-48	-153

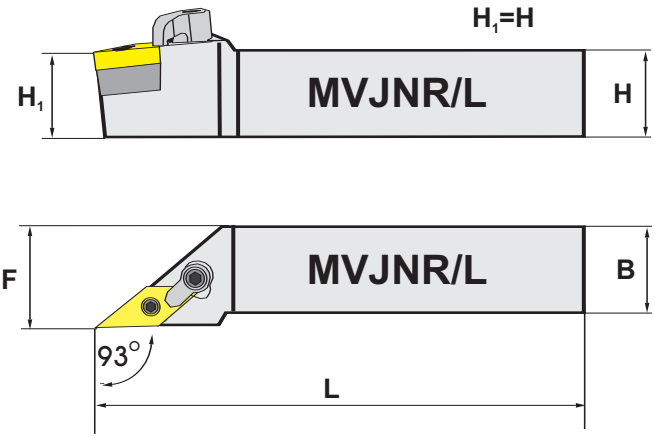
*Screws for system C only

MVJN R/L Toolholders

System M & C for negative 35° diamond VNM... inserts.







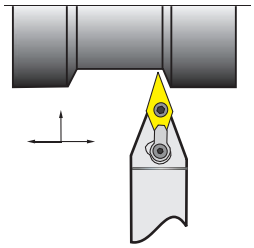
3° Side Cutting Edge Angle.

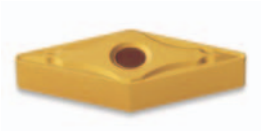
Style	Shank H = B	OAL L	Head F	VNM... Insert	Toolholders		Spare Parts Code No. 6-998-					
					Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MVJNR/L 12-3B	3/4	4-1/2	1.00	332	6-755-012R	6-755-012L	-6074 IVSN-322	-6541*	-6255 NL34L	-6423 CL30	-6531 XNS-510	-147 & -159
MVJNR/L 16-3D	1	6	1.25		6-755-016R	6-755-016L						
MVJNR/L 20-3D	1-1/4	6	1.50		6-755-020R	6-755-020L						
MVJNR/L 16-4D	1	6	1-1/4	432	6-755-116R	6-755-116L	-6077 IVSN-433	-6543*	-6265 NL-46	-6423 CL-30	-6531 XNS-510	-150 & -159
MVJNR/L 20-4D	1-1/4	6	1-1/2		6-755-220R	6-755-220L						
MVJNR/L 24-4E	1-1/2	7	2		6-755-224R	6-755-224L						

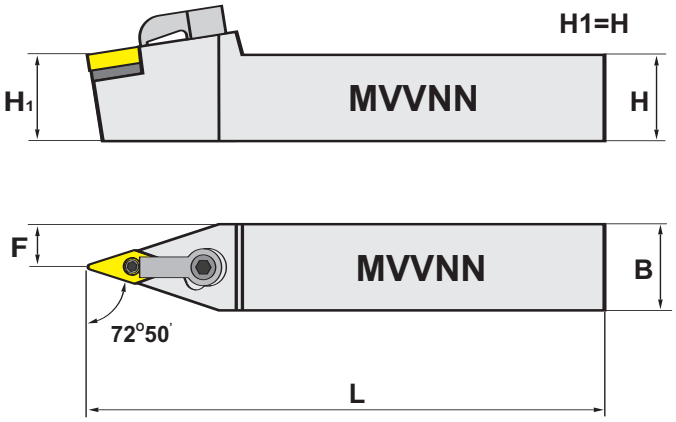
*Screws for system C only

MVVN R/L Toolholders

System M & C for negative 35° diamond VNM... inserts.







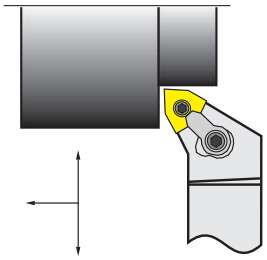
17.5° Side Cutting Edge Angle.

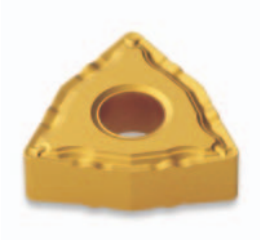
Style	Shank H = B	OAL L	VNM... insert	Toolholders	Spare Parts Code No. 6-998-					
				Code No.	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
MVVNN 12-3B	3/4	4.5	332	6-754-012	-6074 IVSN-322	-6541*	-6255 NL-34L	-6423 CL-30	-6531 XNS-510	-147 & -159
MVVNN 16-3D	1	6		6-754-016						
MVVNN 16-4D	1	6	432	6-754-116	-6077 IVSN-433"	-6543*	-6265 NL-46			-150 & -159

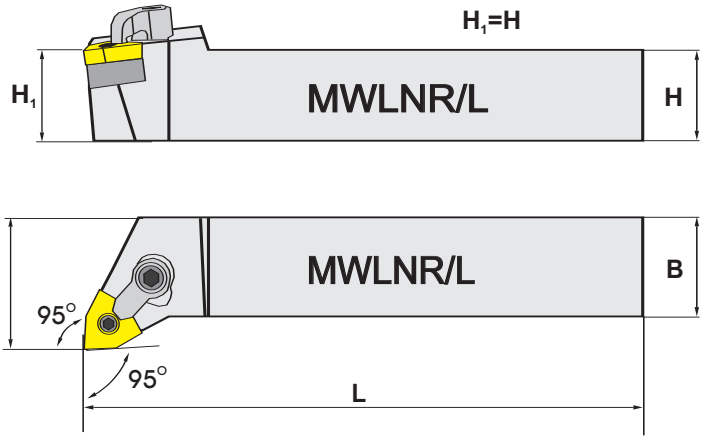
*Screws for system C only

MWLN R/L Toolholders

System M & C for negative 80° trigon WNM... inserts.







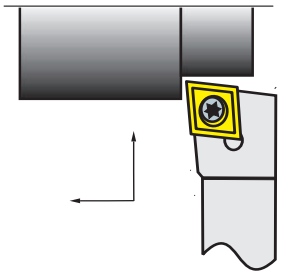
5° End or Side Cutting Edge Angle.

Style	Shank H = B	OAL L	Head F	WNM... Inserts	Toolholders		Sets	Spare Parts Code No. 6-998-				
					Code RH	Code LH	Code RH	Shim	Lock Pin	Clamps	Clamp Screw	Hex Key
MWLNR/L 12-3B	3/4	4.5	1	332	6-750-012R	6-750-012L	-	-6031 IWSN-322	-6255 NL-34L	-6405 CL-6	-6515 XNS-37	-147 & -150
MWLNR/L 12-4B	3/4	4-1/2	1	432	6-750-112R	6-750-112L	6-750-512R	-6035 IWSN-433	-6265 NL-46	-6411 CL-20	-6526 XNS-48	-153 & -150
MWLNR/L 16-4D	1	6	1-1/4		6-750-116R	6-750-116L	6-750-516R					
MWLNR/L 20-4D	1-1/4	6	1-1/2		6-750-120R	6-750-120L	-					
MWLNR/L 24-4E	1-1/2	7	2		6-750-124R	6-750-124L	-					
MWLNR/L 16-5D	1	6	1-1/4	543	6-750-216R	6-750-216L	-	-6041 IWSN-533	-6270 NL-58			-153
MWLNR/L 20-5D	1-1/4	6	1-1/2		6-750-220R	6-750-220L	-					
MWLNR/L 24-5E	1-1/2	7	2		6-750-224R	6-750-224L	-					

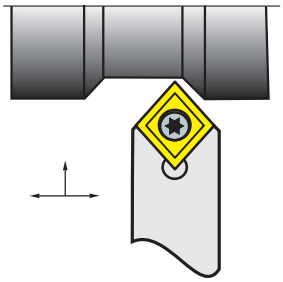
*Screws for system C only

Styles

SC.. CCMT style inserts

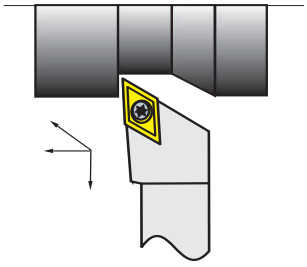


5° End or Side Cutting Edge Angle
SCLCR/L
6-800-

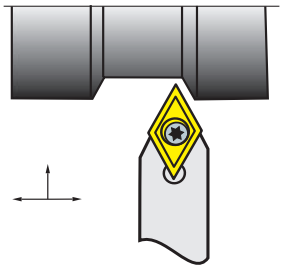


40° Side Cutting Edge Angle
SCMNCN
6-801-

SD.. DCMT style inserts

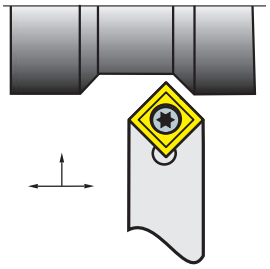


3° Side Cutting Edge Angle
SDJCR/L
6-805-



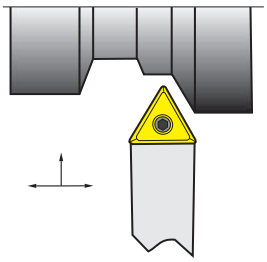
27.5° Side Cutting Edge Angle
SDPCNR/L
6-804-

SS..

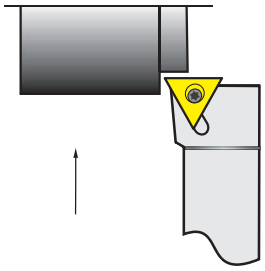


45° Side Cutting Edge Angle
SSDCN
6-810-

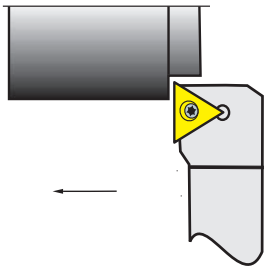
ST.. TCMT style inserts



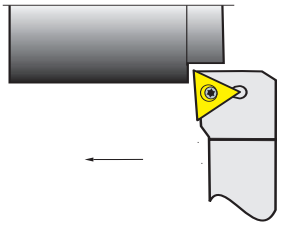
30° Side Cutting Edge Angle
STECN
6-813-



0° End Cutting Edge Angle
STFCNR/L
6-814-

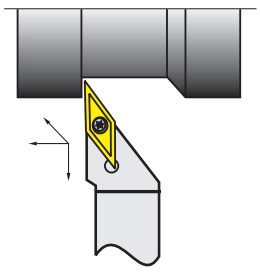


0° Side Cutting Edge Angle
STGCR/L
6-815-



3° Side Cutting Edge Angle
STJCR/L
6-816-

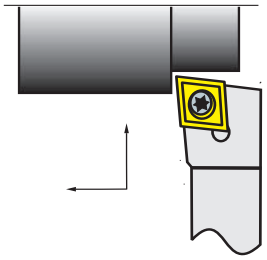
SV.. VCMT style inserts



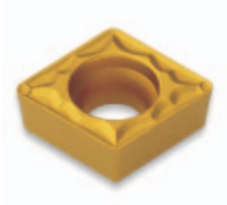
3° Side Cutting Edge Angle
SVJCR/L
6-806-

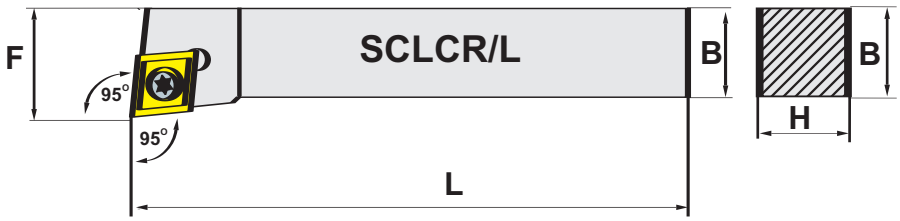
SCLCR/L Toolholders

System S for positive 80° diamond CCMT inserts.



5° End or Side Cutting Edge Angle.

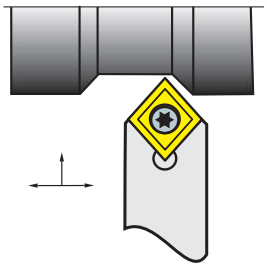




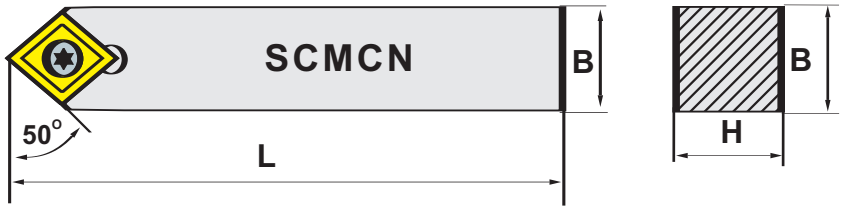
Style	Shank H = B	OAL L	Head F	CC...T Insert	Toolholder Code No. RH	Toolholder Code No. LH	Spare Parts Code No. 6-998- Insert Screw	Spare Parts Code No. 6-998- Torx Key
SCLCR 04-2	.315	2.36	.394	21.51	6-800-042R	-	-2506	-007
SCLCR/L 06-2J	3/8	3-1/2	0.500		6-800-062R	6-800-062L		
SCLCR/L 08-3A	1/2	4	0.625	32.52	6-800-103R	6-800-103L	-4008	-015
SCLCR/L 10-3B	5/8	4-1/2	0.750		6-800-113R	6-800-113L		
SCLCR/L 12-3B	3/4	4-1/2	1.000		6-800-123R	6-800-123L		
SCLCR/L 16-3D	1	6	1.250		6-800-163R	6-800-163L		
SCLCR/L 12-4B	3/4	4-1/2	1.000	432	6-800-224R	6-800-224L	-5012	
SCLCR/L 16-4D	1	6	1.250		6-800-264R	6-800-264L		

SCMCN Toolholders

System S for positive 80° diamond CCMT inserts.



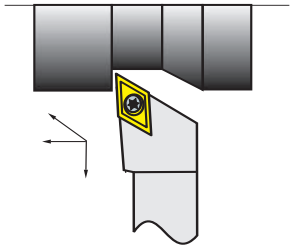
40° Side Cutting Edge Angle.



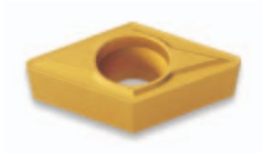
Style	Shank H = B	OAL L	CC...T Insert	Toolholder Code No.	Spare Parts Code No. 6-998- Insert Screw	Spare Parts Code No. 6-998- Torx Key
SCMCN 06-2J	3/8	3-1/2	21.51	6-801-062	-2506	-007
SCMCN 08-3A	1/2	4	32.52	6-801-103	-4008	-015
SCMCN 10-3B	5/8	4-1/2		6-801-113		
SCMCN 12-3B	3/4	4-1/2		6-801-123		
SCMCN 12-4B	3/4	4-1/2	432	6-801-224	-5012	
SCMCN 16-4D	1	6		6-801-264		

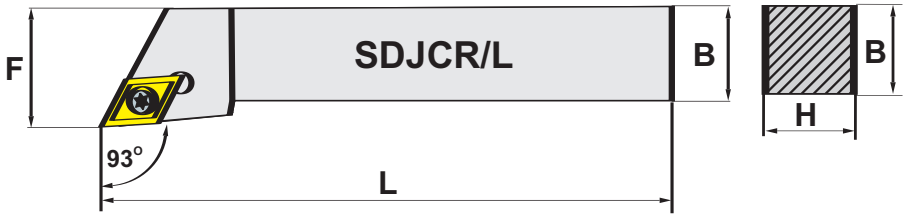
SDJCR/L Toolholders

System S for positive 55° diamond DCMT inserts.



3° Side Cutting Edge Angle.

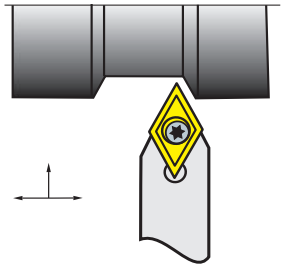




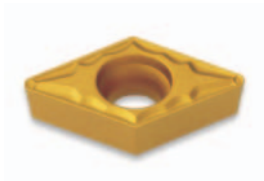
Style	Shank	OAL L	Head	DC...T Insert	Toolholder Code No.		Spare Parts Code No. 6-998-	
					RH	LH	Insert Screw	Torx Key
SDJCR/L 04-2	.315	2.36	0.394	21.51	6-805-042R	6-805-042L	-2506	-007
SDJCR/L 06-2J	3/8	3-1/2	0.500		6-805-062R	6-805-062L		
SDJCR/L 08-2A	1/2	4	0.625		6-805-082R	6-805-082L		
SDJCR/L 08-3A	1/2	4	0.625	32.52	6-805-103R	6-805-103L	-4008	-015
SDJCR/L 10-3B	5/8	4-1/2	0.750		6-805-113R	6-805-113L		
SDJCR/L 12-3B	3/4	4-1/2	0.875		6-805-123R	6-805-123L		
SDJCR/L 16-3D	1	6	1.250		6-805-163R	6-805-163L		
SDJCR/L 12-4B	3/4	4-1/2	1.000	432	6-805-224R	6-805-224L	-5012	
SDJCR/L 16-4D	1	6	1.250		6-805-264R	6-805-264L		

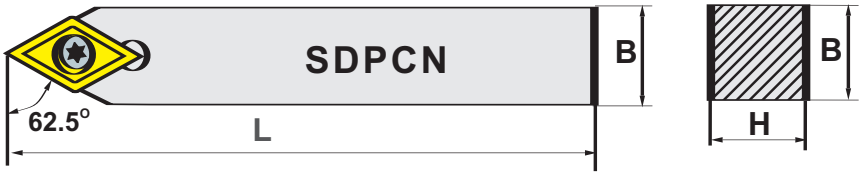
SDPCN Toolholders

System S for positive 55° diamond DCMT inserts.



27.5° Side Cutting Edge Angle.

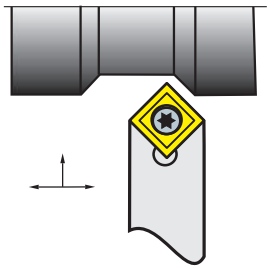




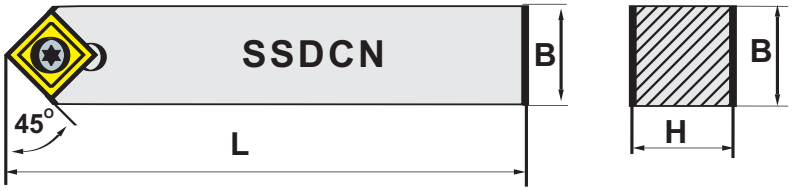
Style	Shank H = B	OAL L	CC...T Insert	Toolholder Code No.	Spare Parts Code No. 6-998-	
					Insert Screw	Torx Key
SCMCN 06-2J	3/8	3-1/2	21.51	6-801-062	-2506	-007
SCMCN 08-3A	1/2	4	32.52	6-801-103	-4008	-015
SCMCN 10-3B	5/8	4-1/2		6-801-113		
SCMCN 12-3B	3/4	4-1/2		6-801-123		
SCMCN 12-4B	3/4	4-1/2	432	6-801-224	-5012	
SCMCN 16-4D	1	6		6-801-264		

SSDCN Toolholders

System S for positive square SCMT inserts.



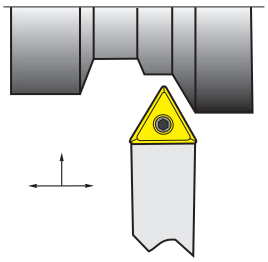
45° Side Cutting Edge Angle.



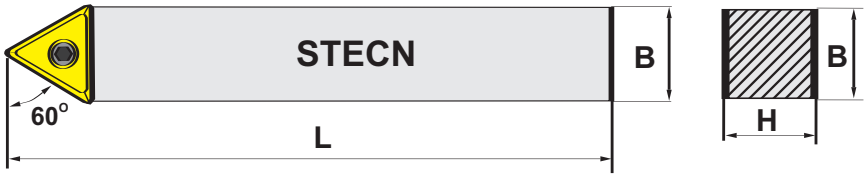
Style	Shank H = B	OAL L	SC...T Insert	Toolholder Code No.	Spare Parts Code No. 6-998-	
					Insert Screw	Torx Key
SSDCN 04-2	.315	2.36	21.51	6-810-042	-2506	-007
SSDCN 08-3A	1/2	4	32.52	6-810-108	-4008	-015
SSDCN 10-3BSS	5/8	4-1/2		6-810-110		
DCN 12-3B	3/4	4-1/2		6-810-112		
SSDCN 16-4D	1	6	43.	6-810-216	-5012	
SSDCN 20-4D	1-1/4	6		6-810-220		

STECN Toolholders

System S for positive 60° triangle TCMT or TCGT inserts.



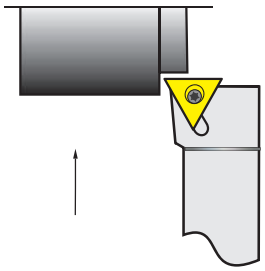
30° Side Cutting Edge Angle.



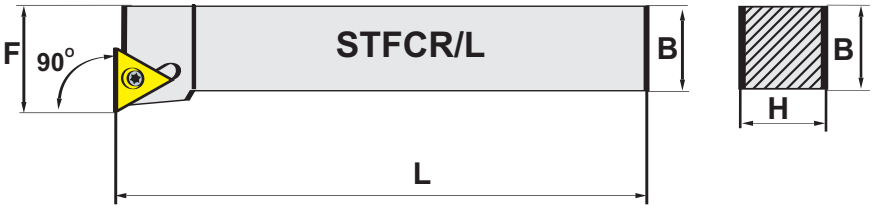
Style	Shank		OAL L	TC...T Insert	Toolholder Code No.	Spare Parts Code No. 6-998-	
	H	B				Insert Screw	Torx Key
STECN 06-2	3/8	3/8	2-1/2	21.51	6-813-006	-2506	-007
STECN 08-2J	1/2	1/2	3-1/2		6-813-008		
STECN 10-2A	5/8	5/8	4		6-813-010		
STECN 12-3B	3/4	3/4	4-1/2	32.52	6-813-112	-4008	-015
STECN 64-3D	3/4	1	6		6-813-164		

STFCR/L Toolholders

System S for positive 60° triange TCMT or TCGT inserts.



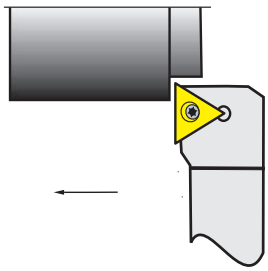
0° End Cutting Edge Angle.



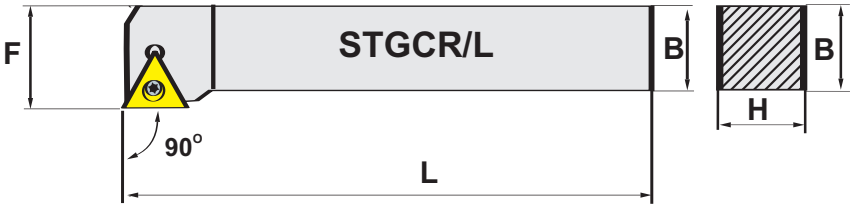
Style	Shank H=B	OAL L	Head F	TC...T Insert	Toolholder Code No.		Spare Parts Code No. 6-998-	
					RH	LH	Insert Screw	Torx Key
STFCR/L 06-2	3/8	2-1/2	.500	21.51	6-814-006R	6-814-006L	-2506	-007
STFCR/L 08-2J	1/2	3-1/2	.625		6-814-008R	6-814-008L		
STFCR/L 10-2A	5/8	4	.750		6-814-010R	6-814-010L		
STFCR/L 10-3B	5/8	4-1/2	.750	32.52	6-814-110R	6-814-110L	-4008	-015
STFCR/L 12-3B	3/4	4-1/2	.875		6-814-112R	6-814-112L		
STFCR/L 16-3D	1	6	1.125		6-814-116R	6-814-116L		

STGCR/L Toolholders

System S for positive 60° triange TCMT or TCGT inserts.



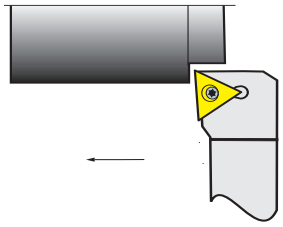
1° Side Cutting Edge Angle.

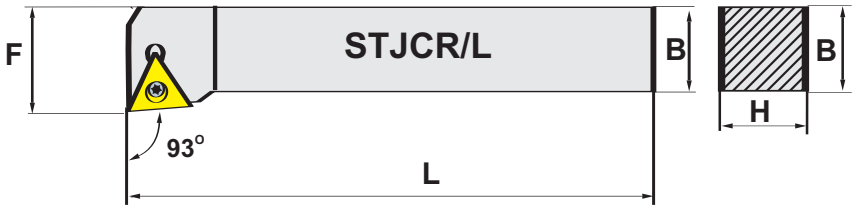


Style	Shank H = B	OAL L	Head F	TC...T Inserts	Toolholder Code No.		Spare Parts Code No. 6-998-	
					RH	LH	Insert Screw	Torx Key
STGCR/L 06-2	3/8	2-1/2	0.500	21.51	6-815-062R	6-815-062L	-2506	-007
STGCR/L 08-2J	1/2	3-1/2	0.625		6-815-082R	6-815-082L		
STGCR/L 10-2A	5/8	4	0.750		6-815-110R	6-815-110L		
STGCR/L 10-3B	5/8	4-1/2	0.750	32.52	6-815-113R	6-815-113L	-4008	-015
STGCR/L 12-3B	3/4	4-1/2	0.875		6-815-123R	6-815-123L		
STGCR/L 16-3D	1	6	1.250		6-815-163R	6-815-163L		

STJCR/L Toolholders

System S for positive 60° triangle TCMT or TCGT inserts.



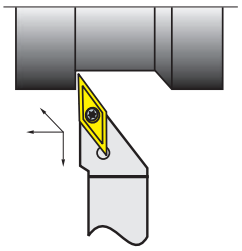


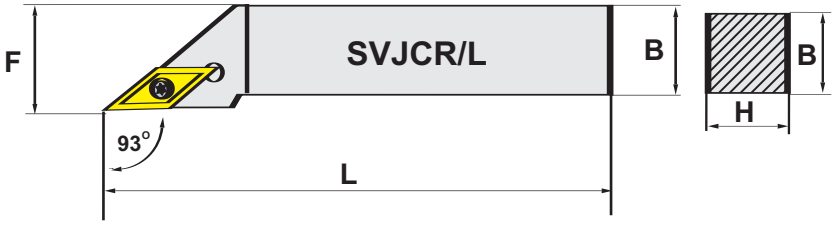
3° Side Cutting Edge Angle.

Style	Shank H=B	OAL L	Head F	TC...T Insert	Toolholder Code No.		Spare Parts Code No. 6-998-	
					RH	LH	Insert Screw	Torx Key
STJCR/L 08-2J	1/2	3-1/2	.625	21.51	6-816-082R	6-816-082L	-2506	-007
STJCR/L 12-3B	3/4	4-1/2	.875	32.52	6-816-123R	6-816-123L	-4008	-015

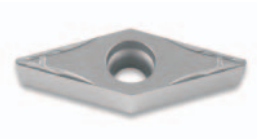
SVJCR/L Toolholders

System S for positive 35° diamond VCMT or VCGT inserts.





3° Side Cutting Edge Angle.



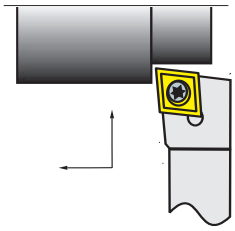
Style	Shank H=B	OAL L	Head F	TC...T Insert	Toolholder Code No.		Spare Parts Code No. 6-998-	
					RH	LH	Insert Screw	Torx Key
SVJCR/L 06-2J	3/8	3-1/2	0.500		6-806-062R	6-806-062L		
SVJCR/L 08-2A	1/2	4	0.625	221	6-806-082R	6-806-082L	-2506	-007
SVJCR/L 10-2B	5/8	4-1/2	0.750		6-806-102R	6-806-102L		
SVJCR/L 12-3B	3/4	4-1/2	1.000		6-806-123R	6-806-123L		
SVJCR/L 16-3C	1	5	1.250	332	6-806-163R	6-806-163L	-3509	-015
SVJCR/L 16-3D	1	6	1.250		6-806-167R	6-806-167L		

5-pc Mini Toolholder and Boring Bar Set

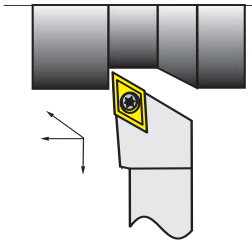
Code No. 6-890-510

- Ideal for precision turning and boring
- Quality storage case also includes 1 wrench and 2 spare screws
- Each set includes 10pcs of the following TiN inserts:
  4pcs. 6-CCM-215L CCMT
  4pcs. 6-DCM-215L DCMT
  2pcs. 6-SCM-215L SCMT

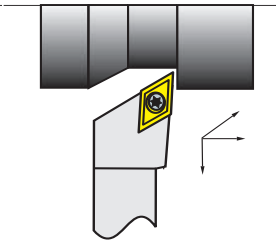
Application:



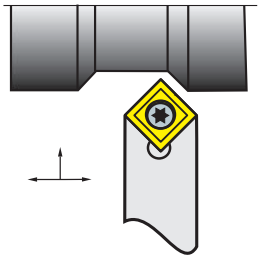
5° End or Side Cutting Edge Angle, Right Hand
6-800-042R



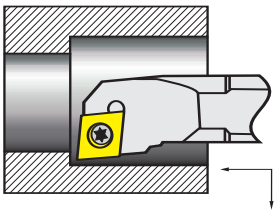
3° Side Cutting Edge Angle, Right Hand
6-805-042R



3° Side Cutting Edge Angle, Left Hand
6-805-042L



45° Side Cutting Edge Angle,
6-805-042R



5° End & Side Cutting Edge Angle, Right Hand
6-870-042R

Toolholder Style	Shank	OAL	F	Insert Style	Toolholder Code No.			Set Code No.	Spare Parts Code No. 6-998-	
					RH	LH	N		Screw	Torx Key
SCLCR 4-2	.315	2.36	.394	CCMT 21.51	6-800-042R	-	-	6-890-510	-2506	-007
SDJCR/L 4-2		2.36	.394	DCMT 2151	6-805-042R	6-805-042L	-			
SSDCN 4-2		2.36	.157	SCMT 21.51	-	-	6-810-042			
Boring Bar Style	Shank	OAL	Dmin.	Insert	Boring Bar Code No.				Screw	Torx Key
SI-SCLCR 4-2	.315	3.98	.354	CCMT 21.5	6-870-042R	-	-		-2504	-007

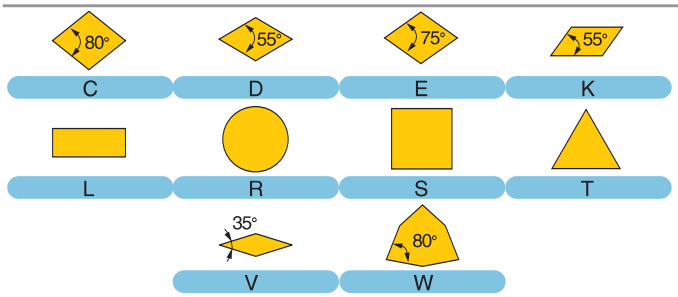
Shank Material

S - steel
A - steel, with coolant hole
H - heavy metal
C - carbide

Boring Bar Type

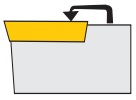
I - Integral

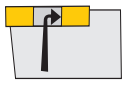
Insert Shape

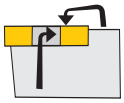


S I - M D J

Clamping System

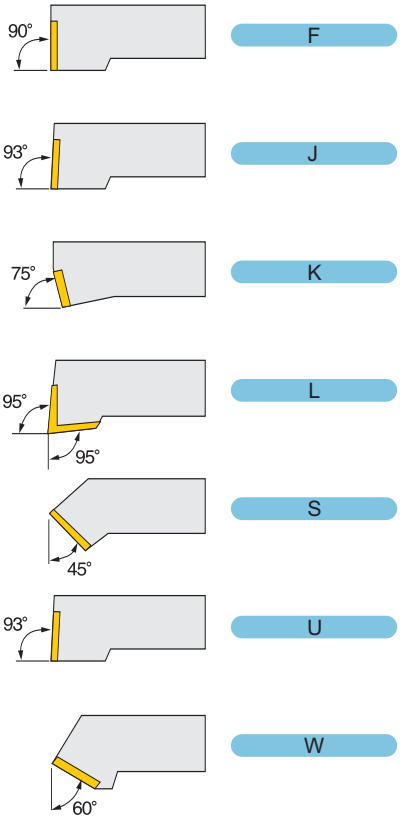

Clamp
C


Pin
P

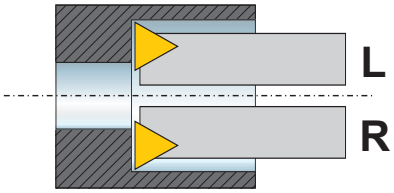

Pin & Clamp
M


Screw
S

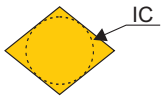
Boring Bar Style



Hand of Tool



Insert Inner Circle



Insert IC	
1.2 = 5/32"	3 = 3/8"
1.5 = 3/16"	4 = 1/2"
1.8 = 7/32"	5 = 5/8"
2 = 1/4"	6 = 3/4"
2.5 = 5/16"	8 = 1"
	10 = 1 1/4"

N R 20 – 4 T

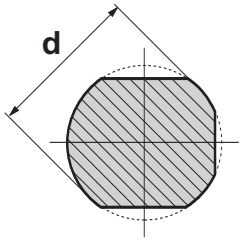
Holder Rake

N - negative
P - positive

Bar Diameter

Bar diameter in 1/16” increments

Common Boring Bar Diameters	
4	1/4"
6	3/8"
8	1/2"
10	5/8"
12	3/4"
16	1"
20	1-1/4"
24	1-1/2"
28	1-3/4"
32	2"

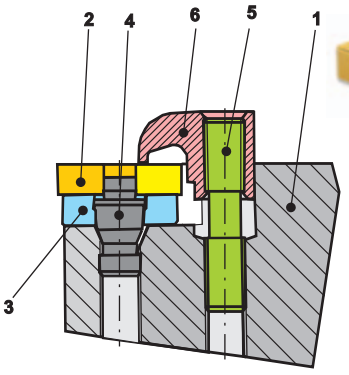


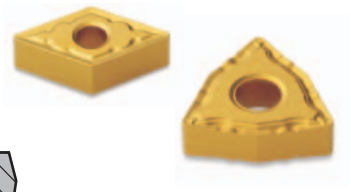
Special

T - Threaded coolant hole

Mounting Systems

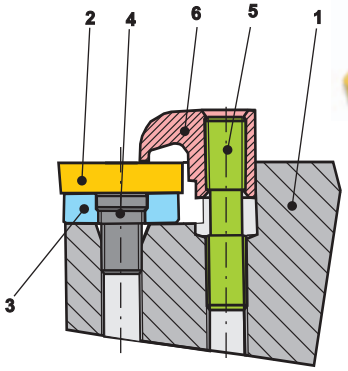
Combination Pin & Clamp "M" System





1—Toolholder
2—Insert
3—Shim (Seat)
4—Lock Pin
5—Clamp Screw
6—Clamp

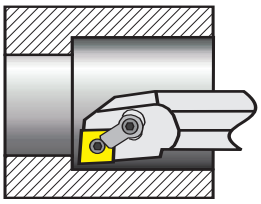
Combination Screw & Clamp "C" System



1—Toolholder
2—Insert
3—Shim (Seat)
4—Lock Pin
5—Clamp Screw
6—Clamp

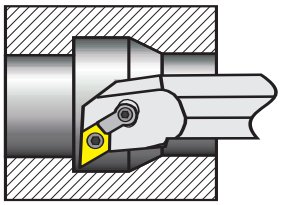
Styles

MC.. CNM.. style inserts



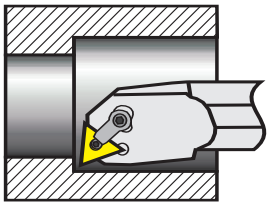
5° End or Side Cutting Edge
SI-MCLNR/L
6-760-

MC.. CNM.. style inserts



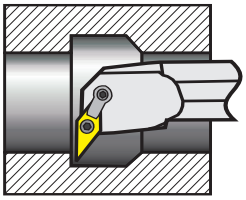
3° Side Cutting Edge Angle
SI-MDUN R/L
6-770-

MC.. CNM.. style inserts



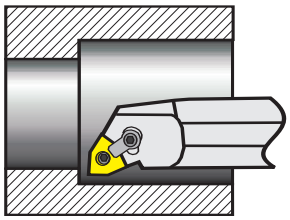
3° Side Cutting Edge Angle
SI-MTUN R/L
6-783-

MV.. VNM.. style inserts



3° Side Cutting Edge Angle
SI-MVUN R/L
6-785-

MW.. WNM.. style inserts

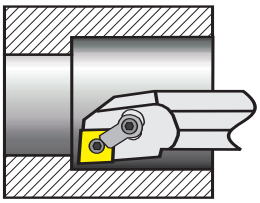


5° Side Cutting Edge Angle
SI-MWLN R/L
6-765-

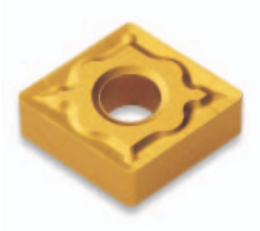
SI-MCLN R/L Boring Bars

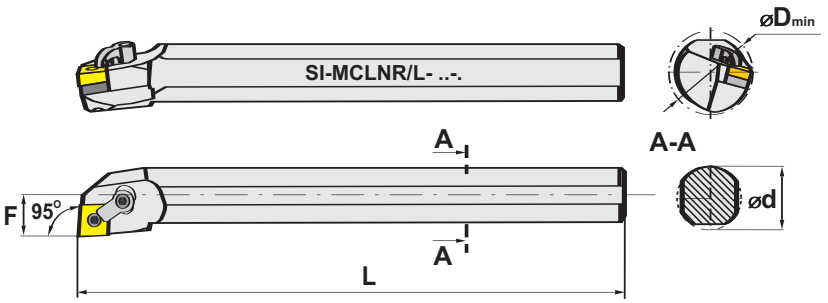
System M & C for negative 80° diamond CNM... inserts.

(with or without coolant hole)



5° End or Side Cutting Edge Angle.



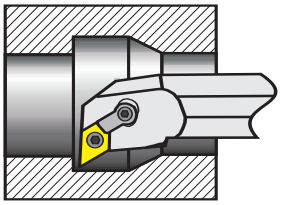


Boring Bar Style	Shank Size d	Min. Bore	OAL L	Center Line F	CNM... Insert	Boring Bars		Spare Parts Code No. 6-998-					
						Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
SI-MCLNR/L 16-4	1.0	1.280	12.0	.640	432	6-760-164R	6-760-164L	-6009 ICSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	150 & 153
SI-MCLNR/L 20-4	1-1/4	1.530	14.0	.765		6-760-204R	6-760-204L						
SI-MCLNR/L 24-4	1-1/2	1.780	14.0	.890		6-760-244R	6-760-244L						
SI-MCLNR/L 28-4	1-3/4	2.030	14.0	1.015		6-760-284R	6-760-284L						
SI-MCLNR/L 32-4	2	2.562	16.0	1.281		6-760-294R	6-760-294L						
SI-MCLNR/L 24-5	1-1/2	2.374	14.0	1.187	543	6-760-315R	6-760-315L	-6015 ICSN-533	-6545*	-6270 NL-58	-6411 CL-12	-6531 XNS-510	-153 &- 159"
SI-MCLNR/L 32-6	2.0	2.562	18.0	1.281	643	6-760-326R	6-760-326L	-6020 ICSN-633	-6547*	-6275 NL-68			-156 &- 159
Boring Bars with Thru-the-Bar Coolant Hole													
AI-MCLNR 16-4T	1.0	1.280	12.0	.640	432	6-760-564R	-	-6009 ICSN-433	-6543*	-6265 NL-46	-6415 CL-20	-6526 XNS-48	150 & 153
AI-MCLNR 20-4T	1-1/4	1.530	14.0	.765		6-760-604R	-						
AI-MCLNR 24-4T	1-1/2	1.780	14.0	.890		6-760-644R	-						
AI-MCLNR 28-4T	1-3/4	2.030	14.0	1.015		6-760-684R	-						

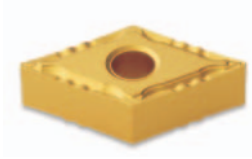
SI-MDUN R/L Boring Bars

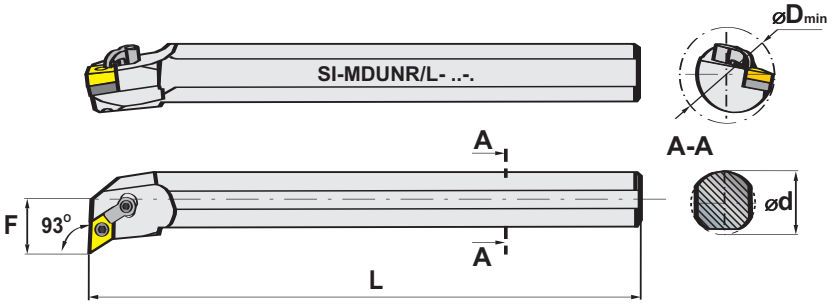
System M & C for negative 55° diamond DNM... inserts.

(with or without coolant hole)



3° Side Cutting Edge Angle.

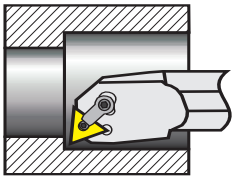




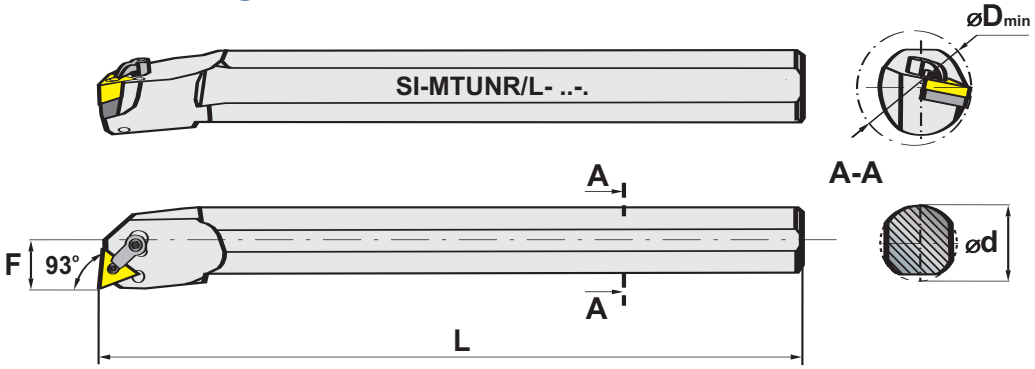
Boring Bar Style	Shank Size	Min. Bore	Length L	Center Line F	DNM... Insert	Boring Bars		Spare parts Code No. 6-998-					
						Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
SI-MDUNR/L 20-4	1-1/4	1.705	14	1.000	432	6-770-120R	6-770-120L	-6081 IDSN-433	-6543	-6265 NL-46	-6411 CL-12	-6531 XNS-510	-150 & -159
SI-MDUNR/L 24-4	1-1/2	2.000	14	1.125		6-770-124R	6-770-124L						
SI-MDUNR/L 28-4	1-3/4	2.250	14	1.250		6-770-128R	6-770-128L						
SI-MDUNR/L 32-4	2	2.500	16	1.375		6-770-132R	6-770-132L						
SI-MDUNR/L 28-5	1-3/4	2.250	14	1.250	543	6-770-228R	6-770-228L	-6086 IDSN-533	-6545	-6270 NL-58	-6423 CL-30		-153 & -159
SI-MDUNR/L 32-5	2	3.000	16	1.375		6-770-232R	6-770-232L						

SI-MTUN R/L Boring Bars

System M & C for negative 60° triangle TNM... inserts.



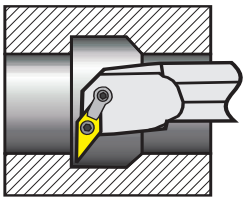
3° End Cutting Edge Angle.



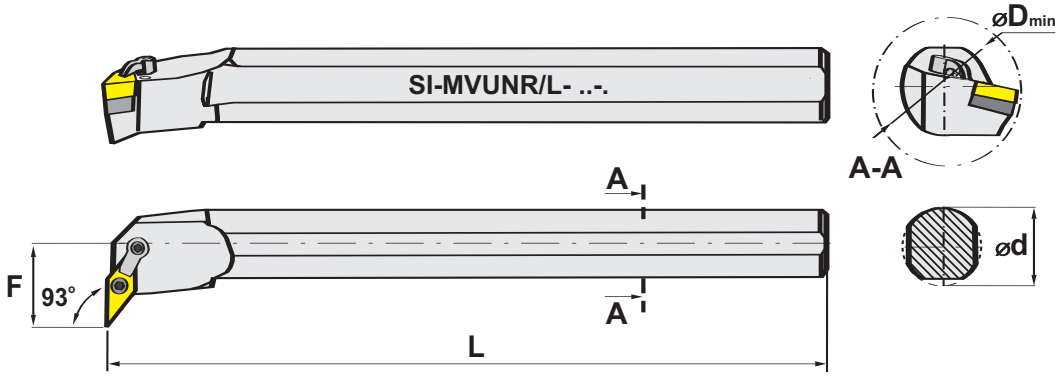
Boring Bar Style	Shank Size	Min. Bore	OAL L	F	TNMG Insert	Boring Bars		Spare Parts Code No. 6-998-					
						Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
SI-MTUNR/L 12-3	3/4	1	10	0.5	332	6-783-012R	6-783-012L	-	-	-6251 NL-33	-6405 CL-06	-6513 XNS-36	147 & 150
SI-MTUNR/L 16-3	1.0	1.280	12.0	.640	332	6-783-016R	6-783-016L	-6053 ITSN-333	-6541	-6255 NL-34L		-6515 XNS-37	
SI-MTUNR/L 20-3	1-1/4	1.530	14.0	.765		6-783-020R	6-783-020L						
SI-MTUNR/L 24-3	1-1/2	2.060	14.0	.890		6-783-024R	6-783-024L						
SI-MTUNR/L 20-4	1-1/4	1.530	14.0	.765	432	6-783-120R	6-783-120L	-6060 ITSN-433	-6543	-6265 NL-46	-6415 CL-20	-6526 XNS-48	-150 & -153
SI-MTUNR/L 24-4	1-1/2	2.060		.890		6-783-124R	6-783-124L						
SI-MTUNR/L 32-4	2.0	2.562		1.281		6-783-132R	6-783-132L						

SI-MVUN R/L Boring Bars

System M & C for negative 35° diamond VNM... inserts.



3° Side Cutting Edge Angle.

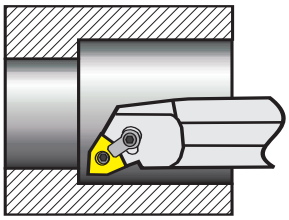


Boring Bar Style	Shank Size	Min. Bore	OAL L	F	VNM... Insert	Boring Bars		Spare Parts Code No. 6-998-					
						Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	No.6 Clamp Screw	Hex Key
SI-MVUNR/L 16-3	1	2.000	12	1.000	332	6-785-016R	6-785-016L	-6074 IVSN-322	-6541*	-6255 NL34L	-6423 CL30	-6531 XNS-510	-147 & -159
SI-MVUNR/L 20-3	1-1/4	2.250	14	1.125		6-785-020R	6-785-020L						
SI-MVUNR/L 24-3	1-1-/2	2.500	14	1.250		6-785-024R	6-785-024L						
SI-MVUNR/L 28-4	1-3/4	3.000	14	1.500	432	6-785-128R	6-785-128L	-6077 IVSN-433	-6543*	-6265 NL-46			-150 & -159
SI-MVUNR/L 32-4	2	3.250	16	1.625		6-785-132R	6-785-132L						

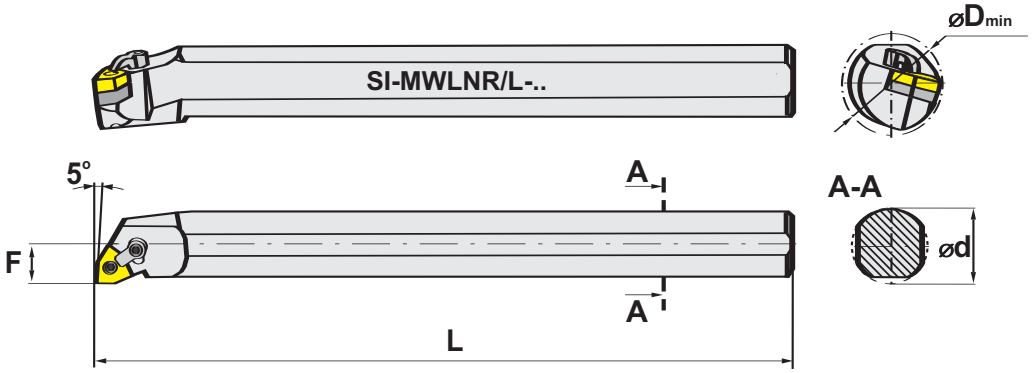
SI-MWLN R/L Boring Bars

System M & C for negative 80° trigon WNM... inserts.

(with or without coolant hole)



3° Side & End Cutting Edge Angle.

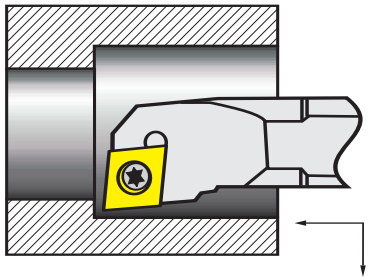


Boring Bar Style	Shank Size d	Min. Bore	OAL L	F	WNM-Insert	Boring Bars		Spare Parts Code No. 6-998-					
						Code RH	Code LH	Shim	Shim Screw	Lock Pin	Clamp	Clamp Screw	Hex Key
SI-MWLNR/L 12-3	3/4	.93	10.0	.500	332	6-765-123R	6-765-123L	-	-	-6251 NL-33	-6405 CL-6	-6513 XNS-36	-147 & -150
SI-MWLNR/L 12-4	3/4	.93	10.0	.500	332	6-765-124R	6-765-124L	-	-	-6260 NL-44	-6415 CL-2	-6520 XNS-46	-150 & -153
SI-MWLNR/L 16-4	1.0	1.280	12.0	.640	332	6-765-164R	6-765-164L						
SI-MWLNR/L 20-4	1-1/4	1.530	14.0	.765	432	6-765-204R	6-765-204L	-6035	-	-6265		-6526	
SI-MWLNR/L 24-4	1-1/2	1.780	14.0	.890	432	6-765-244R	6-765-244L	IWSN-433	6543*	NL-46		XNS-48	
Boring Bars with Thru -the-Bar Coolant Hole													
AI-MWLNR/L 16-4T	1.0	1.280	12.0	.640	432	6-765-564R	6-765-564L	-	-	-6260 NL-44	-6415 CL-20	-6520 XNS-46	-150 & -153
AI-MWLNR/L 20-4T	1-1/4	1.530	14.0	.765	432	6-765-604R	6-765-604L	-6035	-	-6265		-6526	
AI-MWLNR/L 24-4T	1-1/2	1.780	14.0	.890	432	6-765-644R	6-765-644L	IWSN-433	6543*	NL-46		XNS-48	

Styles

SI-SC..

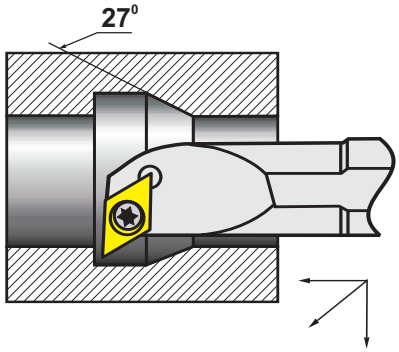
CCM.. style inserts
5° End or Side Cutting Edge Angle



SI-SCLC R/L
6-870-

SI-SD..

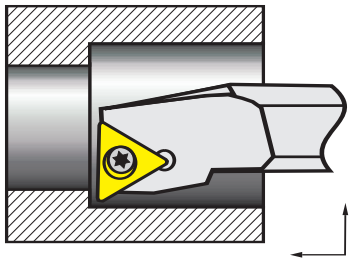
DCM.. style inserts
3° Side Cutting Edge Angle



SI-SDUC R/L
6-875-

SI-ST..

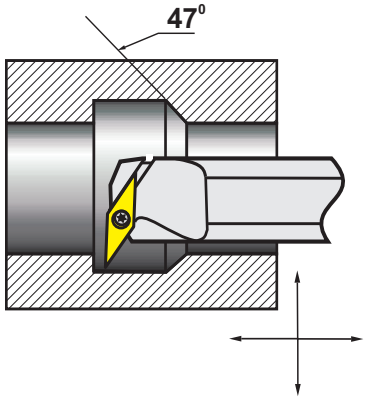
TCM.. style inserts
3° Side Cutting Edge Angle



SI-STUC R/L
6-884-

SI-SV..

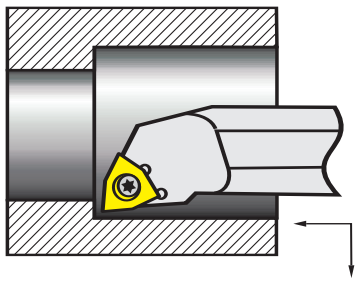
VCM.. style inserts
3° Side Cutting Edge Angle



SI-SVUC R/L
6-887-

SI-SW..

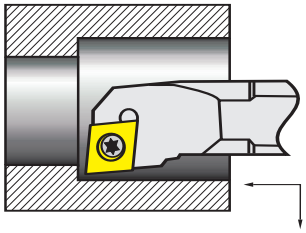
WCM.. style inserts
3° Side Cutting Edge Angle



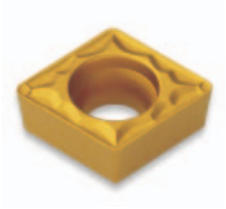
SI-SWUC R/L
6-889-

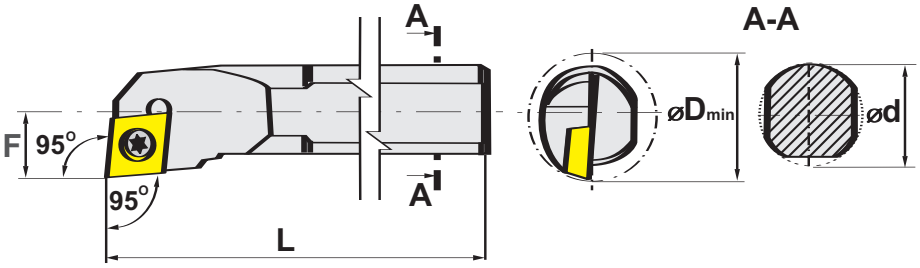
SI-SCLC R/L Boring Bars

System S for positive 80° diamond CCMT or CCGT... inserts.



3° Side & End Cutting Edge Angle.





Boring Bar Style	Shank Size d	Min. Bore D	OAL L	F	CC...T Inserts	Boring Bar Code No.		Spare Parts Code No 6-998-	
						RH	LH	Locking Screw	Hex Key
SI-SCLCR/L 4-2	.315	.354	4	.1875	-21.51	6-870-042R	6-870-042L	-2506	-007
SI-SCLCR/L 6-2	.375	.468	6	.2500		6-870-062R	6-870-062L		
SI-SCLCR/L 8-2	.500	.560	7	.290		6-870-082R	6-870-082L		
SI-SCLCR/L 10-2	.625	.850	8	.405		6-870-085R	6-870-085L		
SI-SCLCR/L 8-3	.500	.625	7	.312	-32.52	6-870-093R	6-870-093L	-4008	-015
SI-SCLCR/L 10-3	.625	.812	8	.4060		6-870-103R	6-870-103L		
SI-SCLCR/L 12-3	.750	1.000	10	.5000		6-870-123R	6-870-123L		
SI-SCLCR/L 16-3	1.000	1.120	12	.6094		6-870-163R	6-870-163L		

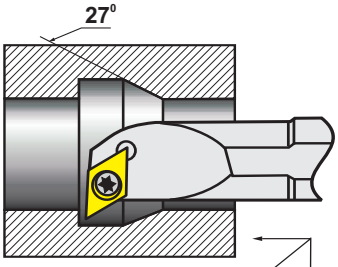
SI-SCLC R/L Boring Bars

System S for positive 80° diamond CCMT or CCGT... inserts.

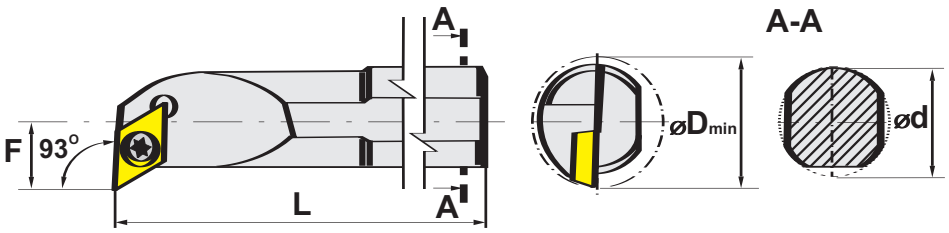
Set Code No.	Sets Include								
	.315	3/8 (.375)	1/2 (.500)	5/8 (.625)	3/4 (.750)	CCMT 21.51	CCMT 32.52	Spare Screws	Torx Key
6-870-500	1	1	1	-	-	6	-	2	2
6-870-515	-	1	1	1	-	2	4	2	2
6-870-510	-	-	1	1	1	-	6	1	1
6-870-505	1	1	1	1	1	4	6	2	2

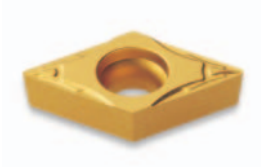
SI-DUC R/L Boring Bars

System S for negative 55° diamond DCMT or DCGT... inserts.



3° End Cutting Edge Angle.

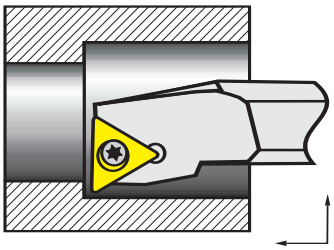




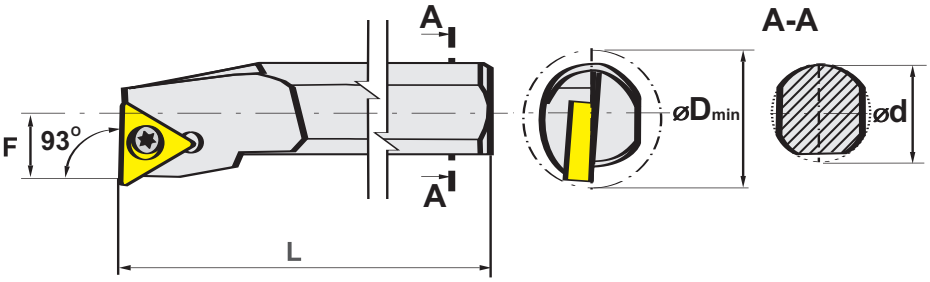
Boring Bar Style	Shank Dia.	Min. Bore	OAL L	Center Line F	DC...T Insert	Toolholder Code No.		Spare Parts Code No. 6-998-	
						RH	LH	Insert Screw	Torx Key
SI-SDUCR/L 06-2	3/8	.625	6.0	.375	21.5	6-875-006R	6-875-006L	-2506	-007
SI-SDUCR/L 08-2	1/2	.780	6.0	.437		6-875-008R	6-875-008L		
SI-SDUCR/L 10-2	5/8	.840	8.0	.500		6-875-010R	6-875-010L		
SI-SDUCR/L 12-3	3/4	1.125	10.0	.562	32.5	6-875-012R	6-875-012L	-4008	-015
SI-SDUCR/L 16-3	1	1.500	12.0	.750		6-875-016R	6-875-016L		
SI-SDUCR/L 20-3	1-1/4	1.750	14.0	.875		6-875-020R	6-875-020L		

SI-STUC R/L Boring Bars

System S for positive 60° triangle TCMT or TCGT... inserts.



3° End Cutting Edge Angle.



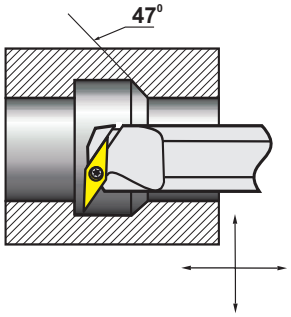
Boring Bar Style	Shank Dia.	Min. Bore	OAL L	F	TC...T Insert	Toolholder Code No.		Spare Parts Code No. 6-998-	
						RH	LH	Insert Screw	Torx Key
SI-STUCR 06-2	3/8	0.500	5.0	.208	21.51	6-884-006R	6-884-006L	-2506	-007
SI-STUCR 08-2	1/2	0.590	6.0	.287		6-884-008R	6-884-008L		
SI-STUCR 10-2	5/8	0.750	8.0	.350		6-884-010R	6-884-010L		
SI-STUCR 12-3	3/4	0.845	10.0	.422	32.52	6-884-012R	6-884-012L	-4008	-015
SI-STUCR 16-3	1	1.115	12.0	.555		6-884-016R	6-884-016L		
SI-STUCR 20-3	1-1/4	1.370	12.0	.682		6-884-020R	6-884-020L		
SI-STUCR 24-3	1-1/2	1.680	12.0	.840		6-884-024R	6-884-024L		

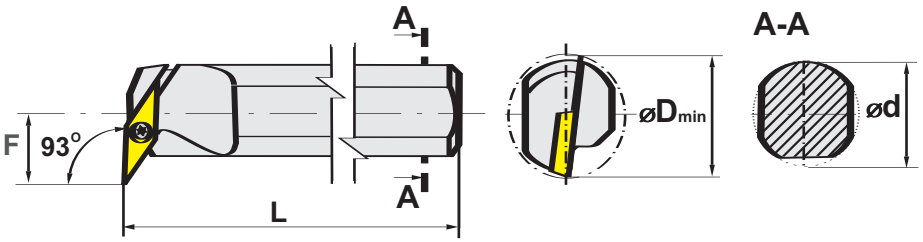
3 pc. Boring Bar Kit
Code No. 6-884-500

Includes:
RH Boring Bars
3/8", 1/2" and 5/8"
6 pcs TCMT-21.51, TiN
1 Torx Key
1 Spare Screw

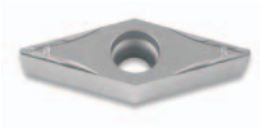
SI-SVUC R/L Boring Bars

System S for positive 35° diamond VCMT or VCGT... inserts.





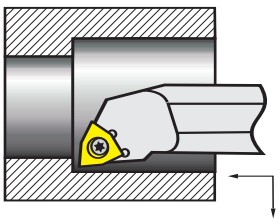
3° End Cutting Edge Angle.

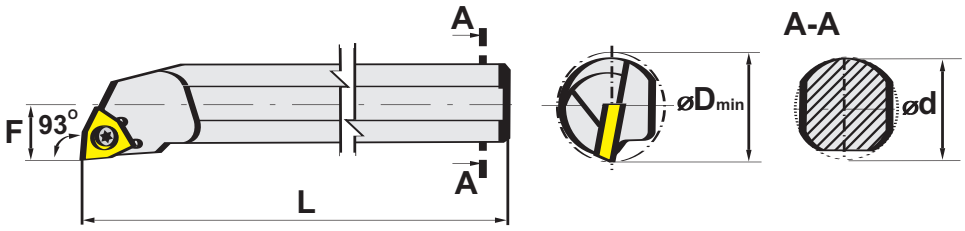


Boring Bar Style	Shank Dia.	Min. Bore	OAL L	F	VC...T Insert	Toolholder Code No.		Spare Parts Code No. 6-998-	
						RH	LH	Insert Screw	Torx Key
SI-SVUCR/L 12-2	3/4	1.125	10.0	.625	221	6-887-122R	6-887-122L	-2506	-007
SI-SVUCR/L 16-2	1	1.500	12.0	.750		6-887-162R	6-887-162L		
SI-SVUCR/L 16-3	1	2.000	12.0	.750	332	6-887-163R	6-887-163L	-3509	-15
SI-SVUCR/L 20-3	1-1/4	2.250	14.0	1.000		6-887-203R	6-887-203L		

SI-SWUC R/L Boring Bars

System S for positive 80° trigon WCMT or WCGT... inserts.



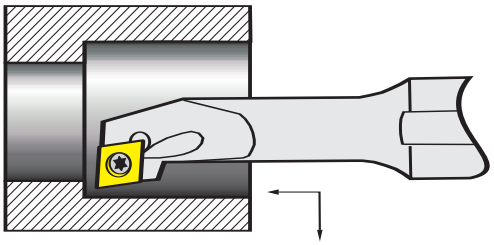


3° End Cutting Edge Angle.

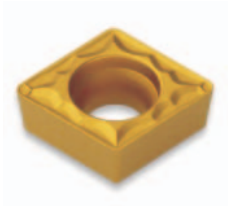
Boring Bar Style	Shank Dia.	Min. Bore	OAL L	F	VC...T Insert	Toolholder Code No.		Spare Parts Code No. 6-998-	
						RH	LH	Insert Screw	Torx Key
SI-SWUCR/L 08-3	1/2	.625	6	.311	32.52	6-889-083R	6-889-083L	-4008	-015
SI-SWUCR/L 10-3	5/8	.812	8	.405		6-889-103R	6-889-103L		
SI-SWUCR/L 12-3	3/4	1.000	10	.500		6-889-123R	6-889-123L		

Mini SI-SCLC R/L Boring Bars

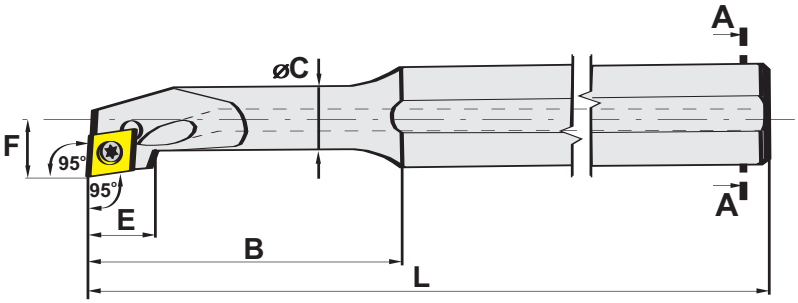
System S for positive 80° diamond CCMT... inserts.



3° End Cutting Edge Angle.



Set Code No.	Sets Include					
	.315	3/8 (.375)	1/2 (.500)	5/8 (.625)	CCMT 21.51	Torx Key
6-871-524	1	1	1	1	10-	1
6-871-525	1	1	1	1		1
Boring Bars with Coolant Hole						
6-871-529	1	1	1	1	10-	1
6-871-530	1	1	1	1		1

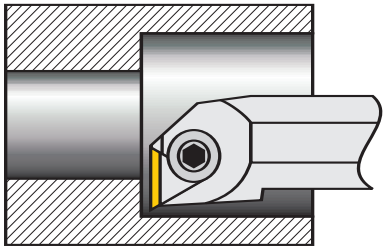


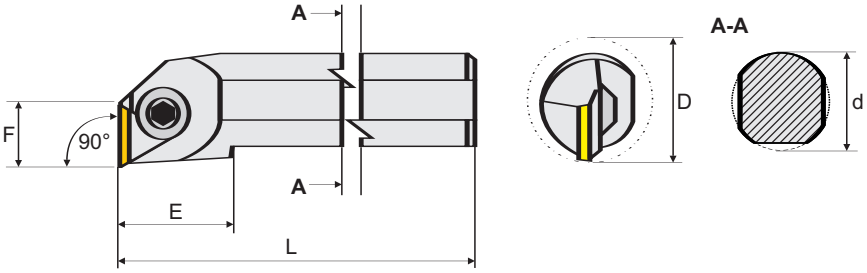
Boring Bar Style	Shank Size	Min. Bore	Length L	Center Line F	B	E	C	d1	Insert CCMT	Code No.	Locking Screw Code No.	Torx Key Code No.
SI-0608H-SCLCR-02	.315	.315	4.000	.1575	1.000	.3150	.2362	.2756	21.51	6-871-006R	6-998-2504	6-998-007
SI-0810J-SCLCR-02	.375	.433	4.500	.2362	1.260	.4134	.3150	.3543		6-871-008R	6-998-2506	
SI-1012K-SCLCR-02	.500	.512	5.000	.2756	1.496	.4528	.3937	.4331		6-871-010R	6-998-2506	
SI-1216M-SCLCR-02	.625	.669	6.000	.3543	1.969	.3937	.4724	.5901		6-871-012R	6-998-2506	
Boring Bars with Thru—the Bar Coolant Hole												
AI-0608H-SCLCR-02	.315	.315	4.000	.1575	1.000	.3150	.2362	.2756	21.51	6-871-206R	6-998-2504	6-998-007
AI-0810J-SCLCR-02	.375	.433	4.500	.2362	1.260	.4134	.3150	.3543		6-871-208R	6-998-2506	
AI-1012K-SCLCR-02	.500	.512	5.000	.2756	1.496	.4528	.3937	.4331		6-871-210R	6-998-2506	
AI-1216M-SCLCR-02	.625	.669	6.000	.3543	1.969	.3937	.4724	.5901		6-871-212R	6-998-2506	

SI-CTFPR Boring Bars

For triangle TPU inserts.

(right hand only)



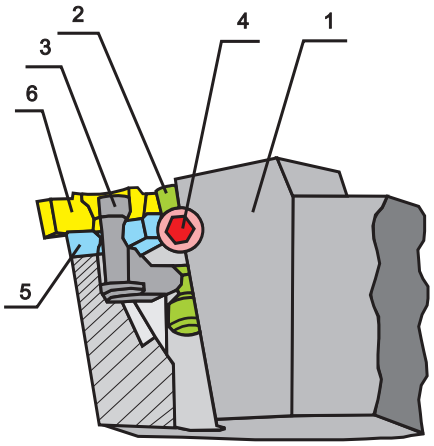


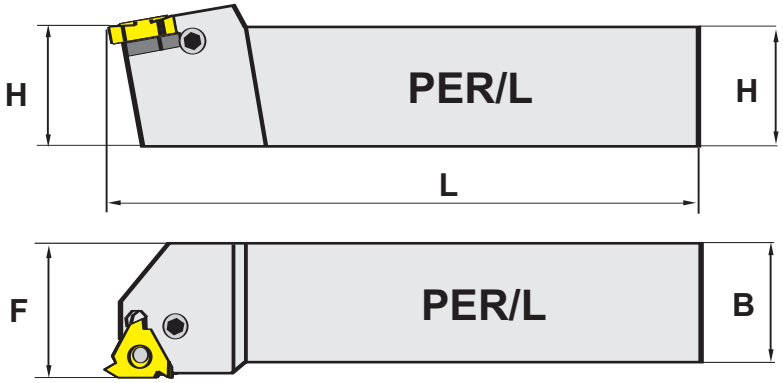
0° End Cutting Edge Angle.

d	D	L	C	E	Inserts	Toolholder Code No.	Shim	Shim Screw	Chipbreaker			Locking Screw	Hex Key
									Fine	Medium	Coarse		
5/8	0.827	8-1/4	.709	1.181	TPU-21	6-939-172	-	-	6-999-859	6-999-860	-	6-999-265	6-999-583
3/4	1.063	9-7/8	.925	1.378	TPU-21	6-939-173	-	-	6-999-863	6-999-864	6-999-865	6-999-271	6-999-584
1	1.339	11-3/4	1.201	1.575	TPU-32	6-939-174	-	-					
1-1/4	1.693	14	1.516	1.772	TPU-32	6-939-175	6-999-391	6-999-400					6-999-582 & 6-999-584
1-1/2	2.086	15	1.889	1.968	TPU-32	6-939-176	6-999-394		6-999-867	6-999-868	6-999-869	6-999-275	6-999-582 & 6-999-585
2	2.559	16	2.362	1.968	TPU-43	6-939-178	6-999-394						

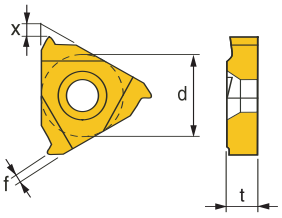
PE R/L Universal External Threading Toolholders

These new universal PER & PEL threading toolholders are designed for use with the most popular IC 3/8" (IC 9.525mm) and IC 1/2" (IC 12.7mm) inserts available from all major manufacturers, such as: VARDEX, SUMITOMO, MITSUBISHI, KENNAMENTAL, SANDVIK COROMANT, PRAMET, PLANSEE TIZIT or KORLOY. Each Toolholder is provided with a shim which allows to cut most common inch and metric threads (please refer to the chart on page 37.)





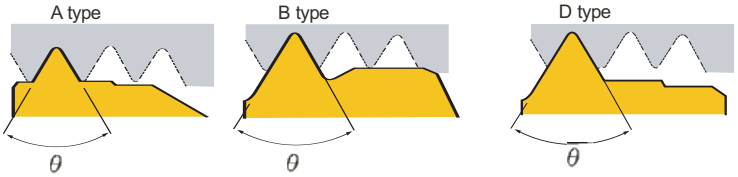
H=B	Insert IC Size	F	L	Toolholder PER/PEL		Spare Parts Code No. 6-820-						Hex Key
						Shim		Shim Screw		Lever	Lever Screw	
				RH	LH	RH	LH	RH	LH			
5/8	3/8	3/4	4	6-820-004R	6-820-004L	-905		-906L	-906R	-903	-902	6-999-582 & 6-999-583
3/4		1	5	6-820-005R	6-820-005L							
1		1	6	6-820-006R	6-820-006L							
3/4	1/2	1	5	6-820-104R	6-820-104L	-910R	-910L	-906R	-906L	-9031	-9021	
1		1-1/4	6	6-820-105R	6-820-105L							



INSERTS:

(IC) d=3/8" (9.525mm)
t min = .138" (3.5mm)
t max = .187" (4.76mm)

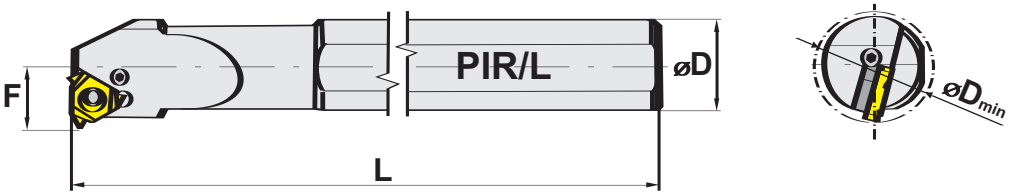
(IC) d = 1/2" (12.7mm)
t = .187" (4.76mm)



60° Full Profile Inserts

60° Partial Profile Insert

PI R/L Universal Internal Threading Boring Bars



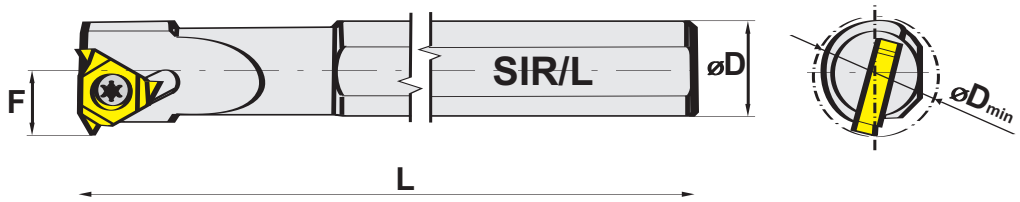
INSERTS:

(IC) d=3/8" (9.525mm)
t min = .138" (3.5mm)
t max = .187" (4.76mm)

(IC) d = 1/2" (12.7mm)
t = .187" (4.76mm)

Shank Dia.	Insert IC Size	F	L	Min. Bore	Right Hand		Left Hand		Spare Parts					
					Type	Code No.	Type	Code No.	Shim	Lever	Lever Screw	Shim Screw RH	Shim Screw LH	Hex Key
1	3/8	5/8	10	1-1/4	SI-PIR 16-3	6-821-116R	SI-PIL 16-3	6-821-116L	6-820-905	6-820-903	6-820-902	6-820-906R	6-820-906L	6-999-582 & 6-999-583

SI R/L Universal Internal Threading Boring Bars



INSERTS:

(IC) d=3/8" (9.525mm)
t min = .138" (3.5mm)
t max = .187" (4.76mm)

(IC) d = 1/2" (12.7mm)
t = .187" (4.76mm)

Shank Dia.	Insert IC Size	F	L	Min. Bore	Right Hand		Left Hand		Spare Parts Code No.	
					Type	Code No.	Type	Code No.	Screw	Torx Key
5/8	3/8	3/8	6	7/8	SI-SIR 10-3	6-821-010R	SI-SIL 10-3	6-821-010L	6-998-3509	6-998-015
3/4		7/16	7	1	SI-SIR 12-3	6-821-012R	SI-SIL 12-3	6-821-012L		

Internal and External Threading Recommendations

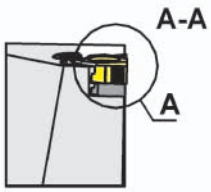
Recommended shims in reference to most popular threads

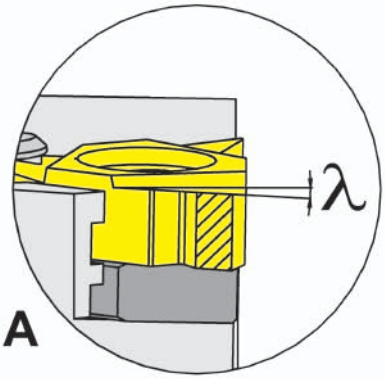
Thread	Shim	Thread	Shim	Thread	Shim	Thread	Shim
Imperial Thread				Metric Thread			
5-36	-	1/4-28	GP-16.03	M1.6 x 0.35	-	M16 x 2	GP-16.02
5-40	GP-16.03	5/16-18	GP-16.03	M2 x 0.4	GP-16.03	M16 x 1.5	GP-16.02
5-44	GP-16.03	5/16-24	GP-16.02	M2.5 x 0.45	GP-16.03	M17 x 1	GP-16.01
6-32	-	3/8-16	GP-16.03	M3 x 0.5	GP-16.03	M18 x 1.5	GP-16.01
6-36	GP-16.03	3/8-24	GP-16.02	M3 x 0.5	GP-16.03	M20 x 2.5	GP-16.02
6-40	GP-16.03	7/16-14	GP-16.03	M3.5 x 0.6		M20 x 1.5	GP-16.01
7-32	-	7/16-20	GP-16.02	M4 x 0.7		M20 x 1	GP-16.01
8-30	-	1/2-13	GP-16.03	M5 x 0.8”		M22 x 2.5	GP-16.02
8-32	-	1/2-20	GP-16.02	M6 x 1	GP-16.03	M22 x 1.5	GP-16.01
8-36	GP-16.03	9/16-12	GP-16.03	M8 x 1.25	GP-16.02	M24 x 3	GP-16.02
8-40	GP-16.03	9/16-18	GP-16.02	M8 x 1	GP-16.03	M25 x 1.5	GP-16.01
9-32	GP-16.03	5/8-11	GP-16.02	M10 x 1.5	GP-16.02	M27 x 3 “	GP-16.02
10-24	-	5/8-18	GP-16.02	M10 x 1.25	GP-16.01	M27 x 2	GP-16.01
10-28	GP-16.03	3/4-10		M10 x 0.75	GP-16.03	M30 x 3.5	GP-16.02
10-30	GP-16.03	3/4-16		M12 x 1.75	GP-16.02	M30 x 2	GP-16.01
10-32	GP-16.03	7/8-9		M12 x 1.5	GP-16.02	M30 x 1.5	GP-16.01
12-24	GP-16.03	7/8-14	GP-16.01	M12 x 1.25	GP-16.01	M33 x 2	GP-16.01
12-28	GP-16.03	1-8	GP-16.02	M12 x 1	GP-16.03	M 35 x 1.5	GP-16.01
12-32	GP-16.03	1-12	GP-16.01	M14 x 2	GP-16.01	M36 x 4	GP-16.02
1/4-20	-	1-1/4-7	GP-16.02	M14 X 1.5	GP-16.02	M36 x 2	GP-16.01

Recommended helix angle in reference to thread diameter and number of threads per inch (TPI) for 3/8” inserts only.

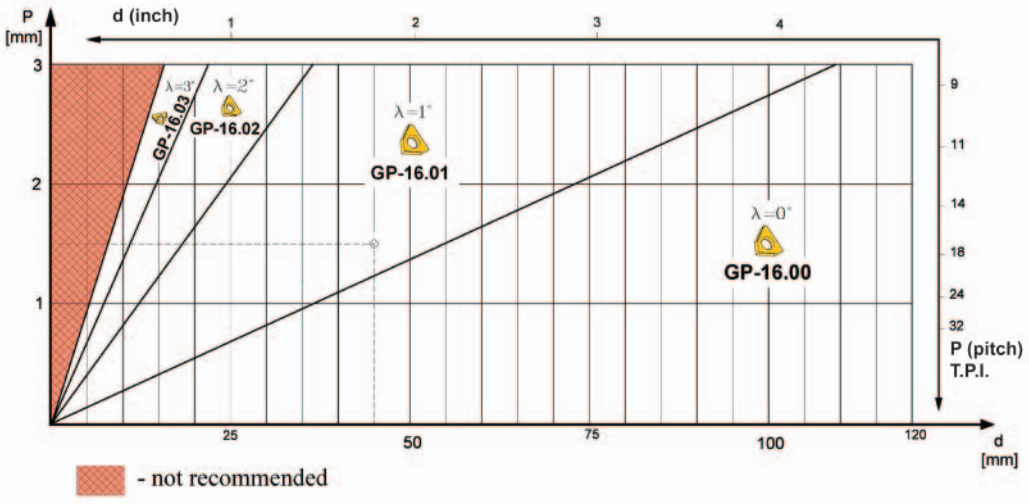
3/8” Shims

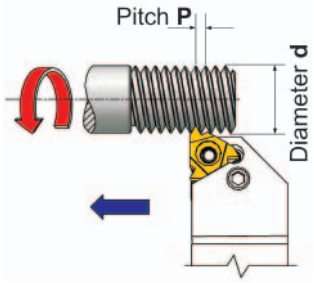
Type	Shim Code No.	Helix Angle
GP-16.00	6-820-9050*	0
GP-16.01	6-820-9051	1
GP-16.02	6-820-9052*	2
GP-16.03	6-820-9053*	3





Section **A**



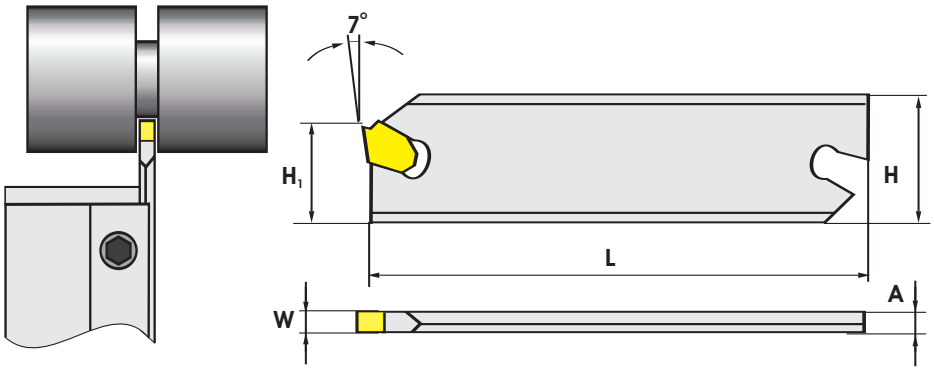


Recommended number of passes in reference to thread pitch “P”

Pitch (mm)	.5	.75	1.0	1.25	1.5	1.75	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Threads per inch	48	32	24	20	16	14	12	10	8	7	6	5.5	5	4.5	4
No. of Passes	4-6	4-7	4-8	5-9	6-10	7-12		8-14	10-16	11-18		11-19	12-20		

$$\text{Pitch “P”} = \frac{25.4}{\text{Threads per inch}}$$

GTN



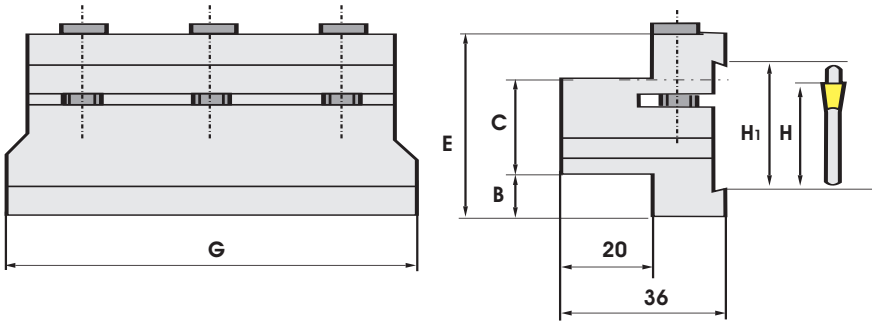
Double-ended adjustable blades

- When cutting off solid bar to center, cutting edge should be .004" – .006" above center height.
- Inserts sold separately.
- Extractor included.

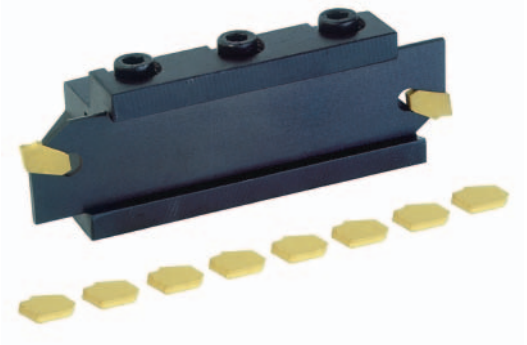
Blade No.	W	H	H1	A	L	D	Blade Code No.	Tool Block Code No.	Insert Style	Extractor Code No.
26-2	.087	1.02	.83	.065	4.33	1.97	6-895-262	6-895-6195	GTN-2	6-998-913
26-3	.122			.091		2.95	6-895-263		GTN-3	
26-4	.161			.126		3.15	6-895-264		GTN-4	
26-5	.201			.169		3.15	6-895-265		GTN-5	
32-3	.122	1.26	.97	.091	5.91	3.94	6-895-323	6-895-6196	GTN-3	
32-4	.161			.126		3.94	6-895-324		GTN-4	
32-5	.201			.169		4.7	6-895-325		GTN-5	
32-6	.240			.217		4.7	6-895-326		GTN-6	

Tool Blocks

- Integral flexible clamping.
- Applicable for both right & left hand turning operations.
- Cutting edge at the same level as top of shank.
- Hex key and mounting screws included.



Tool Block Style	B	C	E	G	Tool Block Code No.	Hex Key Code No.	Screw Code No.
20	.315	.787	1.50	3.5	6-895-6195	6-999-585	6-998-915
20-32	.512	.787	1.89	4.0	6-895-6196		
25-32	.315	1.00	1.89	4.3	6-895-6256		



Blade & Inset Sets

Blade	Inserts TiN Coated	Code No.
26-2	GTN-2	6-895-722
26-3	GTN-3	6-895-723
32-4	GTN-4	6-895-734
32-5	GTN-5	6-895-735
32-6	GTN-6	6-895-736

Tool Block, Blade & Inset Sets

Set #	Blade	Block	Insert* - TiN	Code No.
3	26-3	20	GTN-3	6-895-903
4	26-4		GTN-4	6-895-904
5	26-5		GTN-5	6-895-905
13	32-3	20-32	GTN-3	6-895-913
14	32-4		GTN-4	6-895-914
15	32-5		GTN-5	6-895-915
23	32-3	25-32	GTN-3	6-895-923
24	32-3		GTN-4	6-895-924
25	32-5		GTN-5	6-895-925