



## TURNING - Ceramic

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ISO 513		CERAMIC				
		Si <sub>3</sub> N <sub>4</sub>	Al <sub>2</sub> O <sub>3</sub> MIXED	PVD COATED Al <sub>2</sub> O <sub>3</sub> MIXED	SiAlON	WHISKER
K Cast iron	K01	NSN350	MAC200			
	K10			NSM400		
	K20	NSN450				
	K30					
S HRSA	S01					NWR700
	S10				NSA6000	NWR750
	S20				NSA650	
	S30					
H Hardened steel	H01		MAC200	NAC150		
	H10		NAC250			
	H20					
	H30					

HRSA: Heat resistant super alloy

GRADE	COMPOSITION	HARDNESS HV	COATING		APPLICATION	FEATURES
			TECHNOLOGY	COMPOSITION		
<b>NAC150</b>	Al <sub>2</sub> O <sub>3</sub> +TiCN	2.200	PVD	TiN	H H01 H15	<ul style="list-style-type: none"> <li>Coated ceramic improves tool life, yellow surface helps to identify wear status.</li> <li>La ceramica rivestita migliora la durata dell'utensile; la superficie gialla facilita il controllo dello stato di usura.</li> <li>Die beschichtete Keramik verbessert die Standzeit des Werkzeugs; die gelbe Oberfläche dient zur Erkennung der Verschleißentwicklung</li> <li>La céramique revêtu améliore la durée de vie de l'outil ; la surface jaune permet d'identifier l'évolution de l'usure</li> </ul>
<b>NAC200</b>	Al <sub>2</sub> O <sub>3</sub> +TiCN	2.300	-	-	K K01 K20	<ul style="list-style-type: none"> <li>First choice for finishing of hardened steel and cast iron in stable conditions.</li> <li>Prima scelta per finitura di acciai temprati e ghisa in condizioni di taglio stabili.</li> <li>Erste Wahl für die Feinbearbeitung von gehärteten Stählen und Gusseisen unter stabilen Schnittbedingungen.</li> <li>Premier choix pour la finition d'aciers trempés et de fonte dans des conditions de coupe stables.</li> </ul>
					H H01 H20	
<b>NAC250</b>	Al <sub>2</sub> O <sub>3</sub> +TiC	2.100	-	-	H H10 H25	<ul style="list-style-type: none"> <li>Tough ceramic for general purpose applications with high reliability.</li> <li>Ceramica tenace per impiego generico con elevata affidabilità.</li> <li>Robuste Keramik für allgemeine Zwecke mit hoher Zuverlässigkeit.</li> <li>Céramique tenace à usage générique d'une grande fiabilité.</li> </ul>
<b>NSN350</b>	Si <sub>3</sub> N <sub>4</sub>	1.700	-	-	K K05 K20	<ul style="list-style-type: none"> <li>High wear resistance for continuous cut applications at very high cutting speed.</li> <li>Elevata resistenza all'usura per applicazioni con condizioni di taglio continuo ad alte velocità di taglio.</li> <li>Hohe Verschleißfestigkeit für Anwendungen mit kontinuierlichen Schnittbedingungen bei hohen Schnittgeschwindigkeiten.</li> <li>Haute résistance à l'usure pour applications avec des conditions de coupe continue à des vitesses de coupe élevées.</li> </ul>
<b>NSN400</b>	Si <sub>3</sub> N <sub>4</sub>	1.700	-	-	K K20 K30	<ul style="list-style-type: none"> <li>First choice for roughing of grey cast iron even with interrupted cut.</li> <li>Prima scelta per sgrossatura di ghisa grigia anche con taglio interrotto.</li> <li>Erste Wahl für das Schruppen von Grauguss, auch bei unterbrochenem Schnitt.</li> <li>Premier choix pour le dégrossissage de la fonte grise, y compris en coupe interrompue.</li> </ul>
<b>NSN450</b>	Si <sub>3</sub> N <sub>4</sub>	1.600	-	-	K K20 K30	<ul style="list-style-type: none"> <li>Toughest silicon nitride grade for very difficult applications.</li> <li>Il più tenace grado in nitruro di silicio per applicazioni molto difficili.</li> <li>Die härteste Qualität aus Siliziumnitrid für sehr schwierige Anwendungen.</li> <li>La nuance de nitruro de silicium la plus tenace pour applications très difficiles.</li> </ul>

GRADE	COMPOSITION	HARDNESS HV	COATING		APPLICATION	FEATURES
			TECHNOLOGY	COMPOSITION		
<b>NWR700</b>	Al <sub>2</sub> O <sub>3</sub> +SiC	2.100	-	-	S S01 S15	<ul style="list-style-type: none"> <li>Reinforced alumina ceramic with excellent flank and notch wear resistance, first choice for high speed stable machining of heat resistant super alloys.</li> <li>Ceramica di allumina rinforzata con eccellente resistenza all'usura del fianco e dell'intaglio, prima scelta per lavorazioni stabili ad alta velocità di superleghe resistenti al calore.</li> <li>Verstärkte Aluminiumoxidkeramik mit hervorragendem Flanken- und Schlitzverschleiß, die erste Wahl für die stabile Hochgeschwindigkeitsbearbeitung von hitzebeständigen Superlegierungen.</li> <li>Céramique d'alumine renforcée dotée d'une excellente usure du flanc et de l'entaille, premier choix pour usinages stables à grande vitesse de superalliages résistants à la chaleur.</li> </ul>
<b>NWR750</b>	Al <sub>2</sub> O <sub>3</sub> +SiC	2.100	-	-	S S05 S20	<ul style="list-style-type: none"> <li>Reinforced alumina ceramic with improved toughness, suitable even on heavy interrupted cut.</li> <li>Ceramica di allumina rinforzata con elevata tenacità, applicabile anche con condizioni di taglio fortemente interrotto.</li> <li>Verstärkte Aluminiumoxidkeramik mit verbesserter Robustheit, auch bei stark unterbrochenen Schnittbedingungen einsetzbar.</li> <li>Céramique d'alumine renforcée à ténacité optimisée, applicable y compris dans des conditions de coupe très interrompue.</li> </ul>
<b>NSA6000</b>	SiAlON	1.800	-	-	S S10 S30	<ul style="list-style-type: none"> <li>First choice for heat resistance super alloys (HRSA) machining with variable cutting conditions. Toughness and wear resistance are well-balanced.</li> <li>Prima scelta per superleghe resistenti al calore (HRSA) in condizioni di taglio variabili. Buon bilanciamento fra tenacità e resistenza all'usura.</li> <li>Erste Wahl für hitzebeständige Superlegierungen (HRSA) unter unterschiedlichen Schnittbedingungen. Gutes Verhältnis zwischen Robustheit und Verschleißfestigkeit.</li> <li>Premier choix pour superalliages résistants à la chaleur (HRSA) dans des conditions de coupe variables. Bon équilibre entre ténacité et résistance à l'usure.</li> </ul>
<b>NSA650</b>	SiAlON	1.700	-	-	S S15 S35	<ul style="list-style-type: none"> <li>Excellent thermal and shock resistance for severe applications on HRSA.</li> <li>Eccellente resistenza termica e agli urti per applicazioni gravose su superleghe resistenti al calore (HRSA).</li> <li>Hervorragende Hitze- und Zähigkeit für schwere Anwendungen mit hitzebeständigen Superlegierungen (HRSA).</li> <li>Eccellente résistance thermique et aux chocs pour applications intensives sur superalliages résistants à la chaleur (HRSA).</li> </ul>

ISO 513		nixkoTOOLS	CERAMTEC	ISCAR	KENNAMETAL	KYOCERA	NTK	SANDVIK	TAEGUTEK	TUNGALOY	UNION	WALTER	
<b>K</b>	<b>K01 - K10</b>	NSN350 NSN400	SL654C <u>SL658C</u>	IS6 IS8	KYK10	KS6015	SX6	CC6190 <u>GC1690</u>	AS500	FX105	SN500 SN600	WCK10	
	<b>K10 - K20</b>	NSN400 NSN450	SL500 SL550C SL506 SL606	IS8 IS80	KY3500 KYK25	CS7050 KS6050	SX6	CC6190	AS500	CX710 FX105	NC400 SN300 SN400	WCK10	
	<b>K20 - K30</b>	NSN450	SL508 SL608		KY3500	KS6050	<u>SP9</u> SX9		AS10	CX710	SN300		
<b>S</b>	<b>HRSA</b>	<b>S01 - S10</b>	NWR700 NWR750		IW7		CF1	WA1 WA5	CC670	TC430	SW400 SW800	WWS20	
		<b>S10 - S20</b>	NSA6000	LST320	IS25 IS9	KY4300 KYS25	KS6030 KS6040	SX7 SX3	CC6060 CC6160	TC3020	TS200	SN800	WIS10
		<b>S20 - S30</b>	NSA6000 NSA650	LST320	IS35	KY1540 KYS30	KS6040	SX3 SX9	CC6065 CC6160	TC3030	TS200 TS300	SN1000	
<b>H</b>	<b>H01 - H10</b>	<u>NAC150</u> NAC200	SH2	<u>IN22</u> <u>IN420</u>	KY1615 <u>KY4400</u>	<u>A66N</u> <u>PT600M</u>	HC7 <u>ZC7</u>	CC6050	AB20 <u>AB2010</u>	<u>LX11</u>	ST500 ST900 TC300 <u>TM300</u>		
	<b>H10 - H20</b>	NAC200 NAC250	SH2 SH4	IN23	KY1615	A65	HC2	CC650	AB30	<u>LX11</u> LX21	ST100 ST300 TC100		
	<b>H20 - H30</b>												

BLACK: CVD, UNDERLINED: PVD, RED: uncoated

This table is our own estimation based on information available to the public and is not authorized by the company mentioned on it.

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NEGATIVE type with hole			C	D	S	T	V	W
			80°	55°	90°	60°	35°	80°
<b>K</b>	UNIVERSAL	<b>GP</b> T02020  	 A235 SIZE 12 16	 A237 SIZE 15	 A242 SIZE 12	 A244 SIZE 16	 A247 SIZE 16	 A248 SIZE 08
		<b>WU</b> T02020  	 A235 SIZE 12					
<b>S</b>	UNIVERSAL	<b>GP</b> T02020  	 A235 SIZE 12					
<b>H</b>	UNIVERSAL	<b>GP</b> T02020  	 A235 SIZE 12 16	 A237 SIZE 15	 A242 SIZE 12	 A244 SIZE 16	 A247 SIZE 16	 A248 SIZE 08
		<b>GS</b> S01525 (NAC150) - S02020 (NAC200)  	 A235 SIZE 12	 A237 SIZE 15		 A244 SIZE 16	 A247 SIZE 16	
<b>H</b>	SHARP	<b>CC</b> T01020  	 A235 SIZE 12	 A237 SIZE 15	 A242 SIZE 12	 A244 SIZE 16	 A247 SIZE 16	 A248 SIZE 08
	WIPER	<b>WU</b> T02020  	 A235 SIZE 12					

NEGATIVE type without hole			C	D	R	S	T
			80°	55°	-	90°	60°
<b>K</b>	UNIVERSAL	<b>GP</b> T02020  	<input type="checkbox"/> A236  SIZE 12		<input type="checkbox"/> A240  SIZE 12	<input type="checkbox"/> A243  SIZE 12	<input type="checkbox"/> A245  SIZE 16
		<b>GP</b> T02020 WITH DIMPLE  	<input type="checkbox"/> A236  SIZE 12			<input type="checkbox"/> A243  SIZE 12	
<b>S</b>	UNIVERSAL	<b>GP</b> T02020  	<input type="checkbox"/> A236  SIZE 12		<input type="checkbox"/> A240  SIZE 12 19	<input type="checkbox"/> A243  SIZE 12	
		<b>GP</b> T02020 WITH DIMPLE  	<input type="checkbox"/> A236  SIZE 12			<input type="checkbox"/> A243  SIZE 12	
	SHARP	<b>CC</b> T01020  			<input type="checkbox"/> A240  SIZE 12		
<b>H</b>	UNIVERSAL	<b>GP</b> T02020  	<input type="checkbox"/> A236  SIZE 12	<input type="checkbox"/> A238  SIZE 15	<input type="checkbox"/> A240  SIZE 12	<input type="checkbox"/> A243  SIZE 12	
		<b>GP</b> T02020 WITH DIMPLE  	<input type="checkbox"/> A236  SIZE 12			<input type="checkbox"/> A243  SIZE 12	
REINFORCED		<b>HI</b> P15015  	<input type="checkbox"/> A236  SIZE 12		<input type="checkbox"/> A240  SIZE 12	<input type="checkbox"/> A243  SIZE 12 19	
		<b>HT</b> K15015  			<input type="checkbox"/> A240  SIZE 12		

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POSITIVE type			C	R	S	T		
			80°	-	90°	60°		
K	UNIVERSAL	<p><b>GP</b></p> <p>T02020</p>	<p>CC  A234</p> <p>SIZE 09 12</p>	-	<p>SC  A241</p> <p>SIZE 09 12</p>	<p>TP  A246</p> <p>SIZE 11 16</p>		
		<p><b>GP</b></p> <p>T02020</p>		<p>RC  A239</p> <p>SIZE 06 09 12</p>				
S	UNIVERSAL	<p><b>GP</b></p> <p>T02020</p>		<p>RC  A239</p> <p>SIZE 06 09 12</p>				
		<p><b>CC</b></p> <p>T01020</p>		<p>RC  A239</p> <p>SIZE 06 09 12</p>				
H	UNIVERSAL	<p><b>GP</b></p> <p>T02020</p>		<p>RC  A239</p> <p>SIZE 06 09 12</p>		<p>TP  A246</p> <p>SIZE 11 16</p>		
		<p><b>GS</b></p> <p>S01525</p>		<p>RC  A239</p> <p>SIZE 06</p>		<p>TP  A246</p> <p>SIZE 11 16</p>		
H	SHARP	<p><b>CC</b></p> <p>T01020</p>				<p>TP  A246</p> <p>SIZE 11 16</p>		
		<p><b>HI</b></p> <p>RCGX09/12: P15015 RCGX15/19: P20015</p>		<p>RC  A239</p> <p>SIZE 09 12 15 19</p>				



## CC

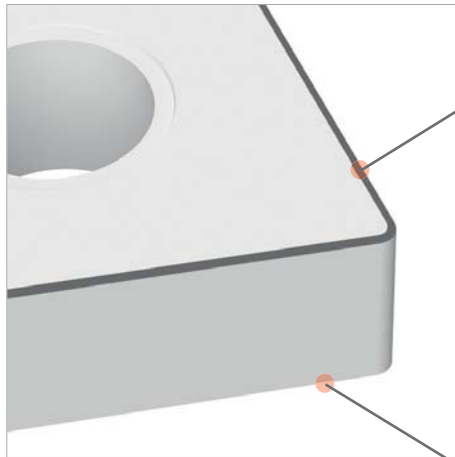
## Edge preparation

- Recommended for stable continuous cutting conditions
  - Sharp edge reduces cutting forces and burrs formation
  - CC Continuous Cut edge preparation is generally combined with mixed ceramics for hardened steel and with SiAlON (only round inserts) for HRSA machining
- Recommended for stable and continuous cutting conditions
  - Die scharfe Schneide reduziert Schnittkräfte und Gratbildung
  - Die Präparation der CC-Schneidkante (Continuous Cut) wird im Allgemeinen mit einer Mischung aus Keramik für gehärtete Stähle und SiAlON (nur für runde Wendeschneidplatten) für die Bearbeitung von hitzebeständigen Superlegierungen (HRSA) kombiniert
- Raccomandato per condizioni stabili di taglio continuo
  - Tagliente affilato che riduce forze di taglio e formazione di bave
  - La preparazione del tagliente CC (Continuous Cut) è generalmente combinata con ceramiche miste per acciai temprati e con SiAlON (solo per inserti rotondi) per lavorazione di superleghe resistenti al calore (HRSA)
- Recommandé pour des conditions stables de coupe continue
  - L'arête de coupe affûtée réduit les forces de coupe et la formation de bavures
  - La préparation de l'arête de coupe CC (Continuous Cut) est généralement associée à un mélange de céramiques pour aciers trempés et de SiAlON (pour inserts ronds uniquement) pour l'usinage de superalliages résistants à la chaleur (HRSA)

CC

Edge preparation

## Features of CC edge preparation

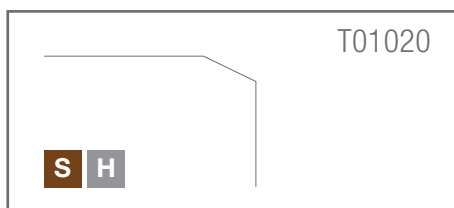


### LOW CUTTING FORCE

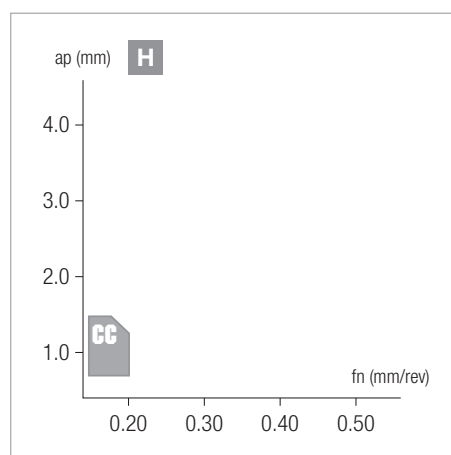
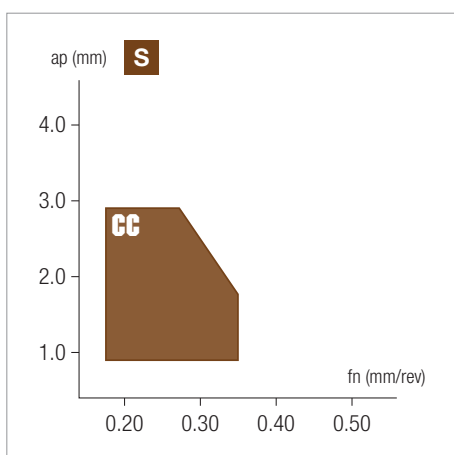
- The edge preparation has been optimized for low cutting forces action
  - The chamfer width is 0.10 mm with an angle of 20° without round honing
- Preparazione del tagliente ottimizzata per azione con basse forze di taglio
  - Larghezza smusso 0.10 mm con angolo di 20°, senza onatura
- Optimierte Präparation der Schneidkante für den Einsatz mit geringen Schneidkräften
  - Fasenbreite 0,10 mm bei 20° Winkel, ohne Honen
- Préparation optimisée de l'arête de coupe pour une faible force de coupe
  - Largeur de chanfrein 0,10 mm avec angle de 20°, sans rodage

### BROAD RANGE

- Available in most common shapes and radii, both positive and negative
- Rompitrucciolo positivi e negativi disponibili nelle più comuni forme e raggi
- Positive und negative Spanbrecher in den gängigsten Formen und Radien erhältlich
- Positive und negative Spanteiler in den gängigsten Formen und Radien erhältlich



## Application range - ISO 513



CC SiAlON



- In combination with NSA grades must be considered the first choice for general purpose machining.
- Combinato con gradi NSA è da considerare prima scelta per Impiego generico.
- Zusammen mit den NSA-Qualitäten die erste Wahl für den allgemeinen Einsatz.
- Combiné avec les qualités NSA, il est considéré comme le premier choix pour un usage générique.

# GP/GS

Edge preparation

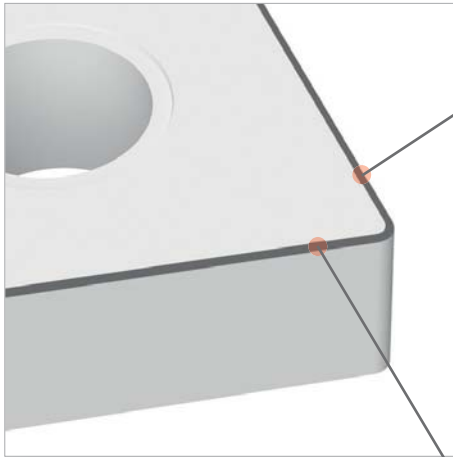
- First choice for almost every kind of applications on cast iron (NSN series) and hardened steel (NAC series)
  - Sharp and tough edge for stable machining
  - GP General Purpose is available in combination of 3 ceramic families: Silicon nitride, whisker reinforced and alumina mixed ceramic. GS (general purpose with honing) is only combined with NAC series
- Erste Wahl für nahezu alle Anwendungen mit Gusseisen (NSN-Serie) und gehärteten Stählen (NAC-Serie)
  - Ausgewogenes Verhältnis zwischen Schärfe und Robustheit
  - GP (Allzweck) ist in Kombination von 3 Keramikfamilien erhältlich: Siliziumnitrid, Whisker reinforced und Aluminiumoxid-Keramikmischung. GS (Allzweck mit Honen) nur in Verbindung mit der Serie NAC
- Prima scelta per quasi tutte le applicazioni su ghisa (serie NSN) e acciai temprati (serie NAC)
  - Buon bilanciamento tra taglieria e robustezza
  - GP (impiego generico) disponibile in combinazione di 3 famiglie di ceramica: nitrato di silicio, whisker reinforced e mix di ceramica di allumina. GS (impiego generico con onatura) combinato solo con serie NAC
- Premier choix pour la quasi totalité des applications sur fonte (série NSN) et aciers trempés (série NAC)
  - Bon équilibre entre affûtage et solidité
  - GP (usage générique) disponible en association avec 3 familles de céramiques : nitrure de silicium, whisker renforcé et mélange céramique alumine. GS (usage générique avec rodage) uniquement combiné avec la série NAC

# GP/GS

Edge preparation

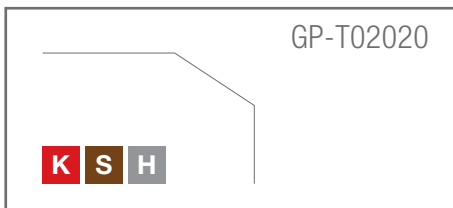
INDEXABLE

## Features of "G" edge preparation



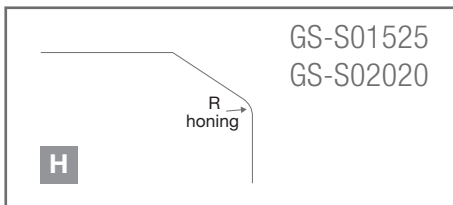
### GP - FIRST CHOICE

- Suitable from continuous to light interrupted cut. Guarantees reliable performances
- The most common chamfer shape is 0.20mm width and 20° angle.
- Adatto per condizioni di taglio da continuo a leggermente interrotto. Assicura prestazioni affidabili
- Larghezza smusso, nella maggior parte dei casi, di 0.20 mm con angolo di 20°
- Geeignet für kontinuierliche bis leicht unterbrochene Schnittbedingungen. Sorgt für zuverlässige Leistung
- Fasenbreite, in den meisten Fällen 0,20 mm bei 20° Winkel
- Convient aux conditions de coupe continue à légèrement interrompue. Garantit des performances fiables
- Largeur de chanfrein, dans la plupart des cas, 0,20 mm avec un angle de 20 °

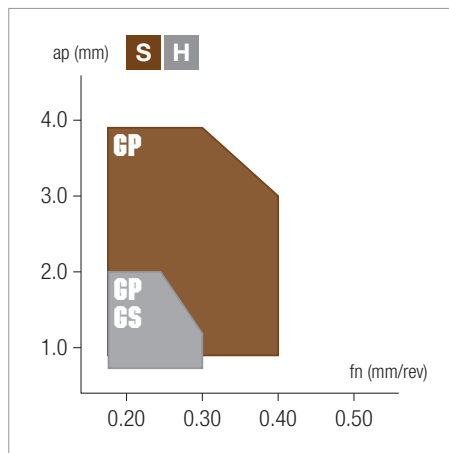
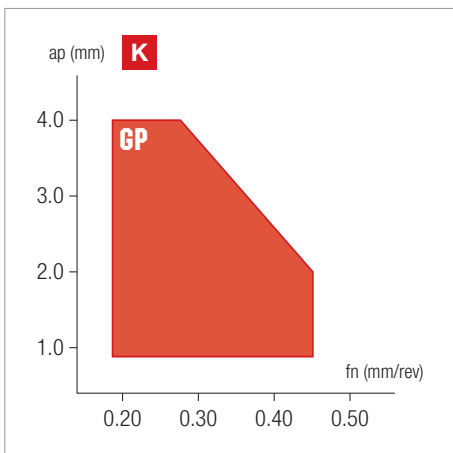


### GS - STRENGTHEN THE EDGE

- Same features of GP but with an additional reinforced honing
- Stesse caratteristiche di GP con addizionale con onatura di rinforzo
- Die gleichen Eigenschaften wie GP mit zusätzlichem verstärkenden Honen
- Mêmes caractéristiques que GP avec rodage de renfort



## Application range - ISO 513



### ISO H FIRST CHOICE



- In combination with NSA grades must be considered as first choice for general purpose machining.
- Combinato con gradi NSA è da considerare prima scelta per Impiego generico.
- Zusammen mit den NSA-Qualitäten die erste Wahl für den allgemeinen Einsatz.
- Combiné avec les qualités NSA, il est considéré comme le premier choix pour un usage générique.

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## HI

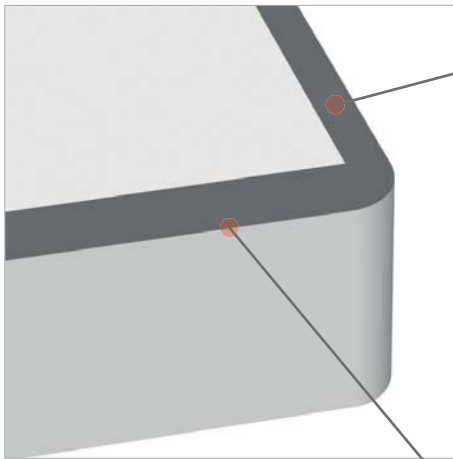
## Edge preparation

- Edge geometry designed to endure heavy cutting conditions
  - HI edge preparation is focused on hard material machining and is available mainly in combination with NAC series
  - Commonly utilized in machining of steel rolls
- Anfester Standard-Rand, verbunden mit einem breiten Fasenwinkel, für harte Schnittbedingungen ausgelegt
  - Präparation der Schneidkante HI für die Bearbeitung harter Materialien, hauptsächlich in Verbindung mit der NAC-Serie erhältlich
  - Häufig bei der Bearbeitung von Stahlwalzen verwendet
- Geometria del tagliente progettata per sopportare condizioni di taglio gravose
  - Preparazione del tagliente HI focalizzata sulla lavorazione di materiali duri, disponibile principalmente in combinazione con la serie NAC
  - Comunemente impiegato nella lavorazione di rulli in acciaio
- Bord biseauté standard lié à un grand angle de chanfrein, conçu pour résister à des conditions de coupe intenses
  - Préparation du tranchant HI axée sur l'usinage de matériaux durs, principalement disponible en association avec la série NAC
  - Couramment utilisé dans l'usinage de rouleaux en acier

HI

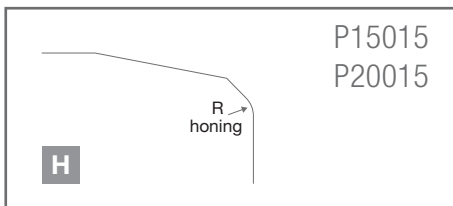
Edge preparation

## Features of HI edge preparation



### DOUBLE CHAMFER

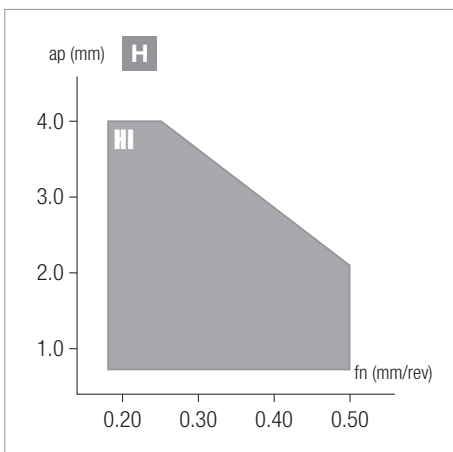
- Main chamfer size starts from 1,5 mm and can reach 2 mm for biggest inserts, with an angle of 15°
- Secondary chamfer width is 0.20 mm with an angle from 25° to 30°
- Dimensioni dello smusso da 1,5mm fino a 2mm negli inserti più grandi, con angolo di 15°
- Larghezza smusso secondario 0.20 mm con angolo da 25° a 30°
- Hauptfase von 1,5 mm bis 2 mm bei den größten Wendeschneidplatten, mit einem Winkel von 15°
- Sekundäre Fasenbreite 0,20 mm mit einem Winkel von 25° bis 30°
- Taille principale du chanfrein de 1,5 mm à 2 mm dans les inserts plus grands, avec un angle de 15 °
- Chanfrein secondaire de 0,20 mm de largeur avec angle de 25 ° à 30 °



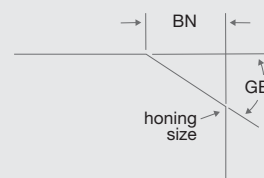
### REINFORCING HONING

- As further reinforcement, the cutting edge honing has been increased compared to general purpose edge preparation
- Come rinforzo ulteriore, l'onatura del tagliente è stata incrementata rispetto alla preparazione del tagliente per impiego generico.
- Als zusätzliche Verstärkung wurde das Honen der Schneidkante im Vergleich zur Präparation der Allzweckschneidkante erhöht.
- En guise de renforcement supplémentaire, le rodage du tranchant a été augmenté par rapport à la préparation du tranchant destiné à un usage générique.

## Application range - ISO 513



### SPECIAL CHAMFER UPON REQUEST



- Big chamfer type is generally combined with round inserts for which we can provide even tailor-made solutions. HT type, for example is a round insert with a double chamfered geometry without round honing.
- Tipologia con grande smusso generalmente combinata a inserti rotondi per i quali possiamo fornire anche soluzioni su misura. Esempio di tipologia HT: inserto tondo con geometria a doppio smusso senza onatura.

- Die großen Fasen werden gewöhnlich mit runden Wendeschneidplatten kombiniert, für die wir auch kundenspezifische Lösungen anbieten können. Beispiel für den HT-Typ: runde Wendeschneidplatten mit doppelt abgeschrägter Geometrie ohne Honen.
- Die großen Fasen werden gewöhnlich mit runden Wendeschneidplatten kombiniert, für die wir auch kundenspezifische Lösungen anbieten können. Beispiel für den HT-Typ: runde Wendeschneidplatten mit doppelt abgeschrägter Geometrie ohne Honen.

## WU

## Edge preparation

- Could be used at higher feed rate to improve productivity or at standard feed rate to reach excellent surface quality
  - WU wiper edge is available in combination with silicon nitride grade (NSN400) for grey cast iron and mixed alumina ceramic (NAC200) for hardened steel
  - Combined with standard 80° shapes (CNGA)
- Kann mit hohen Vorschüben zur Erhöhung der Produktivität oder mit Standardvorschüben für eine hervorragende Oberflächenqualität verwendet werden
  - WU-Wendescheidplatte erhältlich in Kombination mit der Qualität Siliziumnitrid (NSN400) und Aluminiumoxidkeramik (NAC) für gehärtete Stähle
  - Kombiniert mit Standard 80°-Formen (CNGA)
- Può essere impiegato con avanzamenti elevati per migliorare la produttività o con avanzamenti standard per raggiungere eccellente qualità superficiale
  - Tagliente WU raschiante disponibile in combinazione con grado in nitrato di silicio (NSN400) per ghisa grigia e ceramica di allumina mista (NAC) per acciai temprati
  - Combinato con forme standard 80° (CNGA)
- Il peut être employé à des avances élevées pour améliorer la productivité ou à des avances standards pour obtenir une excellente qualité de surface
  - Arête de coupe racleur WU disponible en association avec une nuance de nitrure de silicium (NSN400) et un mélange de céramique d'alumine (NAC) pour aciers trempés
  - Associé avec des formes standards 80 ° (CNGA)

# WU

## Edge preparation

INDEXABLE

A - TURNING

B - THREADING

C - GROOVING

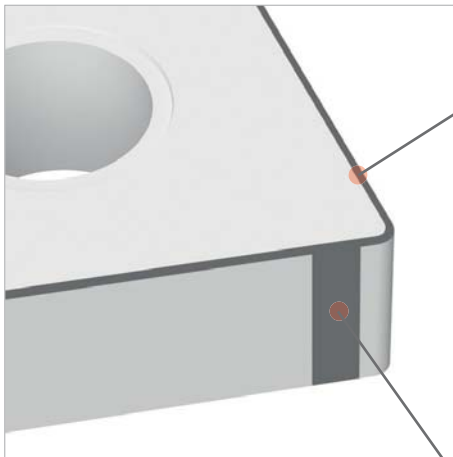
D - MILLING

E - DRILLING

F - ACCESSORIES

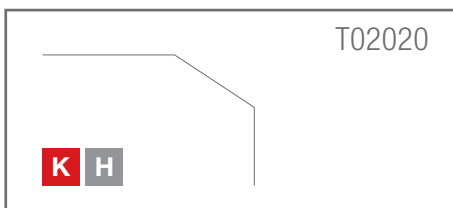
G - SPARE PARTS

## Features of WU edge preparation



### GENERAL PURPOSE

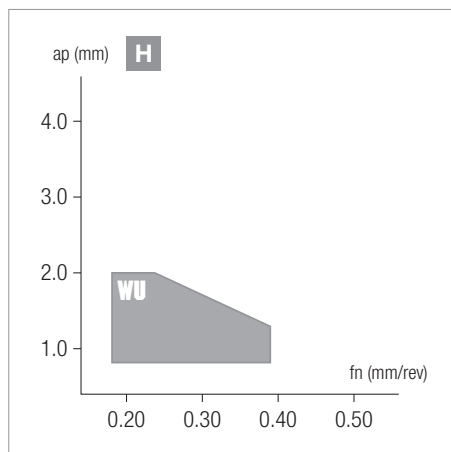
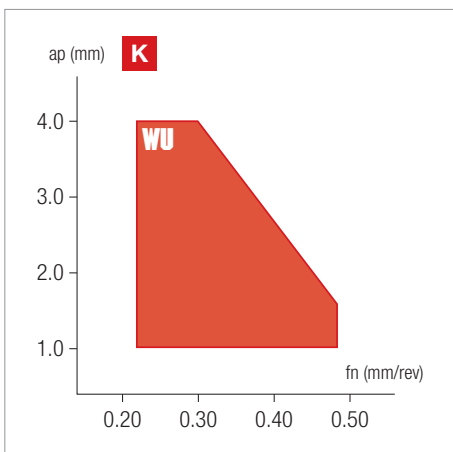
- Small T land chamfer without honing designed for low cutting forces and good accuracy  
• The chamfer width is 0.2 mm with an inclination of 20°
- Smusso ridotto senza onatura per basse forze di taglio e buona accuratezza  
• Larghezza smusso di 0.2 mm con inclinazione di 20°
- Kleine Fase der T-Fläche ohne Honen für geringe Schnittkräfte und gute Genauigkeit  
• Fasenbreite von 0,2 mm bei 20° Neigung
- Petit biseautage sur plaquette en T sans rodage pour de faibles forces de coupe et une bonne précision  
• Largeur de chanfrein de 0,2 mm avec inclinaison de 20 °



### ARC WIPER

- A big arc at optimized position as wiper geometry instead of conventional straight wiper land, effectively reduces vibration and ensures better surface quality
- Grande arco in posizione ottimizzata come geometria raschiante al posto del convenzionale pianetto raschiante diritto per efficace riduzione delle vibrazioni e migliore qualità superficiale
- Großer Bereich in optimierter Position als Wendeschneidplattengeometrie anstelle der herkömmlichen geraden Schneidplatte für effektive Reduzierung von Vibrationen und verbesserte Oberflächenqualität
- Grand arc en position optimisée comme géométrie racleuse au lieu de la plaquette de racleuse droite conventionnelle pour une réduction efficace des vibrations et une qualité de surface optimisée

## Application range - ISO 513



### NOT ONLY FOR FINISHING



- The wiper edge design can create better surface quality at medium or higher feed cutting conditions
- Quando è usato in condizioni di taglio con avanzamenti medi o elevati, il design del tagliente raschiante realizza una migliore qualità superficiale.
- Beim Einsatz unter Schnittbedingungen mit mittleren oder großen Vorschüben sorgt das Design der Wendeschneidplatte für eine bessere Oberflächenqualität.
- Si utilisée dans des conditions de coupe à avance moyenne ou élevée, la conception du tranchant racleur permet d'obtenir une meilleure qualité de surface.

INDEXABLE

A - TURNING

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F - ACCESSORIES

G - SPARE PARTS

K		SILICON NITRIDE AND MIXED CERAMICS				
		NEGATIVE	POSITIVE			
●	wear resistance	NAC200 / CC	NAC200 / CC			
	▲ 1 <sup>st</sup> CHOICE ▼	<b>NSN400 / GP</b>	<b>NSN400 / GP</b>			
	toughness	NSN450 / GP	-			
●	wear resistance	NAC200 / GP	NAC200 / GP			
	▲ 1 <sup>st</sup> CHOICE ▼	<b>NSN400 / GP</b>	<b>NSN400 / GP</b>			
	toughness	NSN450 / GP	-			
⊕	wear resistance	-	-			
	▲ 1 <sup>st</sup> CHOICE ▼	<b>NSN400 / GP</b>	<b>NSN400 / GP</b>			
	toughness	NSN450 / GP	-			

S		WHISKER CERAMICS AND SiAlON				
		NEGATIVE	POSITIVE			
●	wear resistance	-	-			
	▲ 1 <sup>st</sup> CHOICE ▼	<b>NWR700 / GP</b>	<b>NWR700 / GP</b>			
	toughness	NWR750 / GP	NWR750 / GP			
●	wear resistance	NWR750 / GP	NWR750 / GP			
	▲ 1 <sup>st</sup> CHOICE ▼	<b>NSA6000 / CC</b>	<b>NSA6000 / CC</b>			
	toughness	NSA650 / GP	NSA650 / GP			
⊕	wear resistance	NWR750 / GP	NWR750 / GP			
	▲ 1 <sup>st</sup> CHOICE ▼	<b>NSA6000 / GP</b>	<b>NSA6000 / GP</b>			
	toughness	NSA650 / GP	NSA650 / GP			

H		Al <sub>2</sub> O <sub>3</sub> MIXED CERAMICS				
		NEGATIVE	POSITIVE			
●	wear resistance	NAC150 / CC	NAC150 / CC			
	▲ 1 <sup>st</sup> CHOICE ▼	<b>NAC200 / CC</b>	<b>NAC200 / CC</b>			
	toughness	-	-			
●	wear resistance	NAC150 / GS	NAC150 / GS			
	▲ 1 <sup>st</sup> CHOICE ▼	<b>NAC200 / GP</b>	<b>NAC200 / GP</b>			
	toughness	NAC250 / GP	NAC250 / GP			
⊕	wear resistance	NAC200 / HI	NAC200 / HI			
	▲ 1 <sup>st</sup> CHOICE ▼	<b>NAC250 / HI</b>	<b>NAC250 / HI</b>			
	toughness	-	-			

<b>C</b>	<b>N</b>	<b>G</b>	<b>A</b>	<b>12</b>	<b>04</b>	<b>08</b>	-	<b>GP</b>	-	<b>NAC</b>	<b>200</b>
1	2	3	4	5	6	7		8		9	10

1	SHAPE
C	80° rhombic
D	55° rhombic
K	55° parallelogram
S	90° square
T	60° triangular
V	35° rhombic
W	80° trigon

2	RELIEF ANGLE
B	5°
C	7°
D	15°
E	20°
N	0°
P	11°

3	TOLERANCES		
Symbol	I.C.	Thickness	Corner height
E	±0.025	±0.025	±0.025
G	±0.025	±0.13	±0.025
M	±0.05 ~ ±0.15	±0.13	±0.08 ~ ±0.18
U	±0.08 ~ ±0.25	±0.13	±0.13 ~ ±0.38

4	HOLE/CHIPBREAKER		
Symbol	Hole	Hole countersink	Chipbreaker
A		✓	✗
G		✓	✗
M		✓	✗
N		✗	✗
T		✓	40° ÷ 60°
W		✓	40° ÷ 60°
X	NIKKO norm		

5	EDGE LENGHT						
I.C. (mm)	C shape	D shape	R shape	S shape	T shape	V shape	W shape
3.97	03	04		03	06		
4.76	04	05		04	08	08	
5.00			05				
5.56	05	06		05	09		03
6.00			06				
6.35	06	07		06	11	11	04
7.94	08	09		07	13		05
8.00			08				
9.53	09	11	09	09	16	16	06
10.00		12	10				
12.00							
12.70	12	15	12	12	22	22	08
15.88	16	19	15	15	27	24	10
16.00			16				
19.05	19	23	19	19	33	33	13
20.00			20				
22.23	22	27		22	38		
25.00			25				
25.40	25	31	25	25	44	44	17
31.75	32	38	31	31	54	54	21
32.00			32				

6	THICKNESS	
Symbol	(mm)	
01	1.59	
T1	1.98	
02	2.38	
T2	2.78	
03	3.18	
T3	3.97	
04	4.76	
05	5.56	
06	6.35	
07	7.94	
09	9.53	

7	RADIUS	
Symbol	(mm)	
005	0.05	
01	0.10	
02	0.20	
04	0.40	
08	0.80	
12	1.20	
16	1.60	
20	2.00	
24	2.40	

8	EDGE PREPARATION
CC	sharp edge
GP, GS	universal edge
HI	reinforced edge
WU	wiper edge

9	GRADE - features
NAC	Mixed Al <sub>2</sub> O <sub>3</sub> ceramic
NSA	SIAION
NSN	Silicon nitride
NWR	Whisker reinforced

10	GRADE - material	
000÷290	ISO H	
300÷590	ISO K	
600÷790	ISO S	















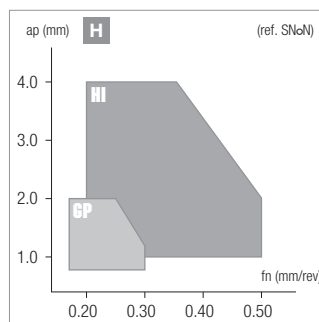
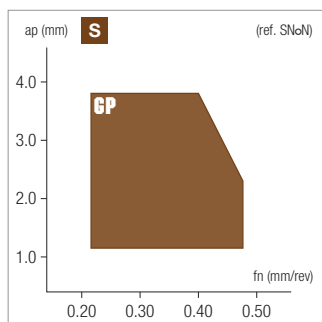
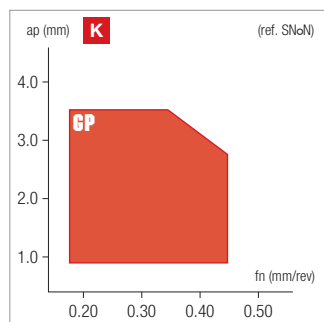




<h1>SN</h1>	CN: Silicon nitride CR: Reinforced ceramic CM: Mixed ceramic CC: Coated ceramic PVD: Physical vapor deposition								CC	CM	CM	CN	CN	CN	CN	CR	
	PVD																
ISO - without hole																	
<ul style="list-style-type: none"> <li>Very strong 90° corner with excellent economy (8 edges on double-sided inserts), especially with solid type CBNs</li> <li>Mostly used for rough facing operations</li> <li>High radial forces push against the workpiece when used for turning</li> <li>Should always be used in a stable set-up</li> </ul>	Stable machining, light cut	● 1 <sup>st</sup> choice ○ suitable	●	●	○	○	○	●	○	○							
	General machining, medium cut	● 1 <sup>st</sup> choice ○ suitable	○	●	●	○	●	●	●	●							
	Unstable machining, heavy cut	⊕ 1 <sup>st</sup> choice ⊕ suitable						⊕									
	Dimensions	ISO	Vc(m/min) - suggested cutting speed range (bold: 1 <sup>st</sup> choice)														
		<b>P</b>															
		<b>M</b>															
		<b>K</b>			400 600				400 1000	400 800							
		<b>N</b>															
		<b>S</b>				150 350	150 400			200 450							
		<b>H</b>	100 200	70 180	60 150												

	Designation	RE	IC	S	D1	LE	Stock														
UNIVERSAL		GP <b>K S H</b>	0.40	12.7	4.76	-	-														
		SNGN120404-GP	0.80	12.7	4.76	-	11.9														
		SNGN120408-GP	1.20	12.7	4.76	-	11.5														
		SNGN120412-GP	0.80	12.7	7.94	-	11.9	⊙	●												
		SNGN120708-GP	1.20	12.7	7.94	-	11.5		●												
		SNGN120712-GP	1.60	12.7	7.94	-	11.1		○												
		SNGN120716-GP	1.60	12.7	4.76	-	11.1														
UNIVERSAL	<p>dimpled type</p>	GP <b>K S H</b>	0.80	12.7	7.94	-	11.9		⊙												
		SNGX120708-GP	1.20	12.7	7.94	-	11.5		●												
		SNGX120712-GP	1.20	12.7	7.94	-	11.5														
		SNGX120716-GP	1.60	12.7	7.94	-	11.1														
REINFORCED		HI <b>H</b>	1.60	12.7	7.94	-	11.1			○											
		SNGN120716-HI	2.40	12.7	7.94	-	10.3		○												
		SNGN120724-HI	2.00	19.05	7.94	-	-		⊙	⊙											

★ 1st choice, ☆ suitable, ● stock standard, ⊙ non-stock standard (no MOQ), ○ non-stock standard (MOQ), ▲ upcoming product, ▽ stock exhaustion



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CUTTING CONDITIONS p. A250

GRADES FEATURES p. A216

HOLDERS p. A255











PRODUCT SELECTION p. A232

CUTTING CONDITIONS p. A250

GRADES FEATURES p. A216

HOLDERS p. A255

ISO 513	MATERIAL	HARDNESS HB	NAC200			NSN350			NSN400					
			min	start	max	min	start	max	min	start	max			
<b>K1</b>	Grey cast iron (ex. 0.6025/GG25/EN-GJL-250)	150 ÷ 250	●	400	500	600	●	600	800	1000	○	500	750	1000
			○				○	500	700	900	●	400	650	900
<b>K2</b>	Nodular cast iron (ex. 0.7050/GGG50/EN-GJS-500-7)	150 ÷ 350	●	300	400	500					○	450	600	750
											●	400	500	600
ISO 513	MATERIAL	HARDNESS HRC	NAC150			NAC200			NAC250					
			min	start	max	min	start	max	min	start	max			
<b>H1</b>	Case-hardened steel (ex. 1.7131/16MnCr5)	50 ÷ 56	●	100	150	200	●	80	130	180	○	70	110	150
							●	70	110	150	●	60	100	140
<b>H2</b>	Bearing steel, quenched and tempered steel (ex. 1.3505/100Cr6)	54 ÷ 62	●	80	130	180	●	70	100	130	○	60	90	120
							●	60	80	100	●	50	60	70
ISO 513	MATERIAL	HARDNESS HRC	NSA6000			NSA650			NWR700					
			min	start	max	min	start	max	min	start	max			
<b>S1 - S2 - S3</b>	Fe/Ni/Co based heat resistant alloys (ex. Hastelloy, Inconel 625, Inconel 718)	50 ÷ 56	○	200	300	400					●	300	400	500
			●	180	250	320	○	150	200	250	○	250	300	350
			○	150	200	250								

Complete workpiece materials p. M1.

<b>NSN450</b>								
min	start	max						
400	600	800						
400	500	600						
<b>NWR750</b>								
min	start	max						
250	350	450						
200	250	300						

Complete workpiece materials p. M1.

INDEXABLE

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DESIGNATION	DEPTH OF CUT			FEED RATE		
	ap (mm)			fn (mm/rev)		
	min	start	max	min	start	max
CCGW09T308-GP <b>K</b>	1.00	2.00	3.00	0.12	0.23	0.34
CCGW09T312-GP <b>K</b>	1.00	2.00	3.00	0.13	0.26	0.36
CCGW120408-GP <b>K</b>	1.00	2.50	4.00	0.14	0.27	0.40
CCGW120412-GP <b>K</b>	1.00	2.50	4.00	0.16	0.31	0.46
CNGA120404-CC <b>H</b>	0.20	0.70	1.20	0.04	0.08	0.12
CNGA120404-GP <b>H</b>	0.40	1.20	2.00	0.06	0.14	0.22
CNGA120404-GS <b>H</b>	0.40	1.20	2.00	0.06	0.14	0.22
CNGA120408-CC <b>H</b>	0.20	0.70	1.20	0.05	0.10	0.15
CNGA120408-GP <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
CNGA120408-GP <b>S</b>	1.00	2.50	4.00	0.14	0.27	0.40
CNGA120408-GS <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
CNGA120410-WU <b>H</b>	0.40	1.20	2.00	0.12	0.26	0.40
CNGA120410-WU <b>K</b>	1.00	2.50	4.00	0.20	0.35	0.50
CNGA120412-CC <b>H</b>	0.20	0.70	1.20	0.06	0.13	0.20
CNGA120412-GP <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
CNGA120412-GP <b>S</b>	1.00	2.50	4.00	0.16	0.31	0.46
CNGA120412-GS <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
CNGA160612-GP <b>H</b>	1.00	2.50	4.00	0.14	0.27	0.40
CNGA160616-GP <b>H</b>	1.00	2.50	4.00	0.15	0.30	0.45
CNGN120708-GP <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
CNGN120708-GP <b>K</b>	1.00	2.50	4.00	0.14	0.27	0.40
CNGN120708-GP <b>S</b>	1.00	2.50	4.00	0.14	0.27	0.40
CNGN120712-GP <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
CNGN120712-GP <b>K</b>	1.00	2.50	4.00	0.16	0.31	0.46
CNGN120712-GP <b>S</b>	1.00	2.50	4.00	0.16	0.31	0.46
CNGN120712-HI <b>H</b>	1.00	2.50	4.00	0.16	0.28	0.40
CNGN120716-GP <b>H</b>	0.40	1.20	2.00	0.14	0.26	0.38
CNGN120716-GP <b>K</b>	1.00	2.50	4.00	0.18	0.33	0.48
CNGN120716-GP <b>S</b>	1.00	2.50	4.00	0.18	0.33	0.48
CNGN120716-HI <b>H</b>	1.00	2.50	4.00	0.20	0.32	0.44
CNGX120708-GP <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
CNGX120712-GP <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
CNMA120408-GP <b>K</b>	1.00	2.50	4.00	0.14	0.27	0.40
CNMA120412-GP <b>K</b>	1.00	2.50	4.00	0.16	0.31	0.46
CNMA120416-GP <b>K</b>	1.00	2.50	4.00	0.18	0.33	0.48
CNMA160612-GP <b>K</b>	2.00	4.00	6.00	0.20	0.35	0.50
CNMA160616-GP <b>K</b>	2.00	4.00	6.00	0.22	0.38	0.54
CNMN120412-GP <b>K</b>	1.00	2.50	4.00	0.16	0.31	0.46
CNMN120416-GP <b>K</b>	1.00	2.50	4.00	0.18	0.33	0.48
CNMN120712-GP <b>K</b>	1.00	2.50	4.00	0.16	0.31	0.46
CNMN120716-GP <b>K</b>	1.00	2.50	4.00	0.18	0.33	0.48
DNGA150604-CC <b>H</b>	0.20	0.70	1.20	0.04	0.08	0.12
DNGA150604-GP <b>H</b>	0.40	1.20	2.00	0.06	0.14	0.22
DNGA150604-GS <b>H</b>	0.40	1.20	2.00	0.06	0.14	0.22
DNGA150608-CC <b>H</b>	0.20	0.70	1.20	0.05	0.10	0.15
DNGA150608-GP <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
DNGA150608-GS <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
DNGA150612-CC <b>H</b>	0.20	0.70	1.20	0.06	0.13	0.20
DNGA150612-GP <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
DNGA150612-GS <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
DNGA150616-GP <b>H</b>	0.40	1.20	2.00	0.14	0.26	0.38
DNGN150708-GP <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
DNGN150712-GP <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
DNGN150716-GP <b>H</b>	0.40	1.20	2.00	0.14	0.26	0.38
RCGX060600-CC <b>S</b>	1.00	1.50	2.00	0.18	0.28	0.38
RCGX060600-GS <b>H</b>	0.40	1.20	2.00	0.10	0.24	0.38
RCGX060700-GP <b>H</b>	0.40	1.20	2.00	0.10	0.24	0.38
RCGX060700-GP <b>S</b>	1.00	2.00	3.00	0.18	0.32	0.46

DESIGNATION	DEPTH OF CUT			FEED RATE		
	ap (mm)			fn (mm/rev)		
	min	start	max	min	start	max
RCGX090700-CC <b>S</b>	1.00	2.00	3.00	0.22	0.32	0.42
RCGX090700-GP <b>H</b>	0.60	1.80	3.00	0.12	0.26	0.40
RCGX090700-GP <b>S</b>	1.00	2.50	4.00	0.22	0.38	0.54
RCGX090700-HI <b>H</b>	0.60	1.80	3.00	0.15	0.30	0.45
RCGX120700-CC <b>S</b>	1.00	2.00	3.00	0.22	0.32	0.42
RCGX120700-GP <b>H</b>	0.60	1.80	3.00	0.12	0.26	0.40
RCGX120700-GP <b>S</b>	1.00	2.50	4.00	0.22	0.38	0.54
RCGX120700-HI <b>H</b>	0.60	1.80	3.00	0.15	0.30	0.45
RCGX151000-HI <b>H</b>	1.00	2.50	4.00	0.20	0.40	0.60
RCGX191000-HI <b>H</b>	1.00	2.50	4.00	0.25	0.45	0.65
RNGN120400-CC <b>S</b>	1.00	2.00	3.00	0.22	0.32	0.42
RNGN120400-GP <b>H</b>	0.60	1.80	3.00	0.12	0.26	0.40
RNGN120400-GP <b>S</b>	1.00	2.50	4.00	0.22	0.38	0.54
RNGN120700-CC <b>S</b>	1.00	2.00	3.00	0.22	0.36	0.50
RNGN120700-GP <b>H</b>	0.60	1.80	3.00	0.12	0.26	0.40
RNGN120700-GP <b>S</b>	1.00	2.50	4.00	0.22	0.32	0.42
RNGN120700-HI <b>H</b>	0.60	1.80	3.00	0.15	0.30	0.45
RNGN120700-HT <b>H</b>	0.60	1.80	3.00	0.15	0.30	0.45
SCGW09T308-GP <b>K</b>	1.00	2.00	3.00	0.12	0.23	0.34
SCGW120408-GP <b>K</b>	1.00	2.50	4.00	0.14	0.27	0.40
SNGA120404-CC <b>H</b>	0.20	0.70	1.20	0.04	0.08	0.12
SNGA120404-GP <b>H</b>	0.40	1.20	2.00	0.06	0.14	0.22
SNGA120408-CC <b>H</b>	0.20	0.70	1.20	0.05	0.10	0.15
SNGA120408-GP <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
SNGA120412-CC <b>H</b>	0.20	0.70	1.20	0.06	0.13	0.20
SNGA120412-GP <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
SNGN120408-GP <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
SNGN120412-GP <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
SNGN120708-GP <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
SNGN120712-GP <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
SNGN120716-GP <b>H</b>	0.40	1.20	2.00	0.14	0.26	0.38
SNGN120716-HI <b>H</b>	1.00	2.50	4.00	0.20	0.32	0.44
SNGN120720-HI <b>H</b>	1.00	2.50	4.00	0.22	0.35	0.48
SNGN120724-HI <b>H</b>	1.00	2.50	4.00	0.24	0.37	0.50
SNGX120708-GP <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
SNGX120712-GP <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
SNMA120408-GP <b>K</b>	1.00	2.50	4.00	0.14	0.27	0.40
SNMA120412-GP <b>K</b>	1.00	2.50	4.00	0.16	0.31	0.46
SNMA120416-GP <b>K</b>	1.00	2.50	4.00	0.18	0.33	0.48
SNMN120416-GP <b>K</b>	1.00	2.50	4.00	0.18	0.33	0.48
SNMX120712-GP <b>K</b>	1.00	2.50	4.00	0.16	0.31	0.46
SNMX120716-GP <b>K</b>	1.00	2.50	4.00	0.18	0.33	0.48
TNGA160404-CC <b>H</b>	0.20	0.70	1.20	0.04	0.08	0.12
TNGA160404-GP <b>H</b>	0.40	1.20	2.00	0.06	0.14	0.22
TNGA160404-GS <b>H</b>	0.40	1.20	2.00	0.06	0.14	0.22
TNGA160408-CC <b>H</b>	0.20	0.70	1.20	0.05	0.10	0.15
TNGA160408-GP <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
TNGA160408-GP <b>K</b>	1.00	2.50	4.00	0.14	0.27	0.40
TNGA160408-GS <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
TNGA160412-CC <b>H</b>	0.20	0.70	1.20	0.06	0.13	0.20
TNGA160412-GP <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
TNGA160412-GP <b>K</b>	1.00	2.50	4.00	0.16	0.31	0.46
TNGA160412-GS <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
TNGN160408-GP <b>K</b>	1.00	2.50	4.00	0.14	0.27	0.40
TNGN160708-GP <b>H</b>	0.40	1.20	2.00	0.10	0.20	0.30
TNGN160708-GP <b>K</b>	1.00	2.50	4.00	0.14	0.27	0.40
TNGN160712-GP <b>H</b>	0.40	1.20	2.00	0.12	0.23	0.34
TNGN160712-GP <b>K</b>	1.00	2.50	4.00	0.16	0.31	0.46

DESIGNATION	DEPTH OF CUT			FEED RATE		
	ap (mm)			fn (mm/rev)		
	min	start	max	min	start	max
TPGN110302-CC <b>H</b>	0.20	<b>0.60</b>	1.00	0.04	<b>0.06</b>	0.08
TPGN110302-GP <b>H</b>	0.40	<b>0.80</b>	1.20	0.05	<b>0.10</b>	0.15
TPGN110302-GS <b>H</b>	0.40	<b>0.80</b>	1.20	0.05	<b>0.10</b>	0.15
TPGN110304-CC <b>H</b>	0.20	<b>0.60</b>	1.00	0.04	<b>0.07</b>	0.10
TPGN110304-GP <b>H</b>	0.40	<b>0.80</b>	1.20	0.04	<b>0.11</b>	0.18
TPGN110304-GS <b>K</b>	1.00	<b>2.00</b>	3.00	0.10	<b>0.20</b>	0.30
TPGN110304-GS <b>H</b>	0.40	<b>0.80</b>	1.20	0.04	<b>0.11</b>	0.18
TPGN110308-CC <b>H</b>	0.20	<b>0.60</b>	1.00	0.05	<b>0.09</b>	0.13
TPGN110308-GP <b>H</b>	0.40	<b>0.80</b>	1.20	0.06	<b>0.15</b>	0.24
TPGN110308-GP <b>K</b>	1.00	<b>2.00</b>	3.00	0.12	<b>0.23</b>	0.34
TPGN110308-GS <b>H</b>	0.40	<b>0.80</b>	1.20	0.06	<b>0.15</b>	0.24
TPGN160304-CC <b>H</b>	0.20	<b>0.70</b>	1.20	0.04	<b>0.08</b>	0.12
TPGN160304-GP <b>H</b>	0.40	<b>1.20</b>	2.00	0.06	<b>0.14</b>	0.22
TPGN160304-GP <b>K</b>	1.00	<b>2.50</b>	4.00	0.12	<b>0.23</b>	0.34
TPGN160304-GS <b>H</b>	0.40	<b>1.20</b>	2.00	0.06	<b>0.14</b>	0.22
TPGN160308-CC <b>H</b>	0.20	<b>0.70</b>	1.20	0.05	<b>0.10</b>	0.15
TPGN160308-GP <b>H</b>	0.40	<b>1.20</b>	2.00	0.10	<b>0.20</b>	0.30
TPGN160308-GP <b>K</b>	1.00	<b>2.50</b>	4.00	0.14	<b>0.27</b>	0.40
TPGN160308-GS <b>H</b>	0.40	<b>1.20</b>	2.00	0.10	<b>0.20</b>	0.30
TPGN160312-CC <b>H</b>	0.20	<b>0.70</b>	1.20	0.06	<b>0.13</b>	0.20
TPGN160312-GP <b>K</b>	1.00	<b>2.50</b>	4.00	0.16	<b>0.31</b>	0.46
VNGA160404-CC <b>H</b>	0.20	<b>0.70</b>	1.20	0.04	<b>0.08</b>	0.12
VNGA160404-GP <b>H</b>	0.40	<b>1.20</b>	2.00	0.06	<b>0.14</b>	0.22
VNGA160404-GP <b>K</b>	1.00	<b>2.50</b>	4.00	0.12	<b>0.23</b>	0.34
VNGA160404-GS <b>H</b>	0.40	<b>1.20</b>	2.00	0.06	<b>0.14</b>	0.22
VNGA160408-CC <b>H</b>	0.20	<b>0.70</b>	1.20	0.05	<b>0.10</b>	0.15
VNGA160408-GP <b>H</b>	0.40	<b>1.20</b>	2.00	0.10	<b>0.20</b>	0.30
VNGA160408-GP <b>K</b>	1.00	<b>2.50</b>	4.00	0.14	<b>0.27</b>	0.40
VNGA160408-GS <b>H</b>	0.40	<b>1.20</b>	2.00	0.10	<b>0.20</b>	0.30
VNGA160412-CC <b>H</b>	0.20	<b>0.70</b>	1.20	0.06	<b>0.13</b>	0.20
VNGA160412-GP <b>H</b>	0.40	<b>1.20</b>	2.00	0.12	<b>0.23</b>	0.34
VNGA160412-GP <b>K</b>	1.00	<b>2.50</b>	4.00	0.16	<b>0.31</b>	0.46
VNGA160412-GS <b>H</b>	0.40	<b>1.20</b>	2.00	0.12	<b>0.23</b>	0.34
WNGA080404-CC <b>H</b>	0.20	<b>0.70</b>	1.20	0.04	<b>0.08</b>	0.12
WNGA080404-GP <b>H</b>	0.40	<b>1.20</b>	2.00	0.06	<b>0.14</b>	0.22
WNGA080408-CC <b>H</b>	0.20	<b>0.70</b>	1.20	0.05	<b>0.10</b>	0.15
WNGA080408-GP <b>H</b>	0.40	<b>1.20</b>	2.00	0.10	<b>0.20</b>	0.30
WNGA080408-GP <b>K</b>	1.00	<b>2.50</b>	4.00	0.14	<b>0.27</b>	0.40
WNGA080412-CC <b>H</b>	0.20	<b>0.70</b>	1.20	0.06	<b>0.13</b>	0.20
WNGA080412-GP <b>H</b>	0.40	<b>1.20</b>	2.00	0.12	<b>0.23</b>	0.34
WNGA080412-GP <b>K</b>	1.00	<b>2.50</b>	4.00	0.16	<b>0.31</b>	0.46

INDEXABLE

A - TURNING

B - THREADING

C - GROOVING

D - MILLING

E - DRILLING

F - ACCESSORIES

G - SPARE PARTS

