NTK

CUTTING TOOLS

Solutions for Machining Heat Resistant Alloys

8000

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Guidelines for Booklet

- This catalog lists products as of August 2019.
- Please note that specifications of the products listed in this catalog may be changed without notice due to continuous research & development and product improvements.
- This catalog contains the major features and relevant information on all of our products. Please contact our sales representatives or dealers if more detailed information is needed.
- Stock Status Symbols

  ● : Standard stock available for Right-Hand, Left-Hand and neutral products
  R : Stock available only in Right-Hand
  L : Stock available only in Left-Hand
  ○ : 1-2 weeks delivery
  Ⓡ : 1-2 weeks delivery only in Right-Hand
  Ⓛ : 1-2 weeks delivery only in Left-Hand
  ■ : While stock lasts
  No symbol : Not stocked

  ← Non-returnable items

- Please note that this catalog was prepared based on products intended mainly for sale in North and South America.

■ Standard

1) Holder Type	Package quantity	Notes
Turning holder	1 pc/case	
Milling cutter	1 pc/case	
2) Spare parts	**Package quantity**	**Notes**
Screw	10 pcs/case	Clamp screw, Clamp bolt, Double screw, Button screw
Seat	10 pcs/case	Shim seat
Clamp	10 pcs/case	Clamp
Wrench and cutter parts (such as cartridges)	5 pcs/case	Wrench, bit, cutter product
Blade	1 pc/case	
Handle, Hose	1 pc/case	Handle with magnet, handle and bit
3) Insert Type	**Package quantity**	**Notes**
BIDEMICS (Brazed)	1 pc/case	JP2
End mill	1 pc/case	SX9 Ceramic end mill
CBN	1 pc/case	B23, B30, B36, B40, B52, B5K, B6K, B99
PCD, Diamond coating	1 pc/case	PD1, PD2, UC1
CTPW insert for cut-off	5 pcs/case	CTPW series
STICK DUO Solid carbide bar	1 pc/case	SHFS, SHFB, SBFS, SBFB, SBB, SBG, SBT, SSP
All others	10 pcs/case	

＊Packaging may vary depending on the product size.
For more information, please contact your nearest distributor or our sales office.

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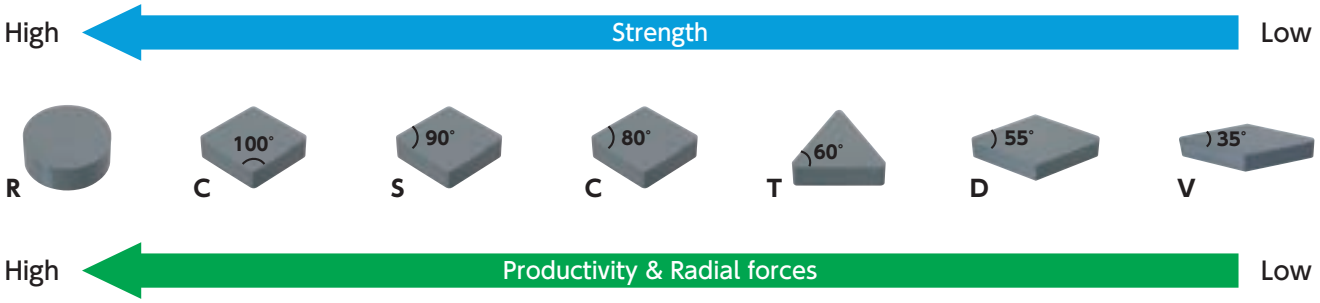
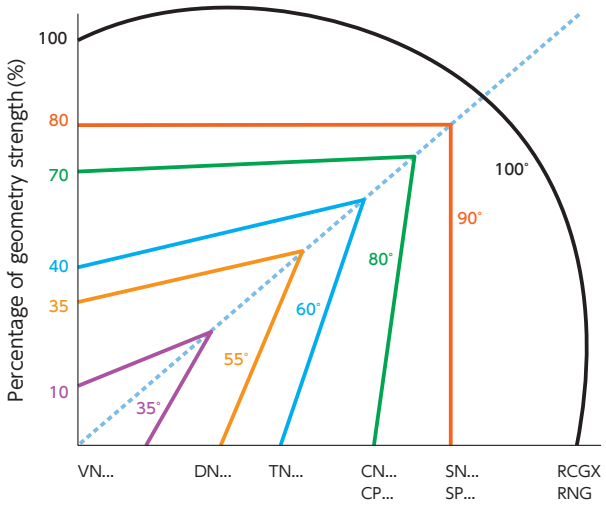
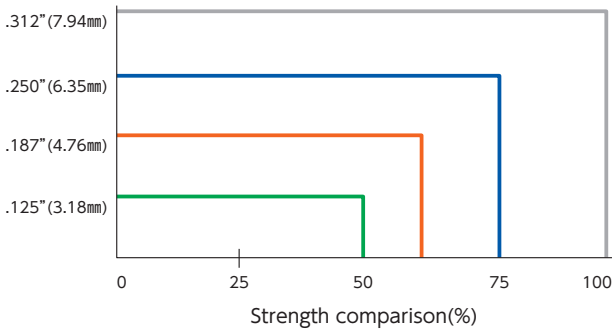
Guidelines for Machining HRSA Materials

Guidelines for Insert Selection

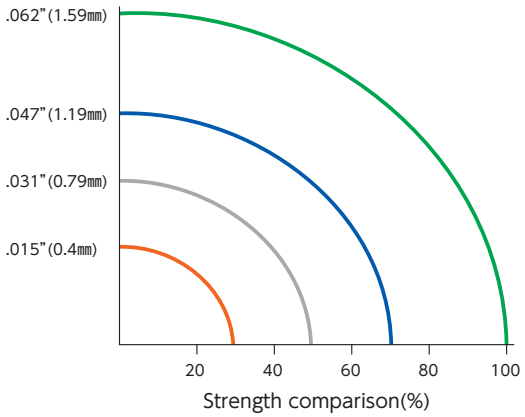




Insert Thickness



Insert Nose Radius Inches



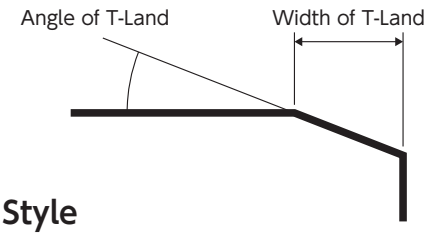
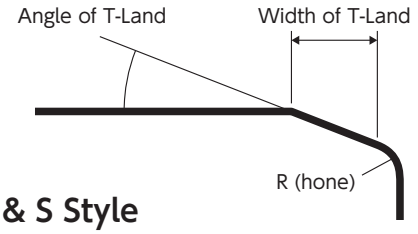
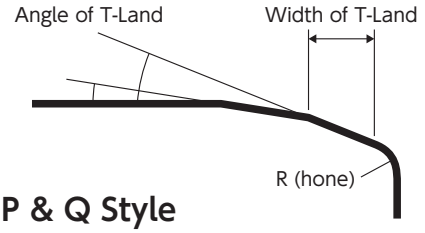
For the best performance always use the strongest possible insert shape to maximize corner strength and productivity. If the operation allows, it is best to use round inserts or square inserts with a large nose radius and a small entering angle.
Use the largest nose radius possible for the operation, so you increase the strength of the insert which will result in better tool life but remember that this will result in increased tool pressure.
Larger insert thickness gives added strength and integrity during machining offering far better impact resistance, heat dispersion, and longer tool life. This results in higher productivity.

Edge Conditions are a Key to Success

An important factor for achieving success when machining with ceramic inserts is to use the correct edge preparation. Ceramic is a hard material therefore the insert needs some edge work in order to withstand cutting forces and optimize the cutting tool performance. The edge preparation must correspond to the ceramic grade selected, the type of HRSA material being machined and the machining operation being performed. The majority of ceramic applications can be handled with NTK' s standard edge preparations.
In unique circumstances that may arise, an edge preparation may need to be specialized to meet the conditions.
The chart below describes standard edge preps.

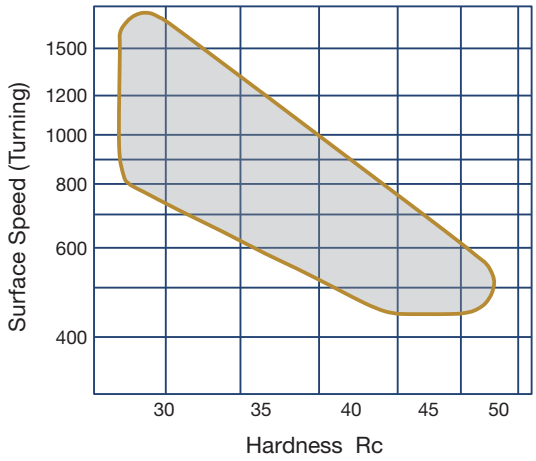
Description of Insert Edge Preparations

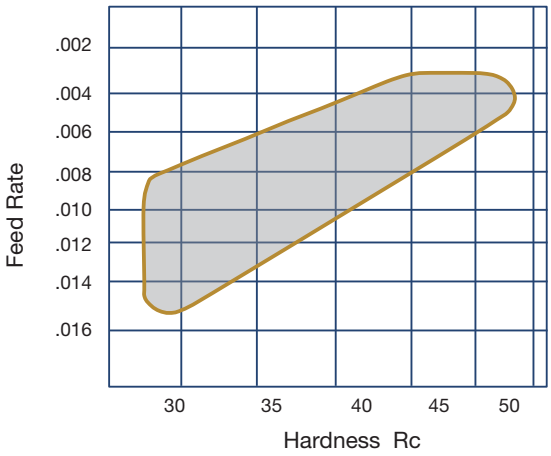
Edge Strength Increases ↓

FNX Style	Up sharp edges are not recommended for ceramics.
E Style	Hones help protect the edge of ceramics from chipping or fracturing. Feed rates must be greater than the hone size to prevent a rubbing rather than a cutting action. Excessive honing reduces tool life.
 **T Style**	This geometry is typically the most common ceramic edge preparation. The cutting forces are distributed over a concentrated area of the ceramic edge.
 **Z & S Style**	A hone added to a T-land provides a stronger edge to prevent chipping. Usually this type of geometry works best on interrupted cuts or turning hardened steels.
 **J, P & Q Style**	Double T-lands and hones are generally used in heavy roughing cuts or hardened materials. This edge is extremely shock resistant but also generates large cutting forces.

Guidelines for Machining HRSA Materials

Know the Workpiece Material to Determine Parameters

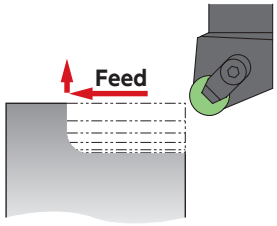




To effectively machine with ceramic inserts it is important to factor in the physical hardness of the material and the surface condition to determine the starting speed and feed. The chart information is based on using an RNG 45 insert with a depth of cut from .125 inches or less. In rough / scale conditions, use the lower side of the speed range for the hardness of the material. If machining clean HRSA material use the higher speed range based on the hardness. When using weaker geometry inserts such as triangles it is important to reduce feeds.

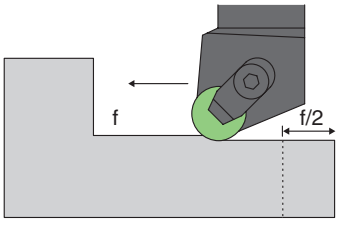
The formation of the chip is a good indicator of the material hardness, the chips will break easily. The cutting temperatures will be higher with hardened materials resulting in more notch wear on the insert edge.

Softer HRSA materials machine similar to stainless steels. Insert grades with greater toughness and reduced hot hardness resistance are ideal in these conditions due to reduced machining temperatures and an increase of the chip breaking against the insert.



Parts that have a forged scale work surface, typically machined in soft state around 26 Rc, require a 25% speed reduction and an increase of the feed until the scale is gone. When cutting cast HRSA material speeds can be increased from those indicated on the graph and it is recommended to reduce feeds to one half of the value indicated on the chart. The maximum depth of cut should be around .060" (for an RNG45) and use flood coolant conditions where applicable. Bar stock is the easiest to machine allowing the use of harder more wear resistant insert grades than when machining forgings.

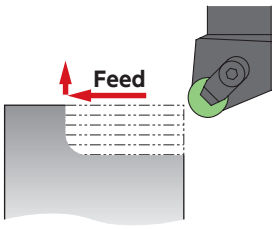
Material	Components	Advantage	Machinability
Forging	Large	High strength	Medium
Casting	Complex shapes	Low strength	Poor
Bar Stock	Less than 7.5" dia.	Availability/strength	good



Guidelines for Machining Heat Resistant Alloy

● Rough

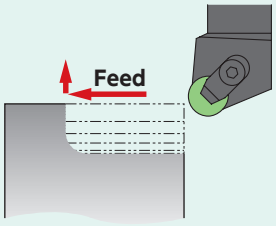
Same Depth of Cut



Note)
Notch wear on the insert cutting edge as shown in is the result of multiple passes being taken at the same depth of cut. This type of wear will minimize tool life. The following programming examples will help to minimize this mode of failure.

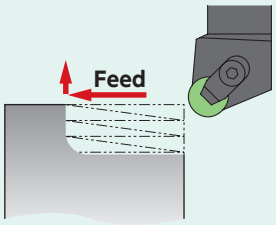
change to

Varying Depth of Cut



Note) Another programming change that may help to reduce notching is by varying the depth of cut. Again, the same principle applies, notching takes place at various points on the cutting edge rather than concentrated at one point.

Ramping



Note) Programming " Ramping " cuts in the same cutting direction is one of the best procedures to use to minimize notching. By varying the DOC, wear is distributed over the entire cutting edge not on one point.

Repeated passes with same depth of cut

This is not a beneficial practice because the insert will develop severe notching at the point of the repetition of DOC. This will result in indexing the insert often. For this reason it is best to vary the depth of cut point by utilizing one of two techniques.

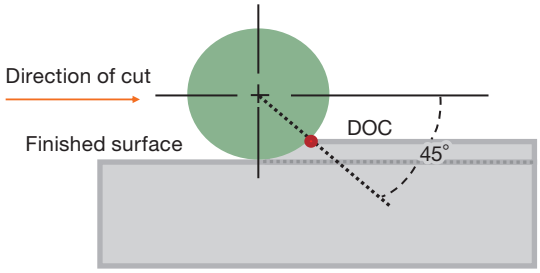
Vary the Depth of cut through multiple passes.

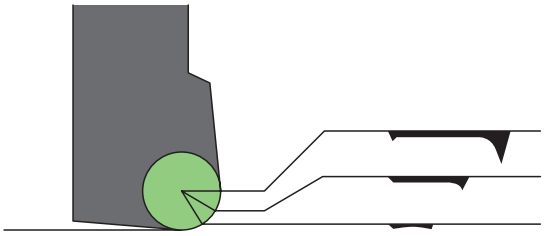
Gradually reduce the depth of cut with every pass. This may increase the operation time slightly but will result in longer tool life for the insert and less indexing of the insert.

Multiple passes using ramping programming

This technique has a proven benefit to roughing operations. Gradually feed out while traversing the part will result in significant reductions in notching. The subsequent pass is programmed at a constant cut since the surface is now ramped.

Depth of Cut and Tool Life

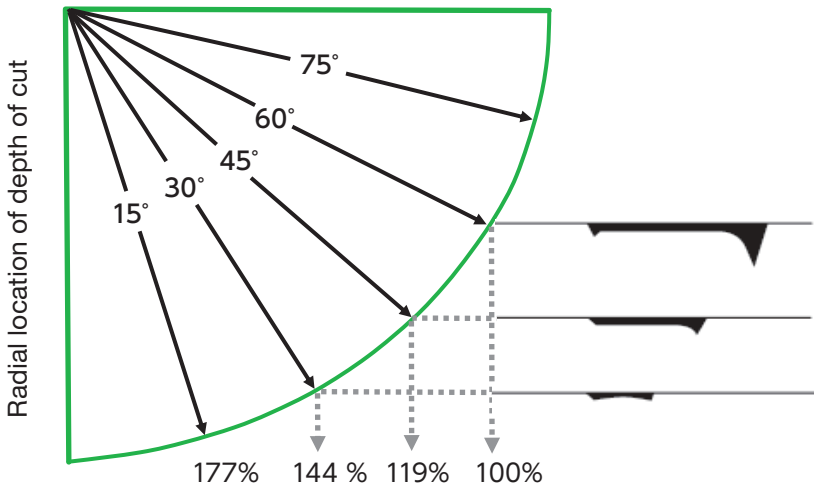




Insert failure due to depth of cut notching is a typical result when machining heat resistant alloys and must be controlled to prevent a catastrophic failure of the cutting edge. The depth of cut is a key consideration during the machining operation to maximize tool life and minimize notch wear on the cutting edge. A decrease in the lead angle results in increased cutting forces on the insert edge. As the DOC exceeds beyond the point on the insert edge where a 45 degree line from the center of the insert intersects the cutting edge the greater the notch wear and the increased risk for failure of the insert edge. There is a direct relationship between the insert radius size and the maximum depth of cut (at around 60 deg. mark) which should be taken. See the chart below for recommendations.

Any increase in DOC requires a reduction of the speed and feed rates. Parameters are based on the ceramic insert's ability to withstand high temperatures and run with a chip thickness that allows the heat to be concentrated in the zone ahead of the insert resulting in low cutting pressure and minimal wear. If the speed is reduced without a corresponding reduction in feed, this effect will be lost and the performance will fall off due to chipping of the insert edge from a cooler chip.

Speed and Feed Rate (%) vs. Depth of Cut on the Radius



Surface Speed and Feed Rate (Percentage)

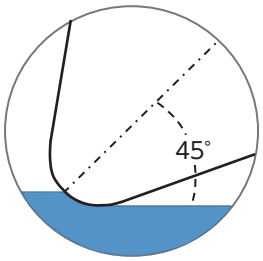
Depth of Cut (Inches)	Insert Diameter		
	.250”	.375”	.50”
.063”	.094”	.125”	
.038”	.056”	.075”	
.018”	.028”	.035”	

Insert Radius Inches (mm)	Ideal DOC Inches (mm)	Insert Descriptions
.125 (3.18)	.038 (0.93)	RCGX / RPGX23; RPG21..
.187 (4.76)	.056 (1.40)	RCGX / RPGX35; RNG / RPG32
.250 (6.35)	.075 (1.86)	RCGX / RPGX45; RNG43 / 45; RPG 43
.312 (7.94)	.092 (2.33)	RNG55
.375 (9.53)	.110 (2.79)	RNG64 / 65; RPG65
.50 (12.70)	.147 (3.72)	RNG85 / 86

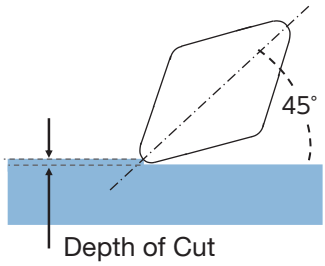
Guidelines for Machining Heat Resistant Alloy

Depth of Cut Recommendation based on Insert Corner Radius

To maximize tool life when using straight-edged inserts (C, D, or S) with corner radii , as opposed to a round insert, the allowable depths of cut are related to the radius and not the insert size. To minimize notching and allow a cut from both directions, the effective machining procedure is to take more material off during the roughing operation, with a round insert. Then the material removal amount for the finishing operation, with a straight edge insert, should be suitable for the nose radius of the insert.

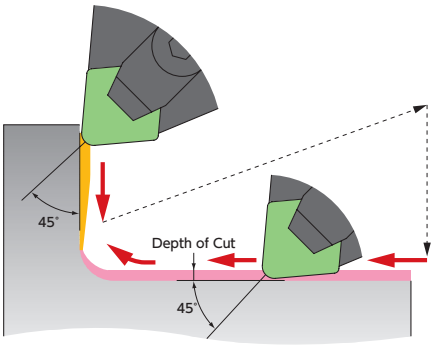


It is important to choose the insert with the appropriate corner radius to complete the finishing operation's depth of cut. If the part has a required radius feature called out, then do not leave more than the amount of material called out for the required insert radius to finish the part and feature. A large corner radius may deflect a part with thin walls because of radial forces generated between the workpiece and insert.

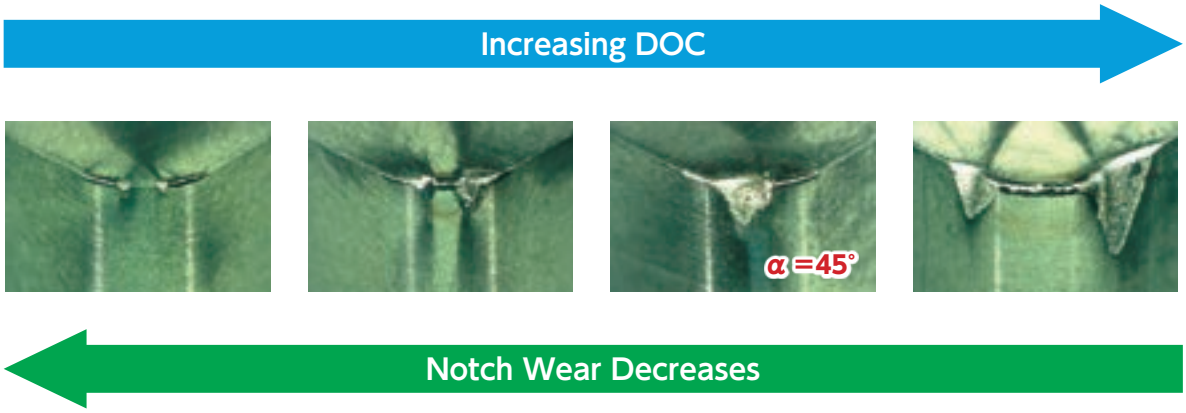


Insert Corner Radius Inch (mm)	Ideal Depth of Cut Inch (mm)	Corner Radius Designation Inch (mm)
.015 (0.38)	.0046 (0.12)	1 (04)
.031 (0.80)	.0092 (0.23)	2 (08)
.048 (1.21)	.0139 (0.35)	3 (12)
.063 (1.59)	.0183 (0.47)	4 (16)
.094 (2.38)	.0275 (0.70)	6 (24)
.125 (3.18)	.0370 (0.93)	8 (32)

Optimum DOC is 5-15% of insert diameter (based on 0 deg. Lead angle)



As seen in these photos, by removing the appropriate amount of stock for the nose radius of the insert and staying below the 45° mark of the corner radius notching is minimized allowing a cutting operation to be programmed from both directions on the insert.



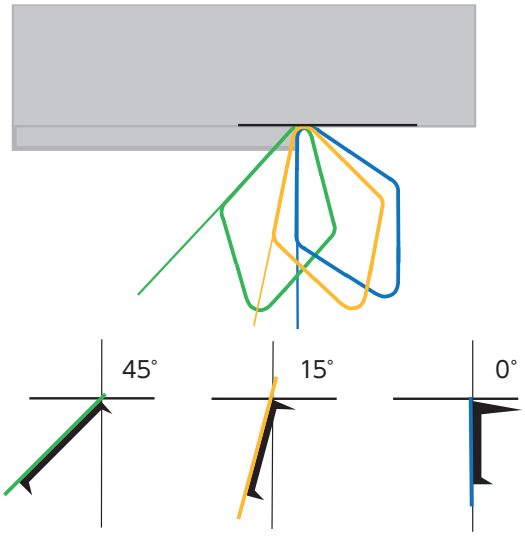
Guidelines for Machining HRSA Materials

Lead Angles

When cutting heat resistant alloys consideration should be given to using the largest lead angle possible. A large lead angle allows the cutting forces to be spread over a larger surface area of the insert. This will also improve tool life and surface finish while reducing notching. As the lead angle increases the chip will flow more easily.

Feed

Surface finish is directly related to the insert nose radius and the feed rate programmed. The larger the radius on the insert the faster the tool can be fed to achieve the appropriate finish. When machining HRSA materials with SiAlON ceramics utilize their superior strength by increasing the feed rate which will minimize wear and cutting time.



Typical insert wear pattern showing the effect of various lead angle changes and the resulting increase of depth of cut notching

Milling Operations on Heat Resistant Alloys (High Nickel)

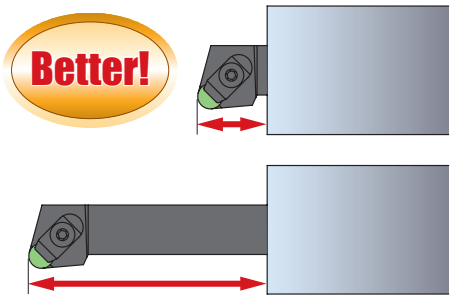
Button inserts in a milling cutter rotate in and out of the cut during a revolution this reaction on the insert edge is comparable to machining an interrupted cut on a turning operation. This rotation in and out of the material also can hinder achieving the desired temperature ahead of the tool. So, an increase in speed, reduced feed/tooth in order or a combination will help generate the heat. It is recommended to use climb milling techniques to avoid elevated temperatures in a thin area of the chip which could create chip welding and re-cutting of the chip which reduces tool life.

Increase speeds from turning recommendations in chart according to width of cut. Reduce the feed rate recommendations for turning in chart by about 50% (This is feed per tooth, not per revolution of the cutter)
The width of the cut has a direct relationship to the temperature generated ahead of the inserts. As the width is decreased the temperature decreases because the insert is out of the cut more than in the cut. The chart below shows the percentage to increase speeds given in the previous chart for various widths of cut. The widths are also expressed as percentages of the cutter diameter (so all cutter sizes apply)
A milling insert can only be cutting 50% of each revolution if the path of cut is equal to the cutter diameter. So, it will always be necessary to increase speed and reduce feed compared to the turning recommendations to achieve the temperatures needed.

Width of cut in % of cutter diameter engaged	Surface speed in % of Graph
100%	125%
90%	150%
80%	220%
70%	280%
60%	340%
50%	400%
40%	460%

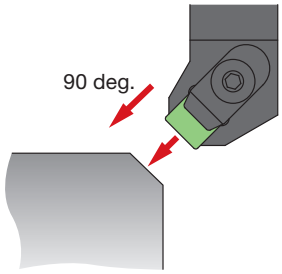
Minimize overhang

Too much overhang causes the holder to deflect resulting in vibration and chatter which is damaging to ceramic inserts and can lead to insert breakage. When working with turret style machines, straight edged inserts should be considered in place of round inserts. The straight edge eliminates radial tool forces and chatter issues.



Pre-chamferring

Pre-chamferring the part reduces the potential for insert chipping or breaking upon the entry or exit point of work material. To effectively complete a pre-chamfer operation it is important to program the feed at a 90 degree angle to the chamfer in order to prevent notching and increase insert tool life.



No dwelling

Inserts wear out when rubbing the part instead of cutting

Coolant

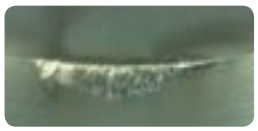
When turning with BIDEMICS, SiAlON and Whisker a flood coolant ondition should be used In some cases where a high interruption is encountered it may be best to shut off the coolant No coolant should be used while milling with SX3, SX7 and SX9

Edge preparations

Typical HRSA machining requires the insert cutting edge to be sharp. Using a slight T-land or honed edge is also effective to reduce notching, flaking and built up edge

Troubleshooting

Cutting Conditions & Parameters Adjustment

		Cutting speed (SFM)		Feed rate (IPR)		Grade attribute		
		SiAlON	BIDEMICS	SiAlON	BIDEMICS	BIDEMICS	SiAlON	Whisker
	Notching		↗ [a]	↗ [b]		🔴	🔴	
	Flank wear	↘ [c]		↗ [d]		🔴	🔵 SX3 SX7	🔴
	Breakage			↘	↘	🔵	🔴	
Heat		↘	↘	↘	↘	—	—	—
Chatter		↗	↗	↘	↘	—	—	—

🔴 1st Choice 🔵 2nd Choice

Test Results

[a] WA1 : Increase cutting speed

500 SFM → **1800 SFM**

[b] SX7 • SX3 • SX9 • SX5 : Increase feed rate

.008 IPR → **.016 IPR**

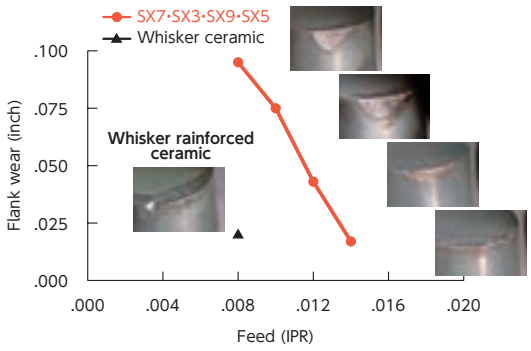
[c] SX7 • SX3 • SX9 • SX5 : Decrease cutting speed

1300 SFM → **500 SFM**

Note : Speed and feed rates shown are recorded test data and should not be thought of as recommended cutting conditions.

[d] SX7 • SX3 • SX9 • SX5 : Increase feed rate

Feed rate increased decreases wear amount of SiAlON



Cutting condition
Work material : Inco718
Insert shape : RNG45
Cutting Speed : 800 SFM
Depth of Cut : .080"
WET

In some cases, in order to increase the wear resistance of SX7 & SX3 & SX9 & SX5, the feed must be increased. By increasing the feed and utilizing the toughness of SX7 & SX3 & SX9 & SX5, the inserts are off the part sooner causing less wear. Increasing the feed also decreases cycle time and improves productivity and profitability.

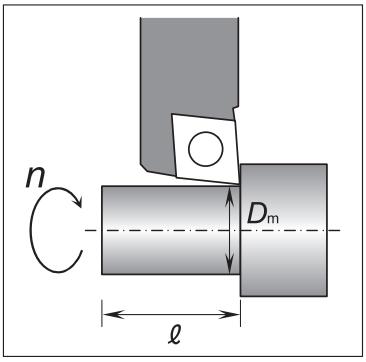
Note : Be careful to reduce the feed rate by 25%, when going into a corner.

Grade Recommendations based on Material's Machinability and Application

Work Material	Rough Turning w/ Scale		Rough no scale & Semifinishing			Grooving		Milling	
	1st	2nd	1st	2nd	High RPM Potential use	1st	2nd	1st	2nd
Hastelloy C	SX5	SX9	SX7	SX3	JX1	SX7	SX3	SX7	WA1
Inconel 625	SX5	SX7	SX7	SX3	JX1	SX7	SX3	SX7	SX9
Inconel 718	SX5	SX9	SX9	SX7	JX1	SX7	SX9	SX9	SX7
Mar M247	SX5	SX3	SX3	SX7	JX1	SX7	WA1	SX7	WA1
Udimet 720	SX5	SX9	SX7	WA1	JX3	SX7	SX3	SX7	WA1
Waspaloy	SX5	SX9	SX7	WA1	JX3	SX5	SX3	SX7	WA1
Rene	SX3	SX7	SX3	SX7	JX1	SX7	SX3	SX3	SX7
Stellite 6	SX5	SX9	SX9	WA1	JX3	SX7	SX3	SX9	SX7
MP35N	SX5	SX3	SX3	WA1	JX3	SX7	WA1	SX7	WA1
Monel	SX3	WA1	SX7	SX3	JX1	SX7	WA1	SX7	SX3
Haynes	SX9	WA1	SX9	SX3	JX1	SX7	WA1	SX7	SX3
Inconel 903	SX3	SX9	SX7	SX3	JX1	SX7	WA1	SX7	SX3
Invar	SX5	SX9	SX9	SX3	JX1	SX7	WA1	SX9	SX3

Formula for Turning

Calculating the cutting speed



Calculating the cutting speed from the rotation speed

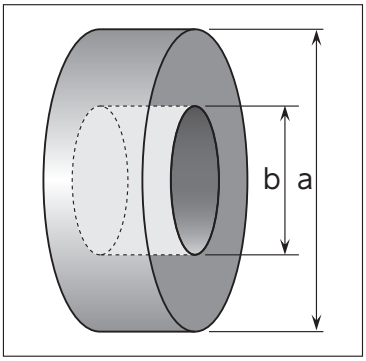
$$V_c\ (\text{SFM}) = \frac{\pi \times D_m \times n}{12}$$

Calculating the revolution speed from the cutting speed

$$n\ (\text{rpm}) = \frac{12 \times V_c}{\pi \times D_m}$$

V_c : Cutting speed (SFM)
D_m : Machining diameter (inch)
n : Spindle speed (rpm)
π : Pi (3.14)

Calculating the cutting time



Calculating the cutting time for OD (ID) machining

$$T\ (\text{min}) = \frac{\ell}{f \times n}$$

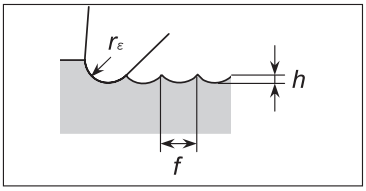
Calculating the cutting time for facing

$$T\ (\text{min}) = \frac{\pi \times (a^2 - b^2)}{4000 \times V_c \times f}$$

T : Cutting time (min)
ℓ : Cutting length (inch)
f : Feed rate (IPR)
n : Spindle speed (rpm)

T : Cutting time (min)
V_c : Cutting speed (m/min)
f : Feed amount (mm/rev)
π : Pi (3.14)

Calculating the theoretical surface roughness



$$h\ (\mu\text{inch}) = \frac{f^2}{8\,r_\varepsilon} \times 1000^2$$

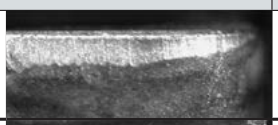
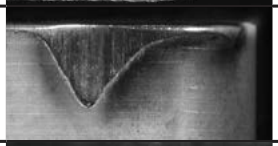
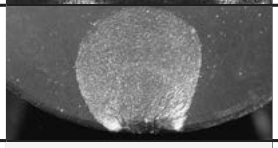
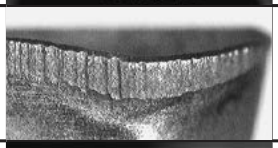
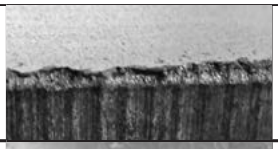
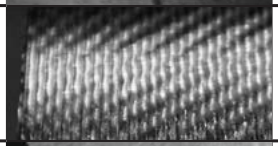
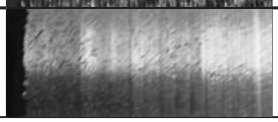
h : Theoretical surface roughness (μinch)
f : Feed amount (IPR)
r_ε : Corner radius (inch)

【Guidelines for actually finished surface roughness】
Steel type work: Theoretical surface roughness × 1.5 to 3
Cast iron type work: Theoretical surface roughness × 3 to 5

Troubleshooting for Turning

Type of problem	Possible cause	Corrective measures	Material/grade selection: Change to a harder material/grade	Material/grade selection: Change to a tougher material/grade	Material/grade selection: Change to a material/grade more resistant to thermal shock	Material/grade selection: Change to a material/grade more resistant to deposition	Cutting conditions: Cutting speed (Decrease ↘ / Increase ↗)	Cutting conditions: Feed rate (Decrease ↘ / Increase ↗)	Cutting conditions: Depth of cut (Decrease ↘ / Increase ↗)	Cutting conditions: Coolant: Use non-water-soluble type	Cutting conditions: Coolant: Review dry or wet operation	Tool shape: Review the type of chipbreaker	Tool shape: Rake angle (Decrease ↘ / Increase ↗)	Tool shape: Nose radius of the insert	Tool shape: Side cutting edge angle	Tool shape: Cutting edge strength, honing	Tool shape: Improve the accuracy of insert	Tool shape: Improve the rigidity of the holder	Machine/installation: Improve the installation accuracy of the cutting tool	Machine/installation: Review the overhang of the cutting tool	Machine/installation: Prevent vibration of the machine, improve the machine rigidity
Short tool life	Excessive insert wear	Unsuitable tool material/grade	●																		
		Unsuitable cutting edge shape										●	↗	↗	↗	↘					
		Improper cutting conditions					↘	↗			Wet										
	Fracture/chipping of the cutting edge	Unsuitable tool material/grade		●																	
		Improper cutting conditions						↘	↘												
		Insufficient cutting edge strength										●		↗		↗					
		Thermal shock			●		↘	↘	↘	●	Dry										
		Built-up edge				●	↗	↗		●	Wet										
		Insufficient toughness																●	●	●	●
Poor dimensional accuracy	Variation in dimensions during cutting	Improper accuracy of insert															●				
		Clearance/relief of the work/tool										●	↗	↘	↘	↘		●	●	●	●
	Need for offsetting during cutting	Increased flank wear	●											↗							
		Built-up edge				●	↗														
		Improper cutting conditions					↘	↗													
Poor surface finish	Poor surface roughness	Deposition					↗			●	Wet										
		Unsuitable cutting edge shape										●		↗							
		Chatter					↘	↘	↘									●	●	●	●
Heat	Deterioration in tool life/accuracy due to excessive heat generation	Improper cutting conditions					↘	↘	↘												
		Unsuitable cutting edge shape										●	↗			↘					
Burring, chipping, scuffing	Burring	Boundary wear	●																		
		Improper cutting conditions					↘	↕			Wet										
		Unsuitable cutting edge shape										●	↗	↘	↘	↘					
	Chipping	Improper cutting conditions						↘	↘												
		Unsuitable cutting edge shape										●	↗	↗	↗	↘					
		Vibration																●	●	●	●
	Scuffing	Unsuitable tool material/grade				●															
		Improper cutting conditions					↗			●	Wet										
		Unsuitable cutting edge shape										●	↗			↘					
		Vibration																●	●	●	●
Chip control	Elongated chips	Improper cutting conditions					↘	↗	↗		Wet										
		Chipbreaker's effective chip control range										●									
		Unsuitable cutting edge shape												↘	↘						

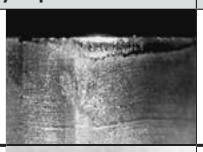
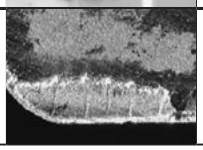
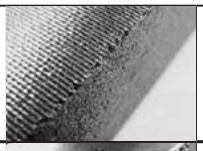
Troubleshooting Case Studies: Turning

	Case/Symptom		Possible causes	Corrective measures
Insert	VB wear		●The material / grade is too soft ●Cutting speed is too high ●Relief angle is too small	●Use a coated grade ●Choose a material/grade highly resistant to wear ●Decrease the cutting speed
	Wear on face		●High temperature causes chemical reactions between the insert material and chips	●Use a coated grade ●Decrease both of the cutting speed and feed rate ●Widen the rake angle
	Notching wear		●The work surface is too hard ●Boundary area has been oxidized ●Burrs, caused by chips in the sheared form, have been cut	●Widen the side cutting edge angle ●Make the nose radius larger so that cutting is performed within the radius ●Use a round insert
	Chipping/ fracture		●Feed rate is too high ●Chips have become trapped ●Chatter resulting in vibration	●Enlarge the honed edge ●Make the nose radius larger ●Narrow the rake angle to secure the cutting edge strength
	Flaking		●This is due to compressive forces being applied to the cutting edge from elastic deformation in the area being cut ●This occurs when deposited/adhered material is peeled off	●Change the cutting conditions by checking the cutting edge ●Choose a material/grade highly resistant to fracture ●Increase the coolant rate and pressure ●Improve the run-out of the main spindle of the machine
	Plastic deformation		●High cutting force and excessive heat is applied to the cutting edge	●Choose a material/grade highly resistant to wear ●Decrease both of the cutting speed and feed rate ●Make the nose radius larger ●Use coolant
	Built-up edge		●This occurs because the cutting temperature is lower than the recrystallization temperature of the work material	●Increase the cutting speed ●Use coolant with excellent lubrication performance ●Change to a grade with less affinity to the work material
	Deposition		●The deposition is caused to the face by a chemical reactions of the work material due to heat generation	●Increase the cutting speed ●Widen the relief angle ●Hone the face with a mirror-like-surface finish ●Change to a grade with less affinity to the work material
	Clamping crack		●The insert was clamped under improper seating conditions	●Clean the clamping areas and install the insert in the recommended way ●Tighten to the specified torque
Work piece	Chipping		●The feed rate is too high ●An unsuitable insert was selected	●Decrease the feed rate ●Use a smaller edge preparation ●Change to a grade highly resistant to boundary wear ●Change the cutting edge angle of the holder
	Burring		●The feed rate is incorrect ●The shape of insert is not suitable	●Decrease the feed rate ●Use a smaller edge preparation
	Chatter mark		●The cutting force is too great ●The rigidity of the work piece and cutting tool is insufficient	●Decrease the feed rate ●Use a smaller edge preparation ●Ensure tool overhang is minimised ●Change the cutting edge angle of the holder
	Gouging		●Vibration of the cutting edge due to deposition/built-up edge	●Increase the cutting speed ●Use cutting oil excellent in lubrication performance ●Change to a grade with less affinity to the work material

Troubleshooting for Milling

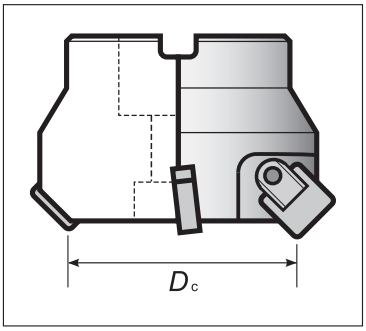
Type of problem	Possible cause	Corrective measures	Material/grade selection: Change to a harder material/grade	Material/grade selection: Change to a tougher material/grade	Material/grade selection: Change to a material/grade more resistant to thermal shock	Material/grade selection: Change to a material/grade more resistant to deposition	Cutting conditions: Cutting speed (Decrease ↘ / Increase ↗)	Cutting conditions: Feed rate (Decrease ↘ / Increase ↗)	Cutting conditions: Depth of cut (Decrease ↘ / Increase ↗)	Cutting conditions: Review cutter diameter and cutting width	Cutting conditions: Review tool path	Cutting conditions: Coolant: Wet	Cutting conditions: Coolant: Dry	Tool shape: Relief angle of insert (Decrease ↘ / Increase ↗)	Tool shape: Nose radius of cutting edge	Tool shape: Cutting edge strength, honing	Tool shape: Number of teeth/blades	Tool shape: Enlarge the chip pocket	Tool shape: Check the wiper shape	Tool shape: Improve accuracy of cutting edge run-out	Tool shape: Improve rigidity of tool
Damaged or broken cutting edge of the insert	Increased flank wear	Improper cutting conditions					↘					●									
		Unsuitable cutting edge shape	●											↗		↘			●		
	Increased wear on face	Improper cutting conditions					↘	↘	↘			●									
		Unsuitable cutting edge shape	●											↗	↗	↘					
	Fracture/ chipping on cutting edge	Improper cutting conditions						↘	↘		●										
		Unsuitable cutting edge shape		●										↘	↗	↗			●	●	●
	Thermal shock	Improper cutting conditions					↘	↘	↘				●								
		Unsuitable cutting edge shape			●									↗		↘					
	Built-up edge	Improper cutting conditions					↗	↗				●									
		Unsuitable cutting edge shape				●								↗		↘					
Machining accuracy	Poor surface finish	Improper cutting conditions					↗	↘	↘			●									
		Unsuitable cutting edge shape	●			●										↘	↘		●	●	
	Burring	Improper cutting conditions						↓↑	↘	●	●										
		Unsuitable cutting edge shape												↗	↘	↘			●		
	Chipping	Improper cutting conditions						↘	↘		●										
		Unsuitable cutting edge shape												↗	↗	↘	↗		●		
	Poor flatness and parallelism	Improper cutting conditions						↘	↘			●		↗	↘	↘	↘		●	●	●
Others	Increased chatter/ vibration	Improper cutting conditions					↘	↘	↘	●	●			↗	↘	↘	↘				
	Poor chip evacuation	Improper cutting conditions					↗	↘		●		●	●								
		Unsuitable tool/blade edge shape												↗			↘	●			

Troubleshooting Case Studies: Milling

	Case/Symptom		Possible causes	Corrective measures
Insert	VB wear		●Cutting speed is too high. ●Feed rate is too low. ●The shape of the insert is not suitable. ●The material / grade of the insert is not suitable.	●Decrease the cutting speed. ●Increase the feed rate. ●Make the nose radius larger. ●Change to a grade highly resistant to boundary wear.
	Notching wear		●The material / grade of the inserts is not suitable. ●The shape of the cutter is not suitable ●The shape of insert is not suitable.	●Change to a grade highly resistant to boundary wear. ●Widen the rake angle. ●Change the Insert shape to a different one.
	Chipping / fracture		●The cutting speed is incorrect. ●The shape of the cutter is not suitable ●The shape of insert is not suitable.	●Decrease the feed rate and depth of cut in order to reduce the cutting force. ●Use a smaller edge preparation. ●Prepare the cutting edge to give it a round honing. ●Change to a grade highly resistant to fracture.
	Thermal crack		●The cutting conditions are incorrect ●The material / grade of insert is not suitable	●Decrease the cutting speed. ●Change to dry cutting from wet cutting. ●Use a material / grade highly resistant to thermal shock
Work piece	Chipping		●The feed rate is too high. ●An unsuitable insert is selected. ●The shape of the cutter is not suitable.	●Decrease the feed rate. ●Use a smaller edge preparation ●Change to a grade highly resistant to boundary wear. ●Set the lead angle at 45 degrees.
	Burring		●The feed rate is incorrect. ●The shape of insert is not suitable. ●The shape of the cutter is not suitable.	●Adjust the feed rate. ●Use a smaller edge preparation. ●Make the lead angle narrower.

Formula for Milling

Calculating the cutting speed



Calculating the cutting speed from the rotation speed

$$V_c = \frac{\pi \times D_c \times n}{12} \quad (\text{SFM})$$

Calculating the revolution speed from the cutting speed

$$n = \frac{12 \times V_c}{\pi \times D_c} \quad (\text{rpm})$$

V_c : Cutting speed (SFM)
D_c : Cutter diameter (inch)
n : Spindle speed (rpm)
π : Pi (3.14)

Calculating the feeding speed and feed rate

Calculating the feed rate per blade

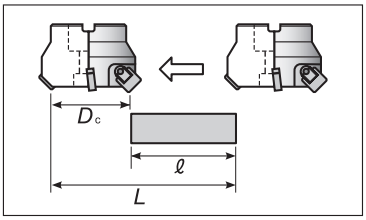
$$f_z = \frac{V_f}{z \times n} \quad (\text{IPT})$$

Calculating the feeding speed per minute

$$V_f = f_z \times z \times n \quad (\text{inch/min})$$

f_z : Inch amount per tooth (IPT)
V_f : Table feed (inch/min)
z : Number of tooth
n : Spindle speed (rpm)

Calculating the machining time



$$T = \frac{L}{V_f} \quad (\text{min})$$

T : Cutting time (min)
L : Total length of table feed ($\ell + D_c$)
V_f : Table feed (inch/min)

Machining HRSA Materials with BIDEMICS and Ceramics

Solutions for the Aerospace & Energy Industries

BIDEMICS - Game Changer

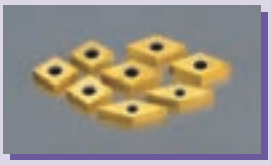
- 1600SFM Capability
- Double tool life at whisker's speed range

JX1

Features
- Up to 1600 SFM speed capability
- Much longer tool life at Whisker ceramics' speed range
- Superior surface finish vs. Whisker ceramics

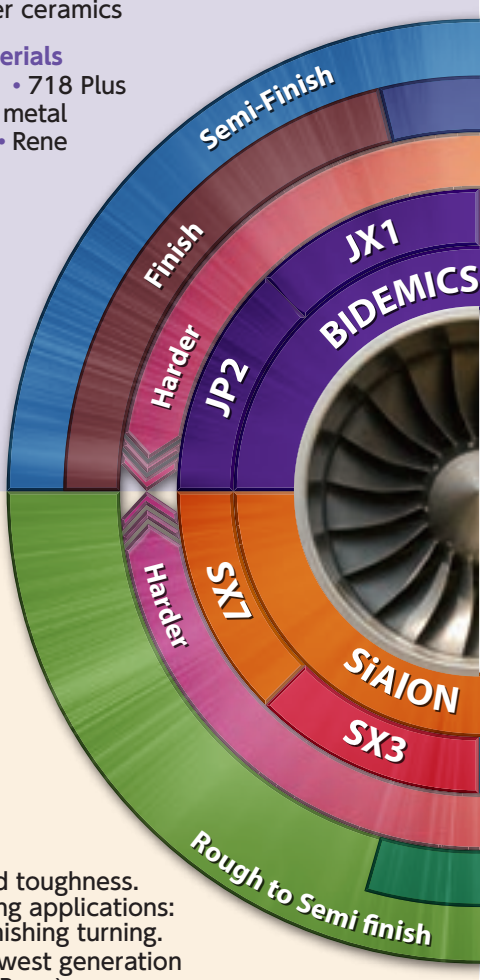
Work Materials
- Inco 718 • 718 Plus
- Powdered metal
- Inco 625 • Rene

JP2



Features
- 10 to 15x speed capability vs. carbide
- Better wear resistance and notching resistance than CBNs
- Superior surface finish to Carbide or CBN

Work Materials
- Inco 718 • 718 Plus
- Powdered metal • Inco 625 • Rene



SX7

Features
- Can run at same cutting condition as whisker ceramics
- Best grade for high-speed milling

Work Materials
- Inco 718 • Inco 625
- Waspaloy • Udimet 720

SX3

Features
- Excellent wear resistance and toughness. Wide range of HRSA machining applications: Roughing with scale - semi finishing turning.
- Able to machine even the newest generation of HRSA work materials (like Rene) as well as most common HRSA materials; such as Inconel 718.

Work Materials
- Inco 718 • 718 Plus
- Powdered metal • Inco 625
- Rene

SiAION - Workhorse

- Durable for scale to semi-finish machining

JX3

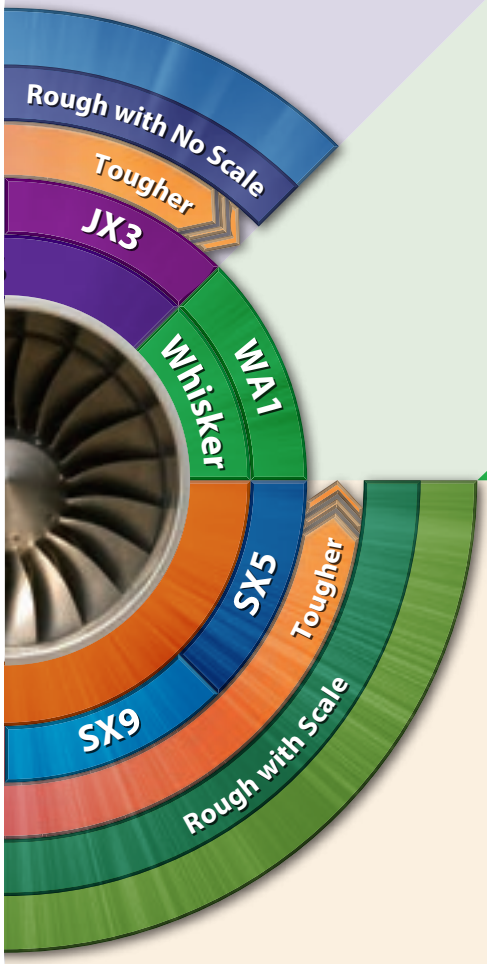
■Features
- Added toughness in BIDEMICS
- Same speed capability as JX1

■Work Materials
- Inco 718
- 718 Plus
- Powdered metal
- Inco 625
- Rene

WA1

■Features
- Better flank wear resistance compared to SiAlON ceramics
- Better notching resistance compared to competitor's whisker ceramics

■Work Materials
- Inco 718
- Inco 625



Whisker - Versatile Player

Productivity and reliability

SX5

■Features
- Best grade for scale and interruptions
- Best grade for machining high-cobalt alloys

■Work Materials
- Waspaloy
- Udimet 720
- 718 Plus
- Rene 41

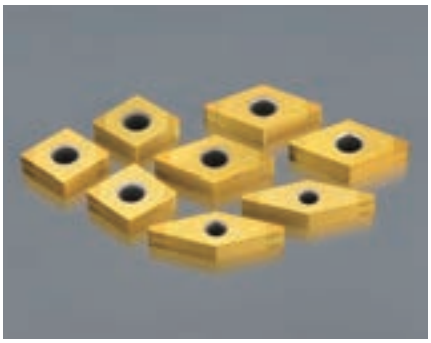
SX9

■Features
- Extreme toughness makes higher feed and heavier DOC machining possible
- Best grade for machining Inco 718 with scale

■Work Materials
- Inco 718
- Inco 706
- Inco 713
- Rene

NEW BIDEMICS New Era in HRSA Machining

WATCH ON YouTube



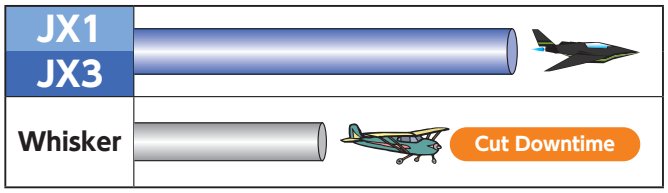
JX1/JX3 NEW

Features **Patented**

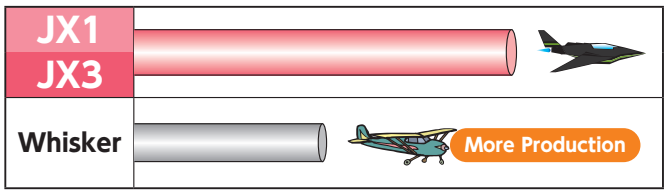
- *Significantly extended tool life compared to whisker ceramics*
- *Double cutting speed potential compared to whisker ceramics*
- *Superior surface finish compared to whisker ceramics*
- *Applicable to powder-metallurgical heat resistant alloys*
- *Newly added JX3 provides toughness to BIDEMICS family*

Increase Productivity vs. Whisker Ceramics

① Significantly extended tool life at same speed



② Double speed capability



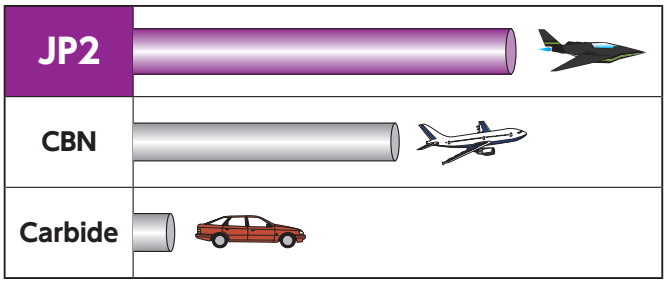
JP2

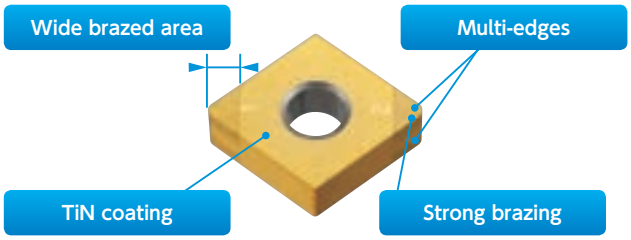
Features **Patented**

- *High speed finish turning can be performed at 800SFM or higher*
- *Superior wear resistance compared to CBN's*
- *Superior notching resistance vs CBN or carbides*
- *Superior surface finishes vs CBNs and coated carbides*

Increase Productivity vs. Carbide

① 10 to 15 times higher speed capability





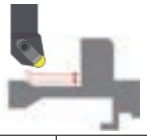
Grade	Work material	Application	Purpose	Cutting speed (SFM)	Feed (IPR)	Depth of cut (inch)	DRY	WET
JX1 JX3	Heat Resistant Alloy	Turning	Rough no scale	600-**1600**	.005-.011	.040-.100		●
			Semi finishing	600-**1600**	.004-.010	.020-.080		●
		Grooving	Rough no scale	600-**1600**	.002-.005	—		●
JP2	Heat Resistant Alloy	Turning	Finishing	600-**1700**	.002-.007	.005-.030		●

1 Higher Speeds, More Productivity

JX1/JX3's superior physical properties compared to Whisker ceramic enable you to increase speeds; potentially as much as 2X Whisker ceramic speeds; increasing productivity and potentially offsetting the need for additional equipment to meet increasing demands.
Chips break easily at higher cutting speeds vs the typically continuous chips of HRSA materials. The result is more efficient chip removal.

LPT disc (Inco718)

	Comp. Whisker	JX3
Shape	RPGX45	←
Cutting speed (SFM)	700	1200
Feed (IPR)	.006	←
Depth of cut (inch)	.070	←
	WET	←



NTK : JX3 — 100 cc/min

Competitor's Whisker ceramic — 60 cc/min

● JX3 cut 1.7 times faster than competitor's whisker and kept good edge.

Disk (Inco718 Finishing)

	Competitor's Coated Carbide	JP2
Shape	CNGG432	CNGA432
Cutting speed (SFM)	70	800
Feed (IPR)	.003	←
Depth of cut (inch)	.010	←
	WET	←
Tool life	1pc	←

NTK : JP2 — 525 cc/min

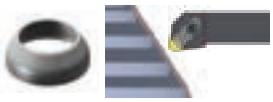
Competitor's Coated Carbide — 45 cc/min

2 Longer tool life

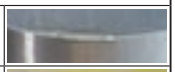
JX1/JX3's combination of High Hardness, Superior Thermal Conductivity and Improved Strength compared to Whisker ceramics results in significantly longer tool life when applied at typical Whisker ceramic speeds, feeds, and depth of cut.

Turbine case (718 Plus semi finish)

	Comp. coated Whisker	JX1
Shape	RNG45	←
Cutting speed (SFM)	800	←
Feed (IPR)	.010	←
Depth of cut (inch)	.020	←
	WET	←



NTK : JX1 — 3 pass



Competitor's Whisker ceramic — 1 pass

● JX1 produced 3 times longer tool life than coated Whisker ceramic on difficult to cut material, 718 Plus.

Ring (Inco625 Finishing)

	Comp. Whisker	JP2
Shape	CNGA433	←
Cutting speed (SFM)	1100	1400
Feed (IPR)	.008	←
Depth of cut (inch)	.012	←
	WET	←

NTK : JP2 — 20 pcs/corner with 27% higher productivity

Competitor's Whisker ceramic — 13 pcs/corner

● JP2 got both better productivity and tool life over Competitor's Whisker.

3 Works well on wide range of High Temperature Alloys

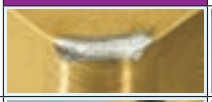
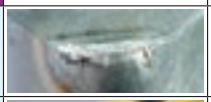
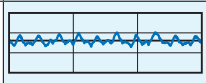
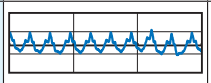
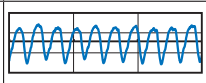
BIDEMICS has success on

Inconel 718
Inconel 625

- 718 Plus
- Rene104
- Rene41
- Waspaloy
- Rene88

etc.

4 Superior surface finish

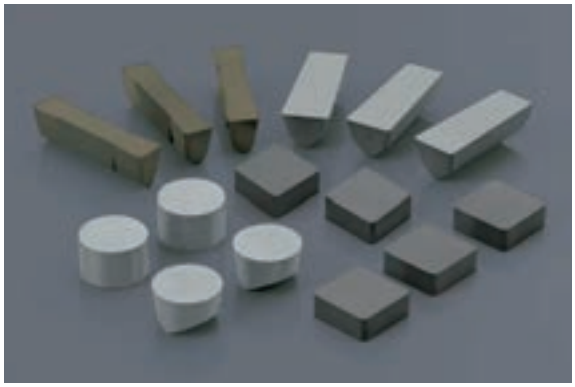
		JP2	CBN	Carbide
				
Machined surface				
Roughness				
	Ra	0.64 μm	1.18 μm	2.75 μm
	Rz	3.36 μm	5.56 μm	9.64 μm
Cutting speed		800 SFM	←	120 SFM
Feed rate		.006 IPR	←	←
Cycle time		3.3 min	←	14.7 min
Removed chip		48 cc	←	←

JP2's outstanding Wear Resistance and Notching Resistance results in work piece surface finishes consistently superior to either CBN or Carbide

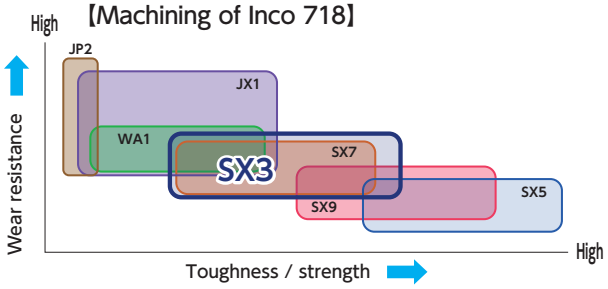
5 Speed up grooving operations

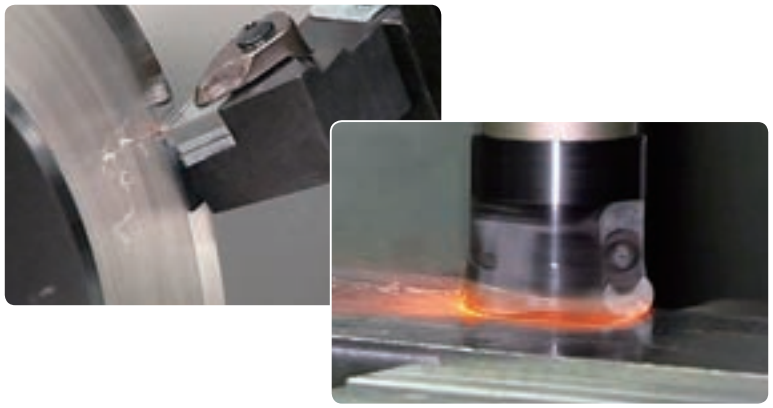
VGW style grooving inserts are now available

SiAlON Ceramics

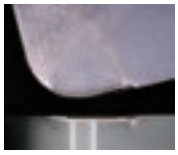


- SiAlON ceramic is a silicon nitride based ceramic combined with “Al” and “O”. SiAlON ceramic offers excellent heat resistance, mechanical strength under high temperature, thermal shock resistance and wear resistance in addition to the toughness of silicon nitride. SiAlON shows superb performance in high speed machining of high temperature alloys.





NEW SX3 Best balance of toughness and wear resistance

Rough turning (Rene130) with Scale		
SNG656	Competitor’s SiAlON Ceramic	SX3
380 SFM		
.006 IPR		
Various DOC		
WET		
NTK : **SX3**	10 min	
Competitor’s SiAlON	10 min * Was chipping a lot	

Features

- *Excellent wear resistance and toughness.*
  Wide range of HRSA machining applications: Rough turning with scale ~ semi-finish turning.
- *Able to machine even the newest generation of HRSA work materials (like Rene) as well as today's most common HRSA materials; such as Inconel 718.*
- *Able to mill with high efficiency.*

Grade	Work material	Application	Purpose	Cutting speed (SFM)	Feed (IPR / IPT)	Depth of cut (inch)	DRY	WET
SX3	Heat resistant alloy	Turning	Rough scale	600-900	.008-.014	.040-.200		●
			Rough no scale	600-900	.008-.016	.040-.100		●
			Semi finish / profiling	600-900	.004-.012	.040-.080		●
			Grooving	500-900	.003-.007	-		●
		Milling	-	2000-4000	.004-.006	.040-.100	●	

SX7

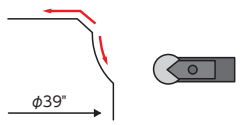
Wear resistant SiAlON ceramic

Features

- *Better notching resistance compared to Whisker ceramics*
  No need to program ramping
- *Better flank wear resistance compared to other SiAlON ceramics*
  Superior performance vs. whisker ceramics under same conditions-even higher productivity at higher feed rates
- *Excellent thermal shock resistance*
  High speed milling can be performed at 3000SFM or higher

Turbine case (Waspaloy semi finish)

RPGX45	
800 SFM	
.012 IPR	
Various DOC	
WET	
NTK: SX7	7.2 min
Competitor's Whisker ceramic	5.3 min • Broken



Grade	Work material	Application	Purpose	Cutting speed (SFM)	Feed (IPR / IPT)	Depth of cut (inch)	DRY	WET
SX7	Heat resistant alloy	Turning	Rough scale	600-900	.004-.009	.040-.200		●
			Rough no scale	600-900	.006-.012	.040-.100		●
			Semi finish / profiling	600-900	.005-.010	.040-.080		●
			Grooving	500-900	.003-.006	-		●
		Milling	-	2000-4000	.003-.005	.040-.100	●	

SX9

Best grade for roughing Inco 718 with scale

Features

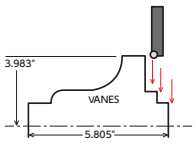
- *Excellent notch wear resistance*
- *Better flank wear resistance compared to competitor's silicon nitride ceramics*
- *Superior toughness compared to Whisker-reinforced ceramics*
- *Best thermal shock resistance*
- *Best grade for roughing Inco 718 with scale*

Housing (Inco 718 with scale)

	Comp. Whisker	SX9
Shape	RCGX45	←
Cutting speed (SFM)	600	←
Feed (IPR)	.005	.008
Depth of cut (inch)	.100	←
	WET	←

NTK: SX9 — • High productivity

Competitor's Whisker ceramic



Grade	Work material	Application	Purpose	Cutting speed (SFM)	Feed (IPR / IPT)	Depth of cut (inch)	DRY	WET
SX9	Heat resistant alloy	Turning	Rough scale	600-800	.008-.014	.040-.200		●
			Rough no scale	600-800	.008-.016	.040-.100		●
			Semi finish / profiling	600-800	.004-.012	.040-.080		●
		Milling	-	1500-3500	.004-.006	.040-.100	●	

SX5

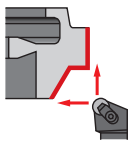
Best grade for roughing Waspaloy with scale

Features

- *Excellent notch wear resistance*
- *Toughest SiAlON grade on the market*
- *Better thermal shock resistance compared to Whisker-reinforced ceramics*
- *Use SX5 where heavy scale or interruptions exist*

Ring (Waspaloy with scale)

RCGX35	
650 SFM	
.008 IPR	
.750-.100 DOC	
WET	
NTK: SX5	10 min
Competitor's SiAlON ceramic	10 min • Was chipping a lot



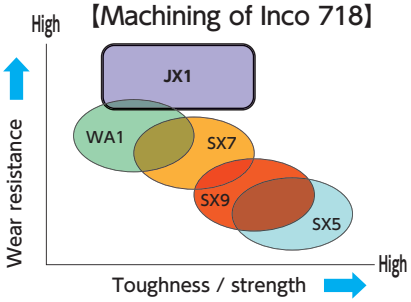
Grade	Work material	Application	Purpose	Cutting speed (SFM)	Feed (IPR / IPT)	Depth of cut (inch)	DRY	WET
SX5	Heat resistant alloy	Turning	Rough scale	600-800	.008-.014	.040-.200		●
			Rough no scale	600-800	.008-.016	.040-.100		●
			Grooving	600-800	.003-.007	-		●

Whisker-reinforced ceramics

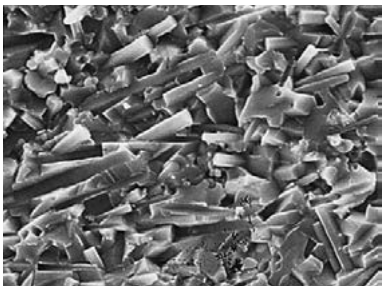
WA1 ceramic grade has a unique combination of superior wear resistance, toughness and flaking resistance as a result of adding SiC Whiskers to Alumina. WA1 is primarily used in machining continuous cuts of aerospace alloys because of its productivity and reliability characteristics. WA1 can also be used to machine gray cast iron and hardened steels because of its excellent thermal shock resistance.

【Heat-resistant alloy】

【Machining of Inco 718】



【WA1 structure】



WA1 High-speed machining of heat resistant alloys and cast iron

Housing	
Inco 625	Competitor's Whisker Ceramic / WA1
900 SFM	
.006 IPR	
.020"-.030" DOC	
WET	
NTK : **WA1**	1 pass
Competitor's whisker ceramic	1 pass

Features

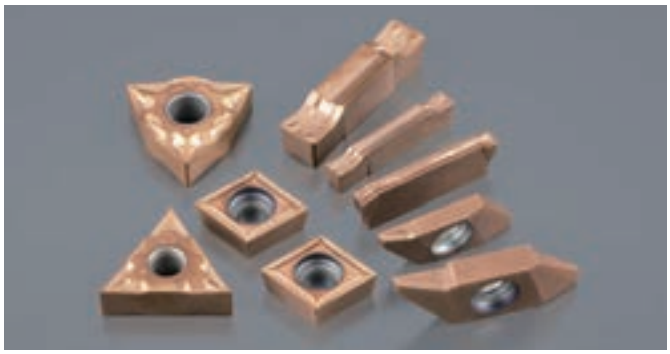
- *Good flank wear resistance at high speed*
- *Best notch wear resistance compared to competitor's Whisker-reinforced ceramics*
- *Increased toughness compared to competitor's Whisker-reinforced ceramics*

Recommended applications

Grade	Work material	Application	Purpose	Cutting speed (SFM)	Feed (IPR)	Depth of cut (inch)	DRY	WET
WA1	Heat resistant alloy	Turning	Rough no scale	600-1000	.005-.010	.040-.100		●
			Semi finish Profiling	600-1100	.004-.010	.020-.080		●
			Grooving	600-1100	.002-.004	-		●
	Gray cast iron	Turning	Semi finish Finish	1200-2100	.004-.016	.020-.120	●	●
	Mill roll (Carbide)	Turning	Rough-Semi finish	150-500	.003-.008	.020-.140	●	
	Hardened Material (HRC 45-62)	Milling		550-850	.0025-.005	.030-.075	●	

DM4

Excellent oxidation resistance



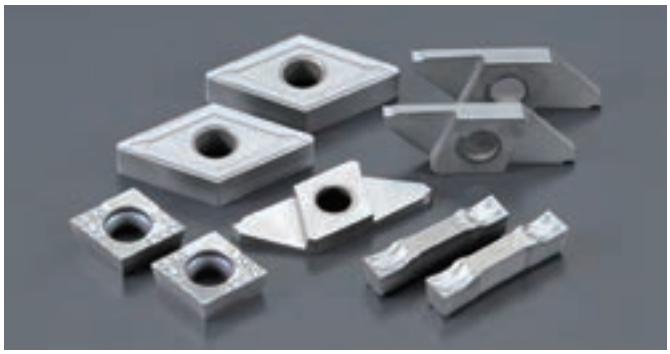
Features

- ***Best oxidation resistance for high temperature machining***
- ***Optimized for Conventional / Swiss-type lathes***

Best for	Optimized for	Excellent in
● Titanium alloys ● Stainless steels ● Alloy steels ● Carbon steels ● Heat resistant alloys	Conventional lathes Swiss-type lathes	Oxidation Heat resistance

QM3

Superb wear resistance and fracture resistance in interrupted cutting



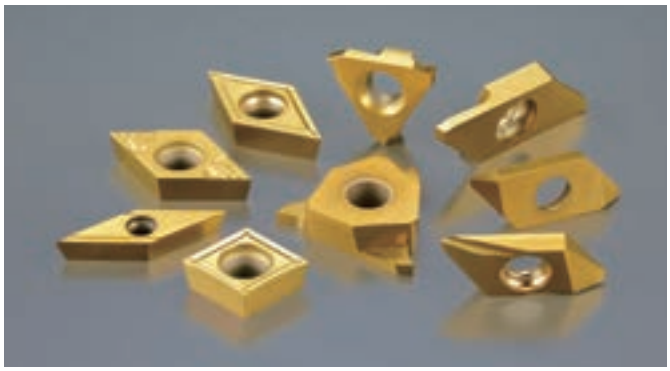
Features

- ***Excellent toughness and wear resistance for wide speed range***
- ***Stable interrupted machining of steel***

Best for	Optimized for	Excellent in
● Carbon steels ● Stainless steels ● Alloy steels ● Heat resistant alloys	Swiss-type lathes Conventional lathes	Wear resistance

ZM3

The best selling grade for Swiss-type lathes



Features

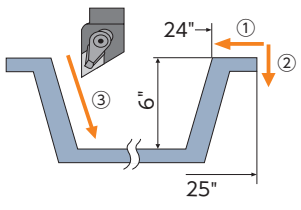
- ***Stabilizes machining dimensions thanks to the coating being firmly adhered to the substrate***
- ***A wide range of cutting tools in various sizes available for Swiss-type lathes***

Best for	Optimized for	Excellent in
● Carbon steels ● Stainless steels ● Alloy steels ● Non-ferrous materials ● Heat resistant alloys	Swiss-type lathes Conventional lathes	Adhesion resistance

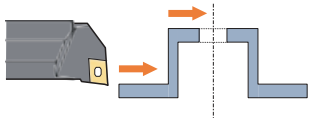
Field Results for Carbides

Aircraft Part - 718 Plus (45-48Rc)		
	Comp. carbide	CCMT32.508 MYL DM4
	Molded edge	Sharp edge
Speed	300 SFM	160SFM
Feed	.0008 IPR	.0015 IPR
Cut length	.75" length 2 passes	←
Result	Tool life: 50 pcs.	Tool life: 150 pcs
	Controlled chip	

Finish Turning -Aircraft Part - Inconel 718		
	Comp.carbide	DNMG431 G QM3
Speed	240SFM	←
Feed	.004 IPR	←
DOC	.040"	←
Coolant	WET	←
Tool Life	10 min	15 min
	Better tool life and chip control	



Finish Turning- Aircraft Part - Titanium		
	Comp.carbide	CNGG431FNZP ZM3
Speed	150SFM	←
Feed	.008 IPR	←
DOC	.060"	←
Coolant	WET	←
Tool Life	20 pcs./ edge	45 pcs./edge
	2 times better tool life with sharper edge	



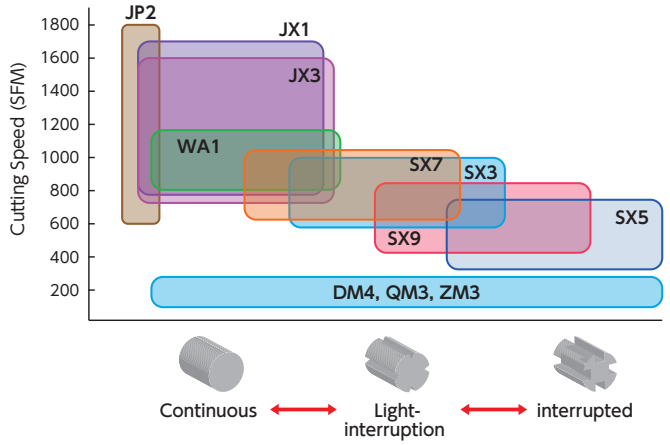
Guidelines for Machining HRSA Materials

Insert Grade

Category	Grade	Attributes	Applications						
			Scale	No scale	Profiling	Finishing	Grooving	Milling	End milling
BIDEMICS	JX1	Special grade with higher speed and longer tool life potential		●	●	○	●		
BIDEMICS	JP2	Special grade for finish turning				●			
BIDEMICS	JX3	Added toughness in BIDEMICS		●	●	○	●		
Whisker	WA1	General versatile grade for turning		○	○		○		
SiAlON	SX3	Best balance of toughness and hardness	○	●	●		●	●	
SiAlON	SX5	Best grade for Waspaloy with scale	●				○		
SiAlON	SX7	Versatile grade for turning and milling	○	○	○		●	●	
SiAlON	SX9	Best grade for scale of Inco718	●	○	○			○	●
Carbide	DM4 QM3 ZM3	Finish turning				○			

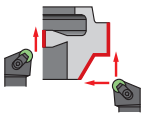
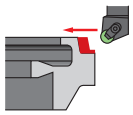
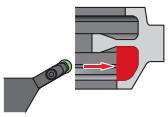
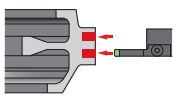
● 1st Choice ○ 2nd Choice

Grade Map



	Grade	Rough with Scale	Rough	Semi-Finishing	Finishing
BIDEMICS	JP2				
BIDEMICS	JX1				
BIDEMICS	JX3				
Whisker	WA1				
SiAlON	SX7				
SiAlON	SX3				
SiAlON	SX9				
SiAlON	SX5				
Carbide	DM4 QM3 ZM3				

Applications

	Rough with scale	Rough & semi-finish	Profiling	Grooving	Milling	End milling
						

Applications

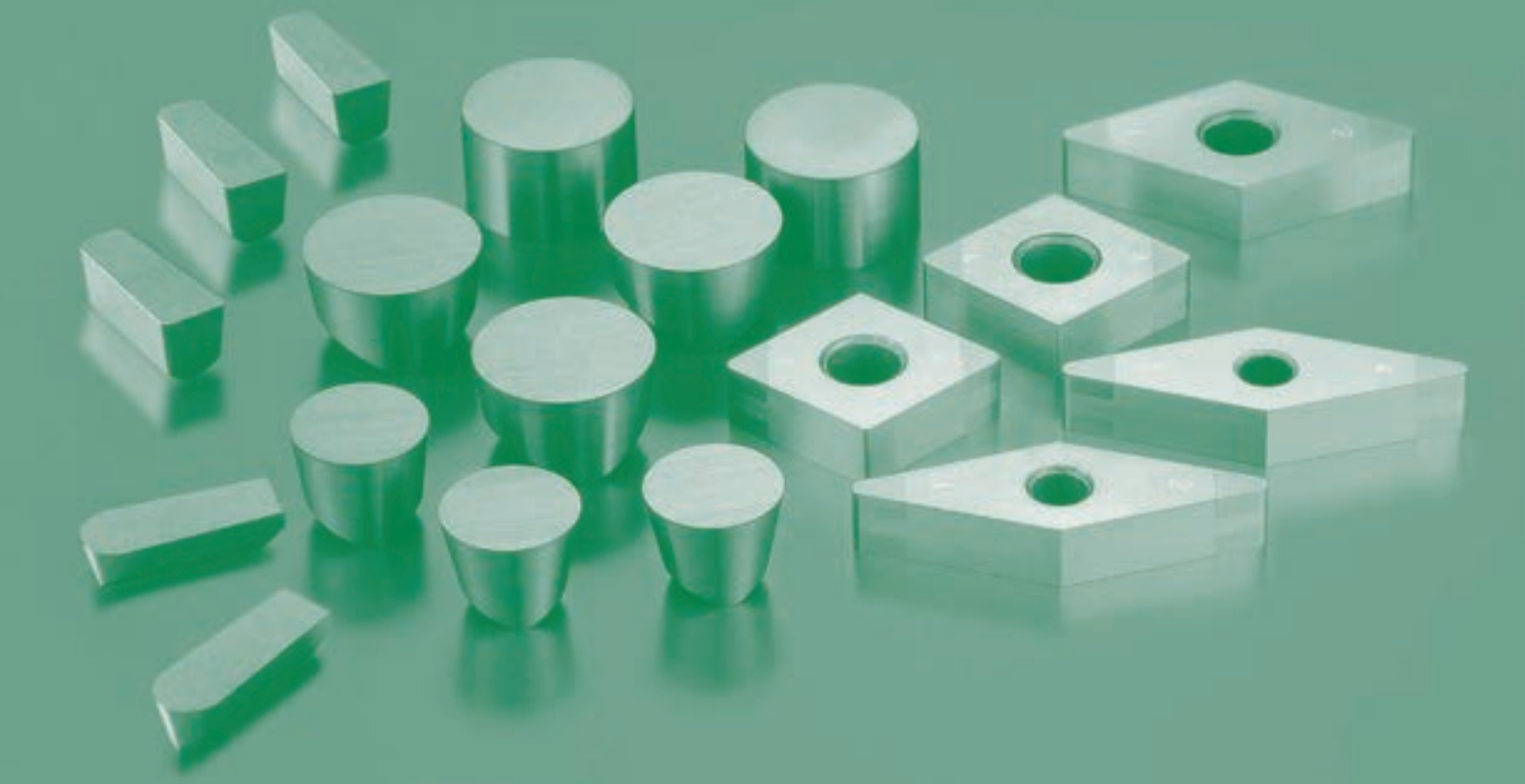
Application	Grade	Work material	Cutting speed (600 800 1000 1200 1400 1600)	Feed (.004 .008 .012 .016 .020)	Depth of cut (.020 .040 .060 .080 .100)	Coolant
Rough with Scale	SX5	Waspaloy	650 (600-800) SFM	.012 (.008-.014) IPR	.080 (.040-.200)"	WET
	SX9	Inco718	650 (600-800) SFM	.012 (.008-.014) IPR	.080 (.040-.200)"	
	SX3	Overall	800 (600-900) SFM	.008 (.004-.009) IPR	.080 (.040-.200)"	
Rough no Scale	JX1 JX3	Overall	700-1300 (600-1600) SFM	.008 (.005-.011) IPR	.070 (.040-.100)"	WET
	SX9 SX3 SX7	Overall	700 (600-900) SFM	.009 (.006-.012) IPR	.080 (.040-.100)"	
	WA1	Overall	800 (600-1000) SFM	.008 (.005-.010) IPR	.070 (.040-.100)"	
Profiling & Semi-Finish	JX1 JX3	Overall	700-1500 (600-1600) SFM	.008 (.004-.010) IPR	.060 (.040-.080)"	WET
	SX3 SX7	Overall	800 (600-900) SFM	.008 (.005-.010) IPR	.060 (.040-.080)"	
	WA1	Overall	800 (600-1100) SFM	.008 (.004-.010) IPR	.060 (.040-.080)"	
Finishing	JP2	Overall	700-1600 (600-1700) SFM	.004 (.002-.007) IPR	.010 (.005-.030)"	WET
Grooving	JX1 JX3	Overall	1200 (600-1600) SFM	.003 (.002-.004) IPR	When using SX7/SX3/SX5, increase feed rates 100% vs. Whisker Ceramics	WET
	SX5	Waspaloy	700 (600-800) SFM	.006 (.003-.007) IPR		
	SX3 SX7	Overall	750 (600-900) SFM	.0045 (.003-.006) IPR		
	WA1	Overall	800 (600-1100) SFM	.003 (.002-.004) IPR		

Application	Grade	Work material	Cutting speed (1500 2000 2500 3000 3500 4000)	Feed (.002 .003 .004 .005 .006)	Depth of cut (.020 .040 .060 .080 .100)	Coolant
Milling	SX3 SX7	Overall	2700 (2000-4000) SFM	.004 (.003-.005) IPT	.070 (.040-.100)"	DRY
	SX9	Overall	2500 (1500-3500) SFM	.005 (.004-.006) IPT	.080 (.040-.100)"	
End milling	SX9	Overall	2000 (980-3300) SFM	.0008-.0013 IPT		DRY

Application	Grade	Work material	Cutting speed (100 150 200 250 300 350)	Feed (.0005 .001 .0015 .002 .0025)	Depth of cut (.020 .040 .060 .080 .100)	Coolant
Finishing	DM4 QM3 ZM3	HRSA & Stainless	130-330 SFM	.0005-.002 IPR	.020 - .080"	WET

MEMO

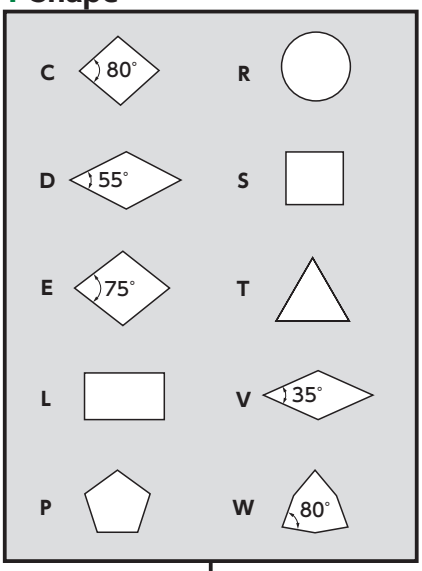
Insert Stock List



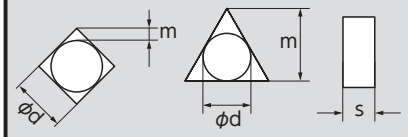
Insert Identification Guide

ANSI / ISO Insert Nomenclature

1 Shape



3 Tolerance Class



Symbol	d (inch)	m (inch)	s (inch)
A	±.0010	±.0002	±.0010
F	±.0050	±.0002	±.0010
C	±.0010	±.0005	±.0010
H	±.0050	±.0005	±.0010
E	±.0010	±.0010	±.0010
G	±.0010	±.0010	±.0050
J	±.0020	±.0020	±.0050
K	±.002~±.005	±.0005	±.0010
L	±.002~±.005	±.0010	±.0010
M	±.002~±.005	±.003~±.007	±.0050
N	±.002~±.005	±.003~±.007	±.0010
U	±.003~±.010	±.005~±.015	±.0050

C S T

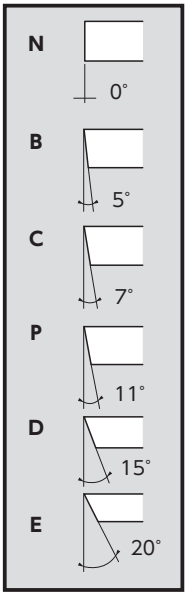
Inscribed Circle	M tolerance d (inch)	M tolerance m (inch)
1/4"	±.002	±.003
3/8"	±.002	±.003
1/2"	±.003	±.005
5/8"	±.004	±.006
3/4"	±.004	±.006
1"	±.005	±.007

D K

Inscribed Circle	M tolerance d (inch)	M tolerance m (inch)
1/4"	±.002	±.004
3/8"	±.002	±.004
1/2"	±.003	±.006
5/8"	±.004	±.006
3/4"	±.004	±.007

	1	2	3	4
Inch	S	N	G	A
Metric	S	N	G	A

2 Clearances



4 Type

Type	Symbol	Type	Symbol
	N (E)	70°–90°	H
	F		
	R	70°–90°	B
	A		
	G	40°–60°	T
	M	40°–60°	W
Special design	X		

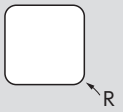
6 Thickness

Thickness S(inch)	Inch	Metric
3/32"	1.5	02
1/8"	2	03
5/32"	2.5	T3
3/16"	3	04
1/4"	4	06
5/16"	5	07
3/8"	6	09
1/2"	8	12

5 Symbol for Insert Size

Inch		Metric						
Inscribed Circle		C	D	R	S	T	V	W
1/4"	2	06	07	06	11	11	04	
3/8"	3	09	11	09	16	16	06	
1/2"	4	12	15	12	22	22	08	
5/8"	5	16	19	15	27	27	10	
3/4"	6	19	23	19	33	33	13	
1"	8	25	31	25	44	44	17	

7 Corner Radius



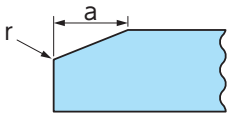
Corner Radius	Inch	Metric
1/64"	1	04
1/32"	2	08
3/64"	3	12
1/16"	4	16
5/64"	5	20
3/32"	6	24
1/8"	8	32

4	3	3	T	04	20
5	6	7	8	9	10
12	04	12	T	010	20

8 Edge Condition

Sharp	FNX08
Honed	E
Chamfered	T
Chamfered and Honed	Z
	S
	U
Double Chamfered	K
Double Chamfered and Honed	J
	P
	Q

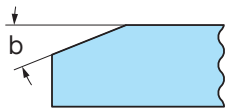
9 Negative Land Width



	Description		a (inch)	r (inch)
	inch	metric		
E	01	002	–	.001
	02	004	–	.002
T	02	005	.002	–
	03	008	.003	–
	04	010	.004	–
	05	012	.005	–
	06	015	.006	–
	08	020	.008	–
Z	04	010	.004	.001
	08	020	.008	.001
S	04	010	.004	.002
	08	020	.008	.002
U	16	040	.016	.003
K	28	070	.028	–
J	60	150	.060	.001
P	71	180	.071	.002
Q	95	240	.095	.003

Note: K, J, P & Q show its primary land width

10 Negative Land Angle



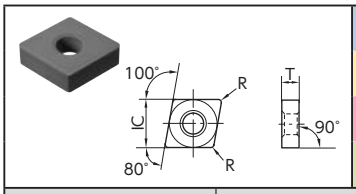
Description	b
10	10°
15	15°
20	20°
25	25°
30	30°

Note: K, J, P & Q show its primary land angle

CNGA

(inch)	IC	T
CNGA 43	1/2	3/16
CNGA 54	5/8	1/4
CNGA 64	3/4	1/4

● : 1st Choice ● : 2nd choice



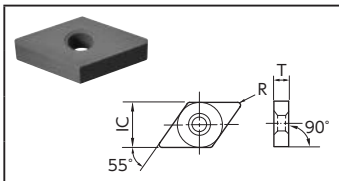
Finishing	●		●		●														
Semi-Finising			●		●		●		●										●
Rough			●		●		●		●		●		●		●		●		●
Rough with Scale							●		●				●		●				

Item Number	ISO Item Number	R	BIDEMICS						Ceramics									
			Coated						SiAlON								Whisker	
			JP2		JX1		JX3		SX7		SX3		SX9		SX5		WA1	
			EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock
CNGA 431 BQ T0220	CNGA 120404 BQ T00520	.016	5925813	●														
CNGA 431 BQE02	CNGA 120404 BQENB		5964069	●														
CNGA 431 T0220	CNGA 120404 T00520																5708102	●
CNGA 432 BQ T0220	CNGA 120408 BQ T00520	.031	5925839	●														
CNGA 432 BQE02	CNGA 120408 BQENB		5964051	●														
CNGA 432 T0220	CNGA 120408 T00520												5650031	●	5649645	●	5660741	●
CNGA 432 T0225	CNGA 120408 T00525												5649264					
CNGA 432 T0320	CNGA 120408 T00820								5851548	●								
CNGA 432 T0420	CNGA 120408 T01020																5660535	●
CNGA 432 T0825	CNGA 120408 T02025												5570262	○				
CNGA 432 Z0820	CNGA 120408 Z02020																5752779	●
CNGA 433 BQ T0220	CNGA 120412 BQ T00520	.047	5925854	●														
CNGA 433 BQE02	CNGA 120412 BQENB		5964044	●														
CNGA 433 T0220	CNGA 120412 T00520												5650049	●	5649652	●	5660675	●
CNGA 433 T0225	CNGA 120412 T00525												5649272					
CNGA 433 T0320	CNGA 120412 T00820								5851555	●								
CNGA 433 T0420	CNGA 120412 T01020												5686316	●			5660691	●
CNGA 433 T0820	CNGA 120412 T02020												5655816	●				
CNGA 433 Z0820	CNGA 120412 Z02020																5752787	●
CNGA 433 T0825	CNGA 120412 T02025												5679113	○				
CNGA 434 T0220	CNGA 120416 T00520	.063											5649280	○	5660436	●	5660717	●
CNGA 434 T0420	CNGA 120416 T01020												5664750				5660519	●
CNGA 434 T0825	CNGA 120416 T02025												5570288	○				
CNGA 543 T0220	CNGA 160612 T00520	.047													5660451	●	5660493	●
CNGA 543 Z0825	CNGA 160612 Z02025																5926894	●
CNGA 544 T0220	CNGA 160616 T00520	.063													5660477	●	5660469	●
CNGA 643 T0220	CNGA 190612 T00520	.047													5660485	●	5660444	●
CNGA 643 T0420	CNGA 190612 T01020																5660402	●
CNGA 643 Z0620	CNGA 190612 Z01520																5686506	●
CNGA 644 T0220	CNGA 190616 T00520	.063													5660501	●	5660428	●
CNGA 644 T1020	CNGA 190616 T00520																5779681	

DNGA

(inch)	IC	T
DNGA 43	1/2	3/16

● : 1st Choice ● : 2nd choice



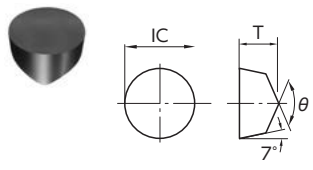
Finishing	● ● ●
Semi-Finising	● ● ● ●
Rough	● ● ● ● ● ●
Rough with Scale	● ● ● ●

Item Number	ISO Item Number	R	BIDEMICS Coated JP2 EDP	JP2 stock	JX1 EDP	JX1 stock	JX3 EDP	JX3 stock	Ceramics SiAlON SX7 EDP	SX7 stock	SX3 EDP	SX3 stock	SX9 EDP	SX9 stock	SX5 EDP	SX5 stock	Whisker WA1 EDP	WA1 stock
DNGA 431 BQ T0220	DNGA 150404 BQ T00520	.016	5925870	●														
DNGA 431 BQE02	DNGA 150404 BQENB		5964077	●														
DNGA 431 T0220	DNGA 150404 T00520																5708094	●
DNGA 432 BQ T0220	DNGA 150408 BQ T00520	.031	5925888	●														
DNGA 432 BQE02	DNGA 150408 BQENB		5964093	●														
DNGA 432 T0220	DNGA 150408 T00520												5650072	●	5649686	●	5660386	●
DNGA 432 T0320	DNGA 150408 T00820								5852165	●								
DNGA 432 T0420	DNGA 150408 T01020																5660329	●
DNGA 432 T0825	DNGA 150408 T02025												5570361	○				
DNGA 432 Z0820	DNGA 150408 Z02020																5752829	●
DNGA 433 BQ T0220	DNGA 150412 BQ T00520	.047	5925896	●														
DNGA 433 BQE02	DNGA 150412 BQENB		5964127	●														
DNGA 433 T0220	DNGA 150412 T00520												5650080	●	5649694	●	5660303	●
DNGA 433 T0320	DNGA 150412 T00820								5849286	●								
DNGA 433 T0420	DNGA 150412 T01020																5660279	●
DNGA 433 T0525	DNGA 150412 T01225																5790209	
DNGA 433 T0620	DNGA 150412 T01520																5669999	
DNGA 433 T0825	DNGA 150412 T02025												5570379	●				
DNGA 434 T0220	DNGA 150416 T00520	.063															5660261	●
DNGA 434 T0420	DNGA 150416 T01020																5660253	●
DNGA 436 T0420	DNGA 150424 T01020	.094															5660360	●

RCGX

(inch)	IC	T	θ
RCGX 23	1/4	3/16	120
RCGX 25	1/4	5/16	120
RCGX 35	3/8	5/16	120
RCGX 45	1/2	5/16	120

● : 1st Choice ● : 2nd choice



Finishing	● ● ●
Semi-Finising	● ● ● ●
Rough	● ● ● ● ● ●
Rough with Scale	● ● ● ●

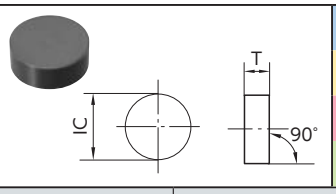
Item Number	ISO Item Number	R	BIDEMICS Coated JP2 EDP	JP2 stock	JX1 EDP	JX1 stock	JX3 EDP	JX3 stock	Ceramics SiAlON SX7 EDP	SX7 stock	SX3 EDP	SX3 stock	SX9 EDP	SX9 stock	SX5 EDP	SX5 stock	Whisker WA1 EDP	WA1 stock
RCGX 23 E02	RCGX 060400 E004				5945647													
RCGX 23 T0220	RCGX 060400 T00520												5679329	●	5660527	●	5661012	●
RCGX 23 T0320	RCGX 060400 T00820				5945654	●	5041645	●	5822143	●								
RCGX 25 T0220	RCGX 060700 T00520										5998034	●	5677075	●	5660576	●	5661087	●
RCGX 25 Z0820	RCGX 060700 Z02020																5781398	●
RCGX 35 E02	RCGX 090700 E004				5918719	●	5041652	●									5689005	●
RCGX 35 T0220	RCGX 090700 T00520										5998042	●	5650130	●	5649744	●	5650429	●
RCGX 35 T0320	RCGX 090700 T00820				5918685	●	5041678	●	5822150	●							5763131	●
RCGX 35 T0420	RCGX 090700 T01020												5659941	●			5661103	●
RCGX 35 Z0420	RCGX 090700 Z01020																5756812	●
RCGX 35 Z0820	RCGX 090700 Z02020																5756796	●
RCGX 45 E02	RCGX 120700 E004				5918776	●	5041686	●	5822242	●			5877345				5689013	●
RCGX 45 T0220	RCGX 120700 T00520										5998059	●	5650148	●	5649751	●	5650437	●
RCGX 45 T0320	RCGX 120700 T00820				5918784	●	5041694	●	5822168	●							5763875	●
RCGX 45 T0420	RCGX 120700 T01020												5659958	●			5661111	●
RCGX 45 Z0620	RCGX 120700 Z01520																5666243	●
RCGX 45 Z0820	RCGX 120700 Z02020																5807516	●

RNG

(inch)	IC	T
RNG 32	3/8	1/8
RNG 33	3/8	3/16
RNG 43	1/2	3/16
RNG 45	1/2	5/16

(inch)	IC	T
RNG 55	5/8	5/16
RNG 65	3/4	5/16
RNG 85	1	5/16
RNG 86	1	3/8

● : 1st Choice ● : 2nd choice



Finishing	●		●		●														
Semi-Finising			●		●		●		●										●
Rough			●		●		●		●		●		●		●				
Rough with Scale							●		●		●		●						

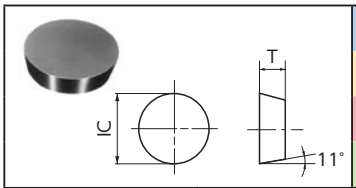
Item Number	ISO Item Number	R	BIDEMICS						Ceramics									
			Coated						SiAlON								Whisker	
			JP2		JX1		JX3		SX7		SX3		SX9		SX5		WA1	
			EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock
RNG 32 E02	RNGN 090300 E004				5046453													
RNG 32 T0220	RNGN 090300 T00520																5534573	●
RNG 32 T0320	RNGN 090300 T00820				5932645		5046446								5046461			
RNG 32 S0820	RNGN 090300 S02020																5862685	
RNG 33 T0320	RNGN 090400 T00820								5835459	●								
RNG 43 E01	RNGN 120400 E002												5959895	●				
RNG 43 E02	RNGN 120400 E004				5918727				5959945	●	5997937	●						
RNG 43 T0220	RNGN 120400 T00520										5997929	●	5650098	●	5649702	●	5637848	●
RNG 43 T0225	RNGN 120400 T00525												5570403	○			5905666	○
RNG 43 T0320	RNGN 120400 T00820				5918735				5822176	●								
RNG 43 T0420	RNGN 120400 T01020												5655972	●			5951538	●
RNG 43 T0825	RNGN 120400 T02025												5570411	○				
RNG 43 S0820	RNGN 120400 S02020																5697180	
RNG 45 E01	RNGN 120700 E002												5693957	●			5661129	●
RNG 45 E02	RNGN 120700 E004				5918743	●	5041769	●	5822317	●	5997952	●						
RNG 45 T0220	RNGN 120700 T00520										5997945	●	5650106	●	5649710	●	5637855	●
RNG 45 T0225	RNGN 120700 T00525												5570106	○			5905690	○
RNG 45 T0320	RNGN 120700 T00820				5918768	●	5041751	●	5822184	●							5408992	
RNG 45 T0420	RNGN 120700 T01020												5656657	●	5624069	●	5624051	●
RNG 45 Z0620	RNGN 120700 Z01520																5666250	●
RNG 55 T0220	RNGN 150700 T00520										5997960	●	5650114	●	5649728	●	5650395	●
RNG 55 T0225	RNGN 150700 T00525												5570197	○			5971254	○
RNG 55 T0320	RNGN 150700 T00820								5839048	●								
RNG 65 T0220	RNGN 190700 T00520										5997978	●	5650122	●	5649736	●	5650403	●
RNG 65 T0225	RNGN 190700 T00525												5570148	○				
RNG 65 T0320	RNGN 190700 T00820								5822192	●								
RNG 65 T0420	RNGN 190700 T01020												5656665	●			5661137	●
RNG 85 T0220	RNGN 250700 T00520										5997986	●	5700703	○	5955158	●	5661095	○
RNG 85 S6015	RNGN 250700 S15015														5660378	●		
RNG 86 T0220	RNGN 250900 T00520										5997994	●			5660337	●		

RPG

(inch)	IC	T
RPG 21.5	1/4	3/32
RPG 32	3/8	1/8
RPG 42	1/2	1/8

(inch)	IC	T
RPG 43	1/2	3/16
RPG 65	3/4	5/16

● : 1st Choice ● : 2nd choice



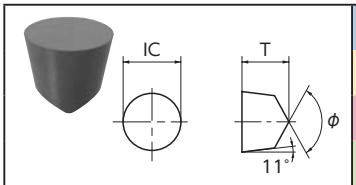
Finishing	●		●		●														
Semi-Finising			●		●		●		●										●
Rough			●		●		●		●		●		●		●		●		●
Rough with Scale							●		●				●		●				

Item Number	ISO Item Number	R	BIDEMICS						Ceramics									
			Coated						SiAlON								Whisker	
			JP2		JX1		JX3		SX7		SX3		SX9		SX5		WA1	
			EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock
RPG 21.5 E02	RPGN 060200 E004								5822309	●								
RPG 21.5 T0220	RPGN 060200 T00520										5998000	●	5659891	●	5660352	●	5660931	●
RPG 21.5 T0320	RPGN 060200 T00820								5822200	●								
RPG 21.5 T0420	RPGN 060200 T01020														5631874		5926951	●
RPG 22 E02	RPGN 060300 E004								5923552									
RPG 22 T0220	RPGN 060300 T00520												5909270					
RPG 22 T0320	RPGN 060300 T00820								5909338									
RPG 32 E02	RPGN 090300 E004								5822259	●			5856141					
RPG 32 T0220	RPGN 090300 T00520										5998018	●	5650155	●			5637905	●
RPG 32 T0320	RPGN 090300 T00820				5023288				5822218	●								
RPG 32 T0420	RPGN 090300 T01020																5786116	●
RPG 43 E01	RPGN 120400 EX0002												5695184	●				
RPG 43 E02	RPGN 120400 E004								5822275	●								
RPG 43 T0220	RPGN 120400 T00520										5998026	●	5659875	●	5660295	●	5637913	●
RPG 43 T0225	RPGN 120400 T00525												5570395	○				
RPG 43 T0320	RPGN 120400 T00820								5822226	●								
RPG 43 T0420	RPGN 120400 T01020												5659883	●	5660311	●	5660949	●
RPG 43 Z0620	RPGN 120400 Z01520																5687496	●
RPG 65 T0220	RPGN 190700 T00520														5660220	●		

RPGX

(inch)	IC	T	θ
RPGX 23	1/4	3/16	120
RPGX 25	1/4	5/16	120
RPGX 35	3/8	5/16	120
RPGX 45	1/2	5/16	120

● : 1st Choice ● : 2nd choice



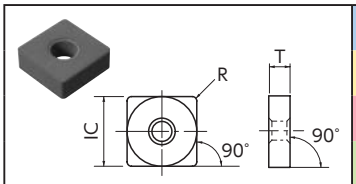
Finishing	●		●		●														
Semi-Finising			●		●		●		●		●								●
Rough			●		●		●		●		●		●		●		●		●
Rough with Scale							●		●		●		●		●				

Item Number	ISO Item Number	R	BIDEMICS						Ceramics									
			Coated						SiAlON								Whisker	
			JP2		JX1		JX3		SX7		SX3		SX9		SX5		WA1	
			EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock
RPGX 23 E02	RPGX 060400 E004				5973649													
RPGX 23 T0220	RPGX 060400 T00520												5686878		5660246	●	5660956	●
RPGX 23 T0320	RPGX 060400 T00820				5953823													
RPGX 23 Z0820	RPGX 060400 Z02020																5756838	
RPGX 25 T0220	RPGX 060700 T00520										5998067	●						
RPGX 35 E02	RPGX 090700 E004				5918701	●	5041702	●									5689021	●
RPGX 35 T0220	RPGX 090700 T00520										5998075	●	5650171	●	5649801	●	5650478	●
RPGX 35 T0320	RPGX 090700 T00820				5918693	●	5041710	●	5822291	●							5720297	
RPGX 35 T0420	RPGX 090700 T01020																5662101	●
RPGX 35 Z0820	RPGX 090700 Z02020																5756820	
RPGX 45 E02	RPGX 120700 E004				5918800	●	5041728	●									5689039	●
RPGX 45 T0220	RPGX 120700 T00520										5998083	●	5650189	●	5649819	●	5650486	●
RPGX 45 T0320	RPGX 120700 T00820				5918792	●	5041744	●	5822283	●							5709233	
RPGX 45 T0420	RPGX 120700 T01020												5659859	●			5660964	●

SNGA

(inch)	IC	T
SNGA 43	1/2	3/16
SNGA 54	5/8	1/4

● : 1st Choice ● : 2nd choice



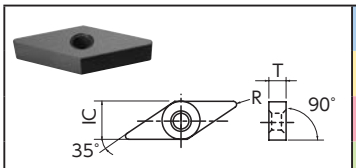
Finishing	●		●		●													
Semi-Finising			●		●		●		●								●	
Rough			●		●		●		●		●		●		●		●	
Rough with Scale							●		●		●		●					

Item Number	ISO Item Number	R	BIDEMICS						Ceramics									
			Coated						SiAlON								Whisker	
			JP2		JX1		JX3		SX7		SX3		SX9		SX5		WA1	
			EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock
SNGA 432 T0220	SNGA 120408 T00520	.031															5660238	●
SNGA 432 T0420	SNGA 120408 T01020																5660006	
SNGA 433 T0220	SNGA 120412 T00520	.047											5650221	●			5660188	●
SNGA 433 T0420	SNGA 120412 T01020												5664354	●	5604855	●	5660212	●
SNGA 434 T0220	SNGA 120416 T00520	.063											5904719					
SNGA 543 T0220	SNGA 150612 T00520	.047													5660121	●	5659776	●
SNGA 543 T0225	SNGA 150612 T00525												5643168	●				
SNGA 544 T0220	SNGA 150616 T00520	.063													5660147	●		
SNGA 544 T0820	SNGA 150616 T02020														5660139	●		

VNGA

(inch)	IC	T
VNGA 33	3/8	3/16

● : 1st Choice ● : 2nd choice



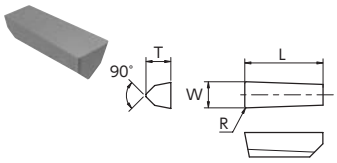
Finishing	●		●		●													
Semi-Finising			●		●		●		●								●	
Rough			●		●		●		●		●		●		●		●	
Rough with Scale							●		●		●		●					

Item Number	ISO Item Number	R	BIDEMICS						Ceramics									
			Coated						SiAlON								Whisker	
			JP2		JX1		JX3		SX7		SX3		SX9		SX5		WA1	
			EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock
VNGA 331 BQ T0220	VNGA 160404 BQ T00520	.016	5925904	●														
VNGA 331 BQ E02	VNGA 160404 BQ ENB		5964135	●														
VNGA 332 BQ T0220	VNGA 160408 BQ T00520	.031	5925912	●														
VNGA 332 BQ E02	VNGA 160408 BQ ENB		5964143	●														
VNGA 333 BQ T0220	VNGA 160412 BQ T00520	.047	5925920	●														
VNGA 333 BQ E02	VNGA 160412 BQ ENB		5964150	●														

VGW

(inch)	T	L
VGW 41	0.187	0.500
VGW 62	0.250	0.750
VGW 83	0.337	1.000

● : 1st Choice ● : 2nd choice



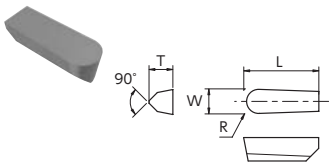
Finishing	●		●											
Semi-Finising	●		●		●		●				●			
Rough	●		●		●		●		●		●			
Rough with Scale					●		●		●					

Item Number	W	R	BIDEMICS				Ceramics							
							SiAlON						Whisker	
			JX1		JX3		SX7		SX3		SX5		WA1	
			EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock
VGW 41251 E02	.125	.015	5990585	●	5041413	●								
VGW 41251 EX001													5663315	●
VGW 41251 T0220							5851969	●	5045281	●				
VGW 41252 E02		.031	5990593	●	5041421	●								
VGW 41252 EX001													5663323	●
VGW 41252 T0220							5851985	●	5045299					
VGW 41561 E02	.156	.015	5990619	●	5041447	●								
VGW 41561 EX001													5663331	●
VGW 41561 T0220							5852033	●	5045307	●				
VGW 41562 E02		.031	5990627	●	5041454	●								
VGW 41562 EX001													5663349	●
VGW 41562 T0220							5852025	●	5045315	●				
VGW 41871 E02	.187	.015	5990650	●	5041470	●								
VGW 41871 EX001													5663356	●
VGW 41871 T0220							5851951	●	5045323	●	5662911			
VGW 41872 E02		.031	5990668	●	5041488	●								
VGW 41872 EX001													5663364	●
VGW 41872 T0220							5851936	●	5045331		5662929	●		
VGW 62501 E02	.250	.015	5990684	●	5041504	●								
VGW 62501 T0220							5851928	●	5045349	●			5667225	●
VGW 62501 T0420													5667233	●
VGW 62501 Z0420													5663398	●
VGW 62502 E02		.031	5990726	●	5041512	●								
VGW 62502 EX001													5663414	●
VGW 62502 T0220							5851910	●	5045356	●	5662937	●		
VGW 62503 E02	.250	.046	5990734	●	5041538	●								
VGW 62503 T0220							5851894	●	5045364	●	5662945	●		
VGW 62814 E02	.281	.062	5990767	●	5041579	●								
VGW 62814 T0220							5852173	●	5045372	●				
VGW 83122 E02	.312	.031	5990775	●	5041587	●								
VGW 83122 EX001													5663448	●
VGW 83122 T0220							5851852	●	5045380	●				
VGW 83124 E02		.062	5990783	●	5041595	●								
VGW 83124 EX001													5663455	●
VGW 83124 T0220							5851845	●	5045398	●	5662952	●		
VGW 83752 E02	.375	.031	5990809	●	5041611	●								
VGW 83752 EX001													5663463	●
VGW 83752 T0220							5851878	●	5045406	●	5662960	●		
VGW 83754 E02	.375	.062	5990817	●	5041629	●								
VGW 83754 EX001													5663471	●
VGW 83754 T0220							5851860	●	5045414	●	5662978	●	5667258	●

VGW..R

(inch)	T	L
VGW 41	0.187	0.500
VGW 62	0.250	0.750
VGW 83	0.337	1.000

● : 1st Choice ● : 2nd choice



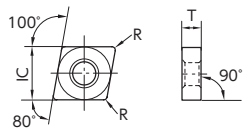
Finishing	●		●													
Semi-Finising	●		●		●		●						●			
Rough	●		●		●		●		●		●		●			
Rough with Scale					●		●		●		●					

Item Number	W	R	BIDEMICS				Ceramics									
							SiAlON								Whisker	
			JX1		JX3		SX7		SX3		SX9		SX5		WA1	
			EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock	EDP	stock
VGW 4125R E02	.125	.063	5990601	●	5041439	●										
VGW 4125R EX001															5663489	●
VGW 4125R T0220							5851993	●	5045422	●	5706064					
VGW 4156R E02	.156	.078	5990635	●	5041462	●										
VGW 4156R EX001															5663497	●
VGW 4156R T0220							5852017	●	5045430	●					5767348	●
VGW 4156R Z0820															5800214	●
VGW 4187R E02	.187	.094	5990676	●	5041496	●										
VGW 4187R EX001															5663505	●
VGW 4187R T0220							5851944	●	5045448	●			5662986	●		
VGW 6218R E02	.218	.109	5990742	●	5041553	●										
VGW 6218R EX001															5663513	●
VGW 6218R T0220							5852009	●	5045455	●						
VGW 6250R E02	.250	.125	5990759	●	5041561	●										
VGW 6250R EX001															5663521	●
VGW 6250R T0220							5851902	●	5045471	●			5662994	●		
VGW 6281R EX001	.281	.141													5663539	●
VGW 8312R E02	.312	.156	5990791	●	5041603	●										
VGW 8312R EX001															5663547	●
VGW 8312R T0220							5851829	●	5011887	●			5663000	●		
VGW 8344R EX001	.344	.172													5663554	●
VGW 8375R E02	.375	.188	5990825	●	5041637	●										
VGW 8375R EX001															5663562	●
VGW 8375R T0220							5851886	●	5045489	●			5663018	●		

80 degree Diamond Negative type (CN..)

● : 1st Choice ● : 2nd choice

(inch)	IC	T
CN..43	1/2	3/16



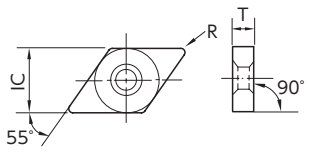
Finishing	●	●	●
Semi-Finising			
Rough			
Rough with Scale			

Shape	Item Number	ISO Item Number	R	Carbide PVD Coated DM4 EDP	DM4 stock	QM3 EDP	QM3 stock	ZM3 EDP	ZM3 stock
	CNGG 431 FNUL	CNGG 120404 FNUL	.016	5922067	●	5018742	●		
	CNGG 431 FNZP	CNGG 120404 FNZP		5844709	●	5157961	●	5157953	●
	CNGG 432 FNUL	CNGG 120408 FNUL	.031	5922059	●	5018759	●		
	CNMG 432 Z5	CNMG 120408 TNBZ5		5816673	○	5157367	○		
	CNGG 432 FNZP	CNGG 120408 FNZP		5840467	●	5157979	●	5161161	●

55 degree Diamond Negative type (DN..)

● : 1st Choice ● : 2nd choice

(inch)	IC	T
DN..43	1/2	3/16



Finishing	●	●	●
Semi-Finising			
Rough			
Rough with Scale			

Shape	Item Number	ISO Item Number	R	Carbide PVD Coated DM4 EDP	DM4 stock	QM3 EDP	QM3 stock	ZM3 EDP	ZM3 stock
	DNGG 431 FNZP	DNGG 150404 FNZP	.016	5840442	●	5211057	●	5211040	●
	DNMG 431 G	DNMG 150404 TNG				5138508	○		
	DNGG 432 FNZP	DNGG 150408 FNZP	.031	5847686	●	5211032	●	5211065	●
	DNMG 432 Z5	DNMG 150408 TNBZ5		5847694	○	5163407	○		

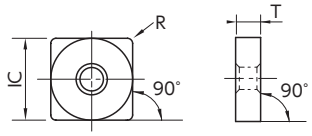
Carbide Grooving Inserts

	Side Turn	GWPG... - GW DM4 GWPG... - GV DM4	See Page P.59
	Face Turn	GWPFM... - GT DM4	See Page P.62

90 degree Square Negative type (SN..)

● : 1st Choice ● : 2nd choice

(inch)	IC	T
SN..43	1/2	3/16



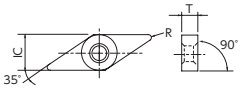
Finishing	●	●	●
Semi-Finising			
Rough			
Rough with Scale			

Shape	Item Number	ISO Item Number	R	Carbide PVD Coated DM4 EDP	DM4 stock	QM3 EDP	QM3 stock	ZM3 EDP	ZM3 stock
	SNMG 432 Z5	SNMG 120408 TNBZ5	.031	5847678	○	5222245	○		

35 degree Diamond type (VN..)

● : 1st Choice ● : 2nd choice

(inch)	IC	T
VN..33	3/8	3/16



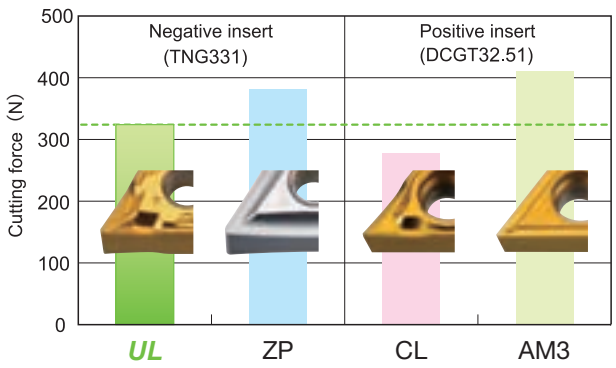
Finishing	●	●	●
Semi-Finising			
Rough			
Rough with Scale			

Shape	Item Number	ISO Item Number	R	Carbide PVD Coated DM4 EDP	DM4 stock	QM3 EDP	QM3 stock	ZM3 EDP	ZM3 stock
	VNGG 331 FNZP	VNGG 160404 FNZP	.016	5847595	○	5496062	●		
	VNMG 331 AM1	VNMG 160404 TNBAM1		5847629	○	5204995	○		
	VNGG 332 FNZP	VNGG 160408 FNZP	.031	5847587	○	5580576	●		
	VNMG 332 AM1	VNMG 160408 TNBAM1		5847611	○	5222732	○		

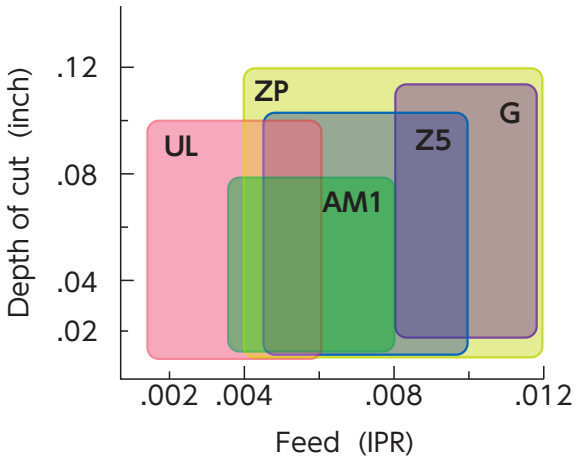
UL Chipbreaker Features:

- *First negative style insert designed for Swiss machines*
- *Less tool pressure which reduces the heat generated leading to a more efficient cut and longer tool life*
- *Good chip control*

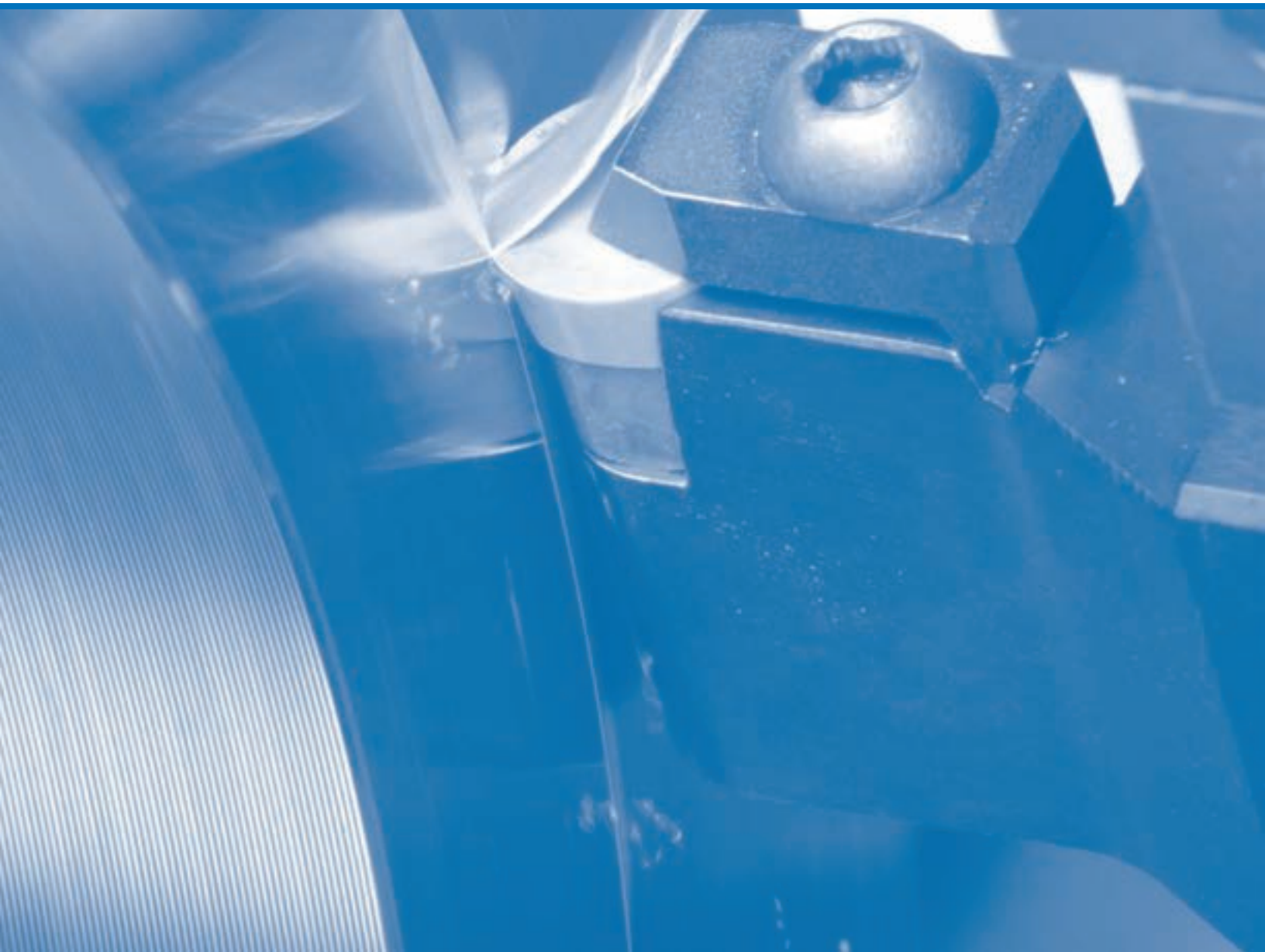
Cuts Like Positive Insert



Chipbreaker- Chip Control Range

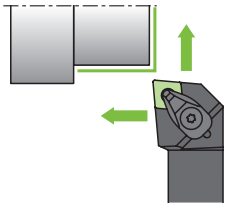


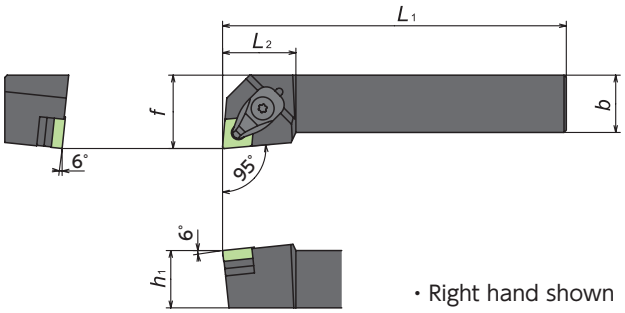
General Turning Tools



CN.. Inserts

WCLN



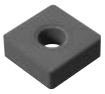


・Right hand shown

● Inch / Metric Holders

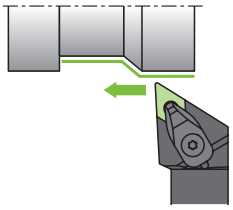
Item Number	Stock		h		b		L1		h1		f		L2		Insert*
	R	L	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	
WCLNR/L 16-4D	●	●	1.00	—	1.00	—	6.00	—	1.00	—	1.25	—	1.25	—	CNGA 43 (CNGA 45)
WCLNR/L 20-4D	●	●	1.25	—	1.25	—	6.00	—	1.25	—	1.50	—	1.25	—	
WCLNR/L 2525M12	○	○	—	25	—	25	—	150	—	25	—	32	—	32	
WCLNR/L 3225P12	○	○	—	32	—	25	—	170	—	32	—	32	—	32	

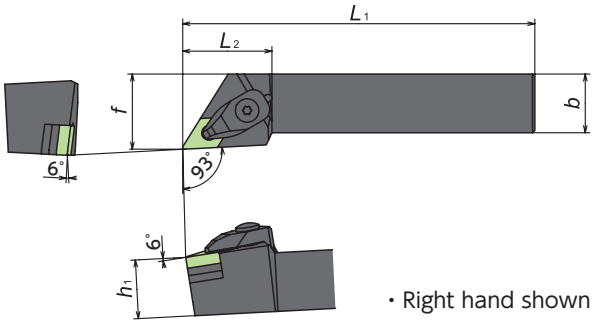
● Spare Parts

	Insert	Clamp	Shim	Clamp Screw	Wrench (for Clamp Screw)	Shim Screw	Wrench (for Shim Screw)	Spring
								
Standard	CNGA 43 / CNGA 45	DC6CN	ACN423×2 / ACN423×1	AOS-6*30W	LLR-T20	FSS15-3.0*12	LLR-T10	ASGL6-D

DN.. Inserts

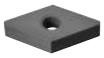
WDJN



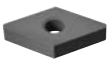


・Right hand shown

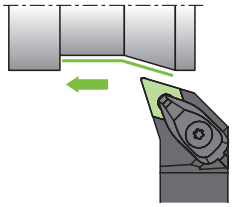
● Inch / Metric Holders

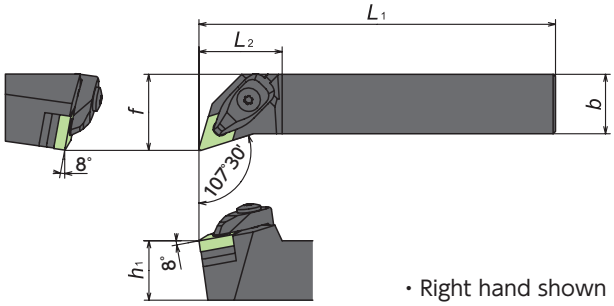
Item Number	Stock		h		b		L1		h1		f		L2		Insert*
	R	L	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	
WDJNR/L 16-4D	●	●	1.00	—	1.00	—	6.00	—	1.00	—	1.25	—	1.50	—	DNGA 43 (DNGA 45) 
WDJNR/L 20-4D	●	●	1.25	—	1.25	—	6.00	—	1.25	—	1.50	—	1.50	—	
WDJNR/L 2525M15	○	○	—	25	—	25	—	150	—	25	—	32	—	38	
WDJNR/L 3225P15	○	○	—	32	—	25	—	170	—	32	—	32	—	38	

● Spare Parts

	Insert	Clamp	Shim	Clamp Screw	Wrench (for Clamp Screw)	Shim Screw	Wrench (for Shim Screw)	Spring
								
Standard	DNGA 43 / DNGA 45	DC6DN	ADN423×2 / ADN423×1	AOS-6*30W	LLR-T20	FSS15-3.0*12	LLR-T10	ASGL6-D

WDHN



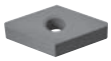
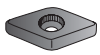


・Right hand shown

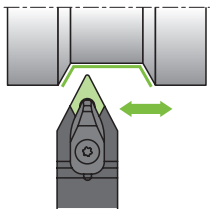
● Inch / Metric Holders

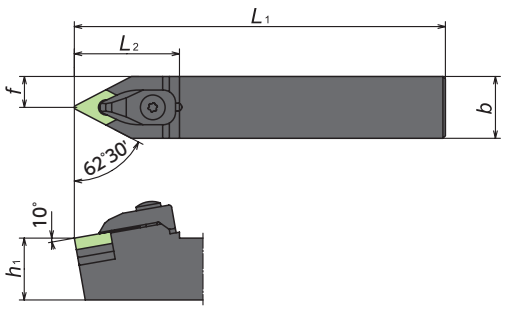
Item Number	Stock		h		b		L_1		h_1		f		L_2		Insert*
	R	L	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	
WDHNR/L 16-4D	●	●	1.00	—	1.25	—	6.00	—	1.00	—	1.25	—	1.38	—	DNGA 43 (DNGA 45)
WDHNR/L 20-4D			1.00	—	1.25	—	6.00	—	1.25	—	1.50	—	1.38	—	
WDHNR/L 2525M15	○	○	—	25	—	25	—	150	—	25	—	32	—	35	

● Spare Parts

	Insert	Clamp	Shim	Clamp Screw	Wrench (for Clamp Screw)	Shim Screw	Wrench (for Shim Screw)	Spring
								
Standard	**DNGA 43**	DC6DN	ADN423×2	AOS-6*30W	LLR-T20	FSS15-3.0*12	LLR-T10	ASGL6-D
	DNGA 45		ADN423×1					

WDNN

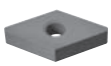
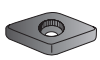




● Inch / Metric Holders

Item Number	Stock	h		b		L_1		h_1		f		L_2		Insert*
		(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	
WDNNN 16-4D	●	1.00	—	1.00	—	6.00	—	1.00	—	.500	—	1.67	—	DNGA 43 (DNGA 45)
WDNNN 20-4D		1.25	—	1.25	—	6.00	—	1.25	—	.625	—	1.67	—	
WDNNN 2525M15	○	—	25	—	25	—	150	—	25	—	12.5	—	42.5	

● Spare Parts

	Insert	Clamp	Shim	Clamp Screw	Wrench (for Clamp Screw)	Shim Screw	Wrench (for Shim Screw)	Spring
								
Standard	**DNGA 43**	DC6DN	ADN423×2	AOS-6*30W	LLR-T20	FSS15-3.0*12	LLR-T10	ASGL6-D
	DNGA 45		ADN423×1					

● : Stock
● : Stock (Newly added)
■ □ R L : While stocks last

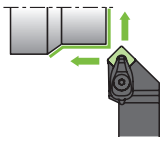
R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

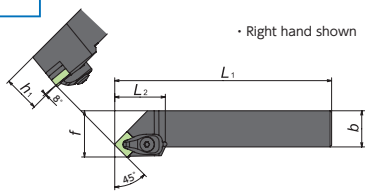
○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only)
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only, Newly added)

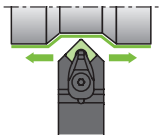
General Turning Tools

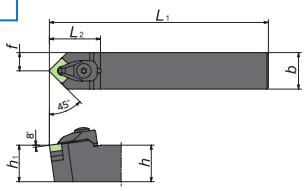
WSSN





WSDN





● Inch / Metric Holders

Item Number	Stock		h		b		L_1		h_1		f		L_2		Insert*
	R	L	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	
WSSNR/L 16-4D	●	●	1.00	—	1.00	—	6.00	—	1.00	—	1.25	—	1.38	—	SNGA 43 (SNGA 45)
WSSNR/L 20-4D			1.25	—	1.25	—	6.00	—	1.25	—	1.50	—	1.38	—	
WSSNR/L 2525M12	●	○	—	25	—	25	—	150	—	25	—	32	—	35	

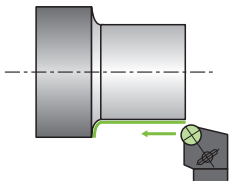
Item Number	Stock	h		b		L_1		h_1		f		L_2		Insert*
		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	
WSDNN 16-4D	●	1.00	—	1.00	—	6.00	—	1.00	—	.500	—	1.42	—	SNGA 43 (SNGA 45)
WSDNN 20-4D		1.25	—	1.25	—	6.00	—	1.25	—	.625	—	1.42	—	
WSDNN 2525M12	○	—	25	—	25	—	150	—	25	—	12.5	—	35	
WSDNN 3225P12	○	—	32	—	25	—	170	—	32	—	12.5	—	35	

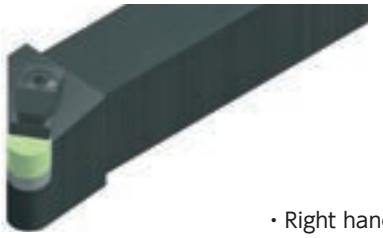
● Spare Parts

	Insert	Clamp	Shim	Clamp Screw	Wrench (for Clamp Screw)	Shim Screw	Wrench (for Shim Screw)	Spring
Standard	SNGA 43	DC6CN	ASN423×2	AOS-6*30W	LLR-T20	FSS15-3.0*12	LLR-T10	ASGL6-D
	SNGA 45		ASN423×1					

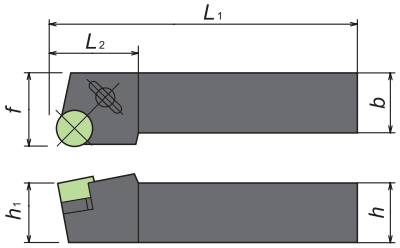
RN.. Inserts

CRGN





• Right hand shown



● Inch Holders

Item Number	Stock		Dimensions (inch)						Insert*
	R	L	h	b	L_1	h_1	f	L_2	
CRGNR/L 164 CD	●	●	1.00	1.00	6.00	1.00	1.25	1.34	RNG 45 (RNG 43)
CRGNR/L 204 CD	●	●	1.25	1.25	6.00	1.25	1.50	1.34	
CRGNR/L 165 CD	●	●	1.00	1.00	6.00	1.00	1.25	1.34	RNG 55
CRGNR/L 205 CD	●	●	1.25	1.25	6.00	1.25	1.50	1.34	
CRGNR/L 206 CD	●	●	1.25	1.25	6.00	1.25	1.50	1.65	RNG 65

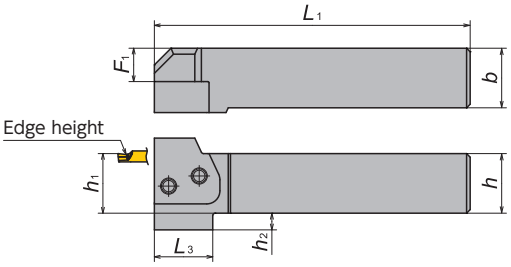
● Spare Parts

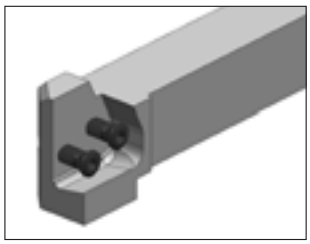
	Insert	Clamp	Blade	Shim	Shim Screw	Wrench
Standard	RNG 45	2413	9414	IRSN 43	1160	LW-4
	RNG 43			IRSN 45 (OP)		
Standard	RNG 55			IRSN 53	1180	
Standard	RNG 65	2417		3919	1182	

RCGX/RPGX Inserts

GTWP-H

Straight style toolholder





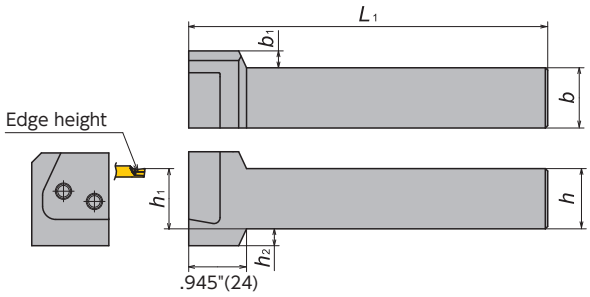
Right-Hand style shown

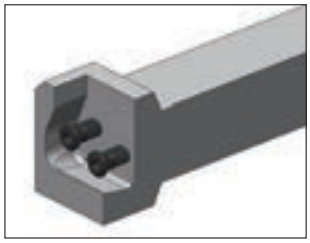
● Toolholder Body

Holder Number	Stock		Dimensions														Blade	Spare Parts	
			h		b		h1		L1		F1		h2		L3			Clamp Screw	Wrench
	R	L	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)			
GTWP□16-IN-H	●	●	1.000	—	1.000	—	1.000	—	5.311	134.9	0.567	14.4	0.260	6.6	0.965	24.5	GBRR/L	FS128-6.0×18	LW-4
GTWP□20-IN-H	●	●	1.250	—	1.250	—	1.250	—	6.311	160.3	0.817	20.75	—	—	—	—	GBRR/L	FS128-6.0×18	LW-4
GTWP□24-IN-H			1.500	—	1.500	—	1.500	—	6.311	160.3	1.067	27.1	—	—	—	—	GBRR/L	FS128-6.0×18	LW-4
GTWP□32-IN-H			2.000	—	2.000	—	2.000	—	6.311	160.3	1.567	39.8	—	—	—	—	GBRR/L	FS128-6.0×18	LW-4
GTWP□2020-H	○	○	0.787	20.0	0.787	20.0	0.787	20.0	4.232	107.5	0.354	9	0.315	8	1.122	28.5	GBRR/L	FS128-6.0×18	LW-4
GTWP□2525-H	●	●	0.984	25.0	0.984	25.0	0.984	25.0	5.217	132.5	0.551	14	0.276	7	0.965	24.5	GBRR/L	FS128-6.0×18	LW-4
GTWP□3232-H	○	○	1.260	32.0	1.000	32.0	1.260	32.0	6.004	152.5	0.827	21	—	—	—	—	GBRR/L	FS128-6.0×18	LW-4

GKWP-H

L-style toolholder





Right-Hand style shown
＊Use opposite hand blade

● Toolholder Body

Holder Number	Stock		Dimensions												Blade	Spare Parts	
			h		b		h1		L1		b1		h2			Clamp Screw	Wrench
	R	L	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)			
GKWP□16-IN-H	●	●	1.000	—	1.000	—	1.000	—	5.961	151.4	0.260	6.6	0.260	6.6	GBRR/L	FS128-6.0×18	LW-4
GKWP□20-IN-H	●	●	1.250	—	1.250	—	1.250	—	6.961	176.8	—	—	—	—	GBRR/L	FS128-6.0×18	LW-4
GKWP□2020-H	○	○	0.787	20.0	0.787	20.0	0.787	20.0	4.882	124	0.472	12	0.315	8	GBRR/L	FS128-6.0×18	LW-4
GKWP□2525-H	●	●	0.984	25.0	0.984	25.0	0.984	25.0	5.866	149	0.276	7	0.276	7	GBRR/L	FS128-6.0×18	LW-4
GKWP□3232-H	○	○	1.260	32.0	1.000	32.0	1.260	32.0	6.654	169	—	—	—	—	GBRR/L	FS128-6.0×18	LW-4

● : Stock
● : Stock (Newly added)
■ □ R L : While stocks last

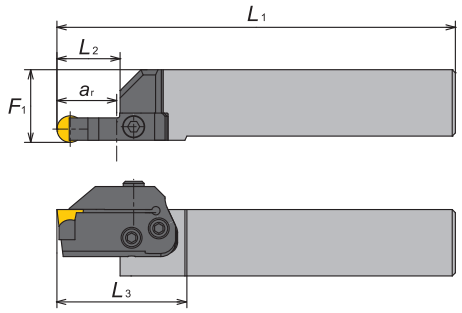
R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

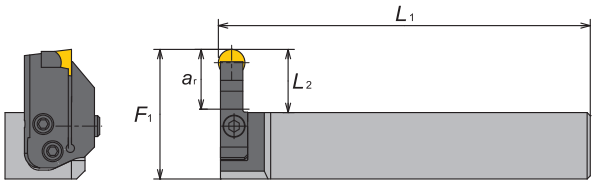
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only)
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only, Newly added)

GBR Blade

For GTWP



For GKWP

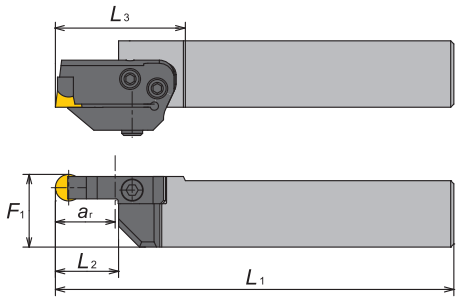


● Right hand

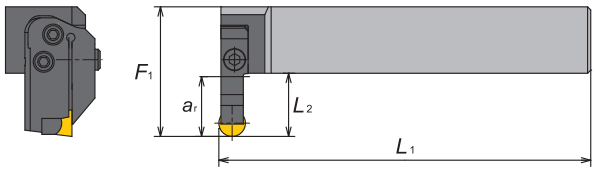
Hand	Blade number	Stock	Insert	Dimensions (Inch)		Holder	Dimensions (Inch)				
							GTWPR-H			GKWPL-H	
				a_r	L_2		L_1	L_3	F_1	L_1	F_1
R	**GBRR-R23-19**	●	RCGX23 RPGX23	.750	.889	GTWPR16-IN-H	6.200	1.854	1.118	6.000	1.889
						GKWPL16-IN-H					
						GTWPR20-IN-H	7.200	—	1.368	7.000	2.139
						GKWPL20-IN-H					
						GTWPR2020-H	5.121	2.011	.906	4.921	1.676
						GKWPL2020-H					
						GTWPR2525-H	6.106	1.854	1.102	5.906	1.873
						GKWPL2525-H					
						GTWPR3232-H	6.893	—	1.378	6.693	2.149
						GKWPL3232-H					
	GBRR-R35-25	●	RCGX35 RPGX35 RCGX103	1.000	1.089	GTWPR16-IN-H	6.400	2.054	1.118	6.000	2.089
						GKWPL16-IN-H					
						GTWPR20-IN-H	7.400	—	1.368	7.000	2.339
						GKWPL20-IN-H					
						GTWPR2020-H	5.321	2.211	.906	4.921	1.876
						GKWPL2020-H					
						GTWPR2525-H	6.306	2.054	1.102	5.906	2.073
						GKWPL2525-H					
						GTWPR3232-H	7.093	—	1.378	6.693	2.349
						GKWPL3232-H					
	GBRR-R45-28	●	RCGX45 RPGX45 RCGX104	1.125	1.189	GTWPR16-IN-H	6.500	2.154	1.118	6.000	2.189
						GKWPL16-IN-H					
						GTWPR20-IN-H	7.500	—	1.368	7.000	2.439
						GKWPL20-IN-H					
						GTWPR2020-H	5.421	2.311	.906	4.921	1.976
						GKWPL2020-H					
						GTWPR2525-H	6.406	2.154	1.102	5.906	2.173
						GKWPL2525-H					
						GTWPR3232-H	7.193	—	1.378	6.693	2.449
						GKWPL3232-H					

GBR Blade

For GTWP



For GKWP



● Left hand

Hand	Blade number	Stock	Insert	Dimensions (Inch)		Holder	Dimensions (Inch)				
							GTWPL-H			GKWPL-H	
				a_r	L_2		L_1	L_3	F_1	L_1	F_1
L	**GBRL-R23-19**	●	RCGX23 RPGX23	.750	.889	GTWPL16-IN-H	6.200	1.854	1.118	6.000	1.889
						GKWPR16-IN-H					
						GTWPL20-IN-H	7.200	—	1.368	7.000	2.139
						GKWPR20-IN-H					
						GTWPL2020-H	5.121	2.011	.906	4.921	1.676
						GKWPR2020-H					
						GTWPL2525-H	6.106	1.854	1.102	5.906	1.873
						GKWPR2525-H					
						GTWPL3232-H	6.893	—	1.378	6.693	2.149
						GKWPR3232-H					
	GBRL-R35-25	●	RCGX35 RPGX35 RCGX103	1.000	1.089	GTWPL16-IN-H	6.400	2.054	1.118	6.000	2.089
						GKWPR16-IN-H					
						GTWPL20-IN-H	7.400	—	1.368	7.000	2.339
						GKWPR20-IN-H					
						GTWPL2020-H	5.321	2.211	.906	4.921	1.876
						GKWPR2020-H					
						GTWPL2525-H	6.306	2.054	1.102	5.906	2.073
						GKWPR2525-H					
						GTWPL3232-H	7.093	—	1.378	6.693	2.349
						GKWPR3232-H					
	GBRL-R45-28	●	RCGX45 RPGX45 RCGX104	1.125	1.189	GTWPL16-IN-H	6.500	2.154	1.118	6.000	2.189
						GKWPR16-IN-H					
						GTWPL20-IN-H	7.500	—	1.368	7.000	2.439
						GKWPR20-IN-H					
						GTWPL2020-H	5.421	2.311	.906	4.921	1.976
						GKWPR2020-H					
						GTWPL2525-H	6.406	2.154	1.102	5.906	2.173
						GKWPR2525-H					
						GTWPL3232-H	7.193	—	1.378	6.693	2.449
						GKWPR3232-H					

● : Stock
● : Stock (Newly added)
■ □ R L : While stocks last

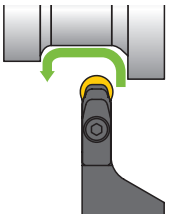
R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

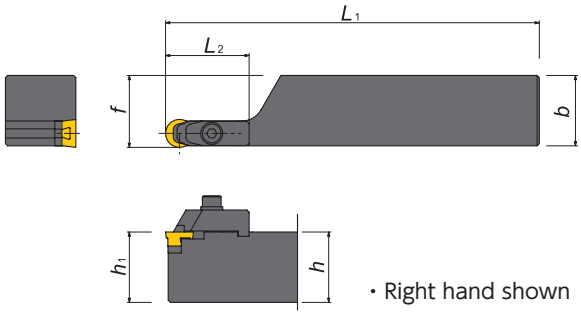
○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only)
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only, Newly added)

RCGX / RPGX Inserts

VRAO R/L





・Right hand shown

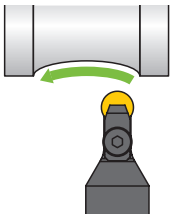
● Inch Holders

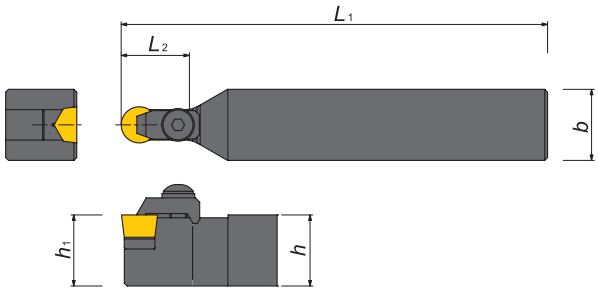
Item Number	Stock		Dimensions (inch)					Insert
	R	L	*h*	*b*	L_1	h_1	L_2	
VRAO R/L 16-2D	●	●	1.00	1.00	6.00	1.00	1.00	RCGX 23 RCGX 25 RPGX 23 RPGX 25
VRAO R/L 20-2D	●	●	1.25	1.25	6.00	1.25	1.00	
VRAO R/L 16-3D	●	●	1.00	1.00	6.00	1.00	1.25	RCGX 35 RPGX 35
VRAO R/L 20-3D	●	●	1.25	1.25	6.00	1.25	1.25	
VRAO R/L 24-3E	●	●	1.50	1.50	7.00	1.50	1.25	
VRAO R/L 16-4D	●	●	1.00	1.00	6.00	1.00	1.50	RCGX 45 RPGX 45
VRAO R/L 20-4D	●	●	1.25	1.25	6.00	1.25	1.50	
VRAO R/L 24-4E	●	●	1.50	1.50	7.00	1.50	1.50	

● Spare Parts

Parts / Toolholder	Clamp	Clamp Screw	Shim	Shim Screw
VRAO R/L 16-2D VRAO R/L 20-2D		CL2RVRL (comes with screw)	SM2RV (RCGX102 / R.GX25) SM2RVS (R.GX23) (OP)	SC02C-08
VRAO R/L 16-3D	CL3RV	SC10F-10	SM3RV	SC05C-08
VRAO R/L 20-3D VRAO R/L 24-3E				SC05C-10
VRAO R/L 16-4D	CL4RV	SC40F-12	SM4RV	SC06C-08
VRAO R/L 20-4D VRAO R/L 24-4E				SC06C-10

VRAON





Inch Holders

Item Number	Stock	Dimensions (inch)				Insert
		h	b	L_1	L_2	
VRAON 16-2D	●	1.00	1.00	6.00	1.00	RCGX 23 RCGX 25 RPGX 23 RPGX 25
VRAON 20-2D	●	1.25	1.25	6.00	1.00	
VRAON 16-3D	●	1.00	1.00	6.00	1.25	RCGX 35 RPGX 35
VRAON 20-3D	●	1.25	1.25	6.00	1.25	
VRAON 24-3E	●	1.50	1.50	7.00	1.25	
VRAON 16-4D	●	1.00	1.00	6.00	1.50	RCGX 45 RPGX 45
VRAON 20-4D	●	1.25	1.25	6.00	1.50	
VRAON 24-4E	●	1.50	1.50	7.00	1.50	

Spare Parts

Parts / Toolholder	Clamp	Shim	Clamp Screw	Shim Screw
	(CL2RV)			
VRAON 16-2D	CL2RV	SM2RV (RCGX102 / R.GX25) SM2RVS (R.GX23) (OP)	SC40F-16	SC02C-08
VRAON 20-2D				
VRAON 16-3D	CL3RV	SM3RV	SC10F-10	SC05C-08
VRAON 20-3D				SC05C-10
VRAON 24-3E				
VRAON 16-4D	CL4RV	SM4RV	SC40F-12	SC06C-08
VRAON 20-4D				SC06C-10
VRAON 24-4E				

● : Stock
● : Stock (Newly added)
■ □ R L : While stocks last

R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only)
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only, Newly added)

MEMO

Grooving / Side Turning Tools

Guideline for grooving HRSA materials

BIDEMICS / Ceramic grooving inserts provide high speed capability to your process. Whisker ceramic is the most versatile option in this category. NTK also offers BIDEMICS and SiAlON grades for more productivity and stability.

	JX1 / JX3	SX3 / SX7	SX5	WA1
Speed	●	●	●	●
Feed		●	●	
Versatility	●	●		●
Toughness		●	●	
	Can run at up to 1500 SFM. Double the speed of whisker	Double the feed of whisker	Best for Scale and interruption	Versatile grade

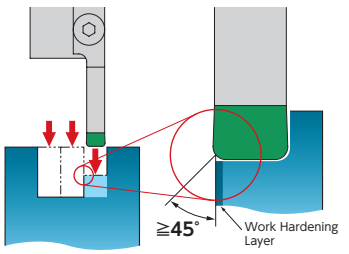
● : 1st choice ● : 2nd choice

Application	Grade	Work material	Cutting speed (600 800 1000 1200 1400 1600)	Feed (.004 .008 .012 .016 .020)	Depth of cut (.020 .040 .060 .080 .100)	Coolant
Grooving	JX1 JX3	Overall	1200 (600-1600) SFM	.003 (.002-.004) IPR	When using SX7 / SX5, increase feed rates 100% vs. Whisker Ceramics	WET
	SX5	Waspaloy	700 (600-800) SFM	.006 (.003-.007) IPR		
	SX3 SX7	Overall	750 (600-900) SFM	.0045 (.003-.006) IPR		
	WA1	Overall	800 (600-1100) SFM	.003 (.002-.004) IPR		

Application	Grade	Work material	Cutting speed (100 150 200 250 300 350)	Feed (.001 .002 .005 .010 .015)	Depth of cut (.020 .040 .060 .080 .100)	Coolant
Finishing	DM4 QM3 ZM3	HRSA	75-225 SFM	.002-.014 IPR	Width: .118-.157" Feed .002 - .006" Width: .157-.197" Feed .004 - .008" Width: > .197" Feed .006 - .014"	WET

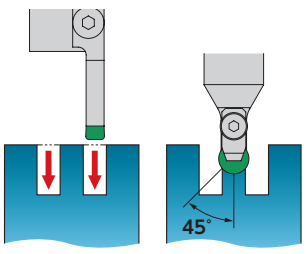
When applying JX1 / JX3, increase speed to over 1000 SFM
When applying SX3 / SX7 / SX5, increase feed rates 100% vs. Whisker Ceramics

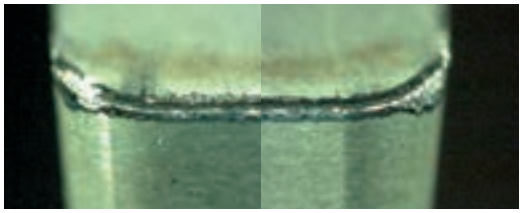
Application Information



When machining a grooved area with multiple passes, the insert radius engages a potentially work hardened area during the last remaining plunge. This programming procedure sets up the potential of corner radius chipping or notching.

Change to



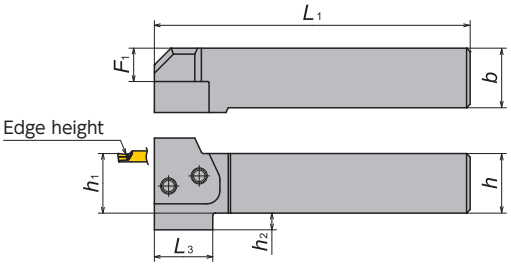


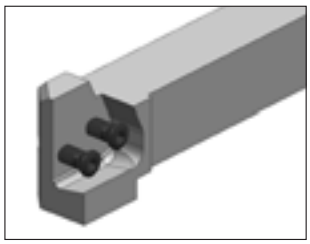
The grooving insert is plunged down both outside walls thus maintaining a good finish. The remaining material can be removed by using a stronger insert shape such as a RCGX style.

Groove DUO Blade

Straight style toolholder

GTWP-H





Right-Hand style shown

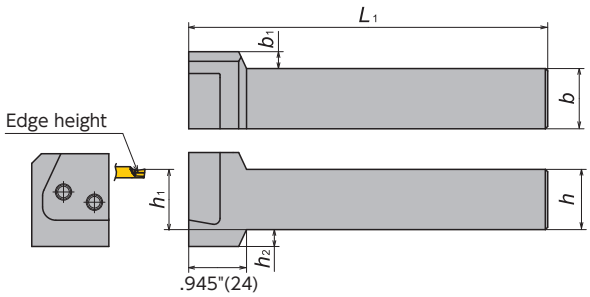
● Toolholder Body

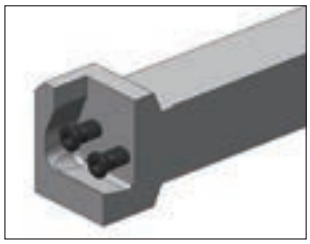
Holder Number	Stock		Dimensions														Blade	Spare Parts	
			h		b		h_1		L_1		F_1		h_2		L_3			Clamp Screw	Wrench
	R	L	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)			
GTWP□16-IN-H	●	●	1.000	—	1.000	—	1.000	—	5.311	134.9	0.567	14.4	0.260	6.6	0.965	24.5	GBVR/L	FS128-6.0×18	LW-4
GTWP□20-IN-H	●	●	1.250	—	1.250	—	1.250	—	6.311	160.3	0.817	20.75	—	—	—	—	GBVR/L	FS128-6.0×18	LW-4
GTWP□24-IN-H			1.500	—	1.500	—	1.500	—	6.311	160.3	1.067	27.1	—	—	—	—	GBRR/L	FS128-6.0×18	LW-4
GTWP□32-IN-H			2.000	—	2.000	—	2.000	—	6.311	160.3	1.567	39.8	—	—	—	—	GBRR/L	FS128-6.0×18	LW-4
GTWP□2020-H	○	○	0.787	20.0	0.787	20.0	0.787	20.0	4.232	107.5	0.354	9	0.315	8	1.122	28.5	GBVR/L	FS128-6.0×18	LW-4
GTWP□2525-H	●	●	0.984	25.0	0.984	25.0	0.984	25.0	5.217	132.5	0.551	14	0.276	7	0.965	24.5	GBVR/L	FS128-6.0×18	LW-4
GTWP□3232-H	○	○	1.260	32.0	1.000	32.0	1.260	32.0	6.004	152.5	0.827	21	—	—	—	—	GBVR/L	FS128-6.0×18	LW-4

Groove DUO Blade

L-style toolholder

GKWP-H





Right-Hand style shown
＊Use opposite hand blade

● Toolholder Body

Holder Number	Stock		Dimensions												Blade	Spare Parts	
			h		b		h_1		L_1		b_1		h_2			Clamp Screw	Wrench
	R	L	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)			
GKWP□16-IN-H	●	●	1.000	—	1.000	—	1.000	—	5.961	151.4	0.260	6.6	0.260	6.6	GBVR/L	FS128-6.0×18	LW-4
GKWP□20-IN-H	●	●	1.250	—	1.250	—	1.250	—	6.961	176.8	—	—	—	—	GBVR/L	FS128-6.0×18	LW-4
GKWP□2020-H	○	○	0.787	20.0	0.787	20.0	0.787	20.0	4.882	124	0.472	12	0.315	8	GBVR/L	FS128-6.0×18	LW-4
GKWP□2525-H	●	●	0.984	25.0	0.984	25.0	0.984	25.0	5.866	149	0.276	7	0.276	7	GBVR/L	FS128-6.0×18	LW-4
GKWP□3232-H	○	○	1.260	32.0	1.000	32.0	1.260	32.0	6.654	169	—	—	—	—	GBVR/L	FS128-6.0×18	LW-4

● : Stock
● : Stock (Newly added)
■ □ R L : While stocks last

R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

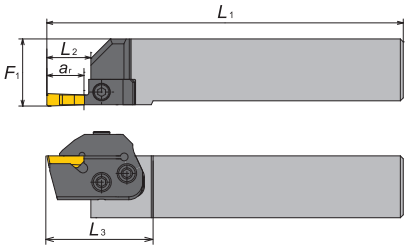
○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only)
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only, Newly added)

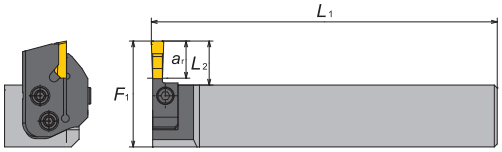
Blade for Straight Grooving

VGW

For GTWP



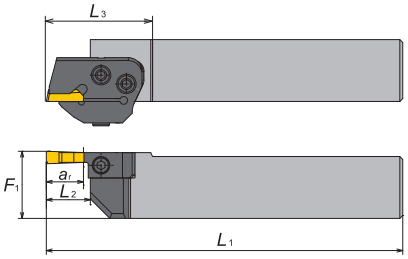
For GKWP



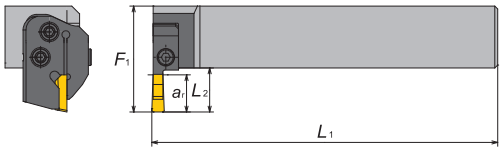
● Right hand

Hand	Blade number	Stock	Insert	Dimensions (inch)		Holder	Insert	Dimensions (inch)				
								GTWPR-H			GKWPL-H	
				a_r	L_2			L_1	L_3	F_1	L_1	F_1
R	**GBVR-VGW4-3T09**	●	VGW4125 VGW4156	.375	.441	GTWPR16-IN-H	VGW4125	5.750	1.404	1.090	5.972	1.439
						GKWPL16-IN-H	VGW4156			1.106	5.987	
						GTWPR20-IN-H	VGW4125	6.750	—	1.340	6.972	1.689
						GKWPL20-IN-H	VGW4156			1.356	6.987	
						GTWPR2020-H	VGW4125	4.671	1.561	0.878	4.893	1.226
						GKWPL2020-H	VGW4156			0.893	4.909	
						GTWPR2525-H	VGW4125	5.656	1.404	1.074	5.878	1.423
						GKWPL2525-H	VGW4156			1.090	5.893	
						GTWPR3232-H	VGW4125	6.443	—	1.350	6.665	1.699
						GKWPL3232-H	VGW4156			1.365	6.680	
	GBVR-VGW4-4T14	●	VGW4156 VGW4187	.562	.689	GTWPR16-IN-H	VGW4156	6.000	1.654	1.094	5.976	1.689
						GKWPL16-IN-H	VGW4187			1.109	5.991	
						GTWPR20-IN-H	VGW4156	7.000	—	1.344	6.976	1.939
						GKWPL20-IN-H	VGW4187			1.359	6.991	
						GTWPR2020-H	VGW4156	4.921	1.811	0.881	4.897	1.476
						GKWPL2020-H	VGW4187			0.897	4.913	
						GTWPR2525-H	VGW4156	5.906	1.654	1.078	5.881	1.673
						GKWPL2525-H	VGW4187			1.094	5.897	
						GTWPR3232-H	VGW4156	6.693	—	1.354	6.669	1.949
						GKWPL3232-H	VGW4187			1.369	6.684	
	GBVR-VGW6-6T14	●	VGW6218 VGW6250	.562	.689	GTWPR16-IN-H	VGW6218	6.000	1.654	1.109	5.991	1.689
						GKWPL16-IN-H	VGW6250			1.125	6.007	
						GTWPR20-IN-H	VGW6218	7.000	—	1.359	6.991	1.939
						GKWPL20-IN-H	VGW6250			1.375	7.007	
						GTWPR2020-H	VGW6218	4.921	1.811	0.897	4.913	1.476
						GKWPL2020-H	VGW6250			0.913	4.928	
						GTWPR2525-H	VGW6218	5.906	1.654	1.094	5.897	1.673
						GKWPL2525-H	VGW6250			1.109	5.913	
						GTWPR3232-H	VGW6218	6.693	—	1.369	6.684	1.949
						GKWPL3232-H	VGW6250			1.385	6.700	
	GBVR-VGW6-6T19	●	VGW6250 VGW6281	.750	.890	GTWPR16-IN-H	VGW6250	6.200	1.854	1.106	5.987	1.889
						GKWPL16-IN-H	VGW6281			1.121	6.003	
						GTWPR20-IN-H	VGW6250	7.200	—	1.356	6.987	2.139
						GKWPL20-IN-H	VGW6281			1.371	7.003	
						GTWPR2020-H	VGW6250	5.121	2.011	0.893	4.909	1.676
						GKWPL2020-H	VGW6281			0.908	4.924	
						GTWPR2525-H	VGW6250	6.106	1.854	1.090	5.893	1.873
						GKWPL2525-H	VGW6281			1.105	5.908	
						GTWPR3232-H	VGW6250	6.893	—	1.365	6.680	2.149
						GKWPL3232-H	VGW6281			1.381	6.696	
	GBVR-VGW8-8T19	●	VGW8312 VGW8344	.750	1.089	GTWPR16-IN-H	VGW8312	6.400	2.054	1.138	6.020	2.089
						GKWPL16-IN-H	VGW8344			1.154	6.036	
						GTWPR20-IN-H	VGW8312	7.400	—	1.388	7.020	2.339
						GKWPL20-IN-H	VGW8344			1.404	7.036	
						GTWPR2020-H	VGW8312	5.321	2.211	0.926	4.941	1.876
						GKWPL2020-H	VGW8344			0.942	4.957	
						GTWPR2525-H	VGW8312	6.306	2.054	1.122	5.926	2.073
						GKWPL2525-H	VGW8344			1.139	5.942	
						GTWPR3232-H	VGW8312	7.093	—	1.398	6.713	2.349
						GKWPL3232-H	VGW8344			1.414	6.729	
	GBVR-VGW8-8T28	●	VGW8344 VGW8375	1.125	1.189	GTWPR16-IN-H	VGW8344	6.500	2.154	1.133	6.015	2.189
						GKWPL16-IN-H	VGW8375			1.148	6.030	
						GTWPR20-IN-H	VGW8344	7.500	—	1.383	7.015	2.439
						GKWPL20-IN-H	VGW8375			1.398	7.030	
						GTWPR2020-H	VGW8344	5.421	2.311	0.920	4.936	1.976
						GKWPL2020-H	VGW8375			0.935	4.951	
						GTWPR2525-H	VGW8344	6.406	2.154	1.117	5.920	2.173
						GKWPL2525-H	VGW8375			1.132	5.935	
						GTWPR3232-H	VGW8344	7.193	—	1.393	6.707	2.449
						GKWPL3232-H	VGW8375			1.408	6.723	

For GTWP



For GKWP



● Left hand

Hand	Blade number	Stock	Insert	Dimensions (inch)		Holder	Insert	Dimensions (inch)				
								GTWPL-H			GKWPR-H	
				a_r	L_2			L_1	L_3	F_1	L_1	F_1
L	**GBVL-VGW4-3T09**	●	VGW4125 VGW4156	.375	.441	GTWPL16-IN-H	VGW4125	5.750	1.404	1.090	5.972	1.439
						GKWPR16-IN-H	VGW4156			1.106	5.987	
						GTWPL20-IN-H	VGW4125	6.750	—	1.340	6.972	1.689
						GKWPR20-IN-H	VGW4156			1.356	6.987	
						GTWPL2020-H	VGW4125	4.671	1.561	0.878	4.893	1.226
						GKWPR2020-H	VGW4156			0.893	4.909	
						GTWPL2525-H	VGW4125	5.656	1.404	1.074	5.878	1.423
						GKWPR2525-H	VGW4156			1.090	5.893	
						GTWPL3232-H	VGW4125	6.443	—	1.350	6.665	1.699
						GKWPR3232-H	VGW4156			1.365	6.680	
	GBVL-VGW4-4T14	●	VGW4156 VGW4187	.562	.689	GTWPL16-IN-H	VGW4156	6.000	1.654	1.094	5.976	1.689
						GKWPR16-IN-H	VGW4187			1.109	5.991	
						GTWPL20-IN-H	VGW4156	7.000	—	1.344	6.976	1.939
						GKWPR20-IN-H	VGW4187			1.359	6.991	
						GTWPL2020-H	VGW4156	4.921	1.811	0.881	4.897	1.476
						GKWPR2020-H	VGW4187			0.897	4.913	
						GTWPL2525-H	VGW4156	5.906	1.654	1.078	5.881	1.673
						GKWPR2525-H	VGW4187			1.094	5.897	
						GTWPL3232-H	VGW4156	6.693	—	1.354	6.669	1.949
						GKWPR3232-H	VGW4187			1.369	6.684	
	GBVL-VGW6-6T14	●	VGW6218 VGW6250	.562	.689	GTWPL16-IN-H	VGW6218	6.000	1.654	1.109	5.991	1.689
						GKWPR16-IN-H	VGW6250			1.125	6.007	
						GTWPL20-IN-H	VGW6218	7.000	—	1.359	6.991	1.939
						GKWPR20-IN-H	VGW6250			1.375	7.007	
						GTWPL2020-H	VGW6218	4.921	1.811	0.897	4.913	1.476
						GKWPR2020-H	VGW6250			0.913	4.928	
						GTWPL2525-H	VGW6218	5.906	1.654	1.094	5.897	1.673
						GKWPR2525-H	VGW6250			1.109	5.913	
						GTWPL3232-H	VGW6218	6.693	—	1.369	6.684	1.949
						GKWPR3232-H	VGW6250			1.385	6.700	
	GBVL-VGW6-6T19	●	VGW6250 VGW6281	.750	.890	GTWPL16-IN-H	VGW6250	6.200	1.854	1.106	5.987	1.889
						GKWPR16-IN-H	VGW6281			1.121	6.003	
						GTWPL20-IN-H	VGW6250	7.200	—	1.356	6.987	2.139
						GKWPR20-IN-H	VGW6281			1.371	7.003	
						GTWPL2020-H	VGW6250	5.121	2.011	0.893	4.909	1.676
						GKWPR2020-H	VGW6281			0.908	4.924	
						GTWPL2525-H	VGW6250	6.106	1.854	1.090	5.893	1.873
						GKWPR2525-H	VGW6281			1.105	5.908	
						GTWPL3232-H	VGW6250	6.893	—	1.365	6.680	2.149
						GKWPR3232-H	VGW6281			1.381	6.696	
	GBVL-VGW8-8T19	●	VGW8312 VGW8344	.750	1.089	GTWPL16-IN-H	VGW8312	6.400	2.054	1.138	6.020	2.089
						GKWPR16-IN-H	VGW8344			1.154	6.036	
						GTWPL20-IN-H	VGW8312	7.400	—	1.388	7.020	2.339
						GKWPR20-IN-H	VGW8344			1.404	7.036	
						GTWPL2020-H	VGW8312	5.321	2.211	0.926	4.941	1.876
						GKWPR2020-H	VGW8344			0.942	4.957	
						GTWPL2525-H	VGW8312	6.306	2.054	1.122	5.926	2.073
						GKWPR2525-H	VGW8344			1.139	5.942	
						GTWPL3232-H	VGW8312	7.093	—	1.398	6.713	2.349
						GKWPR3232-H	VGW8344			1.414	6.729	
	GBVL-VGW8-8T28	●	VGW8344 VGW8375	1.125	1.189	GTWPL16-IN-H	VGW8344	6.500	2.154	1.133	6.015	2.189
						GKWPR16-IN-H	VGW8375			1.148	6.030	
						GTWPL20-IN-H	VGW8344	7.500	—	1.383	7.015	2.439
						GKWPR20-IN-H	VGW8375			1.398	7.030	
						GTWPL2020-H	VGW8344	5.421	2.311	0.920	4.936	1.976
						GKWPR2020-H	VGW8375			0.935	4.951	
						GTWPL2525-H	VGW8344	6.406	2.154	1.117	5.920	2.173
						GKWPR2525-H	VGW8375			1.132	5.935	
						GTWPL3232-H	VGW8344	7.193	—	1.393	6.707	2.449
						GKWPR3232-H	VGW8375			1.408	6.723	

● : Stock
● : Stock (Newly added)
■ □ R L : While stocks last

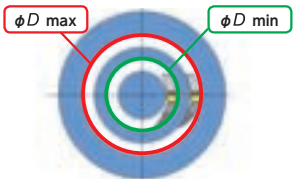
R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

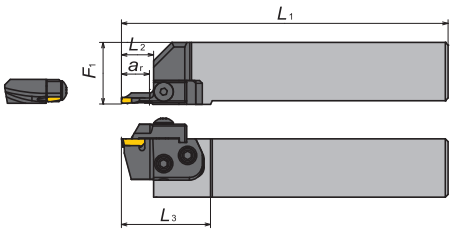
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only)
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only, Newly added)

Blade for Face Grooving

VGW



For GTWP



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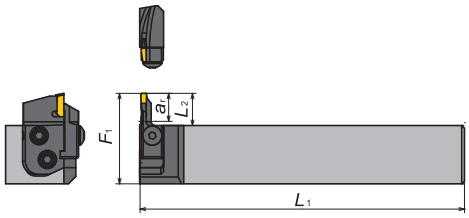
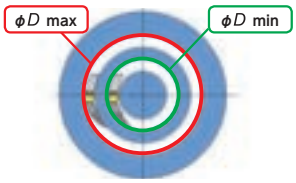
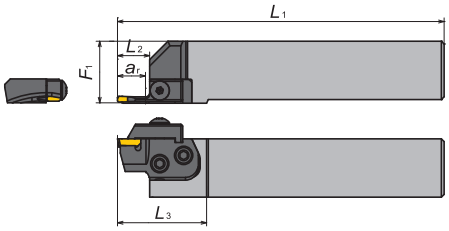


● Right hand

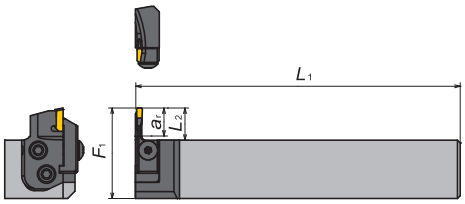
Curve	Blade number	Stock	Insert	O.D. range	Dimensions (inch)		Holder	Insert	Dimensions (inch)				
									GTWPR-H			GKWPL-H	
					a_r	L_2			L_1	L_3	F_1	L_1	F_1
in	GBI-VGW4R3T15-101177	●	VGW4125 VGW4156	4"-7"	.600	.829	GTWPR16-IN-H	VGW4125	6.000	1.909	1.055	5.937	1.949
							GKWPL16-IN-H	VGW4156			1.070	5.952	
							GTWPR20-IN-H	VGW4125	7.000	1.909	1.305	6.937	1.939
							GKWPL20-IN-H	VGW4156			1.320	6.952	
							GTWPR2020-H	VGW4125	4.921	1.909	0.842	4.858	1.949
							GKWPL2020-H	VGW4156			0.857	4.873	
							GTWPR2525-H	VGW4125	5.906	1.909	1.039	5.842	1.949
							GKWPL2525-H	VGW4156			1.054	5.857	
							GTWPR3232-H	VGW4125	6.693	1.909	1.315	6.630	1.949
							GKWPL3232-H	VGW4156			1.330	6.645	
	GBI-VGW4R3T15-177999	●	VGW4125 VGW4156	7" and over	.600	.829	GTWPR16-IN-H	VGW4125	6.000	1.909	1.055	5.937	1.949
							GKWPL16-IN-H	VGW4156			1.070	5.952	
							GTWPR20-IN-H	VGW4125	7.000	1.909	1.305	6.937	1.939
							GKWPL20-IN-H	VGW4156			1.320	6.952	
							GTWPR2020-H	VGW4125	4.921	1.909	0.842	4.858	1.949
							GKWPL2020-H	VGW4156			0.857	4.873	
							GTWPR2525-H	VGW4125	5.906	1.909	1.039	5.842	1.949
							GKWPL2525-H	VGW4156			1.054	5.857	
							GTWPR3232-H	VGW4125	6.693	1.909	1.315	6.630	1.949
							GKWPL3232-H	VGW4156			1.330	6.645	
	GBI-VGW4R4T15-101177	●	VGW4156 VGW4187	4"-7"	.600	.829	GTWPR16-IN-H	VGW4156	6.000	1.909	1.058	5.940	1.949
							GKWPL16-IN-H	VGW4187			1.074	5.956	
							GTWPR20-IN-H	VGW4156	7.000	1.909	1.308	6.940	1.939
							GKWPL20-IN-H	VGW4187			1.324	6.956	
							GTWPR2020-H	VGW4156	4.921	1.909	0.846	4.861	1.949
							GKWPL2020-H	VGW4187			0.861	4.877	
							GTWPR2525-H	VGW4156	5.906	1.909	1.043	5.846	1.949
							GKWPL2525-H	VGW4187			1.058	5.861	
							GTWPR3232-H	VGW4156	6.693	1.909	1.318	6.633	1.949
							GKWPL3232-H	VGW4187			1.334	6.649	
	GBI-VGW4R4T15-177999	●	VGW4156 VGW4187	7" and over	.600	.829	GTWPR16-IN-H	VGW4156	6.000	1.909	1.058	5.940	1.949
							GKWPL16-IN-H	VGW4187			1.074	5.956	
							GTWPR20-IN-H	VGW4156	7.000	1.909	1.308	6.940	1.939
							GKWPL20-IN-H	VGW4187			1.324	6.956	
							GTWPR2020-H	VGW4156	4.921	1.909	0.846	4.861	1.949
							GKWPL2020-H	VGW4187			0.861	4.877	
							GTWPR2525-H	VGW4156	5.906	1.909	1.043	5.846	1.949
							GKWPL2525-H	VGW4187			1.058	5.861	
							GTWPR3232-H	VGW4156	6.693	1.909	1.318	6.633	1.949
							GKWPL3232-H	VGW4187			1.334	6.649	
	GBI-VGW6R6T15-101177	●	VGW6218 VGW6250	4"-7"	.600	.829	GTWPR16-IN-H	VGW6218	6.000	1.909	1.078	5.960	1.949
							GKWPL16-IN-H	VGW6250			1.094	5.976	
							GTWPR20-IN-H	VGW6218	7.000	1.909	1.328	6.960	1.939
							GKWPL20-IN-H	VGW6250			1.344	6.976	
							GTWPR2020-H	VGW6218	4.921	1.909	0.865	4.881	1.949
							GKWPL2020-H	VGW6250			0.881	4.897	
							GTWPR2525-H	VGW6218	5.906	1.909	1.062	5.865	1.949
							GKWPL2525-H	VGW6250			1.078	5.881	
							GTWPR3232-H	VGW6218	6.693	1.909	1.338	6.653	1.949
							GKWPL3232-H	VGW6250			1.354	6.669	
	GBI-VGW6R6T15-177999	●	VGW6218 VGW6250	7" and over	.600	.829	GTWPR16-IN-H	VGW6218	6.000	1.909	1.082	5.964	1.949
							GKWPL16-IN-H	VGW6250			1.098	5.980	
							GTWPR20-IN-H	VGW6218	7.000	1.909	1.332	6.964	1.939
							GKWPL20-IN-H	VGW6250			1.348	6.980	
							GTWPR2020-H	VGW6218	4.921	1.909	0.869	4.885	1.949
							GKWPL2020-H	VGW6250			0.885	4.901	
							GTWPR2525-H	VGW6218	5.906	1.909	1.066	5.869	1.949
							GKWPL2525-H	VGW6250			1.082	5.885	
							GTWPR3232-H	VGW6218	6.693	1.909	1.342	6.657	1.949
							GKWPL3232-H	VGW6250			1.357	6.672	



For GTWP



For GKWP



● Right hand

Curve	Blade number	Stock	Insert	O.D. range	Dimensions (inch) a_r	Dimensions (inch) L_2	Holder	Insert	Dimensions (inch) GTWPL-H L_1	GTWPL-H L_3	GTWPL-H F_1	GKWPR-H L_1	GKWPR-H F_1
out	**GBO-VGW4R3T15-101177**	●	VGW4125 VGW4156	4"-7"	.600	.829	GTWPR16-IN-H	VGW4125	6.000	1.909	1.055	5.937	1.949
							GKWPL16-IN-H	VGW4156			1.070	5.952	
							GTWPR20-IN-H	VGW4125	7.000	1.909	1.305	6.937	1.939
							GKWPL20-IN-H	VGW4156			1.320	6.952	
							GTWPR2020-H	VGW4125	4.921	1.909	0.842	4.858	1.949
							GKWPL2020-H	VGW4156			0.857	4.873	
							GTWPR2525-H	VGW4125	5.906	1.909	1.039	5.842	1.949
							GKWPL2525-H	VGW4156			1.054	5.857	
							GTWPR3232-H	VGW4125	6.693	1.909	1.315	6.630	1.949
							GKWPL3232-H	VGW4156			1.330	6.645	
	GBO-VGW4R3T15-177999	●	VGW4125 VGW4156	7" and over	.600	.829	GTWPR16-IN-H	VGW4125	6.000	1.909	1.094	5.976	1.949
							GKWPL16-IN-H	VGW4156			1.109	5.991	
							GTWPR20-IN-H	VGW4125	7.000	1.909	1.344	6.976	1.939
							GKWPL20-IN-H	VGW4156			1.359	6.991	
							GTWPR2020-H	VGW4125	4.921	1.909	0.881	4.897	1.949
							GKWPL2020-H	VGW4156			0.897	4.913	
							GTWPR2525-H	VGW4125	5.906	1.909	1.078	5.881	1.949
							GKWPL2525-H	VGW4156			1.094	5.897	
							GTWPR3232-H	VGW4125	6.693	1.909	1.354	6.669	1.949
							GKWPL3232-H	VGW4156			1.369	6.684	
	GBO-VGW4R4T15-101177	●	VGW4156 VGW4187	4"-7"	.600	.829	GTWPR16-IN-H	VGW4156	6.000	1.909	1.058	5.940	1.949
							GKWPL16-IN-H	VGW4187			1.074	5.956	
							GTWPR20-IN-H	VGW4156	7.000	1.909	1.308	6.940	1.939
							GKWPL20-IN-H	VGW4187			1.324	6.956	
							GTWPR2020-H	VGW4156	4.921	1.909	0.846	4.861	1.949
							GKWPL2020-H	VGW4187			0.861	4.877	
							GTWPR2525-H	VGW4156	5.906	1.909	1.043	5.846	1.949
							GKWPL2525-H	VGW4187			1.058	5.861	
							GTWPR3232-H	VGW4156	6.693	1.909	1.318	6.633	1.949
							GKWPL3232-H	VGW4187			1.334	6.649	
	GBO-VGW4R4T15-177999	●	VGW4156 VGW4187	7" and over	.600	.829	GTWPR16-IN-H	VGW4156	6.000	1.909	1.094	5.976	1.949
							GKWPL16-IN-H	VGW4187			1.109	5.991	
							GTWPR20-IN-H	VGW4156	7.000	1.909	1.344	6.976	1.939
							GKWPL20-IN-H	VGW4187			1.359	6.991	
							GTWPR2020-H	VGW4156	4.921	1.909	0.881	4.897	1.949
							GKWPL2020-H	VGW4187			0.897	4.916	
							GTWPR2525-H	VGW4156	5.906	1.909	1.078	5.881	1.949
							GKWPL2525-H	VGW4187			1.094	5.897	
							GTWPR3232-H	VGW4156	6.693	1.909	1.354	6.669	1.949
							GKWPL3232-H	VGW4187			1.369	6.684	
	GBO-VGW6R6T15-101177	●	VGW6218 VGW6250	4"-7"	.600	.829	GTWPR16-IN-H	VGW6218	6.000	1.909	1.078	5.960	1.949
							GKWPL16-IN-H	VGW6250			1.094	5.976	
							GTWPR20-IN-H	VGW6218	7.000	1.909	1.328	6.960	1.939
							GKWPL20-IN-H	VGW6250			1.344	6.976	
							GTWPR2020-H	VGW6218	4.921	1.909	0.865	4.881	1.949
							GKWPL2020-H	VGW6250			0.881	4.897	
							GTWPR2525-H	VGW6218	5.906	1.909	1.062	5.865	1.949
							GKWPL2525-H	VGW6250			1.078	5.881	
							GTWPR3232-H	VGW6218	6.693	1.909	1.338	6.653	1.949
							GKWPL3232-H	VGW6250			1.354	6.669	
	GBO-VGW6R6T15-177999	●	VGW6218 VGW6250	7" and over	.600	.829	GTWPR16-IN-H	VGW6218	6.000	1.909	1.082	5.964	1.949
							GKWPL16-IN-H	VGW6250			1.098	5.980	
							GTWPR20-IN-H	VGW6218	7.000	1.909	1.332	6.964	1.939
							GKWPL20-IN-H	VGW6250			1.348	6.980	
							GTWPR2020-H	VGW6218	4.921	1.909	0.869	4.885	1.949
							GKWPL2020-H	VGW6250			0.885	4.901	
							GTWPR2525-H	VGW6218	5.906	1.909	1.066	5.869	1.949
							GKWPL2525-H	VGW6250			1.082	5.885	
							GTWPR3232-H	VGW6218	6.693	1.909	1.342	6.657	1.949
							GKWPL3232-H	VGW6250			1.357	6.672	

● : Stock
● : Stock (Newly added)
■□RL : While stocks last

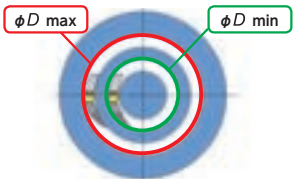
R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

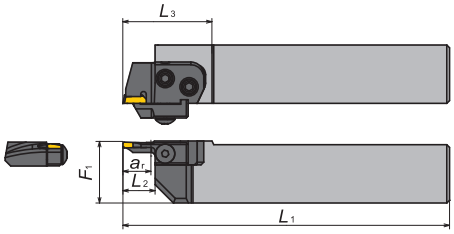
ⓇⓁ : 1-2 week delivery (Right / Left-hand only)
ⓇⓁ : 1-2 week delivery (Right / Left-hand only, Newly added)

Blade for Face Grooving

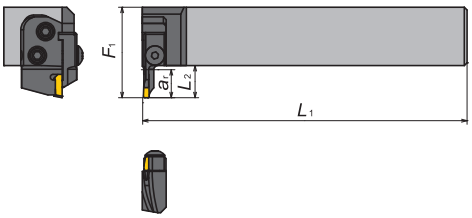
VGW



For GTWP

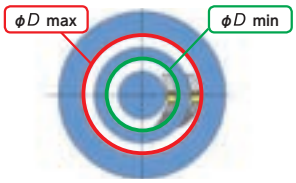


For GKWP

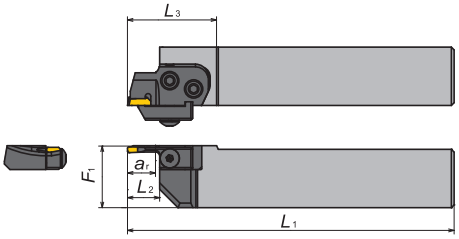


● Left hand

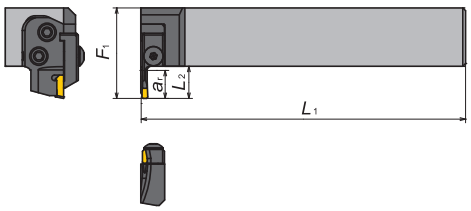
Curve	Blade number	Stock	Insert	O.D. range	Dimensions (inch)		Holder	Insert	Dimensions (inch)				
									GTWPR-H			GKWPL-H	
					a_r	L_2			L_1	L_3	F_1	L_1	F_1
in	GBI-VGW4L3T15-101177	●	VGW4125 VGW4156	4"-7"	.600	.829	GTWPR16-IN-H	VGW4125	6.000	1.909	1.055	5.937	1.949
							GKWPL16-IN-H	VGW4156			1.070	5.952	
							GTWPR20-IN-H	VGW4125	7.000	1.909	1.305	6.937	1.939
							GKWPL20-IN-H	VGW4156			1.320	6.952	
							GTWPR2020-H	VGW4125	4.921	1.909	0.842	4.858	1.949
							GKWPL2020-H	VGW4156			0.857	4.873	
							GTWPR2525-H	VGW4125	5.906	1.909	1.039	5.842	1.949
							GKWPL2525-H	VGW4156			1.054	5.857	
							GTWPR3232-H	VGW4125	6.693	1.909	1.315	6.630	1.949
							GKWPL3232-H	VGW4156			1.330	6.645	
	GBI-VGW4L3T15-177999	●	VGW4125 VGW4156	7" and over	.600	.829	GTWPR16-IN-H	VGW4125	6.000	1.909	1.055	5.933	1.949
							GKWPL16-IN-H	VGW4156			1.070	5.952	
							GTWPR20-IN-H	VGW4125	7.000	1.909	1.305	6.937	1.939
							GKWPL20-IN-H	VGW4156			1.320	6.952	
							GTWPR2020-H	VGW4125	4.921	1.909	0.842	4.858	1.949
							GKWPL2020-H	VGW4156			0.857	4.873	
							GTWPR2525-H	VGW4125	5.906	1.909	1.039	5.842	1.949
							GKWPL2525-H	VGW4156			1.054	5.857	
							GTWPR3232-H	VGW4125	6.693	1.909	1.315	6.630	1.949
							GKWPL3232-H	VGW4156			1.330	6.645	
	GBI-VGW4L4T15-101177	●	VGW4156 VGW4187	4"-7"	.600	.829	GTWPR16-IN-H	VGW4156	6.000	1.909	1.058	5.940	1.949
							GKWPL16-IN-H	VGW4187			1.074	5.956	
							GTWPR20-IN-H	VGW4156	7.000	1.909	1.308	6.940	1.939
							GKWPL20-IN-H	VGW4187			1.324	6.956	
							GTWPR2020-H	VGW4156	4.921	1.909	0.846	4.861	1.949
							GKWPL2020-H	VGW4187			0.861	4.877	
							GTWPR2525-H	VGW4156	5.906	1.909	1.043	5.846	1.949
							GKWPL2525-H	VGW4187			1.058	5.861	
							GTWPR3232-H	VGW4156	6.693	1.909	1.318	6.633	1.949
							GKWPL3232-H	VGW4187			1.334	6.649	
	GBI-VGW4L4T15-177999	●	VGW4156 VGW4187	7" and over	.600	.829	GTWPR16-IN-H	VGW4156	6.000	1.909	1.058	5.940	1.949
							GKWPL16-IN-H	VGW4187			1.074	5.956	
							GTWPR20-IN-H	VGW4156	7.000	1.909	1.308	6.940	1.939
							GKWPL20-IN-H	VGW4187			1.324	6.956	
							GTWPR2020-H	VGW4156	4.921	1.909	0.846	4.861	1.949
							GKWPL2020-H	VGW4187			0.861	4.877	
							GTWPR2525-H	VGW4156	5.906	1.909	1.043	5.846	1.949
							GKWPL2525-H	VGW4187			1.058	5.861	
							GTWPR3232-H	VGW4156	6.693	1.909	1.318	6.633	1.949
							GKWPL3232-H	VGW4187			1.334	6.649	
	GBI-VGW6L6T15-101177	●	VGW6218 VGW6250	4"-7"	.600	.829	GTWPR16-IN-H	VGW6218	6.000	1.909	1.078	5.960	1.949
							GKWPL16-IN-H	VGW6250			1.094	5.976	
							GTWPR20-IN-H	VGW6218	7.000	1.909	1.328	6.960	1.939
							GKWPL20-IN-H	VGW6250			1.344	6.976	
							GTWPR2020-H	VGW6218	4.921	1.909	0.865	4.881	1.949
							GKWPL2020-H	VGW6250			0.881	4.897	
							GTWPR2525-H	VGW6218	5.906	1.909	1.062	5.865	1.949
							GKWPL2525-H	VGW6250			1.078	5.881	
							GTWPR3232-H	VGW6218	6.693	1.909	1.338	6.653	1.949
							GKWPL3232-H	VGW6250			1.354	6.669	
	GBI-VGW6L6T15-177999	●	VGW6218 VGW6250	7" and over	.600	.829	GTWPR16-IN-H	VGW6218	6.000	1.909	1.082	5.964	1.949
							GKWPL16-IN-H	VGW6250			1.098	5.980	
							GTWPR20-IN-H	VGW6218	7.000	1.909	1.332	6.964	1.939
							GKWPL20-IN-H	VGW6250			1.348	6.980	
							GTWPR2020-H	VGW6218	4.921	1.909	0.869	4.885	1.949
							GKWPL2020-H	VGW6250			0.885	4.901	
							GTWPR2525-H	VGW6218	5.906	1.909	1.066	5.869	1.949
							GKWPL2525-H	VGW6250			1.082	5.885	
							GTWPR3232-H	VGW6218	6.693	1.909	1.342	6.657	1.949
							GKWPL3232-H	VGW6250			1.357	6.672	



For GTWP



For GKWP



● Left hand

Curve	Blade number	Stock	Insert	O.D. range	Dimensions (inch) a_r	Dimensions (inch) L_2	Holder	Insert	Dimensions (inch) GTWPL-H L_1	GTWPL-H L_3	GTWPL-H F_1	GKWPR-H L_1	GKWPR-H F_1
out	GBO-VGW4L3T15-101177	●	VGW4125 VGW4156	4"-7"	.600	.829	GTWPR16-IN-H	VGW4125	6.000	1.909	1.055	5.937	1.949
							GKWPL16-IN-H	VGW4156			1.070	5.952	
							GTWPR20-IN-H	VGW4125	7.000	1.909	1.305	6.937	1.939
							GKWPL20-IN-H	VGW4156			1.320	6.952	
							GTWPR2020-H	VGW4125	4.921	1.909	0.842	4.858	1.949
							GKWPL2020-H	VGW4156			0.857	4.873	
							GTWPR2525-H	VGW4125	5.906	1.909	1.039	5.842	1.949
							GKWPL2525-H	VGW4156			1.054	5.857	
							GTWPR3232-H	VGW4125	6.693	1.909	1.315	6.630	1.949
							GKWPL3232-H	VGW4156			1.330	6.645	
	GBO-VGW4L3T15-177999	●	VGW4125 VGW4156	7" and over	.600	.829	GTWPR16-IN-H	VGW4125	6.000	1.909	1.094	5.976	1.949
							GKWPL16-IN-H	VGW4156			1.109	5.991	
							GTWPR20-IN-H	VGW4125	7.000	1.909	1.344	6.976	1.939
							GKWPL20-IN-H	VGW4156			1.359	6.991	
							GTWPR2020-H	VGW4125	4.921	1.909	0.881	4.897	1.949
							GKWPL2020-H	VGW4156			0.897	4.913	
							GTWPR2525-H	VGW4125	5.906	1.909	1.078	5.881	1.949
							GKWPL2525-H	VGW4156			1.094	5.897	
							GTWPR3232-H	VGW4125	6.693	1.909	1.354	6.669	1.949
							GKWPL3232-H	VGW4156			1.369	6.684	
	GBO-VGW4L4T15-101177	●	VGW4156 VGW4187	4"-7"	.600	.829	GTWPR16-IN-H	VGW4156	6.000	1.909	1.058	5.940	1.949
							GKWPL16-IN-H	VGW4187			1.074	5.956	
							GTWPR20-IN-H	VGW4156	7.000	1.909	1.308	6.940	1.939
							GKWPL20-IN-H	VGW4187			1.324	6.956	
							GTWPR2020-H	VGW4156	4.921	1.909	0.846	4.861	1.949
							GKWPL2020-H	VGW4187			0.861	4.877	
							GTWPR2525-H	VGW4156	5.906	1.909	1.043	5.846	1.949
							GKWPL2525-H	VGW4187			1.058	5.861	
							GTWPR3232-H	VGW4156	6.693	1.909	1.318	6.633	1.949
							GKWPL3232-H	VGW4187			1.334	6.649	
	GBO-VGW4L4T15-177999	●	VGW4156 VGW4187	7" and over	.600	.829	GTWPR16-IN-H	VGW4156	6.000	1.909	1.094	5.976	1.949
							GKWPL16-IN-H	VGW4187			1.109	5.991	
							GTWPR20-IN-H	VGW4156	7.000	1.909	1.344	6.976	1.939
							GKWPL20-IN-H	VGW4187			1.359	6.991	
							GTWPR2020-H	VGW4156	4.921	1.909	0.881	4.897	1.949
							GKWPL2020-H	VGW4187			0.897	4.916	
							GTWPR2525-H	VGW4156	5.906	1.909	1.078	5.881	1.949
							GKWPL2525-H	VGW4187			1.094	5.897	
							GTWPR3232-H	VGW4156	6.693	1.909	1.354	6.669	1.949
							GKWPL3232-H	VGW4187			1.369	6.684	
	GBO-VGW6L6T15-101177	●	VGW6218 VGW6250	4"-7"	.600	.829	GTWPR16-IN-H	VGW6218	6.000	1.909	1.078	5.960	1.949
							GKWPL16-IN-H	VGW6250			1.094	5.976	
							GTWPR20-IN-H	VGW6218	7.000	1.909	1.328	6.960	1.939
							GKWPL20-IN-H	VGW6250			1.344	6.976	
							GTWPR2020-H	VGW6218	4.921	1.909	0.865	4.881	1.949
							GKWPL2020-H	VGW6250			0.881	4.897	
							GTWPR2525-H	VGW6218	5.906	1.909	1.062	5.865	1.949
							GKWPL2525-H	VGW6250			1.078	5.881	
							GTWPR3232-H	VGW6218	6.693	1.909	1.338	6.653	1.949
							GKWPL3232-H	VGW6250			1.354	6.669	
	GBO-VGW6L6T15-177999	●	VGW6218 VGW6250	7" and over	.600	.829	GTWPR16-IN-H	VGW6218	6.000	1.909	1.082	5.964	1.949
							GKWPL16-IN-H	VGW6250			1.098	5.980	
							GTWPR20-IN-H	VGW6218	7.000	1.909	1.332	6.964	1.939
							GKWPL20-IN-H	VGW6250			1.348	6.980	
							GTWPR2020-H	VGW6218	4.921	1.909	0.869	4.885	1.949
							GKWPL2020-H	VGW6250			0.885	4.901	
							GTWPR2525-H	VGW6218	5.906	1.909	1.066	5.869	1.949
							GKWPL2525-H	VGW6250			1.082	5.885	
							GTWPR3232-H	VGW6218	6.693	1.909	1.342	6.657	1.949
							GKWPL3232-H	VGW6250			1.357	6.672	

● : Stock
● : Stock (Newly added)
■ □ R L : While stocks last

R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

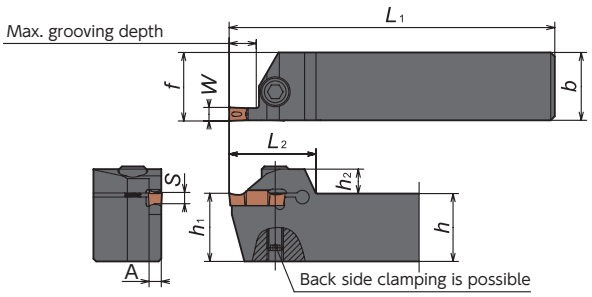
○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only)
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only, Newly added)

Groove DUO

Mono-shank style

GTWP



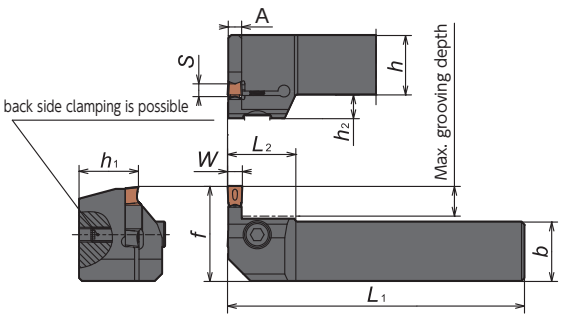
Recommended tightening torque 7.0[N・m]

・Right-hand shown

● Toolholder Body

Holder Number	Stock		Width w		Max. Grooving Depth a_r		Dimensions										Seat Size s	Applicable Insert	Spare Parts	
							h		b		h_1		h_2		f		L_1		L_2		A				Bolt	Wrench
	R	L	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)				
GTWP□2020K-3D10	○	○	.118	3	.394	10	.787	20	.787	20	.787	20	.315	8	.795	20.2	4.921	125	1.142	29	.102	2.6	D	GWP○300	CS0520W	LW-4
GTWP□2525M-3D10	○	○	.118	3	.394	10	.984	25	.984	25	.984	25	.354	9	.992	25.2	5.906	150	1.260	32	.102	2.6	D	GWP○300	CS0625W	LW-5
GTWP□2020K-3D20	○	○	.118	3	.787	20	.787	20	.787	20	.787	20	.315	8	.795	20.2	4.921	125	1.614	41	.102	2.6	D	GWP○300	CS0520W	LW-4
GTWP□2525M-3D20	○	○	.118	3	.787	20	.984	25	.984	25	.984	25	.354	9	.992	25.2	5.906	150	1.732	44	.102	2.6	D	GWP○300	CS0625W	LW-5
GTWP□2020K-4E10	○	○	.157	4	.394	10	.787	20	.787	20	.787	20	.315	8	.799	20.3	4.921	125	1.142	29	.138	3.5	E	GWP○400	CS0520W	LW-4
GTWP□2525M-4E10	○	○	.157	4	.394	10	.984	25	.984	25	.984	25	.354	9	.996	25.3	5.906	150	1.260	32	.138	3.5	E	GWP○400	CS0625W	LW-5
GTWP□2020K-4E20	○	○	.157	4	.787	20	.787	20	.787	20	.787	20	.315	8	.799	20.3	4.921	125	1.614	41	.138	3.5	E	GWP○400	CS0520W	LW-4
GTWP□2525M-4E20	○	○	.157	4	.787	20	.984	25	.984	25	.984	25	.354	9	.996	25.3	5.906	150	1.732	44	.138	3.5	E	GWP○400	CS0625W	LW-5
GTWP□2020K-5F10	○	○	.197	5	.394	10	.787	20	.787	20	.787	20	.315	8	.799	20.3	4.921	125	1.142	29	.177	4.5	F	GWP○500	CS0520W	LW-4
GTWP□2525M-5F10	○	○	.197	5	.394	10	.984	25	.984	25	.984	25	.354	9	.996	25.3	5.906	150	1.260	32	.177	4.5	F	GWP○500	CS0625W	LW-5
GTWP□2020K-5F20	○	○	.197	5	.787	20	.787	20	.787	20	.787	20	.315	8	.799	20.3	4.921	125	1.614	41	.177	4.5	F	GWP○500	CS0520W	LW-4
GTWP□2525M-5F20	○	○	.197	5	.787	20	.984	25	.984	25	.984	25	.354	9	.996	25.3	5.906	150	1.732	44	.177	4.5	F	GWP○500	CS0625W	LW-5
GTWP□2020K-6G12	○	○	.236	6	.472	12	.787	20	.787	20	.787	20	.315	8	.801	20.35	4.921	125	1.339	34	.209	5.3	G	GWP○600	CS0520W	LW-4
GTWP□2525M-6G12	○	○	.236	6	.472	12	.984	25	.984	25	.984	25	.354	9	.998	25.35	5.906	150	1.457	37	.209	5.3	G	GWP○600	CS0625W	LW-5
GTWP□2020K-6G25	○	○	.236	6	.984	25	.787	20	.787	20	.787	20	.315	8	.801	20.35	4.921	125	1.929	49	.209	5.3	G	GWP○600	CS0520W	LW-4
GTWP□2525M-6G25	○	○	.236	6	.984	25	.984	25	.984	25	.984	25	.354	9	.998	25.35	5.906	150	2.047	52	.209	5.3	G	GWP○600	CS0625W	LW-5

GKWP



Recommended tightening torque 7.0[N・m]

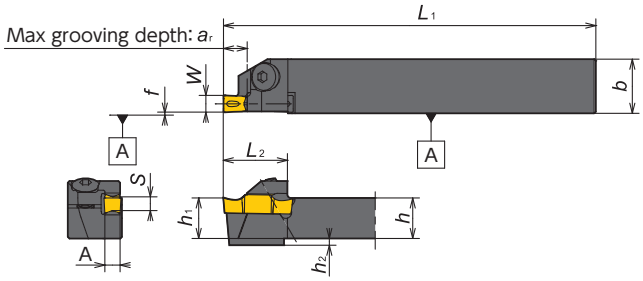
・L-hand shown

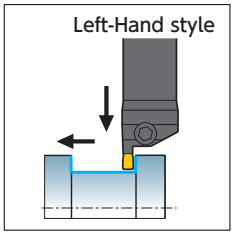
Holder Number	Stock		Width w		Max. Grooving Depth a_r		Dimensions										Seat Size s	Applicable Insert	Spare Parts	
							h		b		h_1		h_2		f		L_1		L_2		A				Bolt	Wrench
	R	L	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)				
GKWP□2020K-3D10		○	.118	3	.394	10	.787	20	.787	20	.787	20	.315	8	1.260	32	4.921	125	.906	23	.102	2.6	D	GWP○300	CS0520W	LW-4
GKWP□2020K-4E10		○	.157	4	.394	10	.787	20	.787	20	.787	20	.315	8	1.260	32	4.921	125	.906	23	.138	3.5	E	GWP○400	CS0520W	LW-4
GKWP□2020K-5F10		○	.197	5	.394	10	.787	20	.787	20	.787	20	.315	8	1.260	32	4.921	125	.906	23	.177	4.5	F	GWP○500	CS0520W	LW-4
GKWP□2020K-6G12		○	.236	6	.472	12	.787	20	.787	20	.787	20	.315	8	1.339	34	4.921	125	.906	23	.209	5.3	G	GWP○600	CS0520W	LW-4

Groove DUO

GTWP

For Swiss Style Machine



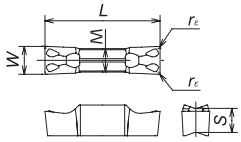
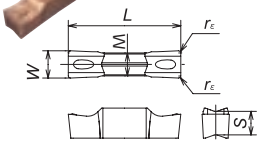


Right-Hand style shown

● Toolholder

Gage Insert	Item Number	Figure	Stock R	Stock L	Groove Width w (Inch)	Groove Width w (mm)	a_r (Inch)	a_r (mm)	h (Inch)	h (mm)	b (Inch)	b (mm)	h_1 (Inch)	h_1 (mm)	L_1 (Inch)	L_1 (mm)	h_2 (Inch)	h_2 (mm)	f (Inch)	f (mm)	L_2 (Inch)	L_2 (mm)	A (Inch)	A (mm)	Seat Size s	Clamp Screw	Wrench
GWP ○ 300	GTWP□08-IN3D07	1	●		.118	3	.275	7	1/2		.630	16	1/2		4.724	120	0	0	.012	0.3	.748	19	.102	2.6	D	AOB-5×14	LW-3S
	GTWP□10-IN3D09	1	●		.118	3	.354	9	5/8		.630	16	5/8		4.724	120	0	0	.012	0.3	.866	22	.102	2.6	D	AOB-5×16	LW-3S
	GTWP□1016-3D07	1	○		.118	3	.275	7	.394	10	.630	16	.472	12	4.724	120	.079	2	.012	0.3	.748	19	.102	2.6	D	AOB-5×14	LW-3S
	GTWP□1216-3D07	1	●	○	.118	3	.275	7	.472	12	.630	16	.472	12	4.724	120	0	0	.012	0.3	.768	19.5	.102	2.6	D	AOB-5×16	LW-3S
	GTWP□1616-3D09	1	○	○	.118	3	.354	9	.630	16	.630	16	.630	16	4.724	120	0	0	.012	0.3	.866	22	.102	2.6	D	AOB-5×16	LW-3S
GWP ○ 400	GTWP□08-IN4E07	1	●		.157	4	.275	7	1/2		.630	16	1/2		4.724	120	0	0	.012	0.3	.748	19	.138	3.5	E	AOB-5×14	LW-3S
	GTWP□10-IN4E09	1	●		.157	4	.354	9	5/8		.630	16	5/8		4.724	120	0	0	.012	0.3	.866	22	.138	3.5	E	AOB-5×16	LW-3S
	GTWP□1016-4E07	1	○		.157	4	.275	7	.394	10	.630	16	.472	12	4.724	120	.079	2	.012	0.3	.748	19	.138	3.5	E	AOB-5×14	LW-3S
	GTWP□1216-4E07	1	●	○	.157	4	.275	7	.472	12	.630	16	.472	12	4.724	120	0	0	.012	0.3	.768	19.5	.138	3.5	E	AOB-5×16	LW-3S
	GTWP□1616-4E09	1	○	○	.157	4	.354	9	.630	16	.630	16	.630	16	4.724	120	0	0	.012	0.3	.866	22	.138	3.5	E	AOB-5×16	LW-3S
GWP ○ 500	GTWP□1016-5F07	1	○		.197	5	.275	7	.394	10	.630	16	.472	12	4.724	120	.079	2	.012	0.3	.748	19	.177	4.5	F	AOB-5×14	LW-3S
	GTWP□1216-5F07	1	○	○	.197	5	.275	7	.472	12	.630	16	.472	12	4.724	120	0	0	.012	0.3	.768	19.5	.177	4.5	F	AOB-5×16	LW-3S
	GTWP□1616-5F09	1	○	○	.197	5	.354	9	.630	16	.630	16	.630	16	4.724	120	0	0	.012	0.3	.866	22	.177	4.5	F	AOB-5×16	LW-3S
GWP ○ 600	GTWP□1020-6G07	1	○		.236	6	.275	7	.394	10	.787	20	.394	10	4.724	120	.079	2	.012	0.3	.866	22	.209	5.3	G	AOB-5×14	LW-3S
	GTWP□1220-6G07	1	○		.236	6	.275	7	.472	12	.787	20	.472	12	4.724	120	0	0	.012	0.3	.886	22.5	.209	5.3	G	AOB-5×16	LW-3S
	GTWP□1620-6G09	1	○	○	.236	6	.354	9	.630	16	.787	20	.630	16	4.724	120	0	0	.012	0.3	.984	25	.209	5.3	G	AOB-5×16	LW-3S

Groove DUO Series - Inserts

Shape	Item Number	w Groove Width (Inch)	w Groove Width (mm)	w Width Tolerance (Inch)	w Width Tolerance (mm)	r_ε (Inch)	r_ε (mm)	M (Inch)	M (mm)	L (Inch)	L (mm)	Seat Size s	Coated Carbide DM4
 GWPG: Outside ground GWPM: Full-molded ●Excellent chip control ●Best for side turning	GWPG300N02D-GW	.118	3.0	.001	± 0.025	.008	0.2	.098	2.5	.811	20.6	D	● 5848023
	GWPG300N04D-GW	.118	3.0	.001	± 0.025	.016	0.4	.098	2.5	.811	20.6	D	● 5848031
	GWPG400N02E-GW	.157	4.0	.001	± 0.025	.008	0.2	.134	3.4	.811	20.6	E	● 5848064
	GWPG400N04E-GW	.157	4.0	.001	± 0.025	.016	0.4	.134	3.4	.811	20.6	E	● 5848072
	GWPG400N08E-GW	.157	4.0	.001	± 0.025	.031	0.8	.134	3.4	.811	20.6	E	● 5852868
	GWPG500N02F-GW	.197	5.0	.001	± 0.025	.008	0.2	.169	4.3	.811	20.6	F	○ 5848106
	GWPG500N04F-GW	.197	5.0	.001	± 0.025	.016	0.4	.169	4.3	.811	20.6	F	○ 5848114
	GWPG500N08F-GW	.197	5.0	.001	± 0.025	.031	0.8	.169	4.3	.811	20.6	F	○ 5852876
	GWPG600N02G-GW	.236	6.0	.001	± 0.025	.008	0.2	.205	5.2	1.008	25.6	G	○ 5848148
	GWPG600N04G-GW	.236	6.0	.001	± 0.025	.016	0.4	.205	5.2	1.008	25.6	G	○ 5848155
	GWPG600N08G-GW	.236	6.0	.001	± 0.025	.031	0.8	.205	5.2	1.008	25.6	G	○ 5852900
	GWPM300N04D-GW	.118	3.0	.002	± 0.05	.016	0.4	.098	2.5	.811	20.6	D	○ 5848171
	GWPM400N04E-GW	.157	4.0	.002	± 0.05	.016	0.4	.134	3.4	.811	20.6	E	○ 5848197
	GWPM500N04F-GW	.197	5.0	.002	± 0.05	.016	0.4	.169	4.3	.811	20.6	F	○ 5848213
	GWPM600N04G-GW	.236	6.0	.002	± 0.05	.016	0.4	.205	5.2	1.008	25.6	G	○ 5848239
 ●Less tool pressure design	GWPG300N02D-GV	.118	3.0	.001	± 0.025	.008	0.2	.205	2.5	.811	20.6	D	● 5848262
	GWPG300N04D-GV	.118	3.0	.001	± 0.025	.016	0.4	.205	2.5	.811	20.6	D	● 5848270
	GWPG400N02E-GV	.157	4.0	.001	± 0.025	.008	0.2	.169	4.3	.811	20.6	E	● 5848353
	GWPG400N04E-GV	.157	4.0	.001	± 0.025	.016	0.4	.169	4.3	.811	20.6	E	● 5848361
	GWPG500N02F-GV	.197	5.0	.001	± 0.025	.008	0.2	.169	4.3	.811	20.6	F	○ 5848395
	GWPG500N04F-GV	.197	5.0	.001	± 0.025	.016	0.4	.169	4.3	.811	20.6	F	○ 5848403
	GWPG600N02G-GV	.236	6.0	.001	± 0.025	.008	0.2	.169	4.3	1.008	25.6	G	○ 5848437
	GWPG600N04G-GV	.236	6.0	.001	± 0.025	.016	0.4	.169	4.3	1.008	25.6	G	○ 5848445

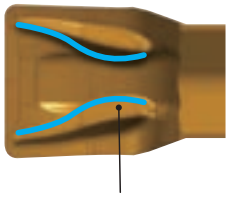
● : Stock
● : Stock (Newly added)
■ □ RL : While stocks last

R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

ⓇⓁ : 1-2 week delivery (Right / Left-hand only)
ⓇⓁ : 1-2 week delivery (Right / Left-hand only, Newly added)

Groove Duo Blade - Carbide Face Grooving Tool -



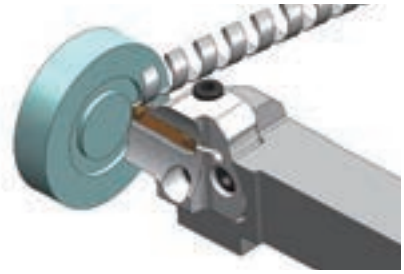
Unique S-shape design

Features

- ***New GT Chipbreaker designed for face-grooving***
- ***The best rigidity in a Modular system***
- ***Excellent chip-control and great finish***

Excellent Chip Control

Grooving

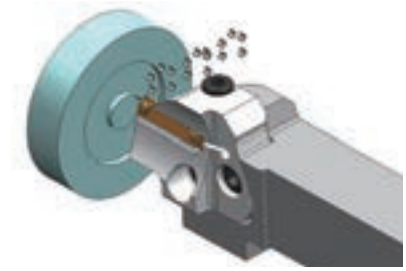


- **Excellent chip control and superior surface finish**
- **Good chip control without a peck cycle**

	NTK:GT chipbreaker	Competitor	
Chip			Tangled chips during deep grooving
Surface finish			Scratches inside bottom

Material : 4130, 450SFM, .004IPR, 2"diameter, .040depth, No step feed, WET
Insert : GWPFM500N04-GT DM4 Holder : GBWPFR-5T15-050120

Side-turning



- **Excellent chip control for side-turning process**
- **Shiny surface finish**

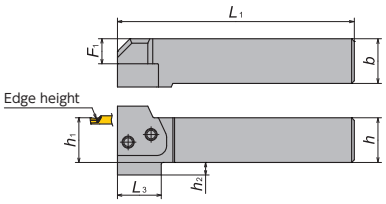
		IPR		
		.002	.004	.008
D.O.C (inch)	.118			
	.039			
	.008			

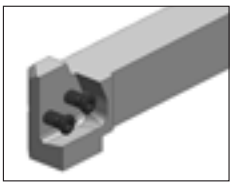
Material : 4130, 450SFM, WET
Insert : GWPFM500N04-GT DM4 Holder : GBWPFR-5T15-050120

Groove DUO Blade

Straight style toolholder

GTWP-H





Right-Hand style shown

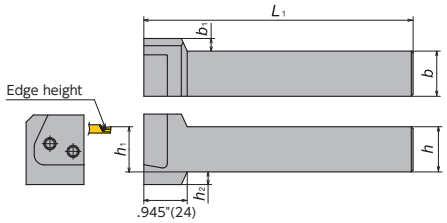
● Toolholder Body

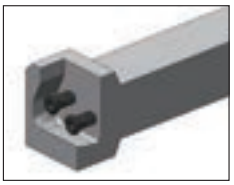
Holder Number	Stock		Dimensions														Blade	Spare Parts	
			h		b		h1		L1		F1		h2		L3			Clamp Screw	Wrench
	R	L	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)			
GTWP□16-IN-H	●	●	1.000	—	1.000	—	1.000	—	5.311	134.9	0.567	14.4	0.260	6.6	0.965	24.5	GBWPFR/L	FS128-6.0×18	LW-4
GTWP□20-IN-H	●	●	1.250	—	1.250	—	1.250	—	6.311	160.3	0.817	20.75	—	—	—	—	GBWPFR/L	FS128-6.0×18	LW-4
GTWP□24-IN-H			1.500	—	1.500	—	1.500	—	6.311	160.3	1.067	27.1	—	—	—	—	GBRR/L	FS128-6.0 × 18	LW-4
GTWP□32-IN-H			2.000	—	2.000	—	2.000	—	6.311	160.3	1.567	39.8	—	—	—	—	GBRR/L	FS128-6.0 × 18	LW-4
GTWP□2020-H	○	○	0.787	20.0	0.787	20.0	0.787	20.0	4.232	107.5	0.354	9	0.315	8	1.122	28.5	GBWPFR/L	FS128-6.0×18	LW-4
GTWP□2525-H	●	●	0.984	25.0	0.984	25.0	0.984	25.0	5.217	132.5	0.551	14	0.276	7	0.965	24.5	GBWPFR/L	FS128-6.0×18	LW-4
GTWP□3232-H	○	○	1.260	32.0	1.000	32.0	1.260	32.0	6.004	152.5	0.827	21	—	—	—	—	GBWPFR/L	FS128-6.0×18	LW-4

Groove DUO Blade

L-style toolholder

GKWP-H



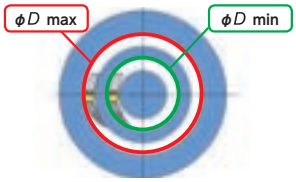


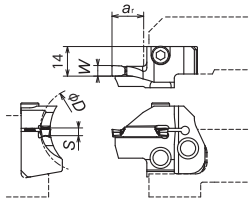
Right-Hand style shown
＊Use opposite hand blade

● Toolholder Body

Holder Number	Stock		Dimensions												Blade	Spare Parts	
			h		b		h1		L1		b1		h2			Clamp Screw	Wrench
	R	L	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)			
GKWP□16-IN-H	●	●	1.000	—	1.000	—	1.000	—	5.961	151.4	0.260	6.6	0.260	6.6	GBWPFR/L	FS128-6.0×18	LW-4
GKWP□20-IN-H	●	●	1.250	—	1.250	—	1.250	—	6.961	176.8	—	—	—	—	GBWPFR/L	FS128-6.0×18	LW-4
GKWP□2020-H	○	○	0.787	20.0	0.787	20.0	0.787	20.0	4.882	124	0.472	12	0.315	8	GBWPFR/L	FS128-6.0×18	LW-4
GKWP□2525-H	●	●	0.984	25.0	0.984	25.0	0.984	25.0	5.866	149	0.276	7	0.276	7	GBWPFR/L	FS128-6.0×18	LW-4
GKWP□3232-H	○	○	1.260	32.0	1.000	32.0	1.260	32.0	6.654	169	—	—	—	—	GBWPFR/L	FS128-6.0×18	LW-4

GBWPF





Right-Hand style shown

● Blade

Blade Number	Stock		Width W		Face grooving OD ϕD min		Face grooving OD ϕD max		Max. grooving depth ar		Applicable insert	Height S	Tightening screw
	R	L	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)	(Inch)	(mm)			
GBWPF□-3T13-029035	●	●	.118	3	1.142	29	1.378	35	.512	13	GWPFM300	C	CS0515
GBWPF□-3T13-035045	●	●			1.378	35	1.772	45	.512	13	GWPFM300		
GBWPF□-3T15-045060	●	●			1.772	45	2.362	60	.591	15	GWPFM300		
GBWPF□-3T15-060100	●	●			2.362	60	3.937	100	.591	15	GWPFM300		
GBWPF□-3T15-100250	●	●			3.937	100	9.843	250	.591	15	GWPFM300		
GBWPF□-4T15-030040	●	●	.157	4	1.181	30	1.575	40	.591	15	GWPFM400		
GBWPF□-4T15-040060	●	●			1.575	40	2.362	60	.591	15	GWPFM400		
GBWPF□-4T15-060120	●	●			2.362	60	4.724	120	.591	15	GWPFM400		
GBWPF□-4T15-120300	●	●			4.724	120	11.81	300	.591	15	GWPFM400		
GBWPF□-5T15-030050	●	●	.197	5	1.181	30	1.969	50	.591	15	GWPFM500		
GBWPF□-5T15-050120	●	●			1.969	50	4.724	120	.591	15	GWPFM500		
GBWPF□-5T15-120999	●	●			4.724	120	∞	∞	.591	15	GWPFM500		
GBWPF□-6T15-035080	●	●	.236	6	1.378	35	3.150	80	.591	15	GWPFM600		
GBWPF□-6T15-080999	●	●			3.150	80	∞	∞	.591	15	GWPFM600		

● : Stock　　○ : 1-2 week delivery

Combination of toolholder and blade for Face Grooving

GTWP-H Straight style toolholder

Right-hand system

Clockwise rotation (M4 command)

Toolholder: GTWP **R**-H

Blade: GBWPF **R**

* Right-hand toolholder takes Right-hand blade.

Left-hand system

Counter clockwise rotation (M3 command)

Toolholder: GTWP **L**-H

Blade: GBWPF **L**

* Left-hand toolholder takes Left-hand blade.

GKWP-H L-style toolholder

Right-hand system

Counter clockwise rotation (M3 command)

Toolholder: GKWP **R**-H

Blade: GBWPF **L**

* Right-hand toolholder takes Left-hand blade.

Left-hand system

Clockwise rotation (M4 command)

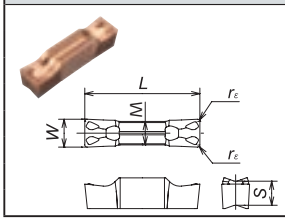
Toolholder: GKWP **L**-H

Blade: GBWPF **R**

* Left-hand toolholder takes Right-hand blade.

Groove DUO Series - Inserts

● Face Grooving Insert

Shape	Item Number	W Groove Width (Inch)	W Groove Width (mm)	W Width Tolerance (Inch)	W Width Tolerance (mm)	r_ε (Inch)	r_ε (mm)	M (Inch)	M (mm)	L (Inch)	L (mm)	Seat Size s	Coated Carbide DM4
	GWPFM300N02-GT	.118	3.0	± .002	± 0.05	.008	0.2	0.087	2.2	.965	24.5	C	● 5963251
	GWPFM300N04-GT	.118	3.0	± .002	± 0.05	.016	0.4	0.087	2.2	.965	24.5	C	● 5963269
	GWPFM400N04-GT	.157	4.0	± .002	± 0.05	.016	0.4	0.126	3.2	1.043	26.5	C	● 5963277
	GWPFM400N08-GT	.157	4.0	± .002	± 0.05	.031	0.8	0.126	3.2	1.043	26.5	C	● 5963285
	GWPFM500N04-GT	.197	5.0	± .002	± 0.05	.016	0.4	0.146	3.7	1.043	26.5	C	● 5963293
	GWPFM500N08-GT	.197	5.0	± .002	± 0.05	.031	0.8	0.146	3.7	1.043	26.5	C	● 5963301
	GWPFM600N04-GT	.236	6.0	± .002	± 0.05	.016	0.4	0.185	4.7	1.043	26.5	C	● 5963319
	GWPFM600N08-GT	.236	6.0	± .002	± 0.05	.031	0.8	0.185	4.7	1.043	26.5	C	● 5963327

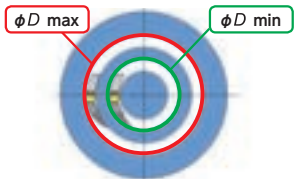
● : Stock ○ : 1-2 week delivery

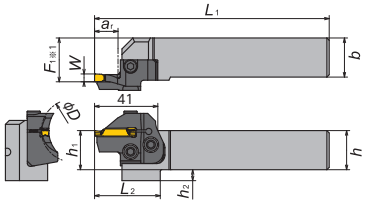
● : Stock
● : Stock (Newly added)
■□RL : While stocks last
R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish
○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through
ⓇⓁ : 1-2 week delivery (Right / Left-hand only)
ⓇⓁ : 1-2 week delivery (Right / Left-hand only, Newly added)

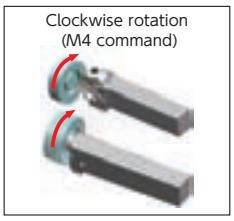
Groove DUO Blade

0° Straight type holder

GTWPR







Right-hand shown

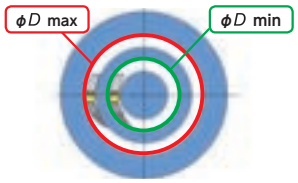
Right-hand toolholder takes Right-hand blade.

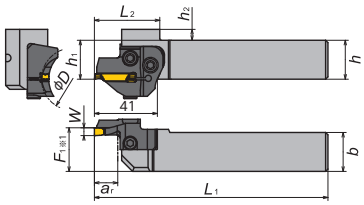
Hand (R/L)	Width W (mm) (inch)	(mm)	Face grooving OD ϕD min (inch)	(mm)	ϕD max (inch)	(mm)	Max.grooving depth a_r (inch)	(mm)	Holder number	Blade number	Dimensions - inch (mm) h	b	L_1	h_1	F_1	L_2	h_2	Applicable insert
R	.118	3	1.142	29	1.378	35	.512	13	GTWPR16-IN-H	GBWPFR-3T13-029035	1" (25.4)	1" (25.4)	6" (152.4)	1" (25.4)	1.102" (28)	1.654" (42)	—	GWPFM300
			1.378	35	1.772	45				GBWPFR-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFR-3T15-045060								
			2.362	60	3.937	100				GBWPFR-3T15-060100								
			3.937	100	9.843	250				GBWPFR-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFR-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFR-4T15-040060								
			2.362	60	4.724	120				GBWPFR-4T15-060120								
			4.724	120	11.811	300				GBWPFR-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFR-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFR-5T15-050120								
			4.724	120	∞	∞				GBWPFR-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFR-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFR-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GTWPR20-IN-H	GBWPFR-3T13-029035	1.25" (31.75)	1.25" (31.75)	7" (177.8)	1.25" (31.75)	1.378" (35)	—	—	GWPFM300
			1.378	35	1.772	45				GBWPFR-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFR-3T15-045060								
			2.362	60	3.937	100				GBWPFR-3T15-060100								
			3.937	100	9.843	250				GBWPFR-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFR-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFR-4T15-040060								
			2.362	60	4.724	120				GBWPFR-4T15-060120								
			4.724	120	11.811	300				GBWPFR-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFR-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFR-5T15-050120								
			4.724	120	∞	∞				GBWPFR-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFR-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFR-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GTWPR2020-H	GBWPFR-3T13-029035	.787" (20)	.787" (20)	4.921" (125)	.787" (20)	.906" (23)	1.81" (46)	.315" (8)	GWPFM300
			1.378	35	1.772	45				GBWPFR-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFR-3T15-045060								
			2.362	60	3.937	100				GBWPFR-3T15-060100								
			3.937	100	9.843	250				GBWPFR-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFR-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFR-4T15-040060								
			2.362	60	4.724	120				GBWPFR-4T15-060120								
			4.724	120	11.811	300				GBWPFR-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFR-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFR-5T15-050120								
			4.724	120	∞	∞				GBWPFR-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFR-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFR-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GTWPR2525-H	GBWPFR-3T13-029035	.984" (25)	.984" (25)	5.906" (150)	.984" (25)	1.102" (28)	1.654" (42)	.276" (7)	GWPFM300
			1.378	35	1.772	45				GBWPFR-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFR-3T15-045060								
			2.362	60	3.937	100				GBWPFR-3T15-060100								
			3.937	100	9.843	250				GBWPFR-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFR-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFR-4T15-040060								
			2.362	60	4.724	120				GBWPFR-4T15-060120								
			4.724	120	11.811	300				GBWPFR-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFR-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFR-5T15-050120								
			4.724	120	∞	∞				GBWPFR-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFR-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFR-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GTWPR3232-H	GBWPFR-3T13-029035	1.260" (32)	1.260" (32)	6.693" (170)	1.260" (32)	1.378" (35)	—	—	GWPFM300
			1.378	35	1.772	45				GBWPFR-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFR-3T15-045060								
			2.362	60	3.937	100				GBWPFR-3T15-060100								
			3.937	100	9.843	250				GBWPFR-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFR-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFR-4T15-040060								
			2.362	60	4.724	120				GBWPFR-4T15-060120								
			4.724	120	11.811	300				GBWPFR-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFR-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFR-5T15-050120								
			4.724	120	∞	∞				GBWPFR-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFR-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFR-6T15-080999								

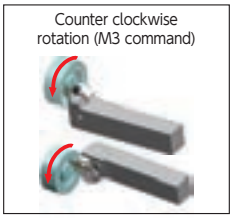
Groove DUO Blade

0° Straight type holder

GTWPL







Left-hand shown

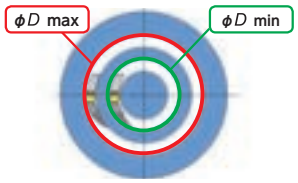
Left-hand toolholder takes Left-hand blade.

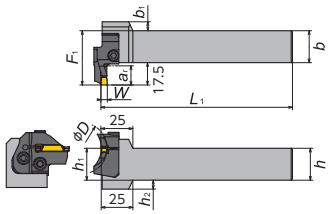
Hand (R/L)	Width W (mm) (inch)	(mm)	Face grooving OD ϕD min (inch)	(mm)	ϕD max (inch)	(mm)	Max.grooving depth a_r (inch)	(mm)	Holder number	Blade number	Dimensions - inch (mm) h	b	L_1	h_1	F_1	L_2	h_2	Applicable insert
L	.118	3	1.142	29	1.378	35	.512	13	GTWPL16-IN-H	GBWPFL-3T13-029035	1" (25.4)	1" (25.4)	6" (152.4)	1" (25.4)	1.102" (28)	1.654" (42)	—	GWPFM300
			1.378	35	1.772	45				GBWPFL-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFL-3T15-045060								
			2.362	60	3.937	100				GBWPFL-3T15-060100								
			3.937	100	9.843	250				GBWPFL-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFL-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFL-4T15-040060								
			2.362	60	4.724	120				GBWPFL-4T15-060120								
			4.724	120	11.811	300				GBWPFL-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFL-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFL-5T15-050120								
			4.724	120	∞	∞				GBWPFL-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFL-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFL-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GTWPL20-IN-H	GBWPFL-3T13-029035	1.25" (31.75)	1.25" (31.75)	7" (177.8)	1.25" (31.75)	1.378" (35)	—	—	GWPFM300
			1.378	35	1.772	45				GBWPFL-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFL-3T15-045060								
			2.362	60	3.937	100				GBWPFL-3T15-060100								
			3.937	100	9.843	250				GBWPFL-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFL-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFL-4T15-040060								
			2.362	60	4.724	120				GBWPFL-4T15-060120								
			4.724	120	11.811	300				GBWPFL-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFL-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFL-5T15-050120								
			4.724	120	∞	∞				GBWPFL-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFL-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFL-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GTWPL2020-H	GBWPFL-3T13-029035	.787" (20)	.787" (20)	4.921" (125)	.787" (20)	.906" (23)	1.81" (46)	.315" (8)	GWPFM300
			1.378	35	1.772	45				GBWPFL-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFL-3T15-045060								
			2.362	60	3.937	100				GBWPFL-3T15-060100								
			3.937	100	9.843	250				GBWPFL-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFL-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFL-4T15-040060								
			2.362	60	4.724	120				GBWPFL-4T15-060120								
			4.724	120	11.811	300				GBWPFL-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFL-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFL-5T15-050120								
			4.724	120	∞	∞				GBWPFL-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFL-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFL-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GTWPL2525-H	GBWPFL-3T13-029035	.984" (25)	.984" (25)	5.906" (150)	.984" (25)	1.102" (28)	1.654" (42)	.276" (7)	GWPFM300
			1.378	35	1.772	45				GBWPFL-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFL-3T15-045060								
			2.362	60	3.937	100				GBWPFL-3T15-060100								
			3.937	100	9.843	250				GBWPFL-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFL-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFL-4T15-040060								
			2.362	60	4.724	120				GBWPFL-4T15-060120								
			4.724	120	11.811	300				GBWPFL-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFL-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFL-5T15-050120								
			4.724	120	∞	∞				GBWPFL-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFL-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFL-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GTWPL3232-H	GBWPFL-3T13-029035	1.260" (32)	1.260" (32)	6.693" (170)	1.260" (32)	1.378" (35)	—	—	GWPFM300
			1.378	35	1.772	45				GBWPFL-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFL-3T15-045060								
			2.362	60	3.937	100				GBWPFL-3T15-060100								
			3.937	100	9.843	250				GBWPFL-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFL-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFL-4T15-040060								
			2.362	60	4.724	120				GBWPFL-4T15-060120								
			4.724	120	11.811	300				GBWPFL-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFL-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFL-5T15-050120								
			4.724	120	∞	∞				GBWPFL-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFL-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFL-6T15-080999								

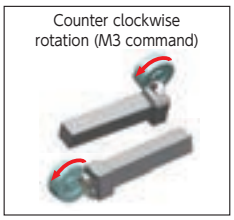
Groove DUO Blade

90° L style holders

GKWPR







Right-hand shown

Right-hand toolholder takes Left-hand blade.

Hand (R/L)	Width W (mm) (inch)	(mm)	Face grooving OD ϕD min (inch)	(mm)	ϕD max (inch)	(mm)	Max.grooving depth a_r (inch)	(mm)	Holder number	Blade number	Dimensions - inch (mm) h	b	L_1	h_1	F_1	b_1	h_2	Applicable insert
R	.118	3	1.142	29	1.378	35	.512	13	GKWPR16-IN-H	GBWPFL-3T13-029035	1" (25.4)	1" (25.4)	6" (152.4)	1" (25.4)	1.689" (42.9)	.260" (6.6)	.260" (6.6)	GWPFM300
			1.378	35	1.772	45				GBWPFL-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFL-3T15-045060								
			2.362	60	3.937	100				GBWPFL-3T15-060100								
			3.937	100	9.843	250				GBWPFL-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFL-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFL-4T15-040060								
			2.362	60	4.724	120				GBWPFL-4T15-060120								
			4.724	120	11.811	300				GBWPFL-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFL-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFL-5T15-050120								
			4.724	120	∞	∞				GBWPFL-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFL-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFL-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GKWPR20-IN-H	GBWPFL-3T13-029035	1.25" (31.75)	1.25" (31.75)	7" (177.8)	1.25" (31.75)	1.939" (49.25)	—	—	GWPFM300
			1.378	35	1.772	45				GBWPFL-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFL-3T15-045060								
			2.362	60	3.937	100				GBWPFL-3T15-060100								
			3.937	100	9.843	250				GBWPFL-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFL-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFL-4T15-040060								
			2.362	60	4.724	120				GBWPFL-4T15-060120								
			4.724	120	11.811	300				GBWPFL-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFL-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFL-5T15-050120								
			4.724	120	∞	∞				GBWPFL-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFL-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFL-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GKWPR2020-H	GBWPFL-3T13-029035	.787" (20)	.787" (20)	4.921" (125)	.787" (20)	1.476" (37.5)	.472" (12)	.315" (8)	GWPFM300
			1.378	35	1.772	45				GBWPFL-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFL-3T15-045060								
			2.362	60	3.937	100				GBWPFL-3T15-060100								
			3.937	100	9.843	250				GBWPFL-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFL-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFL-4T15-040060								
			2.362	60	4.724	120				GBWPFL-4T15-060120								
			4.724	120	11.811	300				GBWPFL-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFL-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFL-5T15-050120								
			4.724	120	∞	∞				GBWPFL-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFL-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFL-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GKWPR2525-H	GBWPFL-3T13-029035	.984" (25)	.984" (25)	5.906" (150)	.984" (25)	1.673" (42.5)	.276" (7)	.276" (7)	GWPFM300
			1.378	35	1.772	45				GBWPFL-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFL-3T15-045060								
			2.362	60	3.937	100				GBWPFL-3T15-060100								
			3.937	100	9.843	250				GBWPFL-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFL-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFL-4T15-040060								
			2.362	60	4.724	120				GBWPFL-4T15-060120								
			4.724	120	11.811	300				GBWPFL-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFL-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFL-5T15-050120								
			4.724	120	∞	∞				GBWPFL-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFL-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFL-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GKWPR3232-H	GBWPFL-3T13-029035	1.260" (32)	1.260" (32)	6.693" (170)	1.260" (32)	1.949" (49.5)	—	—	GWPFM300
			1.378	35	1.772	45				GBWPFL-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFL-3T15-045060								
			2.362	60	3.937	100				GBWPFL-3T15-060100								
			3.937	100	9.843	250				GBWPFL-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFL-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFL-4T15-040060								
			2.362	60	4.724	120				GBWPFL-4T15-060120								
			4.724	120	11.811	300				GBWPFL-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFL-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFL-5T15-050120								
			4.724	120	∞	∞				GBWPFL-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFL-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFL-6T15-080999								

● : Stock
● : Stock (Newly added)
■ □ R L : While stocks last

R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

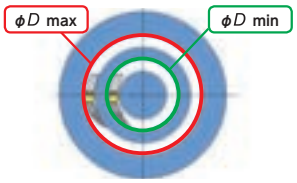
○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

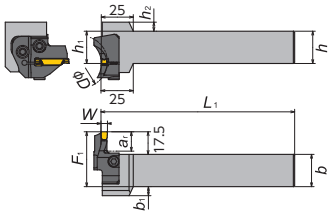
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only)
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only, Newly added)

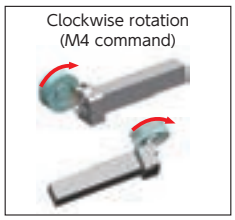
Groove DUO Blade

90° L style holders

GKWPL







Left-hand shown

Left-hand toolholder takes Right-hand blade.

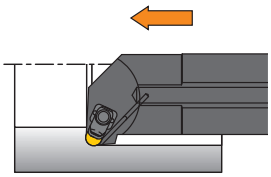
Hand (R/L)	Width W (mm) (inch)	(mm)	Face grooving OD ϕD min (inch)	(mm)	ϕD max (inch)	(mm)	Max.grooving depth a_r (inch)	(mm)	Holder number	Blade number	Dimensions - inch (mm) h	b	L_1	h_1	F_1	b_1	h_2	Applicable insert
L	.118	3	1.142	29	1.378	35	.512	13	GKWPL16-IN-H	GBWPFR-3T13-029035	1" (25.4)	1" (25.4)	6" (152.4)	1" (25.4)	1.689" (42.9)	.260" (6.6)	.260" (6.6)	GWPFM300
			1.378	35	1.772	45				GBWPFR-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFR-3T15-045060								
			2.362	60	3.937	100				GBWPFR-3T15-060100								
			3.937	100	9.843	250				GBWPFR-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFR-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFR-4T15-040060								
			2.362	60	4.724	120				GBWPFR-4T15-060120								
			4.724	120	11.811	300				GBWPFR-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFR-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFR-5T15-050120								
			4.724	120	∞	∞				GBWPFR-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFR-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFR-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GKWPL20-IN-H	GBWPFR-3T13-029035	1.25" (31.75)	1.25" (31.75)	7" (177.8)	1.25" (31.75)	1.939" (49.25)	—	—	GWPFM300
			1.378	35	1.772	45				GBWPFR-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFR-3T15-045060								
			2.362	60	3.937	100				GBWPFR-3T15-060100								
			3.937	100	9.843	250				GBWPFR-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFR-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFR-4T15-040060								
			2.362	60	4.724	120				GBWPFR-4T15-060120								
			4.724	120	11.811	300				GBWPFR-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFR-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFR-5T15-050120								
			4.724	120	∞	∞				GBWPFR-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFR-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFR-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GKWPL2020-H	GBWPFR-3T13-029035	.787" (20)	.787" (20)	4.921" (125)	.787" (20)	1.476" (37.5)	.472" (12)	.315" (8)	GWPFM300
			1.378	35	1.772	45				GBWPFR-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFR-3T15-045060								
			2.362	60	3.937	100				GBWPFR-3T15-060100								
			3.937	100	9.843	250				GBWPFR-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFR-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFR-4T15-040060								
			2.362	60	4.724	120				GBWPFR-4T15-060120								
			4.724	120	11.811	300				GBWPFR-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFR-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFR-5T15-050120								
			4.724	120	∞	∞				GBWPFR-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFR-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFR-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GKWPL2525-H	GBWPFR-3T13-029035	.984" (25)	.984" (25)	5.906" (150)	.984" (25)	1.673" (42.5)	.276" (7)	.276" (7)	GWPFM300
			1.378	35	1.772	45				GBWPFR-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFR-3T15-045060								
			2.362	60	3.937	100				GBWPFR-3T15-060100								
			3.937	100	9.843	250				GBWPFR-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFR-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFR-4T15-040060								
			2.362	60	4.724	120				GBWPFR-4T15-060120								
			4.724	120	11.811	300				GBWPFR-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFR-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFR-5T15-050120								
			4.724	120	∞	∞				GBWPFR-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFR-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFR-6T15-080999								
	.118	3	1.142	29	1.378	35	.512	13	GKWPL3232-H	GBWPFR-3T13-029035	1.260" (32)	1.260" (32)	6.693" (170)	1.260" (32)	1.949" (49.5)	—	—	GWPFM300
			1.378	35	1.772	45				GBWPFR-3T13-035045								
			1.772	45	2.362	60	.591	15		GBWPFR-3T15-045060								
			2.362	60	3.937	100				GBWPFR-3T15-060100								
			3.937	100	9.843	250				GBWPFR-3T15-100250								
	.157	4	1.181	30	1.575	40	.591	15		GBWPFR-4T15-030040								GWPFM400
			1.575	40	2.362	60				GBWPFR-4T15-040060								
			2.362	60	4.724	120				GBWPFR-4T15-060120								
			4.724	120	11.811	300				GBWPFR-4T15-120300								
	.197	5	1.181	30	1.969	50	.591	15		GBWPFR-5T15-030050								GWPFM500
			1.969	50	4.724	120				GBWPFR-5T15-050120								
			4.724	120	∞	∞				GBWPFR-5T15-120999								
	.236	6	1.378	35	3.150	80	.591	15		GBWPFR-6T15-035080								GWPFM600
			3.150	80	∞	∞				GBWPFR-6T15-080999								

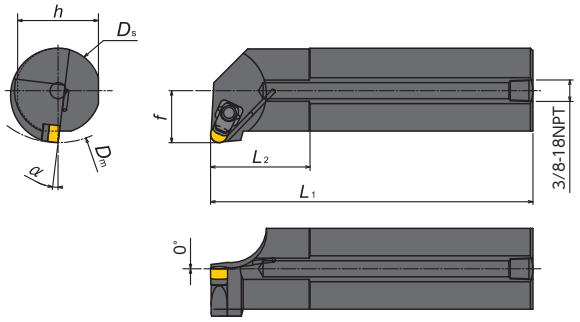
ID Tools

RN.. Inserts

S-CRGN (Coolant through)

Min. Bore Diameter ϕ3.0" -





● Inch Holders

Item Number	Stock R	Stock L	Min. Bore Dia. Dm (inch)	Dimensions (inch) Ds	h	L1	f	L2	α	Insert*
S50-CRGNR/L-32-4	●		3.0	2.0	1.87	16.0	1.281	2.362	7	RNG 45 (RNG 43)
S50-CRGNR/L-40-4	●		3.5	2.5	2.38	16.0	1.531	2.950	7	

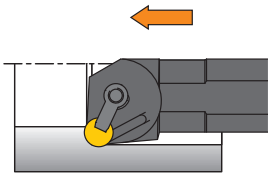
● Spare Parts

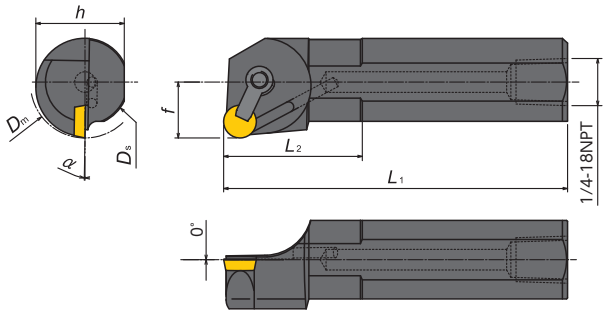
	Insert	Clamp	Blade	Shim	Shim Screw	Wrench
Standard	**RNG 45** / **RNG 43**	2413	9414	IRSN 43 / IRSN 45 (OP)	1161	5104

RP.. Inserts

S-CRGP (Coolant through)

Min. Bore Diameter ϕ1.25" -





● Inch Holders

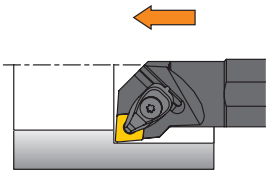
Item Number	Stock R	Stock L	Min. Bore Dia. Dm (inch)	Dimensions (inch) Ds	h	L1	f	L2	α	Insert
S12-CRGPR/L-16-3	●		1.25	1.0	0.89	12.0	.640	1.574	1	RPG 32

● Spare Parts

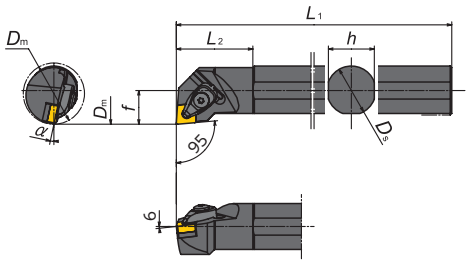
	Insert	Clamp	Diff Screw	Wrench
Standard	**RPG 32**	CL-7	XNS-36	5124

CN.. Inserts

S-WCLN



Min. Bore Diameter ϕ1.299" -



・Right hand shown

Metric Holders

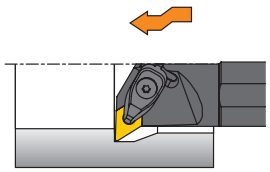
Item Number	Stock		Min. Bore Dia. D_m (mm)	Dimensions (mm)						Insert*
	R	L		D_s	h	L_1	f	L_2	α	
S25R-WCLN$^{R}_{L}$12	○	○	33	25	24	200	17	40	14	CNGA 43 (CNGA 45)
S32S-WCLN$^{R}_{L}$12	○	○	40	32	30	250	22	50	12	
S40T-WCLN$^{R}_{L}$12	○	○	50	40	38	300	27	60	10	
S50U-WCLN$^{R}_{L}$12	○	○	63	50	47	350	35	65	8	

Spare Parts

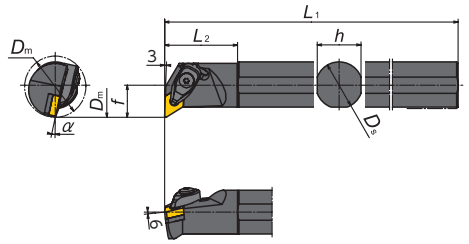
	Insert	Clamp	Shim	Clamp Screw	Wrench (for Clamp Screw)	Shim Screw	Wrench (for Shim Screw)	Spring
Standard	**CNGA 43**	DC6CN	ACN423×1	AOS-6*26W (S25R-WCLN$^{R}_{L}$12) AOS-6*30W (Others)	LLR-T20	FSS16-3.0*8	LLR-T10	ASGL6-D
	CNGA 45		—			—	—	

DN.. Inserts

S-WDUN

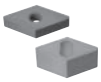


Min. Bore Diameter ϕ1.654" -

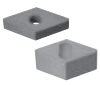
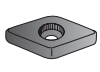


・Right hand shown

Metric Holders

Item Number	Stock		Min. Bore Dia. D_m (mm)	Dimensions (mm)						Insert*
	R	L		D_s	h	L_1	f	L_2	α	
S32S-WDUN$^{R}_{L}$15	○	○	42	32	30	250	22	50	12	DNGA 43 (DNGA 45) (DNGX 45) 
S40T-WDUN$^{R}_{L}$15	○	○	50	40	38	300	27	60	10	

Spare Parts

	Insert	Clamp	Shim	Clamp Screw	Wrench (for Clamp Screw)	Shim Screw	Wrench (for Shim Screw)	Spring
								
Standard	**DNGA 43**	DC6DN	ADN423×1	AOS-6*26W (S32S-WDUN$^{R}_{L}$15) AOS-6*30W (S40T-WDUN$^{R}_{L}$15)	LLR-T20	FSS16-3.0*8	LLR-T10	ASGL6-D
	DNGA 45		—			—	—	

● : Stock
● : Stock (Newly added)
■ □ R L : While stocks last

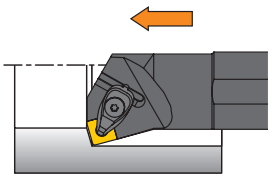
R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

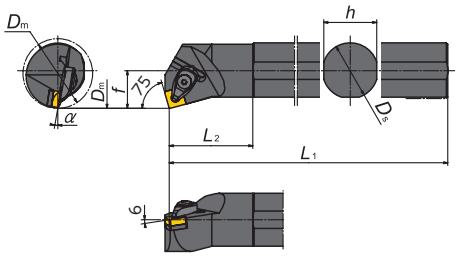
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only)
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only, Newly added)

SN.. Inserts

S-WSKN



Min. Bore Diameter ϕ1.969" -



・Right hand shown

Metric Holder

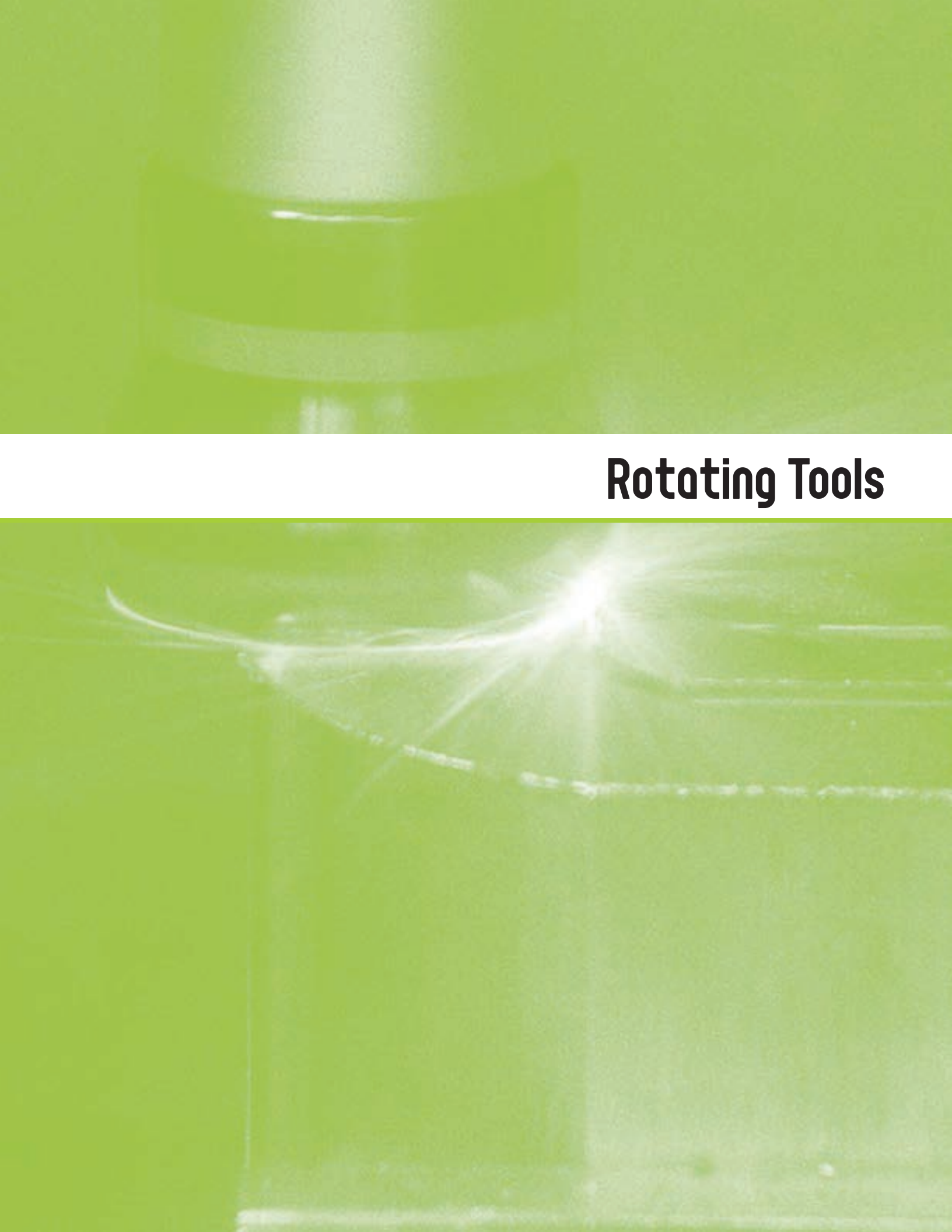
Item Number	Stock		Min. Bore Dia.	Dimensions (mm)						Insert*
	R	L	D_m (mm)	D_s	h	L_1	f	L_2	α	
S40T-WSKNR/L12	○	○	50	40	38	300	27	60	10	SNGA 43 (SNGA 45)

Spare Parts

	Insert	Clamp	Shim	Clamp Screw	Wrench (for Clamp Screw)	Shim Screw	Wrench (for Shim Screw)	Spring
Standard	SNGA 43	DC6CN	ASN423×1	AOS-6*30W	LLR-T20	FSS16-3.0*8	LLR-T10	ASGL6-D
	SNGA 45		—			—	—	

* Optional spare parts are required to use the inserts in parentheses. See spare parts lists for detail.

● : Stock
● : Stock (Newly added)
■□RL : While stocks last
R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish
○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through
ⓇⓁ : 1-2 week delivery (Right / Left-hand only)
ⓇⓁ : 1-2 week delivery (Right / Left-hand only, Newly added)



Rotating Tools

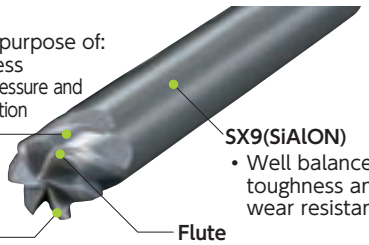
NEW Solid Ceramic End Mill

Features

- *Extremely high speed machining for HRSA materials with our durable SiAlON grade "SX9"*
- *More than 15 times higher productivity than a Carbide end mill*
- *4, 6 and 8 flutes are available*
- *Unique patent pending design provides toughness to the edge*

RCE for HRSA materials

Ceramic specialist's design

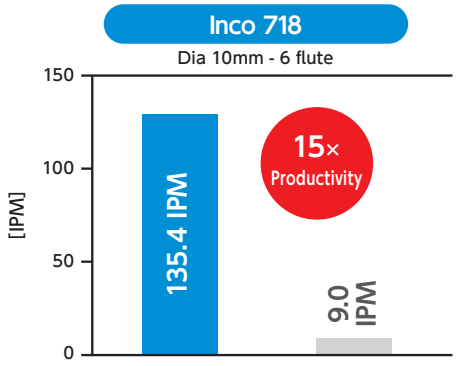


Helix angle
- Designed for the purpose of:
  - 4-flute: toughness
  - 6-flute: less tool pressure and better chip evacuation

SX9(SiAlON)
- Well balanced for toughness and wear resistance

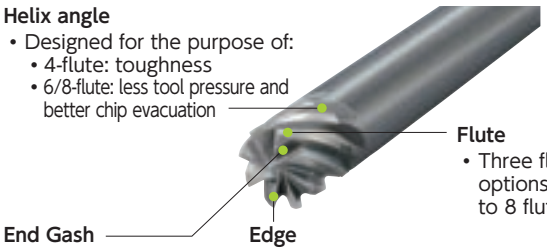
Bottom edge
- Unique shape provides toughness

Flute
- Optimized for HRSA materials
- Excellent toughness



	SX9	Carbide
SFM	1970	130
IPT	.0012	←
DOC	.118	←

RCS for Cast iron / HRSA materials

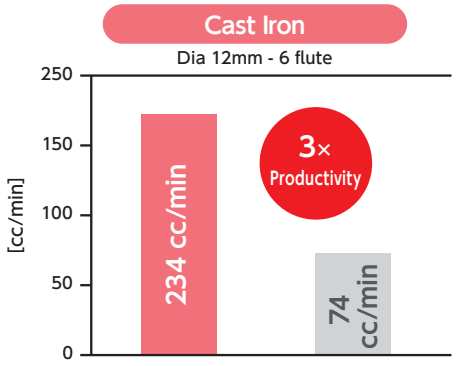


Helix angle
- Designed for the purpose of:
  - 4-flute: toughness
  - 6/8-flute: less tool pressure and better chip evacuation

Flute
- Three flute options up to 8 flute

End Gash
- Bigger end gash brings toughness

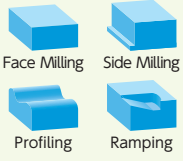
Edge
- Added chamfer provides toughness for cast iron machining



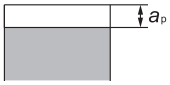
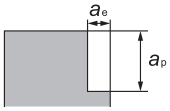
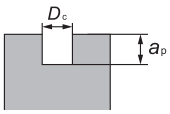
	SX9	Carbide
SFM	2300	360
IPT	.002	←
DOC	.138	.275

4-flute

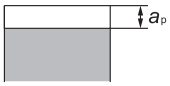
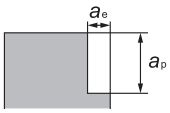
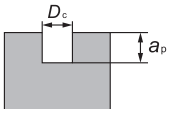
6-flute **8-flute**



Recommend Cutting Conditions for HRSA material

Application	Grade	ϕ D_c	Flute	Cutting Speed (SFM) 500 2000 3500	Feed (IPT)	Depth of cut (a_p —inch)	Width of cut (a_e —inch)	Coolant
Face Milling 	SX9	3/8"	4/6/8		.0012	.056	—	DRY
		1/2"				.075		
		5/8"				.094		
		3/4"				.113		
		8mm				.047		
		10mm				.059		
		12mm				.071		
		16mm				.094		
		20mm				.118		
Side Milling 	SX9	3/8"	4/6/8		.0012	.187	.037	DRY
		1/2"				.250	.050	
		5/8"				.313	.063	
		3/4"				.375	.075	
		8mm				.157	.031	
		10mm				.197	.039	
		12mm				.236	.047	
		16mm				.315	.063	
		20mm				.394	.079	
Slotting 	SX9	3/8"	4		.0012	.094	—	DRY
		1/2"				.125		
		5/8"				.156		
		8mm				.079		
		10mm				.098		
		12mm				.118		
		16mm				.157		
		3/8"	6			.056		DRY
		1/2"				.075		
		5/8"				.094		
		8mm				.047		
		10mm				.059		
		12mm				.071		
		16mm				.094		
		3/4"	8			.113	—	
		16mm				.118		

Recommended cutting conditions for Cast Iron

Application	Grade	ϕ D_c	Flute	Cutting Speed (SFM) 500 2000 3500	Feed (IPT)	Depth of cut (a_p —inch)	Width of cut (a_e —inch)	Coolant
Face Milling 	SX9	1/2"	4/6/8		.004	.094	—	DRY
		5/8"				.156		
		3/4"				.187		
		12mm				.118		
		16mm				.158		
		20mm				.197		
Side Milling 	SX9	1/2"	4/6/8		.004	.375	.083	DRY
		5/8"				.469	.104	
		3/4"				.563	.125	
		12mm				.354	.079	
		16mm				.472	.098	
		20mm				.591	.130	
Slotting 	SX9	1/2"	4/6/8		.004	.094	—	DRY
		5/8"				.156		
		3/4"				.187		
		12mm				.118		
		16mm				.157		
		20mm				.197		

For Maximum Productivity

- *A continuous cut is recommended. An interrupted cut may cause chipping or breakage.*
- *When using a Hydraulic or Shrink chuck, blow air to the arbor body, DON'T blow air to the endmill itself.*
- *A Minimum speed of 980 SFM is required. (Don't run at lower speed.)*
- *A 1.5 degree ramping angle is recommended. Run at 50% lower feed rate when ramping cut.*

When cutting HRSA materials

- Continue to machine even if you see BUE, removing BUE may cause chipping or breakage to the edge.
- High speed machining work hardens the material. For this reason, leave at least 0.3mm of material for a finishing process.

RCE for HRSA Materials

RCE-H4 (4-flute with Neck)

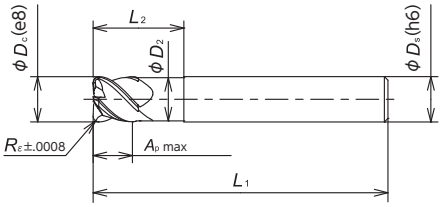
○No center cutting edge

Slotting

Pocketing

Ramping

Z=4



Tolerances

ϕDc / ϕDs	e8	h6
3/8", 8mm, 10mm	-.00098/-.00185"	+0/-.00035"
1/2", 12mm	-.00126/-.00232"	+0/-.00043"

Heat Resistant Alloy | S | ● : 1st Choice ● : 2nd choice

Item Number	Grade SX9	Flute	ϕDc (Inch)	ϕDc (mm)	ϕDs (Inch)	ϕDs (mm)	ϕD2 (Inch)	ϕD2 (mm)	Rε (Inch)	Rε (mm)	Ap max (Inch)	Ap max (mm)	L1 (Inch)	L1 (mm)	L2 (Inch)	L2 (mm)
RCEI375H4R047S	●	4	3/8		3/8		.359		.047		9/32		2.50		3/4	
RCEI500H4R068S	●	4	1/2		1/2		.484		.068		3/8		2.75		1	
RCEM080H4R100S	●	4	.315	8	.315	8	.299	7.6	.039	1.0	.236	6	2.362	60	0.630	16
RCEM100H4R125S	●	4	.394	10	.394	10	.378	9.6	.049	1.25	.295	7.5	2.559	65	0.787	20
RCEM120H4R150S	●	4	.472	12	.472	12	.457	11.6	.059	1.5	.354	9	2.756	70	0.945	24

RCE-J6 (6-flute)

○No center cutting edge

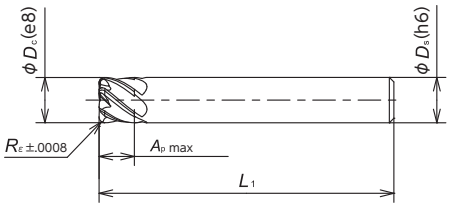
Face Milling

Side Milling

Profiling

Ramping

Z=6



Tolerances

ϕDc / ϕDs	e8	h6
3/8", 8mm, 10mm	-.00098/-.00185"	+0/-.00035"
1/2", 12mm	-.00126/-.00232"	+0/-.00043"

Heat Resistant Alloy | S | ● : 1st Choice ● : 2nd choice

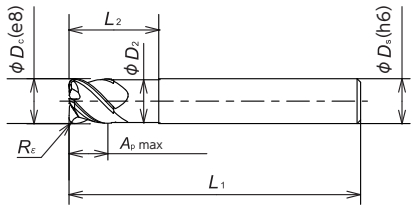
Item Number	Grade SX9	Flute	ϕDc (Inch)	ϕDc (mm)	ϕDs (Inch)	ϕDs (mm)	Rε (Inch)	Rε (mm)	Ap max (Inch)	Ap max (mm)	L1 (Inch)	L1 (mm)
RCEI375J6R047S	●	6	3/8		3/8		.047		9/32		2.50	
RCEI500J6R068S	●	6	1/2		1/2		.068		3/8		2.75	
RCEM080J6R100S	●	6	.315	8	.315	8	.039	1.0	.236	6	2.362	60
RCEM100J6R125S	●	6	.394	10	.394	10	.049	1.25	.295	7.5	2.559	65
RCEM120J6R150S	●	6	.472	12	.472	12	.059	1.5	.354	9	2.756	70

RCS for HRSA Materials

RCS-H4

○No center cutting edge

Slotting　Pocketing　Ramping　Z=4



Tolerances

ϕDc / ϕDs	e8	h6
1/2", 12mm, 5/8", 16mm	-.00126/-.00232"	+0/-.00043"

Cast Iron	K ●
Heat Resistant Alloy	S ●

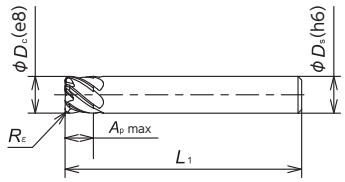
● : 1st Choice　● : 2nd choice

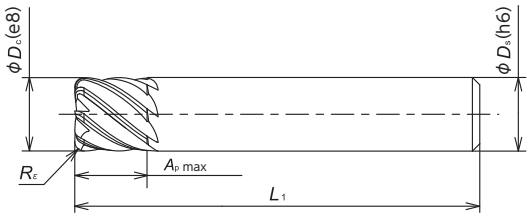
	Item Number	Grade SX9	Flute	ϕDc (Inch)	ϕDc (mm)	ϕDs (Inch)	ϕDs (mm)	ϕD2 (Inch)	ϕD2 (mm)	Rε (Inch)	Rε (mm)	Ap max (Inch)	Ap max (mm)	L1 (Inch)	L1 (mm)	L2 (Inch)	L2 (mm)
RCS-H4	RCSI500H4R068S	●	4	1/2		1/2		.484	12.3	.068	1.73	3/8		2.75	69.85	1	25.4
	RCSI625H4R078S	●	4	5/8		5/8		.605	15.4	.078	1.98	.469	11.91	3	76.2	1.25	31.75
	RCSM120H4R150S	●	4	.472	12	.472	12	.457	11.6	.059	1.5	.354	9	2.76	70	.954	24
	RCSM160H4R200S	●	4	.630	16	.630	16	.610	15.5	.079	2.0	.472	12	2.95	75	1.26	32

RCS-J6 / RCS-J8

○No center cutting edge

Face Milling　Side Milling　Profiling　Ramping　Z=6　Z=8





Tolerances

ϕDc / ϕDs	e8	h6
1/2", 12mm, 5/8", 16mm	-.00126/-.00232"	+0/-.00043"
3/4", 20mm	-.00157/-.00287"	+0/-.00051"

Cast Iron	K ●
Heat Resistant Alloy	S ●

● : 1st Choice　● : 2nd choice

	Item Number	Grade SX9	Flute	ϕDc (Inch)	ϕDc (mm)	ϕDs (Inch)	ϕDs (mm)	Rε (Inch)	Rε (mm)	Ap max (Inch)	Ap max (mm)	L1 (Inch)	L1 (mm)
RCS-J6	RCSI500J6R068S	●	6	1/2		1/2		.068	1.73	3/8		2.75	
	RCSI625J6R078S	●	6	5/8		5/8		.078	1.98	.469	11.91	3	
	RCSM120J6R150S	●	6	.472	12	.472	12	.059	1.5	.354	9	2.76	70
	RCSM160J6R200S	●	6	.630	16	.630	16	.079	2.0	.472	12	2.95	75
RCS-J8	RCSI750J8R094S	●	8	3/4		3/4		.094	2.38	.563	14.29	4.25	
	RCSM200J8R250S	●	8	.787	20	.787	20	.098	2.5	.984	15	4.33	110

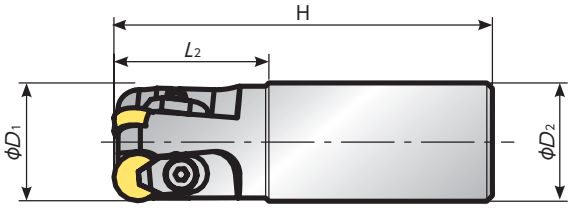
● : Stock
● : Stock (Newly added)
■ □ R L : While stocks last
R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish
○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through
ⓇⓁ : 1-2 week delivery (Right / Left-hand only)
ⓇⓁ : 1-2 week delivery (Right / Left-hand only, Newly added)

AHM series

ccel igh-speed ill

* Recommend using torque wrench @35lbs (4Nm)

A.R.+5°
R.R.-7°30'



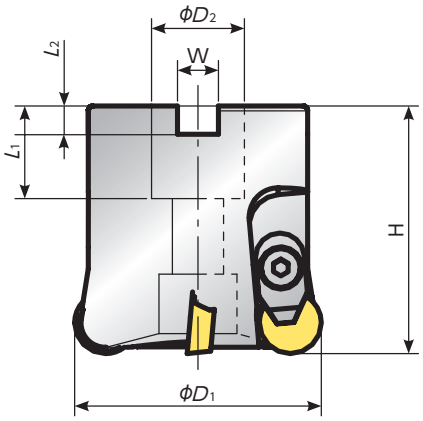
● Inch size cutters

Item Number	Stock		Dimensions (inch)				Clamp	Clamp Screw	Weight (lbs)	Insert
			ϕD_1	D_2	H	L_2				
RPIW0625E0625R02	●	2	.625	.625	3.160	1.250	C-423978	S-3-48*1/4SHCS	0.2	RPG 21.5
RPIW075E075R02	●	2	.750	.750	3.270	1.220	AMS-3	AOB-3S	0.4	RPG 21.5
RPIW100E100R03	●	3	1.000	1.000	3.270	1.000	AMS-4	AOB-4S	0.6	RPG 32
RPIW125E125R03	●	3	1.250	1.250	4.000	1.640	AMS-5T	AOB-5S-T25	1.1	RPG 43
RPIW150E150R03	●	3	1.500	1.500	4.000	1.830			1.6	

● Metric size cutters

Item Number	Stock		Dimensions (㎜)				Clamp	Clamp Screw	Weight (kg)	Insert
			ϕD_1	D_2	H	L_2				
JRPMW032E250R03	○	3	32	25	120	40	AMS-5T	AOB-5S-T25	0.4	RPG 43
JRPMW032E320R03	○		32	32					0.6	
JRPMW040E320R03	○		40	32					0.7	

A.R.+5°
R.R.-2°30' ~ -5°



● Inch size cutters

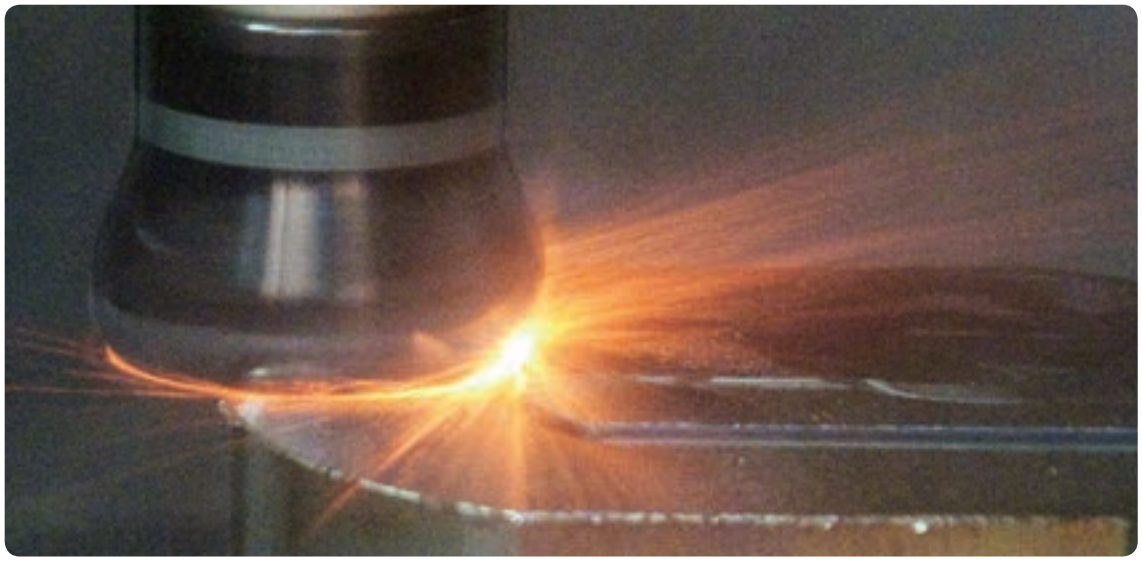
Item Number	Stock		Dimensions (inch)						Shim	Shim Screw	Clamp	Clamp Screw	A.R.	R.R.	Weight (lbs)	Insert
			ϕD_1	H	D_2	W	L_1	L_2								
RPIW200S075R04	●	4	2.00	2.00	.750	.32	.75	.22	ARP42A	M3*8	AMS-5T	AOB-5S-T25	+5°	+5°	0.9	RPG 43
RPIW300S100R05	●	5	3.00	2.00	1.000	.38	.75	.22					+5°	+5°	2.0	
RPIW400S125R06	●	6	4.00	2.00	1.250	.50	.82	.30					+5°	+5°	4.2	

● Metric size cutters

Item Number	Stock		Dimensions (㎜)						Shim	Shim Screw	Clamp	Clamp Screw	A.R.	R.R.	Weight (kg)	Insert
			ϕD_1	H	D_2	W	L_1	L_2								
JRPMW050S220R04	○	4	50	50	22	10.4	20	6.3	ARP42A	M3*8	AMS-5T	AOB-5S-T25	+5°	+5°	0.4	RPG 43
JRPMW063S220R04	○	4	63	50	22	10.4	20	6.3					+5°	+5°	0.6	
JRPMW080S254R05	○	5	80	50	25.4	9.5	25	6.0					+5°	+2°30′	0.9	

Recommend Cutting Conditions

Work Material		Grade	Dry	Wet	Cutting Speed (SFM) 200 700 1200 1700 2200 2700 3200 3700	Feed (IPT) .002 .003 .004 .005 .006 .007	Depth of Cut (inch)
S		SX7	●				~.150
Heat Resistant Alloys		SX3	●				~.150
		SX9	●				~.150
H		WA1	●	○			~.150
Hardened Steel	HRC 45-55	HC7	●	○			~.150
	HRC 55-65	WA1	●	○			~.150
		HC7	●	○			~.150



● : Stock
● : Stock (Newly added)
■ □ R L : While stocks last

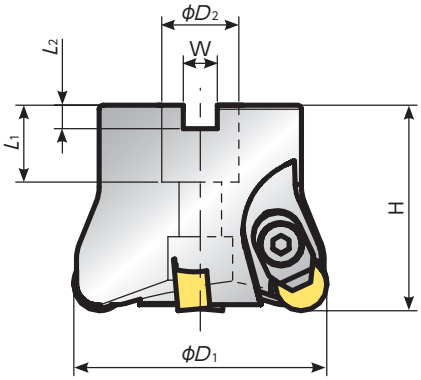
R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
Ⓜ : Mirror finish

○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
💧 : Coolant through

Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only)
Ⓡ Ⓛ : 1-2 week delivery (Right / Left-hand only, Newly added)

* Recommend using torque wrench @35lbs (4Nm)

A.R.-5°
R.R.-10°



● Inch size cutters

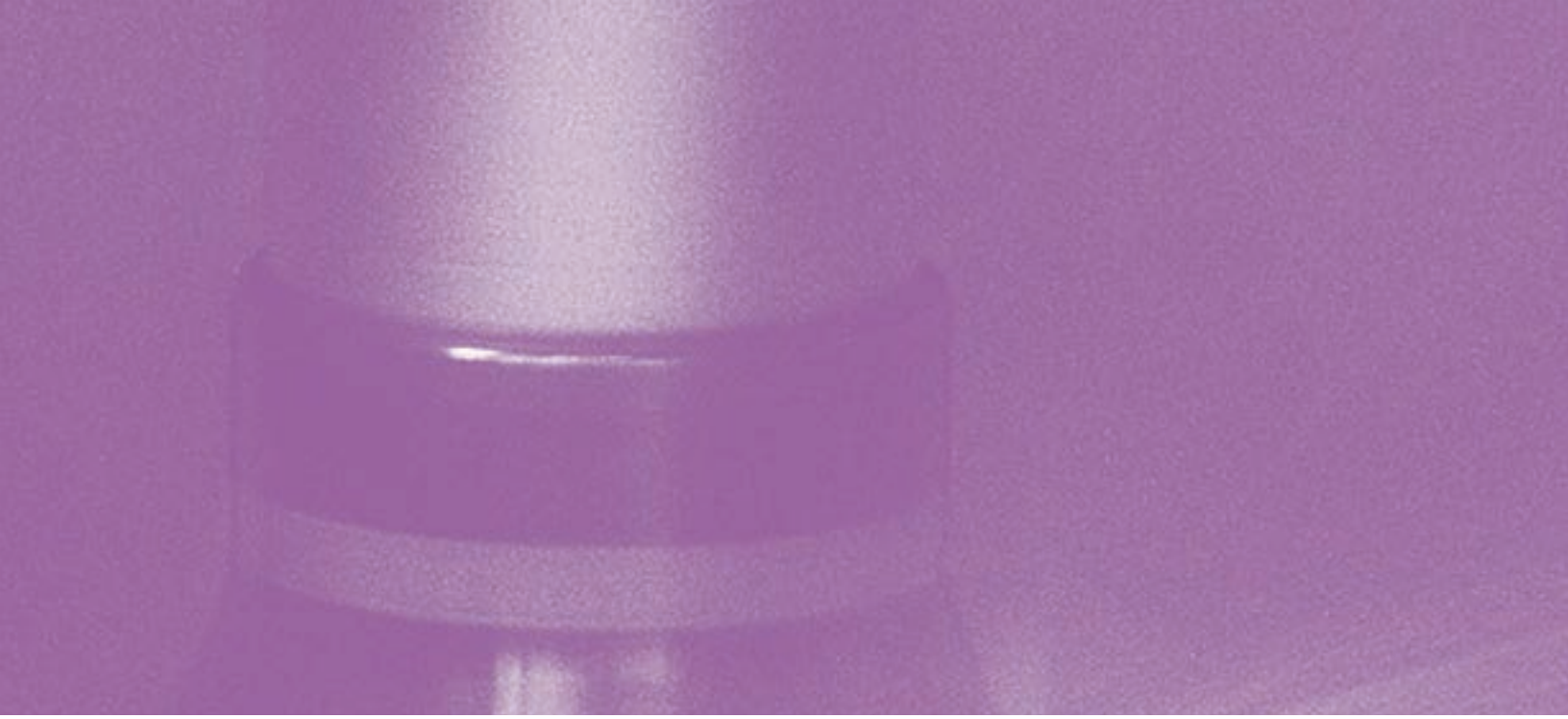
Item Number	Stock		Dimensions (inch)						Clamp	Clamp Screw	Weight (lbs)	Insert
			ϕD1	H	ϕD2	W	L1	L2				
RNIW200S075R04-43	●	4	2.00	2.00	.750	.32	.75	.22	AMS-6T	AOB-6S-T30	1.0	RNG 43
RNIW200S075R03	●	3	2.00	2.00	.750	.32	.75	.22			1.0	RNG 45
RNIW250S075R04	●	4	2.50	2.00	.750	.32	.75	.22			1.3	
RNIW300S100R05	●	5	3.00	2.00	1.000	.38	.75	.22			1.6	
RNIW400S125R06	●	6	4.00	2.00	1.250	.51	.82	.30			4.2	

● Metric size cutters

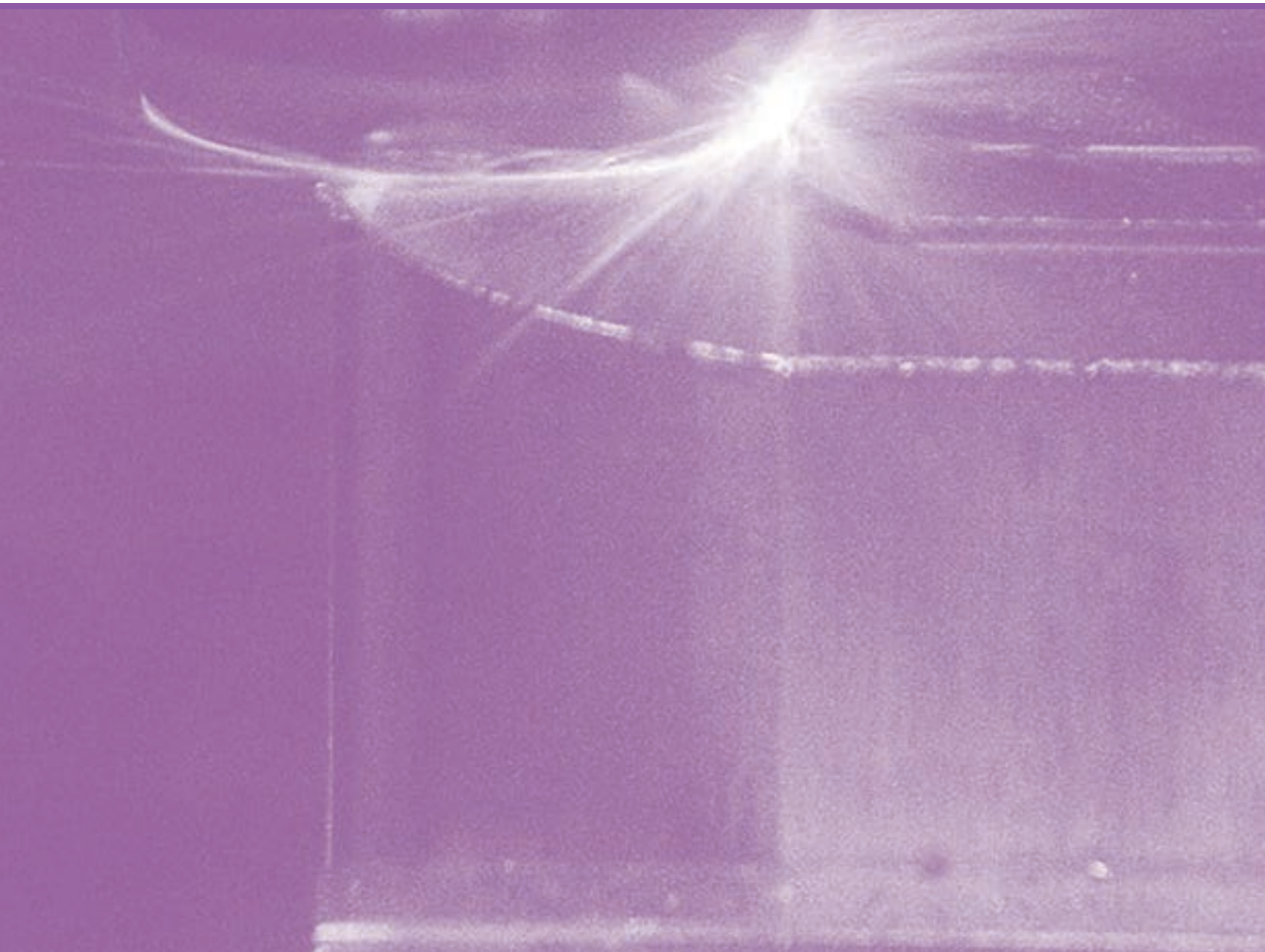
Item Number	Stock		Dimensions (㎜)						Clamp	Clamp Screw	Weight (kg)	Insert
			ϕD1	H	ϕD2	W	L1	L2				
JRNMW050S220R03	○	3	50	50	22	10.4	20	6.3	AMS-6T	AOB-6S-T30	0.4	RNG 45
JRNMW063S220R04	○	4	63	50	22	10.4	20	6.3			0.6	
JRNMW080S254R05	○	5	80	50	25.4	9.5	25	6.0			0.9	

● Recommend Cutting Conditions

Work Material		Grade	Dry	Wet	Cutting Speed (SFM) 200 700 1200 1700 2200 2700 3200 3700	Feed (IPT) .002 .003 .004 .005 .006 .007	Depth of Cut (inch)
S		SX7	●				~.150
Heat Resistant Alloys		SX3	●				~.150
		SX9	●				~.150
H		WA1	●	○			~.150
Hardened Steel	HRC 45-55	HC7	●	○			~.150
	HRC 55-65	WA1	●	○			~.150
		HC7	●	○			~.150



Rotating & Turning Tool Stock List



Rotating & Turning Tool Stock List

END MILLS / HOLDERS / CUTTERS / PARTS

Item Description	EDP	Stock Status	Product	Page Number
1160	#US6990018	●	Part	42
1161	#US6000984	●	Part	68
1180	$_1180	●	Part	42
1182	$_1182	●	Part	42
2413	#US6000018	●	Part	42,68
2417	#US6000020	●	Part	42
9414	$_9414	●	Part	42,68
AOB-4S	5380993	●	Part	76
AOB-5S-T25	5660667	●	Part	76
AOB-5X14	5913942	○	Part	59
AOB-6S-T30	5660683	●	Part	78
AOS-6X26W	5663729	○	Part	63
AOS-6X30W	5641402	●	Part	40,41,42,69,70
ACN423	5355730	●	Part	40,69
ADN423	5605613	●	Part	40,41,69
AMS-3	5777354	●	Part	76
AMS-4	5380985	●	Part	76
AMS-5T	5060132	●	Part	76
AMS-6T	5060116	●	Part	78
AOB-3S	5578331	●	Part	76
AOB-5X16	5859590	○	Part	59
ARP42A	5660659	●	Part	76
ASGL6-D	5686647	●	Part	69,70
ASN423	5060827	●	Part	42,70
C-423978	#US6000926	●	Part	76
CL2RV	#US6000106	●	Part	46
CL2RVRL	#US6000107	●	Part	46
CL3RV	#US6000108	●	Part	47
CL4RV	#US6000110	●	Part	47
CL-7	#US6000114	●	Part	68
CRGNL164CD	5731989	●	Holder	42
CRGNL165CD	5731930	●	Holder	42
CRGNL204CD	5731963	●	Holder	42
CRGNL205CD	5731914	●	Holder	42
CRGNL206CD	5731898	●	Holder	42
CRGNR164CD	5731997	●	Holder	42
CRGNR165CD	5731948	●	Holder	42
CRGNR204CD	5731971	●	Holder	42
CRGNR205CD	5731922	●	Holder	42
CRGNR206CD	5731906	●	Holder	42
CS0515	5442199	●	Part	61
CS0520W	5859616	○	Part	58
CS0625W	5859608	○	Part	58
DC6CN	5686530	●	Part	40,69,70
DC6DN	5686548	●	Part	40,41,69
FSI28-6.0X18	5967062	●	Part	43,51
FSS15-3.0X12	5657010	●	Part	40,41
FSS16-3.0X8	5681390	●	Part	69,70
GBI-VGW4L3T15-101177	5043260	●	Part Blade	56
GBI-VGW4L3T15-177999	5044987	●	Part Blade	56
GBI-VGW4L4T15-101177	5045042	●	Part Blade	56
GBI-VGW4L4T15-177999	5043278	●	Part Blade	56
GBI-VGW4R3T15-101177	5043187	●	Part Blade	54
GBI-VGW4R3T15-177999	5044979	●	Part Blade	54
GBI-VGW4R4T15-101177	5045034	●	Part Blade	54
GBI-VGW4R4T15-177999	5043195	●	Part Blade	54

Item Description	EDP	Stock Status	Product	Page Number
GBI-VGW6L6T15-101177	5043286	●	Part Blade	56
GBI-VGW6L6T15-177999	5043294	●	Part Blade	56
GBI-VGW6R6T15-101177	5043203	●	Part Blade	54
GBI-VGW6R6T15-177999	5043211	●	Part Blade	54
GBO-VGW4L3T15-101177	5043229	●	Part Blade	57
GBO-VGW4L3T15-177999	5045026	●	Part Blade	57
GBO-VGW4L4T15-101177	5045067	●	Part Blade	57
GBO-VGW4L4T15-177999	5043237	●	Part Blade	57
GBO-VGW4R3T15-101177	5043138	●	Part Blade	55
GBO-VGW4R3T15-177999	5044995	●	Part Blade	55
GBO-VGW4R4T15-101177	5045059	●	Part Blade	55
GBO-VGW4R4T15-177999	5043146	●	Part Blade	55
GBO-VGW6L6T15-101177	5043245	●	Part Blade	57
GBO-VGW6L6T15-177999	5043252	●	Part Blade	57
GBO-VGW6R6T15-101177	5043161	●	Part Blade	55
GBO-VGW6R6T15-177999	5043179	●	Part Blade	55
GBRL-R23-19	5990221	●	Part Blade	45
GBRL-R35-25	5990270	●	Part Blade	45
GBRL-R45-28	5990304	●	Part Blade	45
GBRR-R23-19	5990247	●	Part Blade	44
GBRR-R35-25	5990296	●	Part Blade	44
GBRR-R45-28	5990312	●	Part Blade	44
GBVL-VGW4-3T09	5989926	●	Part Blade	53
GBVL-VGW4-4T14	5990072	●	Part Blade	53
GBVL-VGW6-6T14	5990098	●	Part Blade	53
GBVL-VGW6-6T19	5990122	●	Part Blade	53
GBVL-VGW8-8T19	5990155	●	Part Blade	53
GBVL-VGW8-8T28	5990171	●	Part Blade	53
GBVR-VGW4-3T09	5990064	●	Part Blade	52
GBVR-VGW4-4T14	5990080	●	Part Blade	52
GBVR-VGW6-6T14	5990114	●	Part Blade	52
GBVR-VGW6-6T19	5990130	●	Part Blade	52
GBVR-VGW8-8T19	5990163	●	Part Blade	52
GBVR-VGW8-8T28	5990189	●	Part Blade	52
GBWPFL-3T13-029035	5963491	●	Part Blade	64,65
GBWPFL-3T13-035045	5963509	●	Part Blade	64,65
GBWPFL-3T15-045060	5963517	●	Part Blade	64,65
GBWPFL-3T15-060100	5963525	●	Part Blade	64,65
GBWPFL-3T15-100250	5963533	●	Part Blade	64,65
GBWPFL-4T15-030040	5963558	●	Part Blade	64,65
GBWPFL-4T15-040060	5963566	●	Part Blade	64,65
GBWPFL-4T15-060120	5963574	●	Part Blade	64,65
GBWPFL-4T15-120300	5963582	●	Part Blade	64,65
GBWPFL-5T15-030050	5963715	●	Part Blade	64,65
GBWPFL-5T15-050120	5963608	●	Part Blade	64,65
GBWPFL-5T15-120999	5963616	●	Part Blade	64,65
GBWPFL-6T15-035080	5963632	●	Part Blade	64,65
GBWPFL-6T15-080999	5963640	●	Part Blade	64,65
GBWPFR-3T13-029035	5963335	●	Part Blade	63,66
GBWPFR-3T13-035045	5963343	●	Part Blade	63,66
GBWPFR-3T15-045060	5963350	●	Part Blade	63,66
GBWPFR-3T15-060100	5963368	●	Part Blade	63,66
GBWPFR-3T15-100250	5963376	●	Part Blade	63,66
GBWPFR-4T15-030040	5963392	●	Part Blade	63,66
GBWPFR-4T15-040060	5963426	●	Part Blade	63,66
GBWPFR-4T15-060120	5963434	●	Part Blade	63,66

Item Description	EDP	Stock Status	Product	Page Number
GBWPFR-4T15-120300	5963442	●	Part Blade	63,66
GBWPFR-5T15-030050	5963707	●	Part Blade	63,66
GBWPFR-5T15-050120	5963459	●	Part Blade	63,66
GBWPFR-5T15-120999	5963467	●	Part Blade	63,66
GBWPFR-6T15-035080	5963475	●	Part Blade	63,66
GBWPFR-6T15-080999	5963483	●	Part Blade	63,66
GKWPL16-IN-H	5923875	●	Holder	51,52,54,55, 56,64,66
GKWPL2020-H	5923834	○	Holder	51,52,54,55, 56,64,66
GKWPL2020K-3D10	5893607	○	Holder	58
GKWPL2020K-4E10	5893615	○	Holder	58
GKWPL2020K-5F10	5893623	○	Holder	58
GKWPL2020K-6G12	5893631	○	Holder	58
GKWPL20-IN-H	5923891	●	Holder	51,52,54,55, 56,64,66
GKWPL2525-H	5923859	●	Holder	51,52,54,55, 56,64,66
GKWPL3232-H	5963699	○	Holder	51,52,54,55, 56,64,66
GKWPR16-IN-H	5923867	●	Holder	51,53,55
GKWPR2020-H	5923826	○	Holder	51,53,55
GKWPR20-IN-H	5923883	●	Holder	51,53,55
GKWPR2525-H	5923842	●	Holder	51,53,55
GKWPR3232-H	5963681	○	Holder	51,53,55
GTWPL1216-3D07	5852280	○	Holder	59
GTWPL1216-4E07	5852314	○	Holder	59
GTWPL1216-5F07	5852355	○	Holder	59
GTWPL1616-3D09	5852306	○	Holder	59
GTWPL1616-4E09	5852322	○	Holder	59
GTWPL1616-5F09	5852371	○	Holder	59
GTWPL1620-6G09	5893599	○	Holder	59
GTWPL16-IN-H	5919428	●	Holder	51,53,61,64
GTWPL2020-H	5923792	○	Holder	51,53,61,64
GTWPL2020K-3D10	5852397	○	Holder	58
GTWPL2020K-3D20	5852421	○	Holder	58
GTWPL2020K-4E10	5852447	○	Holder	58
GTWPL2020K-4E20	5852470	○	Holder	58
GTWPL2020K-5F10	5852496	○	Holder	58
GTWPL2020K-5F20	5852520	○	Holder	58
GTWPL2020K-6G12	5852546	○	Holder	58
GTWPL2020K-6G25	5852561	○	Holder	58
GTWPL20-IN-H	5919444	●	Holder	51,53,61,64
GTWPL-24-IN-H	5996624		Holder	51
GTWPL2525-H	5923818	●	Holder	51,53,61,64
GTWPL2525M-3D10	5852405	○	Holder	58
GTWPL2525M-3D20	5852439	○	Holder	58
GTWPL2525M-4E10	5852454	○	Holder	58
GTWPL2525M-4E20	5852488	○	Holder	58
GTWPL2525M-5F10	5852512	○	Holder	58
GTWPL2525M-5F20	5852538	○	Holder	58
GTWPL2525M-6G12	5852553	○	Holder	58
GTWPL2525M-6G25	5852587	○	Holder	58
GTWPL3232-H	5963673	○	Holder	51,53,61,64
GTWPL-32-IN-H	5000658		Holder	51
GTWPR08-IN-3D07	5914593	●	Holder	59
GTWPR08-IN-4E07	5914627	●	Holder	59
GTWPR1016-3D07	5875125	○	Holder	59
GTWPR1016-4E07	5875133	○	Holder	59
GTWPR1016-5F07	5875141	○	Holder	59
GTWPR1020-6G07	5893565	○	Holder	59
GTWPR10-IN-3D09	5914601	●	Holder	59

Item Description	EDP	Stock Status	Product	Page Number
GTWPR10-IN-4E09	5914650	●	Holder	59
GTWPR1216-3D07	5849054	●	Holder	59
GTWPR1216-4E07	5849088	●	Holder	59
GTWPR1216-5F07	5849104	○	Holder	59
GTWPR1220-6G07	5893573	○	Holder	59
GTWPR1616-3D09	5849070	○	Holder	59
GTWPR1616-4E09	5849096	○	Holder	59
GTWPR1616-5F09	5849112	○	Holder	59
GTWPR1620-6G09	5893581	○	Holder	59
GTWPR16-IN-H	5919410	●	Holder	51,52,54,55, 56,57,61,63
GTWPR2020-H	5923784	○	Holder	51,52,54,55, 56,57,61,63
GTWPR2020K-3D10	5849120	○	Holder	58
GTWPR2020K-3D20	5849146	○	Holder	58
GTWPR2020K-4E10	5849161	○	Holder	58
GTWPR2020K-4E20	5849187	○	Holder	58
GTWPR2020K-5F10	5849203	○	Holder	58
GTWPR2020K-5F20	5849229	○	Holder	58
GTWPR2020K-6G12	5849245	○	Holder	58
GTWPR2020K-6G25	5849260	○	Holder	58
GTWPR20-IN-H	5919436	●	Holder	51,52,54,55, 56,57,61,63
GTWPR-24-IN-H	5000633		Holder	51
GTWPR2525-H	5923800	●	Holder	51,52,54,55, 56,57,61,63
GTWPR2525M-3D10	5849138	○	Holder	58
GTWPR2525M-3D20	5849153	○	Holder	58
GTWPR2525M-4E10	5849179	○	Holder	58
GTWPR2525M-4E20	5849195	○	Holder	58
GTWPR2525M-5F10	5849211	○	Holder	58
GTWPR2525M-5F20	5849237	○	Holder	58
GTWPR2525M-6G12	5849252	○	Holder	58
GTWPR2525M-6G25	5849278	○	Holder	58
GTWPR3232-H	5963657	○	Holder	51,52,54,55, 56,57,61,63
GTWPR-32-IN-H	5000641		Holder	51
JRNMW050S220R03	5719950	○	Milling Cutter	78
JRNMW063S220R04	5719968	○	Milling Cutter	78
JRNMW080S254R05	5719976	○	Milling Cutter	78
JRPMW032E250R03	5720719	○	Milling Cutter	76
JRPMW032E320R03	5719919	○	Milling Cutter	76
JRPMW040E320R03	5719927	○	Milling Cutter	76
JRPMW050S220R04	5719935	○	Milling Cutter	76
JRPMW063S220R04	5726096	○	Milling Cutter	76
JRPMW080S254R05	5719943	○	Milling Cutter	76
LLR-T10	5657028	●	Part	40,41,42,69,70
LLR-T20	5657036	●	Part	41
LW-3S	5859624	○	Part	59
LW-4	5521208	●	Part	42,43,51,58, 61,69,70
LW-5	5418520	●	Part	58
M3X8	5225453	●	Part	76
RCEI375H4R047S SX9	5995519	●	End Mill	74
RCEI375J6R047S SX9	5995568	●	End Mill	74
RCEI500H4R068S SX9	5995527	●	End Mill	74
RCEI500J6R068S SX9	5995576	●	End Mill	74
RCEM080H4R100S SX9	5995535	●	End Mill	74
RCEM080J6R100S SX9	5995584	●	End Mill	74
RCEM100H4R125S SX9	5995543	●	End Mill	74
RCEM100J6R125S SX9	5995592	●	End Mill	74
RCEM120H4R150S SX9	5995550	●	End Mill	74
RCEM120J6R150S SX9	5995600	●	End Mill	74

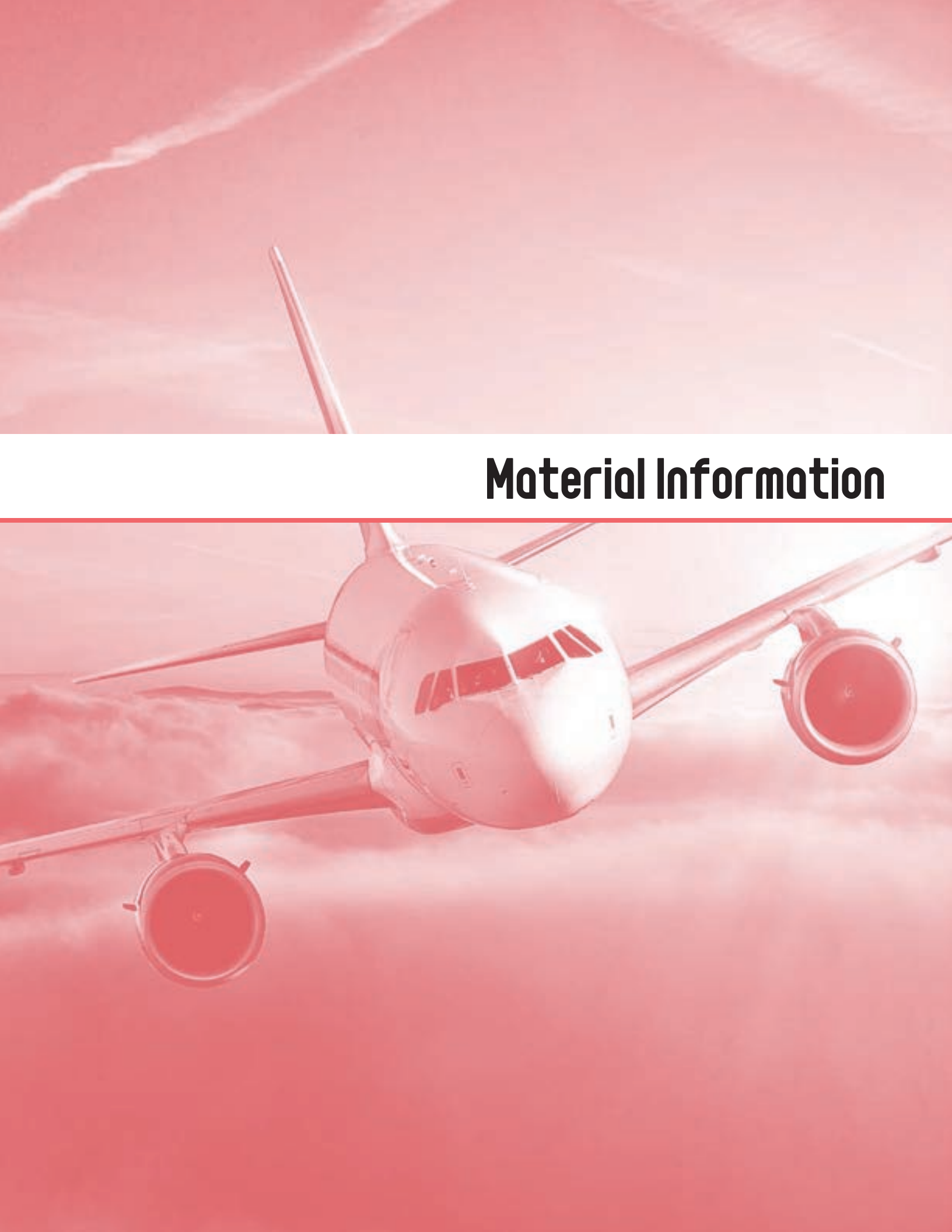
Rotating & Turning Tool Stock List

Item Description	EDP	Stock Status	Product	Page Number
RCEM160J6R200S SX9	5023544		End Mill	74
RCSI500H4R068S SX9	5040878	●	End Mill	75
RCSI500J6R068S SX9	5040928	●	End Mill	75
RCSI625H4R078S SX9	5040894	●	End Mill	75
RCSI625J6R078S SX9	5040936	●	End Mill	75
RCSI750J8R094S SX9	5040951	●	End Mill	75
RCSM120H4R150S SX9	5040852	●	End Mill	75
RCSM120J6R150S SX9	5040902	●	End Mill	75
RCSM160H4R200S SX9	5040860	●	End Mill	75
RCSM160J6R200S SX9	5040910	●	End Mill	75
RCSM200J8R250S SX9	5040944	●	End Mill	75
RNIW200S075R03	5660626	●	Milling Cutter	78
RNIW200S075R04-43	#US6000978	●	Milling Cutter	78
RNIW250S075R04	5660634	●	Milling Cutter	78
RNIW300S100R05	5660642	●	Milling Cutter	78
RNIW400S125R06	#US6000897	●	Milling Cutter	78
RPIW0625E0625R02	#US6000884	●	Milling Cutter	76
RPIW075E075R02	5732565	●	Milling Cutter	76
RPIW100E100R03	5732557	●	Milling Cutter	76
RPIW125E125R03	5660584	●	Milling Cutter	76
RPIW150E150R03	5660592	●	Milling Cutter	76
RPIW200S075R04	5660600	●	Milling Cutter	76
RPIW300S100R05	5660618	●	Milling Cutter	76
RPIW400S125R06	#US6000896	●	Milling Cutter	76
S12-CRGPL-163	#US6000909		Holder	68
S12-CRGPR-163	#US6000910	●	Holder	68
S25R-WCLNL12	5682653	○	Holder	69
S25R-WCLNR12	5682646	○	Holder	69
S25R-WWLNL08	5683040	○	Holder	69
S25R-WWLNR08	5683032	○	Holder	69
S32S-WCLNL12	5682679	○	Holder	69
S32S-WCLNR12	5682661	○	Holder	69
S32S-WDUNL15	5682802	○	Holder	69
S32S-WDUNR15	5682794	○	Holder	69
S-3-48X1/4SHCS	#US6000927	●	Part	76
S40T-WCLNL12	5682695	○	Holder	69
S40T-WCLNR12	5682687	○	Holder	69
S40T-WDUNL15	5701560	○	Holder	69
S40T-WDUNR15	5701545	○	Holder	69
S40T-WSKNL12	5682968	○	Holder	69
S40T-WSKNR12	5682950	○	Holder	69
S50-CRGNL-324	#US6000913		Holder	68
S50-CRGNL-404	#US6000914		Holder	68
S50-CRGNR-324	9100002	●	Holder	68
S50-CRGNR-404	#US6000915	●	Holder	68
S50U-WCLNL12	5682711	○	Holder	69
S50U-WCLNR12	5682703	○	Holder	69
SC02C-08	#US6000437	●	Part	46,47
SC05C-08	#US6000438	●	Part	46,47
SC05C-10	#US6000439	●	Part	46,47
SC06C-08	#US6000440	●	Part	46,47
SC06C-10	#US6000441	●	Part	46,47
SC10F-10	#US6000444	●	Part	46,47
SC40F-12	#US6000447	●	Part	46,47
SC40F-16	#US6000448	●	Part	46,47
SM2RV	#US6000461	●	Part	46,47
SM2RVS	#US6000462	●	Part	46,47

Item Description	EDP	Stock Status	Product	Page Number
SM3RV	#US6000464	●	Part	46,47
SM4RV	#US6000465	●	Part	46,47
VRAOL16-2D	#US6000901	●	Holder	46
VRAOL16-2D (RCGX23 OPTION)	#US6001036	●	Holder	46
VRAOL16-3D	5732524	●	Holder	46
VRAOL16-4D	5732672	●	Holder	46
VRAOL20-2D	5732516	●	Holder	46
VRAOL20-2D (RCGX23 OPTION)	#US6001038	●	Holder	46
VRAOL20-3D	5732508	●	Holder	46
VRAOL20-4D	5732490	●	Holder	46
VRAOL24-3E	5732482	●	Holder	46
VRAOL24-4E	5732474	●	Holder	46
VRAON16-2D	5732466	●	Holder	47
VRAON16-2D (RCGX23 OPTION)	#US6001039	●	Holder	47
VRAON16-3D	5732458	●	Holder	47
VRAON16-4D	5732441	●	Holder	47
VRAON20-2D	5732433	●	Holder	47
VRAON20-2D (RCGX23 OPTION)	#US6001040	●	Holder	47
VRAON20-3D	5732425	●	Holder	47
VRAON20-4D	5732417	●	Holder	47
VRAON24-3E	5732391	●	Holder	47
VRAON24-4E	5732375	●	Holder	47
VRAOR16-2D	5732342	●	Holder	46
VRAOR16-2D (RCGX23 OPTION)	#US6001009	●	Holder	46
VRAOR16-3D	5732243	●	Holder	46
VRAOR16-4D	5732219	●	Holder	46
VRAOR20-2D	5732201	●	Holder	46
VRAOR20-2D (RCGX23 OPTION)	#US6001037	●	Holder	46
VRAOR20-3D	5732185	●	Holder	46
VRAOR20-4D	5732177	●	Holder	46
VRAOR24-3E	5732169	●	Holder	46
VRAOR24-4E	5732151	●	Holder	46
WCLNL16-4D	5853361	●	Holder	40
WCLNL20-4D	5657176	●	Holder	40
WCLNL2525M12	5682588	○	Holder	40
WCLNL3225P12	5682612	○	Holder	40
WCLNR16-4D	5853353	●	Holder	40
WCLNR20-4D	5657168	●	Holder	40
WCLNR2525M12	5682570	○	Holder	40
WCLNR3225P12	5682604	○	Holder	40
WDHNL16-4D	5853445	●	Holder	41
WDHNL20-4D			Holder	41
WDHNL2525M15	5682786	○	Holder	41
WDHNR16-4D	5853437	●	Holder	41
WDHNR20-4D			Holder	41
WDHNR2525M15	5682778	○	Holder	41
WDHNR3225P15	5764469		Holder	41
WDJNL16-4D	5680012	●	Holder	40
WDJNL20-4D	5657192	●	Holder	40
WDJNL2525M15		○	Holder	40
WDJNL3225P15		○	Holder	40
WDJNR16-4D	5680004	●	Holder	40
WDJNR20-4D	5657184	●	Holder	40
WDJNR2525M15	5682729	○	Holder	40
WDJNR3225P15	5682745	○	Holder	40
WDNNN16-4D	5853940	●	Holder	41
WDNNN20-4D	5853957		Holder	41

Item Description	EDP	Stock Status	Product	Page Number
WDNNN2525M15	5682760	○	Holder	41
WSDNN16-4D	5853502	●	Holder	42
WSDNN20-4D			Holder	42
WSDNN2525M12	5682935	○	Holder	42
WSDNN3225P12	5682943	○	Holder	42
WSSNL16-4D	5853676	●	Holder	42
WSSNL2525M12	5682919	○	Holder	42
WSSNR16-4D	5853668	●	Holder	42
WSSNR2525M12	5682901	●	Holder	42
XNS-36	#US6000709	●	Part	68

MEMO



Material Information

Ni-based Heat Resistant Alloys

● Material Specifications Cross-Reference List-Aerospace Material Designation

Commercial designation	Hardness Brinell HB		Nominal composition Approximate content in %										
	Ann.	Aged	Ni	Cr	Co	Fe	Mo	C	Mn	Si	Al	Ti	Others
Astroloy*	—	—	56.9	15.0	15.0	—	5.25	0.06	—	—	4.0	3.5	0.05
AerMet 100			11.1	3.1	13.4	70.0	1.20	0.23				0.05	
GMR 235*	—	—	63.3	15.5	—	10.0	5.2	0.15	0.25	0.6	3.0	2.0	0.06
GMR 235D	—	—	63.0	15.5	—	4.5	5.0	0.15	0.1	0.3	3.5	2.5	0.05
Hastalloy B*	140	—	64.3	0.6	1.25	5.5	28.0	0.1	0.8	0.7	—	—	—
Hastalloy B-3			65.0	1.5	3.00	1.5	28.5	0.01	3.0	0.1	0.5		1.0
Hastalloy C*	200	—	54.1	16.0	1.25	5.75	17.0	0.07	0.8	0.7	—	—	4.0
Hastalloy C-22			56.0	22.0	2.50	3.00			0.5	0.1			3.8
Hastalloy C*22HS			74.0	22.0	1.00	2.00							0.0
Hastalloy C-276			57.0	16.0	2.50	5.00	16.0	0.01	1.0	0.1			1.0
Hastalloy N*	—	—	72.2	7.0	0.25	3.0	16.5	0.06	0.4	0.25	0.5	—	0.21
Hastalloy W*	—	—	62.7	5.0	1.25	5.5	24.5	0.06	0.5	0.5	—	—	—
Hastalloy X*	160	—	47.1	22.0	1.5	18.5	9.0	0.1	0.6	0.6	—	—	0.6
Hastelloy R235*	—	—	61.0	15.0	2.5	10.0	5.5	0.15	0.25	0.6	3.0	2.0	—
Haynes 25			10.0	20.0	51.0	3.0	1.0	0.10	1.50	0.4			15.0
Haynes 75	—	—	73.7	20.0	—	5.0	—	0.12	—	—	0.25	0.4	0.5
Haynes 80A	—	—	70.9	20.0	2.0	3.0	—	0.1	—	—	1.5	2.5	—
Haynes 188			22.0	22.0	39.0	3.0		0.1	1.25	0.35			1.0
Haynes 263	—	25	51.4	20.0	20.0	—	6.0	0.06	—	—	1.0	1.5	—
Haynes 600	—	—	75.9	16.0	—	8.0	—	0.08	—	—	—	—	—
Haynes 625	—	—	61.4	21.0	—	5.0	9.0	0.1	—	—	—	—	3.5
Haynes 718	—	43	53.5	18.0	—	19.0	3.0	0.08	—	—	0.5	0.9	5.0
Haynes X-750	—	37	74.9	16.0	—	7.0	—	0.08	—	—	0.8	0.25	1.0
IN-100*	—	—	61.6	10.0	15.0	—	3.0	0.18	1.2	0.5	5.5	4.75	—
Incoloy A-286			25.5	15.0		56.5						2.10	
Incoloy 800			35.0	23.0		39.5		0.10			0.6	0.60	1.8
Incoloy 804*	—	—	41.0	29.5	—	26.0	—	0.1	1.0	0.75	0.25	0.6	0.5
Incoloy 825*	180	—	42.0	21.0	—	30.0	3.0	0.04	—	—	—	1.0	2.0
Incoloy 901*	180	300	44.3	12.5	—	34.0	6.0	0.05	0.24	0.12	0.15	2.7	0.15
Incoloy 903*	—	380	39.0	—	15.0	41.0	—	0.02	—	—	0.7	1.4	3.0
Incoloy 909			38.0		13.0	42.0	1.25			0.4	0.0	1.5	4.7
Incoloy MA956				20.0		74.0					4.5	0.5	0.5
Inconel 600*	170	—	75.0	15.5	—	8.0	—	0.05	—	—	—	—	—
Inconel 601*	150	—	60.0	23.0	—	14.0	—	0.05	—	—	1.4	—	—
Inconel 604*	180	—	74.4	15.8	—	7.2	—	0.04	0.2	0.2	—	—	0.1
Inconel 617			52.0	22.0	12.5	1.5	9.5				1.2		
Inconel 625*	180	—	61.0	21.5	—	2.5	9.0	0.04	0.5	0.5	0.4	0.4	3.6
Inconel 625CLF			61.0	21.5		2.5	9.0						3.6
Inconel 700*	—	350	46.0	15.0	23.5	0.7	3.75	0.12	0.1	0.3	3.0	2.2	—
Inconel 702*	—	—	79.6	15.6	—	0.35	—	0.04	0.05	0.2	3.0	0.7	—
Inconel 706*	—	—	42.0	16.0	—	40.0	—	0.03	0.2	0.3	0.4	1.75	—
Inconel 713*	—	—	75.0	12.5	—	—	4.2	0.12	—	—	6.1	0.8	—
Inconel 718*	180	380	52.5	19.0	—	19.0	3.0	0.04	0.35	0.35	0.9	0.9	0.1
Inconel 718SPF			54.0	18.0		18.5	3.0					1.0	5.0
Inconel 722*	—	380	74.8	15.0	—	6.5	—	0.04	0.55	0.2	0.6	2.4	—
Inconel 751*	—	—	70.0	15.5	—	7.0	—	0.1	1.0	0.5	1.5	2.6	0.5
Inconel 781	—	—	70.0	16.0	—	8.0	—	0.07	2.25	0.15	0.1	3.0	0.2
Inconel 783			30.0	3.5	26.5	27.0		0.03	0.05		6.0	0.4	
Inconel HX			47.0	22.0	1.5	18.0	9.0						0.6
Inconel MA754			77.5	20.0		1.0					0.3	0.5	0.6
Inconel X-750*	—	390	73.0	15.5	—	7.0	—	0.04	0.35	0.35	0.7	2.5	—
Invar 36			36.0	0.25	0.5	62.0		0.15	0.60	0.40			1.00
Invar 42			41.0			56.0		0.50	0.40				1.00
Jessop G39*	130	—	67.5	19.5	—	5.0	3.0	0.5	—	—	—	—	4.5
Jessop G64*	220	—	60.7	11.0	—	2.0	3.0	0.15	—	—	6.0	—	4.0
Jessop G81*	—	300	79.3	20.0	13.0	—	—	0.05	—	—	1.3	2.3	—
Jethete M-152			2.5	16.8			1.8	0.12	0.7	0.18			0.6
Jethete M-252*	—	320	55.3	20.0	10.0	—	10.0	0.15	0.5	0.5	1.0	2.6	—
MAR-M 200*	—	—	69.4	9.0	10.0	—	—	0.15	—	—	5.0	2.0	13.5
MAR-M 246*	—	270	59.5	9.0	10.0	0.2	2.5	0.15	—	—	5.5	1.5	11.5
MAR-M 421*	—	—	62.3	15.5	10.0	—	1.7	0.15	—	—	4.3	1.75	5.3
MAR-M 432*	—	—	52.3	15.5	20.0	—	—	0.15	—	—	2.8	4.3	5.0
Monel 400*	110	—	65.0	—	—	1.5	—	0.12	1.0	—	—	—	32.0
Monel 405			63.0			2.5		0.30	2.0	0.5			34.0
Monel K-500*	120	290	64.0	—	—	1.0	—	0.13	0.8	—	2.8	0.6	30.0

* These alloys can be hardened by an aging process

USA		UK	France	Germany		Others
SAE	AMS	BS	AFNOR	Werkst.-Nr	DIN1706	
—	—	—	—	—	—	—
—	—	—	—	—	—	AISI:686
—	—	—	—	—	NiCr16MoAl	—
5396A	5396	—	ND37FeV	2.48	S-NiMo30	N10001
5388C	5388	—	—	2.4602	NiCr17Mo17FeW	N10002
5771	5607	—	—	—	—	N10003
—	5786	—	—	—	—	N10004
5390A	5390	—	NC22FeD	2.4603	—	N06002
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	5872	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	5596/5597	—	—	—	—	—
—	5542/5593	—	NC15TNbA	—	—	—
—	5397	—	—	LW2.4674	NiCo15Cr10MoAlTi	N13100
—	—	—	—	—	—	—
—	—	3072-76	NC21FeDU	2.4858	NiCr21Mo	N08825
—	5660	—	ZSNCDT42	LW2.4662	NiFe35Cr14MoTi	N09901
—	—	—	—	—	—	—
5540	5580	3072-76	NC15Fe	2.4816	NiCr15Fe	N06600
—	5715	—	—	2.4851	NiCr23Fe	N06601
—	—	—	—	—	—	—
	5887-89					
—	5666	—	NC22FeDNB	2.4856	NiCr22Mo9Nb	N06625
	5879					
—	—	—	NK27CADT	—	NiCo29Cr15MoAlTi	—
—	5550	—	—	—	—	N07702
—	5702	—	—	—	—	N09707
—	5391	3146-3	NC12AD	LW2.4670	S-NiCr13Al6MoNb	—
5383	5589	HR8	NC19FeNB	LW24668	NiCr19Fe19NbMo	N07713
	5596G					
—	5541	—	NC16FeTi	—	NiCr16FeTi	N07722
—	—	—	—	—	—	N07751
—	—	—	—	—	—	—
	5536					
5542G	5582	—	NC16FeTNb	2.4669	NiCr16FeTi	N07750
—	—	—	—	—	NiCr20MoW	—
—	—	—	—	—	NiCr11AlWNb	—
—	—	—	—	—	NiCr20Co18Ti	—
—	5551	—	—	2.4916	S-NiCr19Co	N07252
—	—	—	—	—	NiW13Co10Cr9AlTi	—
—	—	—	—	2.4675	NiCo10W10Cr9AlTi	—
—	—	—	—	—	NiCR16Co10WAlTi	—
—	—	—	—	—	NiCo20Cr16WAlTi	—
4544	4574	3072-76	NU30	2.436	NiCu30Fe	N04400
4676	—	3072-76	—	2.4375	NiCu30Al	N05500

Ni-based Heat Resistant Alloys

● Material Specifications Cross-Reference List-Aerospace Material Designation

Commercial designation	Hardness Brinell HB		Nominal composition Approximate content in %										
	Ann.	Aged	Ni	Cr	Co	Fe	Mo	C	Mn	Si	Al	Ti	Others
Monel R-405*	110	—	66.0	—	—	1.2	—	0.15	1.0	—	—	—	31.06
Multimet N155			21.0	22.5	21		3.5	0.16	2.0	1.0			4.50
Nickel 200			99.0			0.4		0.15	0.35	0.35			0.26
Nickel 201			99.0			0.4		0.02	0.35	0.35			0.26
Nimocast 80*	—	—	69.9	20.0	2.0	5.0	—	0.1	—	—	1.0	2.0	—
Nimocast 90*	—	—	52.9	20.0	18.0	5.0	—	0.1	—	—	1.5	2.5	—
Nimocast 713	—	—	72.6	13.4	—	—	4.5	0.12	—	—	6.2	1.0	2.3
Nimocast 842	—	—	57.7	22.0	10.0	—	10.0	0.3	—	—	—	—	—
Nimocast PD16	—	—	43.8	16.5	—	34.0	3.3	0.06	—	—	1.2	1.2	—
Nimocast PE10	—	—	56.4	20.0	—	—	6.0	—	—	—	—	—	9.0
Nimocast PK24	—	—	61.1	9.5	15.0	—	3.0	0.17	—	—	5.5	4.7	1.0
Nimonic 75*	170	—	75.0	19.5	—	4.0	—	0.12	—	—	—	0.4	—
Nimonic 80A*	—	350	75.0	19.5	—	—	—	0.08	—	—	1.4	2.4	—
Nimonic 86			65.0	25.0			10.0						
Nimonic 90*	—	346	59.0	19.5	16.5	—	—	0.08	—	—	1.5	2.5	—
Nimonic 95	—	—	49.9	19.5	—	5.0	—	0.11	—	1.0	2.0	3.5	—
Nimonic 101			48.0	24.2	19.7		1.5				1.4	3.0	
Nimonic 105*	—	320	53.0	15.0	20.0	—	5.0	0.12	—	—	4.7	1.2	—
Nimonic 115*	—	350	59.0	14.2	13.2	—	4.0	0.16	—	—	5.0	4.0	—
Nimonic 242	—	—	58.0	21.5	10.0	—	10.5	—	—	—	—	—	—
Nimonic 263/C263*	—	275	51.5	20.2	20.0	—	6.0	0.06	—	—	0.5	2.0	—
Nimonic 901*	—	350	44.0	12.5	—	35.0	5.7	0.04	—	—	0.3	2.9	—
Nimonic PE11			39.0	18.0		34.0	5.2				0.8	2.3	
Nimonic PE13	—	—	49.0	21.8	1.5	18.5	9.0	0.1	0.5	0.5	—	—	0.6
Nimonic PE16*	—	250	43.5	16.5	—	34.0	3.3	0.06	—	—	1.2	1.2	—
Nimonic PK25	—	—	49.9	19.0	19.5	—	4.0	0.08	0.8	0.8	2.9	2.9	—
Nimonic PK31	—	—	53.8	20.0	14.0	—	4.5	—	—	—	0.4	2.3	5.0
Nimonic PK33*	—	350	55.9	18.0	14.0	0.5	7.0	0.05	0.25	0.25	2.1	2.2	—
R-235*	—	—	63.3	15.0	1.2	10.0	5.5	0.12	0.1	0.3	2.0	2.5	—
Refractaloy 26	—	—	38.0	19.0	20.0	16.0	3.2	0.03	0.8	1.0	0.2	2.75	—
Rene 41	—	—	53.1	19.0	11.0	1.8	10.0	0.09	0.3	0.3	1.5	3.1	—
Rene 63	—	—	54.4	14.0	15.0	0.5	6.0	0.05	0.1	0.2	3.8	2.5	3.5
Rene 77	—	—	57.6	15.0	15.0	0.4	4.2	0.17	0.1	0.1	4.3	3.3	—
Rene 80	—	—	61.0	14.0	9.5	—	4.0	0.15	—	—	—	4.0	8.0
Rene 95	—	—	64.5	14.0	8.0	—	3.5	0.15	—	—	—	2.5	3.5
Rene 100	—	—	60.6	10.0	15.0	—	3.0	0.18	—	—	5.5	4.7	—
Rene 125	—	—	60.0	8.9	10.0	—	2.0	0.1	—	—	4.7	2.5	7.0
TRW 1800	—	—	70.0	13.0	—	—	—	0.1	—	—	6.0	0.06	10.5
TRW V1 A	—	—	70.5	6.0	7.5	—	2.0	0.13	—	—	5.4	1.0	6.3
Udimar 250			18.0		8.0	68.0	5.0				0.1	0.4	
Udimar 300			18.5		9.0	66.0	5.0				0.1	0.7	
Udimet 500*	—	—	51.7	19.0	19.0	—	4.0	0.1	0.1	0.1	3.0	3.0	—
Udimet 520			56.0	19.0	12.0		6.0				2.0	3.0	1.0
Udimet 630	—	—	51.0	17.0	—	17.5	3.0	0.04	—	—	0.6	1.1	4.1
Udimel 700	—	—	54.6	15.0	17.5	—	—	0.1	—	—	4.4	3.4	—
Udimet 710	—	—	55.0	18.0	15.0	0.5	1.5	0.07	—	—	2.5	5.0	1.5
Udimet 718*	180	380	52.5	18.0	—	18.0	3.0	0.05	—	—	0.6	0.1	5.2
Udimet 720			56.0	16.0	14.7		3.0				2.5	5.0	1.3
Udimet alloy D-979			45.0	15.0		27.0	4.0				1.0	3.0	4.0
Udimet L-605			10.0	20.5	50.0	3.0			1.5				15.0
Udimet alloy R41			55.0	19.0	11.0		10.0				1.5	3.1	
Waspaloy*	—	HRC35-42	56.9	19.8	13.5	0.8	4.45	0.07	0.1	0.1	1.4	3.0	—

* These alloys can be hardened by an aging process

USA		UK	France	Germany		Others
SAE	AMS	BS	AFNOR	Werkst.-Nr	DIN1706	
4674	7234	—	—	—	—	N04405
—	—	3146	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
5391A	—	HC203	NC13AD	2.467	S-NiCr13Al6MoNb	—
—	5397	HC204	NK15CAT	LW2.4674	—	—
—	—	—	—	—	NiFe33Cr17Mo	—
—	—	3146	—	—	—	—
—	—	HR5,203-4	NC20T	2.463	NiCr20Ti	—
—	—	Hr401,601	NC20TA	2.4631	NiCr20TiAk	N07080
—	—	Hr2,202	Nc20ATV	2.4632	NiCr20Co18Ti	N07090
—	—	—	—	—	—	—
—	—	HR3	NCKD20ATV	2.4634	NiCo20C15MoAlTi	—
—	—	HR4	NCK15ATD	2.4636	NiCo15Cr15MoAlTi	—
—	—	—	—	—	—	—
—	—	HR10	NCK20D	2.465	NiCr15Co19MoTi	—
5660C	5661A	—	ZSNCDT42	2.4662	NiCr15MoTi	—
5536E	5754E	HR6,204	NC22FeD	2.4665	NiCr22Fe18Mo	—
—	—	HR207	NW11AC	—	NiFe33Cr17Mo	—
5751A	5753	—	NKOD20ATU	2.4666	NiCr18CoMo	—
—	—	—	—	—	—	—
—	—	—	NC19KDUV	—	NiCr20Co16MoTi	—
—	—	—	—	—	—	—
—	—	—	Z6NKCDT38	—	—	—
—	5399	—	NC19KDT	2.4973	NiCr19Co11MoTi	N07041
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	NC14K8	—	—	—
—	—	—	—	—	NiCo15Cr10MoAlTi	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	NiTa9Co8W6CrAl	—
	6512					
—	5751	—	NCK19DAT	2.4983	NiCr18Co18MoTi	N07500
—	—	—	—	2.4668	NiCr19NbMo	—
—	—	—	NCKD20AT	2.4636	NiCo15CrMoAlTi	—
—	—	—	NC18TDA	—	—	—
5383	5589	HR8	NC19FeN	LW2.4668	NiCr19Fe19NbMo	N07718
	5759					
—	5544	—	NC20K14	LW2.4668	NiCr19Fe19NbMo	N07001

Co-based Heat Resistant Alloys

● Material Specifications Cross-Reference List-Aerospace Material Designation

Commercial designation	Hardness Brinell HB		Nominal composition Approximate content in %										
	Ann.	Aged	Ni	Cr	Co	Fe	Mo	W	Mn	Si	Al	Ti	Others
Air Resist 13	—	—	1.0	—	79.6	2.5	—	11.0	—	—	3.5	—	4.12
Air Resist 213	—	—	—	19.0	65.8	—	—	4.7	—	—	3.5	—	6.68
Altemp S 816	—	—	20.0	20.0	47.6	—	4.0	4.0	—	—	—	—	0.4
FSX 414	—	—	10.0	29.0	52.8	1.0	—	7.0	—	—	—	—	0.25
Haynes 25*	—	—	10.0	20.0	49.0	3.0	—	15.0	1.5	0.5	—	—	0.1
Haynes 36	—	—	10.0	18.5	52.8	2.0	—	14.5	1.2	0.6	—	—	0.4
Haynes 151	—	—	—	20.0	65.6	—	—	12.8	0.5	0.5	—	0.15	0.47
Haynes 188*	—	—	22.0	22.0	38.0	2.5	—	14.0	1.0	0.4	—	—	0.1
HS 6*	—	—	2.5	28.0	60.5	3.0	—	5.0	—	—	—	—	1.0
HS 21*	—	—	3.0	27.0	62.6	2.0	5.0	—	0.6	0.6	—	—	0.25
HS 25	—	—	10.0	20.0	48.4	3.0	—	15.0	1.5	2.0	—	—	0.1
HS 30	—	—	16.0	24.0	51.4	1.0	6.0	—	0.6	0.6	—	—	0.4
HS 31	—	—	10.0	25.0	53.8	1.5	—	8.0	0.6	0.8	—	—	0.4
HS 36	—	—	10.0	18.0	53.1	2.0	—	15.0	1.5	—	—	—	0.4
Inconel 783			28.5	3.0	34.0	26.0					5.4	0.1	3.0
J 1570*	—	—	28.0	19.0	39.0	2.0	—	7.0	—	—	—	—	—
J 1650	—	—	27.0	19.0	38.0	—	—	12.0	—	—	—	—	0.2
Jessop 832	—	—	12.0	19.0	44.0	17.0	2.0	—	0.8	0.3	—	—	3.5
Jessop 834	—	—	12.0	19.0	42.0	20.0	2.0	—	—	—	—	—	6.5
Jessop 865	—	—	10.5	25.5	53.0	2.0	—	7.5	0.6	0.6	—	—	0.45
Jessop 875	—	—	—	21.0	66.0	—	—	11.0	—	—	—	—	2.45
Jessop 887	—	—	10.0	20.0	50.0	3.0	—	15.0	0.5	1.5	—	—	0.1
Jessop X-40			10.5	25.5	53.0	1.5	—	7.5	0.75	0.75	—	—	0.5
Jessop X-45			10.5	25.5	54.7	2.0	—	7.0	—	—	—	—	0.25
Jessop X-50			20.5	25.5	40.3	4.0	—	12.0	—	—	—	—	0.75
Jessop X-63			10.0	25.0	57.6	1.0	6.0	—	—	—	—	—	0.45
Jetalloy 209	—	—	10.0	20.0	52.0	1.0	—	15.0	—	—	—	2.0	0.02
L-251	—	—	10.0	19.0	56.0	1.0	—	14.0	—	—	—	—	0.4
L-605	—	—	10.0	20.0	51.0	1.6	—	15.0	1.5	0.6	—	—	0.1
M 203	—	—	25.0	20.0	38.0	1.6	—	12.0	0.8	1.0	0.7	2.0	1.67
M 204	—	—	25.0	18.0	42.0	1.6	—	12.0	—	—	—	—	1.27
M 205	—	—	25.0	18.0	40.0	1.6	—	12.0	—	—	2.7	—	1.67
ME16				15.0	23.0	2.0	5				5.0		22.25
MP35N			37.0	21.0	29.2	1.0	10.5		0.15	0.15		1.0	0.04
MAR-M 302	—	—	—	21.5	57.0	0.75	—	10.0	0.1	0.2	—	—	10.0
MAR-M 322	—	—	—	21.5	60.0	0.75	—	9.0	0.1	0.1	—	0.75	7.7
MAR-M 509	—	—	10.0	23.0	55.0	—	—	7.0	0.05	0.05	—	0.2	4.6
MAR-M 905	—	—	20.0	20.0	55.0	—	—	—	—	—	—	0.5	7.65
MAR-M 918	—	—	20.0	20.0	52.0	0.4	—	—	0.1	0.1	—	0.5	7.65
NF3				14.3	22.4		3.9				4.8	4.6	17.90
Refractaloy 70	—	—	20.0	21.0	46.0	0.5	8.0	4.0	—	—	—	—	0.08
STELLITE 6				26.0	72.0			5.0					
UDIMET 188			22.0	22.0	38.0	3.0		14.0	1.25				
V-36	—	—	20.0	25.0	43.2	2.4	4.0	2.0	0.6	0.5	—	—	2.29
Wl-52			0.5	21.0	62.6	2.0	—	11.0	0.25	0.25	—	—	2.45

* These alloys can be hardened by an aging process

USA		UK	France	Germany		Others
SAE	AMS	BS	AFNOR	Werkst.-Nr	DIN1706	
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	(5534)	—	—	LW2.4989	CoCr20Ni20W	—
—	—	—	—	—	—	—
5537C	5759	—	KC20WN	LW2.4964	CoCr20W15Ni	—
—	—	—	—	—	CoCr19W14NiB	—
—	—	—	—	—	CoCr20W13	—
—	5772	—	KC22WN	—	CoCr22W14Ni	—
—	5373	—	—	—	—	R30006
—	5385	3531	—	—	CoCr29Mo	R30021
	5759	—	KC20WN	LW2.4964	CoCr20W15Ni	—
5380	—	—	—	—	CoCr25NiW	R30030
5382	—	3146	—	LW2.4670	CoCr25NiW	R30031
—	—	—	—	—	CoCr19W14NiB	—
	5940					
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	CoCr19Fe16NiMoVNb	—
—	—	—	—	—	CoCr19Fe20NiMoVNb	—
—	—	—	—	—	CoCr25Niw	—
—	—	—	—	—	CoCr21W11Nb	—
—	—	—	—	—	CoCr20W15Ni	—
—	5382	3156-2	—	LW2.4670	CoCr25NiW	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	5759	—	—	2.4964	CoCr20W15Ni	R30605
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
	5844					
—	—	—	—	—	CoCrW10TaZrB	—
—	—	—	—	—	CoCr22W9TaZrNb	—
—	—	3146-3	—	—	CoCr24Ni10WTaZrB	—
—	—	—	—	—	—	—
—	—	—	—	—	CoCr20Ni20Ta	—
—	—	—	—	—	—	—
—	—	—	—	—	CoCr25NiMoWNb	—
—	—	—	—	—	CoCr12MoW	—

Hardness Comparison Chart

Vickers Hardness (HV)	Rockwell hardness			Brinell hardness, 10 mm balls, 3000 kgf load	Shore hardness	Tensile strength Kgf/mm² [N/m²] Approximate value MPa (1)
	Scale A Load: 60 kgf brale indenter (HRA)	Scale C Load: 150 kgf brale indenter (HRC)	Scale B Load: 100 kgf Diameter 1/16" indenter (HRB)	Tungsten carbide ball		
2200	(95.1)	–	–	–	–	
2100	(94.6)	–	–	–	–	
2000	94.2	–	–	–	–	
1900	93.7	(80.5)	–	–	–	
1800	93.2	(79.2)	–	–	–	
1700	92.7	(77.9)	–	–	–	
1600	91.8	(76.6)	–	–	–	
1500	91.0	(75.3)	–	–	–	
1450	90.4	(74.6)	–	–	–	
1400	90.0	74.0	–	–	–	
1350	89.6	73.4	–	–	–	
1300	89.1	72.7	–	–	–	
1250	88.6	72.1	–	–	–	
1200	88.1	71.5	–	–	–	
1150	87.6	70.9	–	–	–	
1100	87.1	70.3	–	–	–	
1050	86.6	69.6	–	–	–	
1000	86.2	68.9	–	–	–	
940	85.6	68.0	–	–	97	
920	85.3	67.5	–	–	96	
900	85.0	67.0	–	–	95	
880	84.7	66.4	–	(767)	93	
860	84.4	65.9	–	(757)	92	
840	84.1	65.3	–	(745)	91	
820	83.8	64.7	–	(733)	90	
800	83.4	64.0	–	(722)	88	
780	83.0	63.3	–	(710)	87	
760	82.6	62.5	–	(698)	86	
740	82.2	61.8	–	(684)	84	
720	81.8	61.0	–	(670)	83	
700	81.3	60.1	–	(656)	81	
690	81.1	59.7	–	(647)	–	
680	80.8	59.2	–	(638)	80	
670	80.6	58.8	–	630	–	
660	80.3	58.3	–	620	79	
650	80.0	57.8	–	611	–	
640	79.8	57.3	–	601	77	
630	79.5	56.8	–	591	–	
620	79.2	56.3	–	582	75	
610	78.9	55.7	–	573	–	
600	78.6	55.2	–	564	74	
590	78.4	54.7	–	554	–	
580	78.0	54.1	–	545	72	
570	77.8	53.6	–	535	–	
560	77.4	53.0	–	525	71	
550	77.0	52.3	–	517	–	
540	76.7	51.7	–	507	69	
530	76.4	51.1	–	497	–	
520	76.1	50.5	–	488	67	
510	75.7	49.8	–	479	–	
500	75.3	49.1	–	471	66	

Vickers Hardness (HV)	Rockwell hardness			Brinell hardness, 10 mm balls, 3000 kgf load	Shore hardness	Tensile strength Kgf/mm² [N/m²] Approximate value MPa (1)
	Scale A Load: 60 kgf brale indenter (HRA)	Scale C Load: 150 kgf brale indenter (HRC)	Scale B Load: 100 kgf Diameter 1/16" indenter (HRB)	Tungsten carbide ball		
490	74.9	48.4	–	460	–	
480	74.5	47.7	–	452	64	
470	74.1	46.9	–	442	–	
460	73.6	46.1	–	433	62	
450	73.3	45.3	–	425	–	
440	72.8	44.5	–	415	59	
430	72.3	43.6	–	405	–	
420	71.8	42.7	–	397	57	
410	71.4	41.8	–	388	–	
400	70.8	40.8	–	379	55	
390	70.3	39.8	–	369	–	
380	69.8	38.8	(110.0)	360	52	
370	69.2	37.7	–	350	–	
360	68.7	36.6	(109.0)	341	50	
350	68.1	35.5	–	331	–	
340	67.6	34.4	(108.0)	322	47	
330	67.0	33.3	–	313	–	
320	66.4	32.2	(107.0)	303	45	
310	65.8	31.0	–	294	–	
300	65.2	29.8	(105.5)	284	42	
295	64.8	29.2	–	280	–	
290	64.5	28.5	104.5	275	41	
285	64.2	27.8	–	270	–	
280	63.8	27.0	103.5	265	40	
275	63.5	26.4	–	261	–	
270	63.1	25.6	102.0	256	38	
265	62.7	24.8	–	252	–	
260	62.4	24.0	101.0	247	37	825
255	62.0	23.1	–	243	–	805
250	61.6	22.2	99.5	238	36	795
245	61.2	21.3	–	233	–	780
240	60.7	20.3	98.1	228	34	765
230	–	18.0	96.7	219	33	730
220	–	15.7	95.0	209	32	695
210	–	13.4	93.4	200	30	670
200	–	(11.0)	91.5	190	29	635
190	–	(8.5)	89.5	181	28	605
180		(6.0)	87.1	171	26	580
170		(3.0)	85.0	162	25	545
160		(0.0)	81.7	152	24	515
150			78.7	143	22	490
140			75.0	133	21	455
130			71.2	124	20	425
120			66.7	114		390
110			52.3	105		–
100			56.2	95		–
95			52.0	90		–
90			48.0	86		–
85			41.0	81		–

(1) 1 MPa = 1 N/mm²

(2)This table is an excerpt from the JIS Iron and Steel Handbook

(3)Values in parentheses in the above table are not usually used