

THE NEW VALUE FRONTIER



For machining  
heat-resistant alloy

PR005S  
PR015S

# PR005S/PR015S



Providing stable and consistent performance while machining  
of heat-resistant alloys

Improved thermal properties help to reduce sudden fracture and decrease edge wear

Improved wear resistance with MEGACOAT HARD coating

Low-cutting force and stable machining with newly designed chipbreakers (SQ / SX / SG)



For roughing applications:  
SG chipbreaker

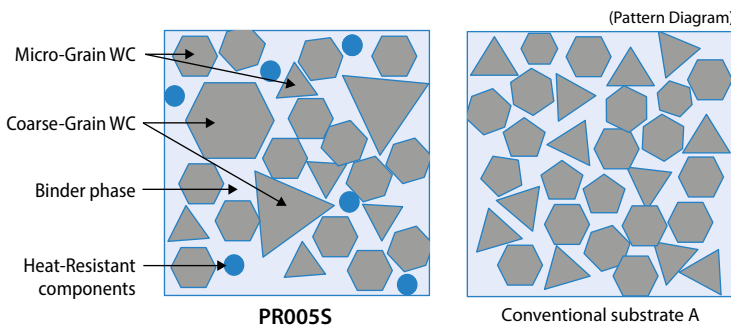


For machining heat-resistant alloy

# PR005S/PR015S

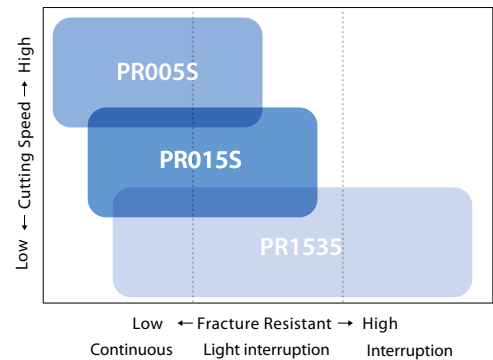
Improved thermal properties help to reduce sudden fracture and edge wear

## 1 Newly developed substrate helps to reduce sudden fracture and notch wear



Improved thermal conductivity by optimum distribution of WC coarse grains

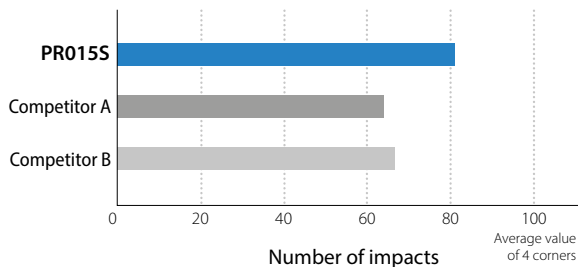
Resists heat concentration at the cutting edge to promote stable machining



**PR005S: Hard, wear-resistant grade for high-speed machining**

**PR015S: General purpose grade with excellent wear resistance and stability**

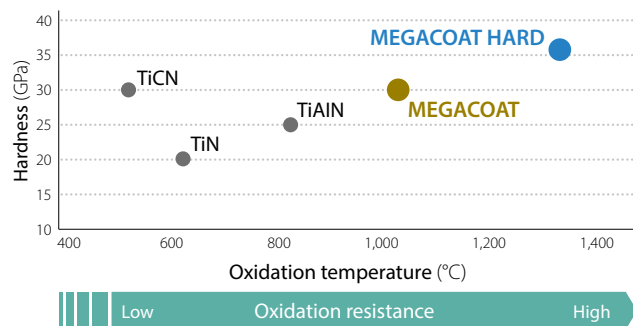
Fracture resistance comparison (Internal evaluation)



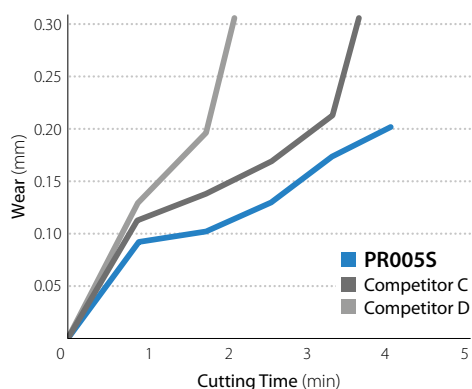
Cutting conditions:  $V_c = 25$  m/min,  $a_p = 1.0$  mm,  $f = 0.10$  mm/rev, wet  
CNMG120408 type, workpiece: Nickel-based superalloy, cylindrical workpiece with 1 flat face

## 2 Improved wear resistance with MEGACOAT HARD coating

Coating properties (Internal evaluation)



Wear resistance comparison (Internal evaluation)



Machining Time: 3.5 min  
Competitor D could only reach 2.6 minutes



Excellent wear resistance with high-hardness and resists boundary damage with improved thermal properties

Cutting conditions:  $V_c = 60$  m/min,  $a_p = 1.0$  mm,  $f = 0.20$  mm/rev, wet, CNMG120408 type  
Workpiece: Nickel-based superalloy

### 3 New chipbreaker designs improve machining stability

#### Finishing to medium machining: SQ Chipbreaker

Extended tool life and improved efficiency for mid-range to finishing applications in heat-resistant alloys

#### Double-sided 4-Corner design

**SQ chipbreaker benefits**  
 Reduced temperature at the cutting edge  
 → Extended tool life reduces burring  
 → Extended tool life and efficiency improvements



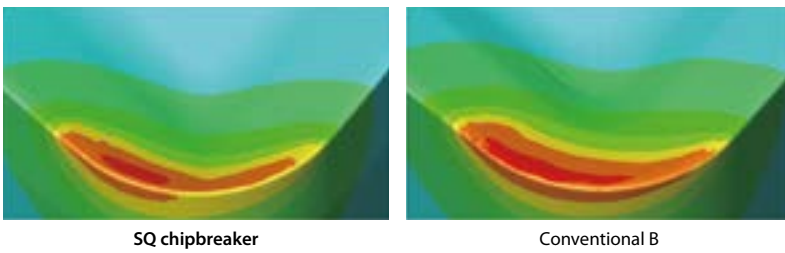
**Special rake face design decreases cutting edge temperature**

Optimal design achieved with simulation technology

#### Slant cutting edge

Inclined in negative direction  
 Effective for burr suppression and reducing notching

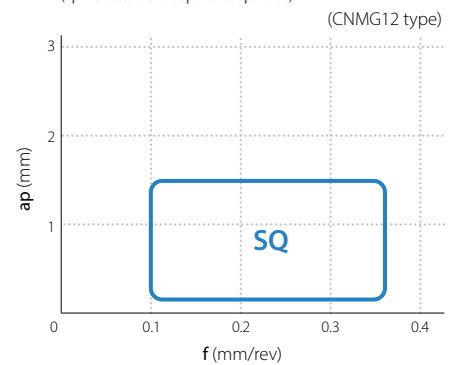
Simulation of edge-temperature comparison (Internal evaluation)



Cutting conditions:  $V_c = 40$  m/min,  $a_p = 1.0$  mm,  $f = 0.15$  mm/rev, CNMG120408 Type, dry, Workpiece: Nickel-based superalloy

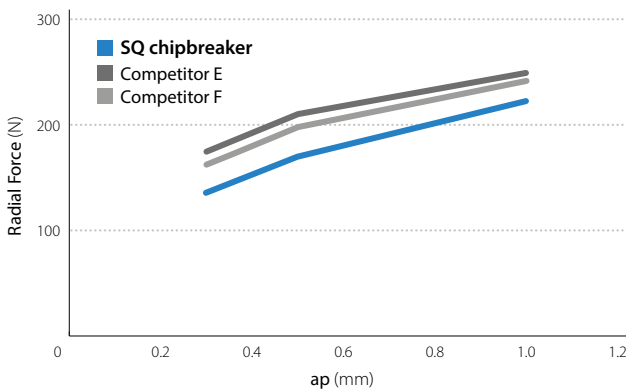
Applicable chipbreaker range

( $a_p$  Indicates radial depth of cut per side)



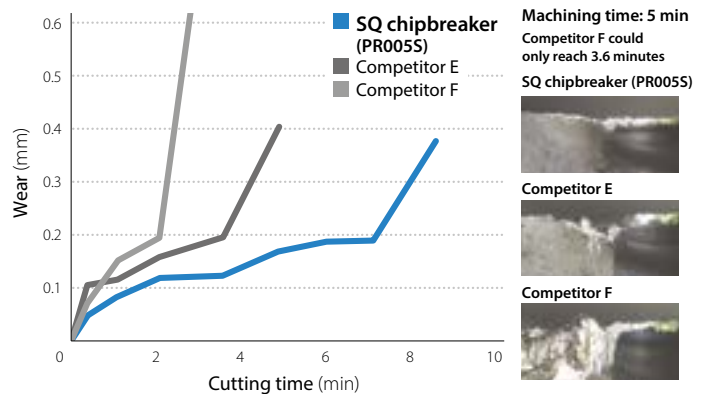
The newly developed chipbreaker reduces temperature at the cutting edge, thereby improving tool life and machining efficiency in semi-finishing applications.

Cutting force comparison - radial force (Internal evaluation)



Cutting conditions:  $V_c = 40$  m/min,  $f = 0.15$  mm/rev, wet, CNMG120408 type Workpiece: Nickel-based superalloy

Wear resistance comparison (Internal evaluation)



Machining time: 5 min  
 Competitor F could only reach 3.6 minutes  
 SQ chipbreaker (PR005S)



Cutting conditions:  $V_c = 40$  m/min,  $a_p = 1.0$  mm,  $f = 0.20$  mm/rev, wet, CNMG120408 type Workpiece: Nickel-based superalloy

# High efficiency roughing: SX chipbreaker

Improved efficiency for roughing applications in heat-resistant alloys

## Single-sided 2-corner design

### SX chipbreaker benefits

- Decreased edge temperature  
→ Longer tool life
- Suppresses burr formation  
→ Greater depths of cut
- Decreased radial forces  
→ Resists chattering and improves efficiency



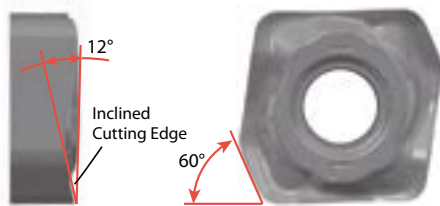
The SG chipbreaker is recommended if a double-sided 4-corner design for roughing is required

See P5 for details



### Unique Cutting Edge Design (Handed Insert)

- 60 Degree Lead Angle (when Installed in the Toolholder)
- 12 Degree inclined cutting edge

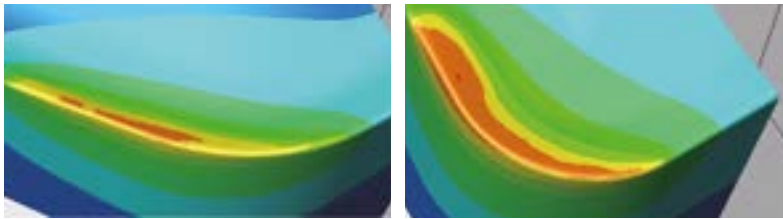


Rake design decreases temperature at the cutting edge

Optimal design achieved with simulation technology

- Can be installed in standard Kyocera 80° (C type) toolholders by changing to corresponding SX shim
- Single-sided handed insert

### Simulation of edge-temperature comparison (Internal evaluation)



SX chipbreaker

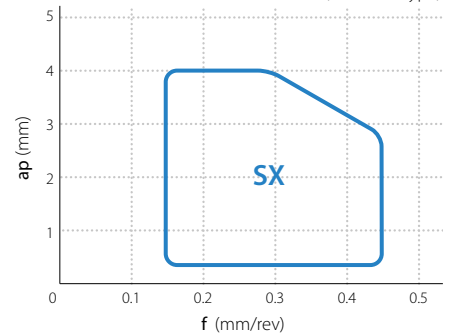
Conventional C

Cutting conditions:  $V_c = 40$  m/min,  $a_p = 2.0$  mm,  $f = 0.25$  mm/rev, dry, CNMM1204XL-SX, CNMG120412 type  
Workpiece: Nickel-based superalloy

### Applicable chipbreaker range

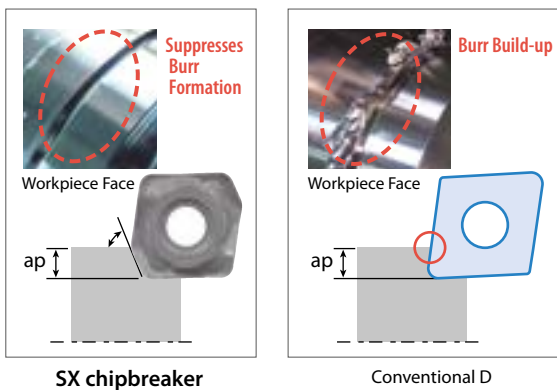
( $a_p$  indicates radial depth of cut per side)

(CNMM12 type)



The SX chipbreaker provides longer tool life and improved efficiency with its unique cutting edge and rake face design

### Burr comparison (Internal evaluation)



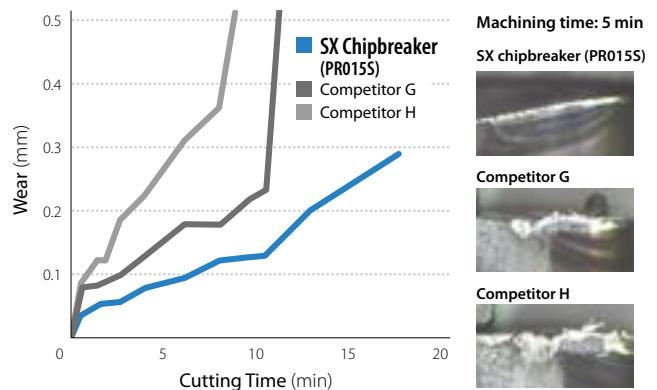
SX chipbreaker

Conventional D

Cutting conditions:  $V_c = 40$  m/min,  $a_p = 2.0$  mm,  $f = 0.25$  mm/rev, wet CNMM1204XL-SX, CNMG120412 type, after machining 9.4 min, workpiece: Nickel-based superalloy

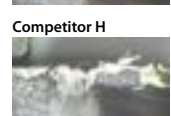
Even in larger depths of cut, the SX chipbreaker is able to suppress burr build-up. Increased D.O.C. capability and reduced notch wear combine to provide greater machining efficiency.

### Wear resistance comparison (Internal evaluation)



Machining time: 5 min

SX chipbreaker (PR015S)



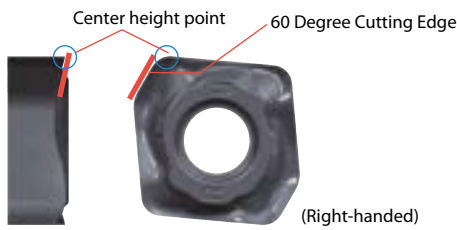
Cutting conditions:  $V_c = 40$  m/min,  $a_p = 2.0$  mm,  $f = 0.25$  mm/rev, wet CNMM1204XL-SX, CNMG120412 type, workpiece: Nickel-based superalloy

SX Chipbreaker and PR015S resist notching, thereby improving tool life.

# Caution when using SX chipbreaker

## 1. Cutting edge height

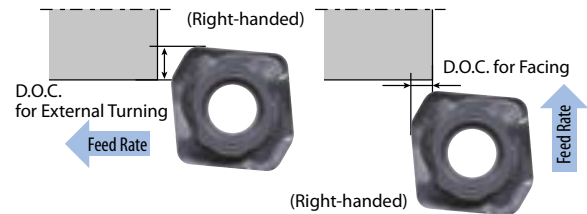
The center of the cutting edge height of the nose is slanted by 60 degrees based on circled portions in image below.



## 2. Recommended D.O.C.

Recommended depth of cut is no greater than the 60° lead angle; however, larger depths of cut are possible.

Description	Recommended D.O.C. external turning (mm)	Max. D.O.C. facing (mm)
CNMM1204X R/L-SX	0.5 - 2.0 - 4.0	2.0
CNMM1606X R/L-SX	0.5 - 2.5 - 4.5	2.0
CNMM1906X R/L-SX	0.5 - 3.0 - 5.0	2.5



## 3. Applicable toolholder

The SX chipbreaker insert requires a different shim than standard inserts. No additional toolholder modifications are necessary when using the applicable Kyocera holders.

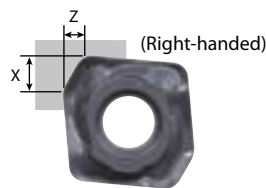
Insert description	Applicable toolholder (Kyocera)	Standard shim	Shim for SX chipbreaker
CNMM1204X R/L-SX	DCLN R/L2020K-12	DC-44	DC-44-C
	DCLN R/L2525M-12		
	PCLN R/L2020H-12	LC-42N	LC-42N-C
	PCLN R/L2020K-12		
	PCLN R/L2525M-12		
PCLN R/L3225P-12			
CNMM1606X R/L-SX	PCLN R/L2525M-16	LC-53N	LC-53N-C
	PCLN R/L3232P-16		
CNMM1906X R/L-SX	PCLN R/L3232P-19	LC-63	LC-63-C

Boring is not recommended

## 4. Unmachined portion varies with insert size

Unmachined portion is reflected below.

Description	Amount uncut (mm)	
	X	Z
CNMM1204X R/L-SX	4.1	2.9
CNMM1606X R/L-SX	4.8	3.3
CNMM1906X R/L-SX	5.4	3.6



## 5. Facing

Facing is possible, but turning is recommended. Cutting edge may drop below center in facing operations. Boss remains at the center of the workpiece.

Description	Run-out amount when facing (mm)
CNMM1204XR/L-SX	0.75
CNMM1606XR/L-SX	0.85
CNMM1906XR/L-SX	1.05

The SX chipbreaker is uniquely designed for high efficiency roughing. It differs from standard inserts by the following

- Handed single-sided 2-corner insert
- Requires a dedicated shim
- Unmachined portion remains at corner (4. Unmachined portion varies with insert size)
- Position of insert is below the center when facing (5. Facing)

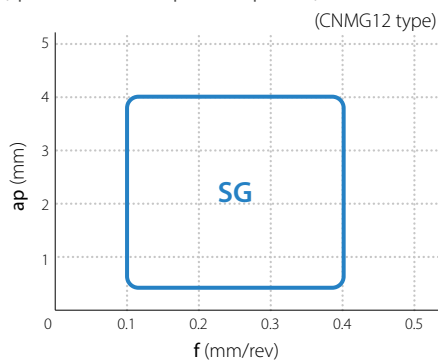
## For Roughing Applications: SG chipbreaker NEW

### For Roughing applications in heat-resistant alloys

#### Double-sided 4-corner design

**SG Chipbreaker Benefits**  
 Well-balanced rake face shape → Extended tool life  
 Shallow bottom chipbreaker design → Smooth chip control

Applicable chipbreaker range  
 (ap indicates radial depth of cut per side)



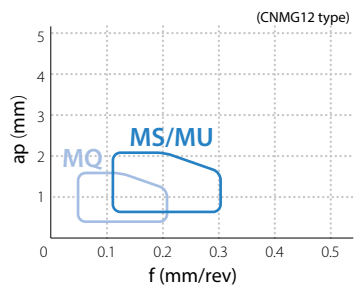
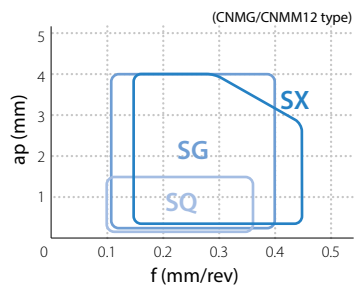
**Standard chipbreaker**

Stable chip control during heavy machining applications

**Well-balanced rake face shape**

High-strength land and low cutting force design

### Applicable chipbreaker range (ap Indicates radial depth of cut per side)



### Recommended cutting conditions

Workpiece	Cutting range	Application	Recommended chipbreaker	Recommended grade	Min. - Recommendation - Max.		
					Vc (m/min)	ap (mm)	f (mm/rev)
Heat-Resistant alloys	Finishing	Continuous	MQ	PR005S	30 – 55 – 90	0.2 – 0.3 – 1.0	0.05 – 0.08 – 0.15
		Interruption		PR015S	25 – 45 – 70	0.2 – 0.5 – 1.0	0.05 – 0.1 – 0.2
	Medium	Continuous	MU	PR005S	30 – 55 – 90	0.5 – 1.0 – 2.0	0.1 – 0.15 – 0.3
		Interruption		PR015S	25 – 45 – 70	0.5 – 1.0 – 2.0	0.1 – 0.15 – 0.3
		Continuous	MS	PR005S	30 – 55 – 90	0.5 – 1.0 – 2.0	0.1 – 0.15 – 0.3
		Interruption		PR015S	25 – 45 – 70	0.5 – 1.0 – 2.0	0.1 – 0.15 – 0.3
		Continuous	SQ	PR005S	30 – 55 – 90	0.3 – 0.5 – 1.5	0.1 – 0.17 – 0.35
		Interruption		PR015S	25 – 45 – 70	0.3 – 0.5 – 1.5	0.1 – 0.17 – 0.35
	Roughing	Continuous	SG	PR005S	30 – 55 – 90	0.5 – 2.0 – 4.0	0.1 – 0.3 – 0.4
		Interruption		PR015S	25 – 45 – 70	0.5 – 2.0 – 4.0	0.1 – 0.3 – 0.4
		Continuous	SX	PR005S	30 – 55 – 90	0.5 – 2.0 – 4.0	0.15 – 0.3 – 0.45
		Interruption		PR015S	25 – 45 – 70	0.5 – 2.0 – 4.0	0.15 – 0.3 – 0.45

# Available inserts

Shape Handed insert shows Right-hand	Description	Dimensions (mm)				PROSS	PRO155	
		I.C.	Thick-ness	Hole	Corner-R(re)			
	CNMG 120404SQ 120408SQ 120412SQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●	
	CNMG 160612SQ 160616SQ	15.875	6.35	6.35	1.2 1.6	●	●	
	CNMG 190612SQ 190616SQ	19.05	6.35	7.94	1.2 1.6	●	●	
	CNMG 120404MQ 120408MQ	12.70	4.76	5.16	0.4 0.8	●	●	
	CNMG 120404MS 120408MS 120412MS 120416MS	12.70	4.76	5.16	0.4 0.8 1.2 1.6	●	●	
	CNMG 120404MU 120408MU 120412MU	12.70	4.76	5.16	0.4 0.8 1.2	●	●	
	CNMG 160608MU 160612MU 160616MU	15.875	6.35	6.35	0.8 1.2 1.6	●	●	
	CNMG 190612MU 190616MU	19.05	6.35	7.94	1.2 1.6	●	●	
	CNMG 120408SG 120412SG	12.70	4.76	5.16	0.8 1.2	●	●	
	CNMG 160612SG 160616SG	15.875	6.35	6.35	1.2 1.6	●	●	
	CNMG 190612SG 190616SG	19.05	6.35	7.94	1.2 1.6	●	●	
	CNMM 1204X <sup>R/L</sup> -SX 1606X <sup>R/L</sup> -SX 1906X <sup>R/L</sup> -SX	12.70 15.875 19.05	4.42 5.96 5.93	5.16 6.35 7.94	– – –	●	●	
		DNMG 150404SQ 150408SQ 150412SQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●
		DNMG 150604SQ 150608SQ 150612SQ	12.70	6.35	5.16	0.4 0.8 1.2	●	●
		DNMG 150404MQ 150408MQ	12.70	4.76	5.16	0.4 0.8	●	●
	DNMG 150604MQ 150608MQ	12.70	6.35	5.16	0.4 0.8	●	●	
		DNMG 150404MS 150408MS 150412MS	12.70	4.76	5.16	0.4 0.8 1.2	●	●
DNMG 150604MS 150608MS 150612MS		12.70	6.35	5.16	0.4 0.8 1.2	●	●	
		DNMG 150404MU 150408MU	12.70	4.76	5.16	0.4 0.8	●	●
	DNMG 150604MU 150608MU	12.70	6.35	5.16	0.4 0.8	●	●	
		DNMG 150408SG 150412SG	12.70	4.76	5.16	0.8 1.2	●	●
DNMG 150608SG 150612SG		12.70	6.35	5.16	0.8 1.2	●	●	

CNMM...X<sup>R/L</sup>-SX inserts are single-sided with 2 cutting edges

Shape	Description	Dimensions (mm)				PROSS	PRO155	
		I.C.	Thick-ness	Hole	Corner-R(re)			
	SNMG 120404MQ 120408MQ	12.70	4.76	5.16	0.4 0.8	●	●	
		SNMG 120404MS 120408MS 120412MS 120416MS	12.70	4.76	5.16	0.4 0.8 1.2 1.6	●	●
		SNMG 190612MU 190616MU	19.05	6.35	7.94	1.2 1.6	●	●
			SNMG 120408SG 120412SG	12.70	4.76	5.16	0.8 1.2	●
SNMG 190612SG 190616SG			19.05	6.35	7.94	1.2 1.6	●	●
	TNMG 160404MQ 160408MQ	9.525	4.76	3.81	0.4 0.8	●	●	
		TNMG 160404MS 160408MS 160412MS	9.525	4.76	3.81	0.4 0.8 1.2	●	●
		TNMG 160404MU 160408MU	9.525	4.76	3.81	0.4 0.8	●	●
		TNMG 160408SG 160412SG	9.525	4.76	3.81	0.8 1.2	●	●
TNMG 220408SG 220412SG		12.70	4.76	5.16	0.8 1.2	●	●	
	VNMG 160404MQ 160408MQ	9.525	4.76	3.81	0.4 0.8	●	●	
		VNMG 160404MS 160408MS 160412MS	9.525	4.76	3.81	0.4 0.8 1.2	●	●
		VNMG 160404MU 160408MU	9.525	4.76	3.81	0.4 0.8	●	●
		VNMG 160404SG 160408SG	9.525	4.76	3.81	0.4 0.8	●	●
		WNMG 080404MQ 080408MQ	12.70	4.76	5.16	0.4 0.8	●	●
		WNMG 080404MS 080408MS 080412MS	12.70	4.76	5.16	0.4 0.8 1.2	●	●
		WNMG 080404MU 080408MU	12.70	4.76	5.16	0.4 0.8	●	●
		WNMG 080408SG 080412SG	12.70	4.76	5.16	0.8 1.2	●	●

● : Available

CVD coated carbide grade for steel

NEW

# CA025P Series

- Improved wear resistance with new CVD grade for steel
- Excellent fracture resistance
- Excellent adhesion resistance and chipping resistance



CVD coated carbide for cast iron

# CA3 Series

- CA310 Gray cast iron - first recommendation
- CA315 Nodular cast iron - first recommendation
- CA320 For interrupted machining

