

THE NEW VALUE FRONTIER



New CVD coated carbides
for cast iron

CA3 Series

CA3 Series

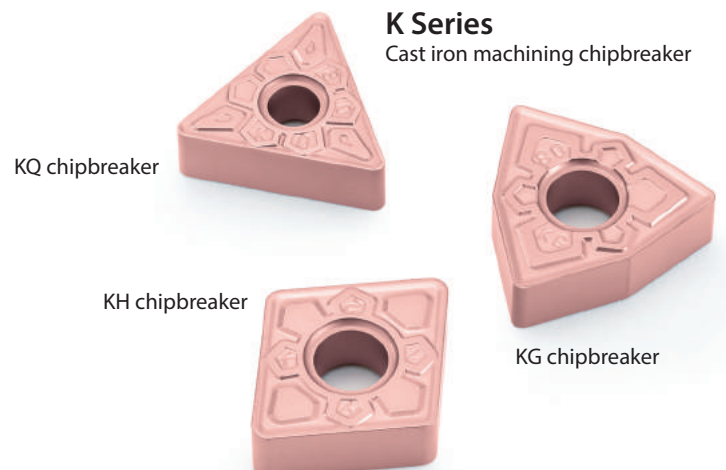


CVD coated carbide for highly stable cast iron machining

Improved coating adhesion prevents chipping and provides stable machining

Micro TiCN coating provides excellent wear resistance

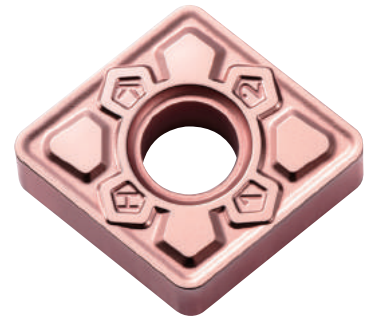
Unique insert grades for various cast iron machining applications
(CA310/CA315/CA320)



New CVD coated carbide for highly stable cast iron machining

CA3 Series

Reliable & efficient cast iron turning grades



Prevents adhesion due to specialized post-coating

Hard surface layer

Provides advanced wear resistance.

High-performance α -Al₂O₃ layer

Excellent wear and chipping resistance.

Strong intra-coating adhesion

Higher adhesion between each layer with improved crystal structure.

Micro TiCN layer

Higher coating hardness is possible due to a micro TiCN crystal structure, resulting in increased wear resistance.

1 High coating adhesion results in stable machining

Strong intra-coating adhesion

Micro intra-coating structure

Higher adhesion by increasing bonding surface with aluminum oxide layer.

Impact-resistant intra-coating structure

Interface strength is increased by 20% (compared to our products), which resists boundary destruction.

Rake face condition (In-house evaluation)



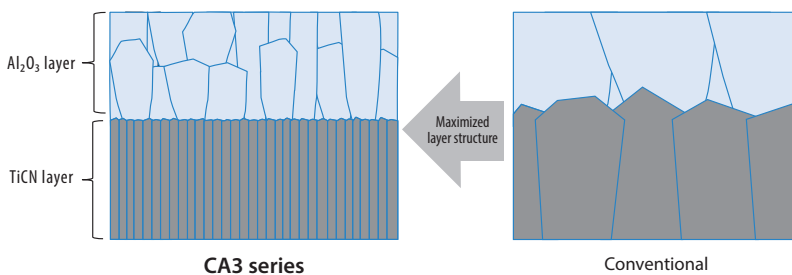
CA3 series (CA315)

Competitor A

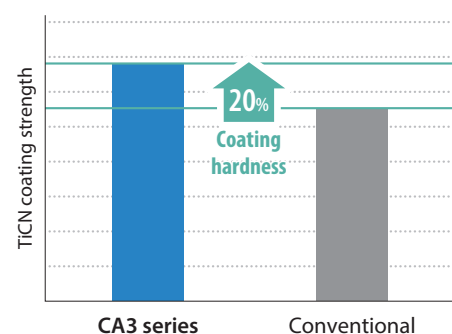
Cutting conditions: Vc = 150 m/min, ap = 1.5 mm, f = 0.3 mm/rev, wet, CNMG120412 type, facing, (After withstanding 3,000 impacts)
Workpiece: GGG70 (8 grooves in workpiece)

2 Micro TiCN coating provides excellent wear resistance

Maximized layer structure (Pattern diagram)

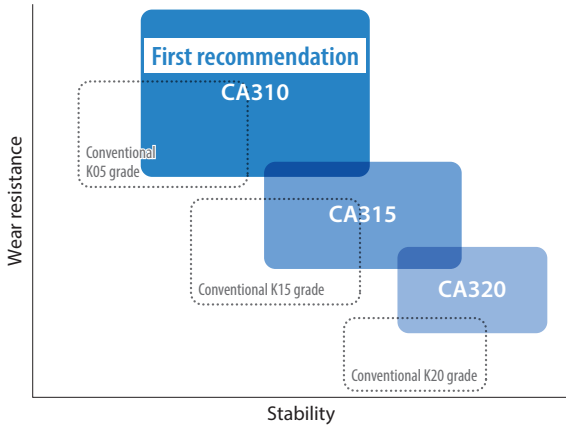


Coating hardness comparison (In-house evaluation)

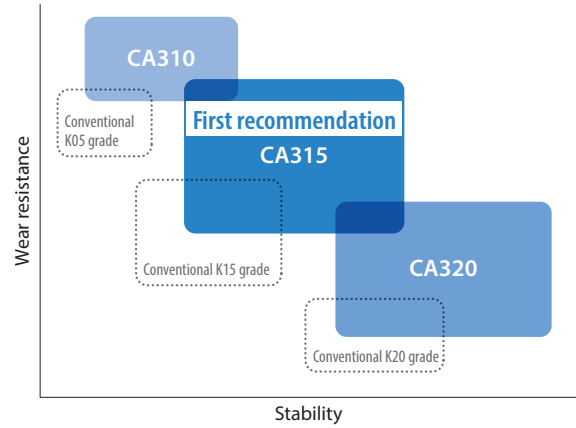


3 Unique insert grades for various cast iron machining applications

Gray cast Iron - first recommendation CA310



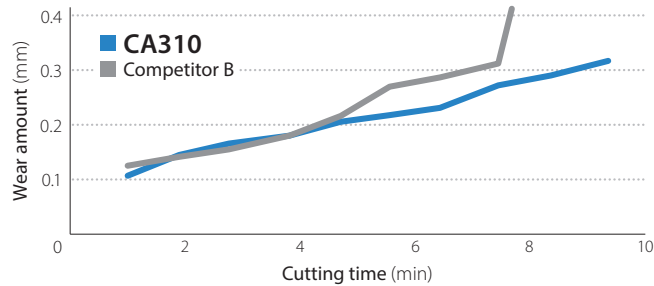
Nodular cast iron - first recommendation CA315



CA310 Gray cast iron - first recommendation

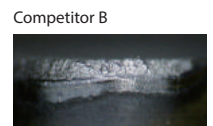
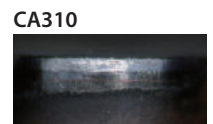
- Grade for high-speed continuous machining and improved tool life through the deposition of a thickened alumina coating layer
- For finishing to roughing of gray cast iron

Wear resistance comparison (In-house evaluation)



Cutting conditions: $V_c = 300$ m/min, $a_p = 1.5$ mm, $f = 0.3$ mm/rev, wet, CNMG120412 type
Workpiece: GGG70

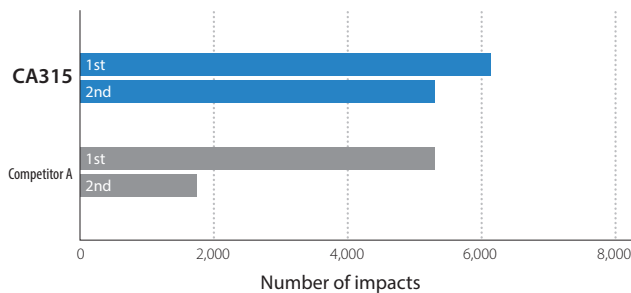
Machining duration:
About 7.4 min. later



CA315 Nodular cast iron - first recommendation

- For continuous to interrupted machining with a good balance of wear resistance and stability
- Excellent performance for machining gray and nodular cast iron by optimizing the total coating layer thickness
- High efficiency and long tool life

Fracture resistance comparison (In-house evaluation)

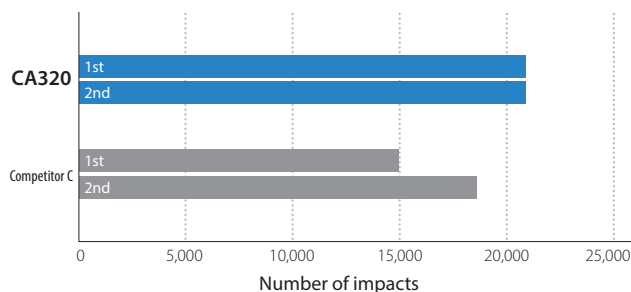


Cutting conditions: $V_c = 200$ m/min, $a_p = 1.5$ mm, $f = 0.45$ mm/rev, wet, CNMG120412 type
Workpiece: GGG70 (8 grooves in workpiece)
Interruption evaluation: 2 times

CA320 For interrupted machining

- Improved stability with CVD layer structure with high adhesion
- Long tool life for nodular cast iron during heavily interrupted or high-speed machining

Fracture resistance comparison (In-house evaluation)



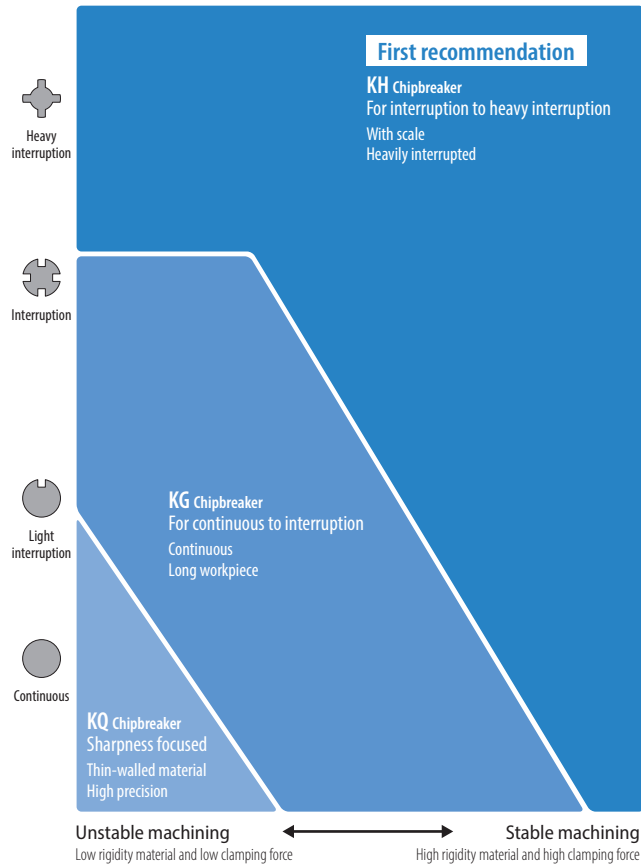
Cutting conditions: $V_c = 150$ m/min, $a_p = 1.5$ mm, $f = 0.3$ mm/rev, wet, CNMG120412 type
Workpiece: GGG70 (8 grooves in workpiece)
Interruption evaluation: 2 times

4

CA3 for cast iron machining with new K-Series chipbreakers

Great for a large range of heavy machining operations due to improved chipping resistance

Recommended K-Series chipbreakers

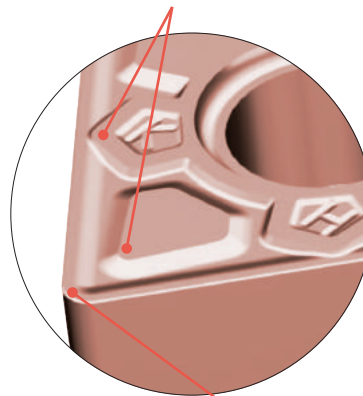


First recommendation

KH chipbreaker (For interruption to heavy interruption)

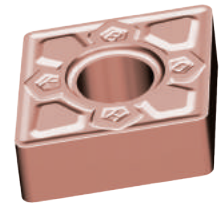
- Good for heavily interrupted machining
- Focus on high stability with flat land

Improved locating / seating in the toolholder pocket
 Resists vibration and edge location movement



Flat land

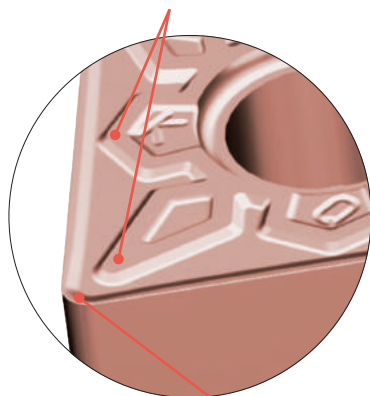
- Tough and reliable edge security
- High feed to heavily interrupted machining
- First recommended edge preparation with breakage resistance



KQ chipbreaker (Sharpness focused)

- Good for machining when sharpness is necessary such as thin-walled material
- Good balance of low cutting forces and edge strength

Improved locating / seating in the toolholder pocket
 Resists machining vibration



Balance of sharpness and strength

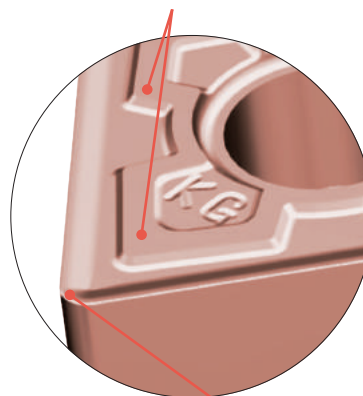
Edge geometry is appropriate for thin-walled workpieces



KG chipbreaker (For continuous to interruption)

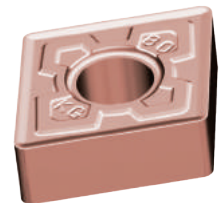
- For various cast iron machining applications
- Chipping resistance is improved in spite of having a positive land

Improved locating / seating in the toolholder pocket
 Resists machining vibration and great for a wide variety of machining operations




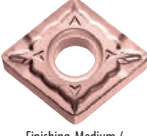
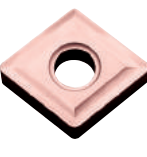



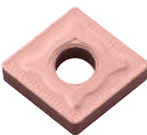
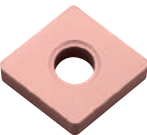



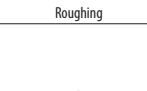


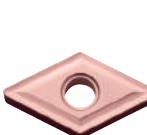
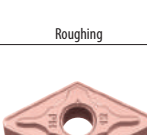
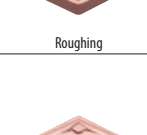
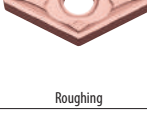
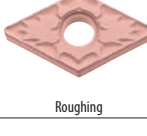
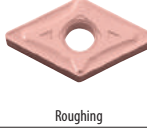
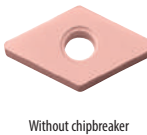


Positive land

- Excellent balance of sharpness and strength
- Machining from continuous to interruption














Negative type inserts






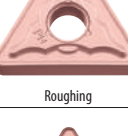
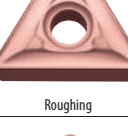
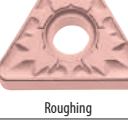
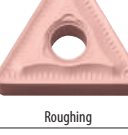

Shape	Description	Dimensions (mm)				Corner-R (r _e)	CA310	CA315	CA320
		I.C.	Thickness	Hole					
 Roughing	CNMG 120408KH 120412KH 120416KH	12.70	4.76	5.16	0.8	●	●	●	
					1.2	●	●	●	
					1.6	●	●	●	
 Roughing	CNMG 120404KG 120408KG 120412KG	12.70	4.76	5.16	0.4	●	●	●	
					0.8	●	●	●	
					1.2	●	●	●	
 Sharp Edge	CNMG 120404KQ 120408KQ 120412KQ	12.70	4.76	5.16	0.4	●	●	●	
					0.8	●	●	●	
					1.2	●	●	●	
 Finishing-Medium / with Wiper edge	CNMG 120408WQ 120412WQ	12.70	4.76	5.16	0.8	●	●	●	
					1.2	●	●	●	
 Roughing	CNMG 120404 120408 120412 120416	12.70	4.76	5.16	0.4	●	●	●	
					0.8	●	●	●	
					1.2	●	●	●	
	CNMG 160612 160616	15.875	6.35	6.35	1.2	●	●	●	
					1.6	●	●	●	
	CNMG 190608 190612 190616	19.05	6.35	7.94	0.8	●	●	●	
1.2					●	●	●		
1.6					●	●	●		
 Roughing	CNMG 120408PH 120412PH 120416PH	12.70	4.76	5.16	0.8	●	●	●	
					1.2	●	●	●	
					1.6	●	●	●	
	CNMG 160612PH 160616PH	15.875	6.35	6.35	1.2	●	●	●	
 Roughing	CNMG 120404C 120408C 120412C 120416C	12.70	4.76	5.16	0.4	●	●	●	
					0.8	●	●	●	
					1.2	●	●	●	
					1.6	●	●	●	
	CNMG 160612C	15.875	6.35	6.35	1.2	●	●	●	
 Roughing	CNMG 120408ZS 120412ZS	12.70	4.76	5.16	0.8	●	●	●	
					1.2	●	●	●	
 Roughing	CNMG 120408GC 120412GC	12.70	4.76	5.16	0.8	●	●	●	
					1.2	●	●	●	
 Without chipbreaker	CNMA 120404 120408 120412 120416	12.70	4.76	5.16	0.4	●	●	●	
					0.8	●	●	●	
					1.2	●	●	●	
					1.6	●	●	●	

Shape	Description	Dimensions (mm)				Corner-R (r _e)	CA310	CA315	CA320
		I.C.	Thickness	Hole					
 Roughing	DNMG 150408KH 150412KH	12.70	4.76	5.16	0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150608KH 150612KH	12.70	6.35	5.16	0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150404KG 150408KG 150412KG	12.70	4.76	5.16	0.4	●	●	●	
					0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150604KG 150608KG 150612KG	12.70	6.35	5.16	0.4	●	●	●	
					0.8	●	●	●	
					1.2	●	●	●	
 Sharp edge	DNMG 150404KQ 150408KQ	12.70	4.76	5.16	0.4	●	●	●	
					0.8	●	●	●	
 Sharp edge	DNMG 150604KQ 150608KQ	12.70	6.35	5.16	0.4	●	●	●	
					0.8	●	●	●	
 Roughing	DNMG 150404 150408 150412	12.70	4.76	5.16	0.4	●	●	●	
					0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150604 150608 150612	12.70	6.35	5.16	0.4	●	●	●	
					0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150408PH 150412PH	12.70	4.76	5.16	0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150608PH 150612PH	12.70	6.35	5.16	0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150404C 150408C 150412C	12.70	4.76	5.16	0.4	●	●	●	
					0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150604C 150608C 150612C	12.70	6.35	5.16	0.4	●	●	●	
					0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150408ZS 150412ZS	12.70	4.76	5.16	0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150608ZS 150612ZS	12.70	6.35	5.16	0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150408GC 150412GC	12.70	4.76	5.16	0.8	●	●	●	
					1.2	●	●	●	
 Roughing	DNMG 150608GC 150612GC	12.70	6.35	5.16	0.8	●	●	●	
					1.2	●	●	●	
 Without chipbreaker	DNMA 150404 150408	12.70	4.76	5.16	0.4	●	●	●	
					0.8	●	●	●	
 Without chipbreaker	DNMA 150604 150608	12.70	6.35	5.16	0.4	●	●	●	
					0.8	●	●	●	
 Medium-Roughing	RNMG 120400 RNMG 150600	12.70	4.76	5.16	–	●	●	●	
					15.875	6.35	6.35	–	●

● Available













Negative type inserts

Shape	Description	Dimensions (mm)				Corner-R (re)	CA310	CA315	CA320
		I.C.	Thickness	Hole					
 Roughing	SNMG 120408KH 120412KH 120416KH	12.70	4.76	5.16	0.8 1.2 1.6	● ● ●	● ● ●	● ● ●	
 Roughing	SNMG 120408KG 120412KG	12.70	4.76	5.16	0.8 1.2	● ●	● ●	● ●	
 Roughing	SNMG 090308	9.525	3.18	3.81	0.8	●	●	●	
 Roughing	SNMG 120404 120408 120412 120416 120420	12.70	4.76	5.16	0.4 0.8 1.2 1.6 2.0	● ● ● ● ●	● ● ● ● ●	● ● ● ● ●	
 Roughing	SNMG 120408PH 120412PH 120416PH	12.70	4.76	5.16	0.8 1.2 1.6	● ● ●	● ● ●	● ● ●	
 Roughing	SNMG 150612PH 150616PH	15.875	6.35	6.35	1.2 1.6	● ●	● ●	● ●	
 Roughing	SNMG 120408C 120412C	12.70	4.76	5.16	0.8 1.2	● ●	● ●	● ●	
 Roughing	SNMG 120408ZS 120412ZS	12.70	4.76	5.16	0.8 1.2	● ●	● ●	● ●	
 Roughing	SNMG 120408GC 120412GC	12.70	4.76	5.16	0.8 1.2	● ●	● ●	● ●	
 Without chipbreaker	SNMA 120404 120408 120412 120416 120420	12.70	4.76	5.16	0.4 0.8 1.2 1.6 2.0	● ● ● ● ●	● ● ● ● ●	● ● ● ● ●	
 Without chipbreaker	SNMN 120408 120412	12.70	4.76	–	0.8 1.2	● ●	● ●	● ●	

Shape	Description	Dimensions (mm)				Corner-R (re)	CA310	CA315	CA320
		I.C.	Thickness	Hole					
 Roughing	TNMG 160408KH 160412KH 160416KH	9.525	4.76	3.81	0.8 1.2 1.6	● ● ●	● ● ●	● ● ●	
 Roughing	TNMG 160404KG 160408KG 160412KG	9.525	4.76	3.81	0.4 0.8 1.2	● ● ●	● ● ●	● ● ●	
 Sharp Edge	TNMG 160404KQ 160408KQ	9.525	4.76	3.81	0.4 0.8	● ●	● ●	● ●	
 Roughing	TNMG 160404 160408 160412 160416 160420	9.525	4.76	3.81	0.4 0.8 1.2 1.6 2.0	● ● ● ● ●	● ● ● ● ●	● ● ● ● ●	
 Roughing	TNMG 220404 220408 220412	12.70	4.76	5.16	0.4 0.8 1.2	● ● ●	● ● ●	● ● ●	
 Roughing	TNMG 160408PH 160412PH	9.525	4.76	3.81	0.8 1.2	● ●	● ●	● ●	
 Roughing	TNMG 160404C 160408C 160412C	9.525	4.76	3.81	0.4 0.8 1.2	● ● ●	● ● ●	● ● ●	
 Roughing	TNMG 160408ZS 160412ZS	9.525	4.76	3.81	0.8 1.2	● ●	● ●	● ●	
 Roughing	TNMG 160408GC 160412GC	9.525	4.76	3.81	0.8 1.2	● ●	● ●	● ●	
 Without chipbreaker	TNMA 160404 160408 160412 160416 160420	9.525	4.76	3.81	0.4 0.8 1.2 1.6 2.0	● ● ● ● ●	● ● ● ● ●	● ● ● ● ●	

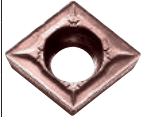
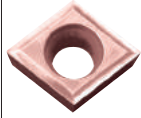


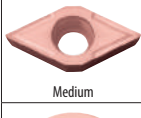


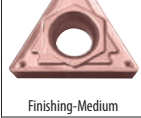
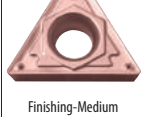


● Available

Negative type inserts

Shape	Description	Dimensions (mm)				Corner-R (r _e)	CA310	CA315	CA320
		I.C.	Thickness	Hole					
 Roughing	VNMG 160408KH 160412KH	9.525	4.76	3.81	0.8 1.2	●	●	●	
 Roughing	VNMG 160408KG 160412KG	9.525	4.76	3.81	0.8 1.2	●	●	●	
 Roughing	VNMG 160404 160408	9.525	4.76	3.81	0.4 0.8	●	●	●	
 Roughing	WNMG 080408KH 080412KH 080416KH	12.70	4.76	5.16	0.8 1.2 1.6	●	●	●	
 Roughing	WNMG 080404KG 080408KG 080412KG	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	
 Sharp edge	WNMG 080404KQ 080408KQ 080412KQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	
 Roughing	WNMG 080404 080408 080412	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	
 Roughing	WNMG 080408PH 080412PH	12.70	4.76	5.16	0.8 1.2	●	●	●	
 Roughing	WNMG 080404C 080408C 080412C	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	
 Roughing	WNMG 080408ZS 080412ZS	12.70	4.76	5.16	0.8 1.2	●	●	●	
 Roughing	WNMG 080408GC 080412GC	12.70	4.76	5.16	0.8 1.2	●	●	●	
 Without chipbreaker	WNMA 080408 080412	12.70	4.76	5.16	0.8 1.2	●	●	●	

● Available

Positive type inserts

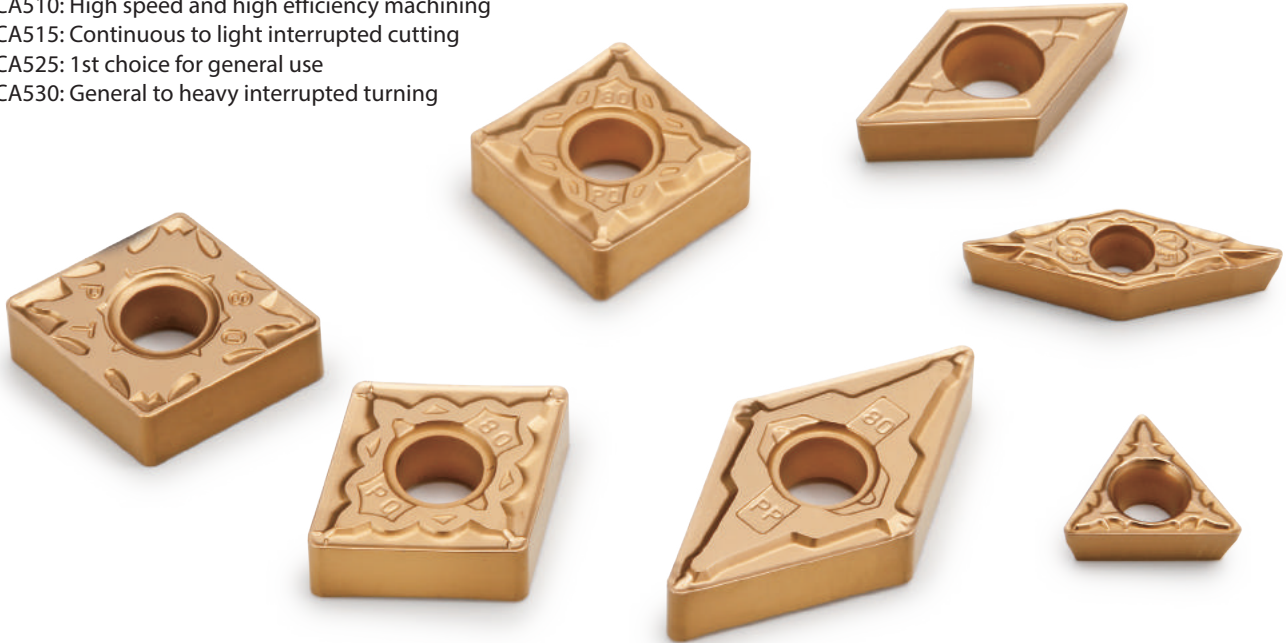
Shape	Description	Dimensions (mm)					CA310	CA315	CA320
		I.C.	Thickness	Hole	Corner-R (r _e)	Relief angle			
 Finishing-Medium	CCMT 060204GK	6.35	2.38	2.8	0.4	7°	●	●	●
	CCMT 09T304GK	9.525	3.97	4.4	0.4	7°	●	●	●
	CCMT 120404GK 120408GK	12.7	4.76	5.5	0.4 0.8	7°	●	●	●
 Medium	CCMT 09T308	9.525	3.97	4.4	0.8	7°	●	●	●
 Medium	CPMH 080204 080208	7.94	2.38	3.5	0.4 0.8	11°	●	●	●
	CPMH 090304 090308	9.525	3.18	4.5	0.4 0.8	11°	●	●	●
 Finishing-Medium	DCMT 070204GK 070208GK	6.35	2.38	2.8	0.4 0.8	7°	●	●	●
	DCMT 11T304GK 11T308GK	9.525	3.97	4.4	0.4 0.8	7°	●	●	●
 Medium	DCMT 11T308	9.525	3.97	4.4	0.8	7°	●	●	●
 Medium	RCMX 1204M0	12.0	4.76	4.2	-	7°	●	●	●
 Without chipbreaker	SPMN 120304 120308	12.7	3.18	-	0.4 0.8	11°	●	●	●
	SPMN 120408 120412	12.7	4.76	-	0.8 1.2	11°	●	●	●
 Finishing-Medium	TCMT 110204HQ 110208HQ	6.35	2.38	2.8	0.4 0.8	7°	●	●	●
	TCMT 16T308HQ 16T312HQ	9.525	3.97	4.4	0.8 1.2	7°	●	●	●
 Finishing-Medium	TPMT 110304HQ 110308HQ	6.35	3.18	3.3	0.4 0.8	11°	●	●	●
	TPMT 160304HQ 160308HQ	9.525	3.18	4.4	0.4 0.8	11°	●	●	●
 Medium	TPMR 110304 110308	6.35	3.18	-	0.4 0.8	11°	●	●	●
	TPMR 160304 160308	9.525	3.18	-	0.4 0.8	11°	●	●	●
 Without chipbreaker	TPMN 110304 110308	6.35	3.18	-	0.4 0.8	11°	●	●	●
	TPMN 160304 160308 160312	9.525	3.18	-	0.4 0.8 1.2	11°	●	●	●

● Available

CVD coated carbide for steel

CA5 Series

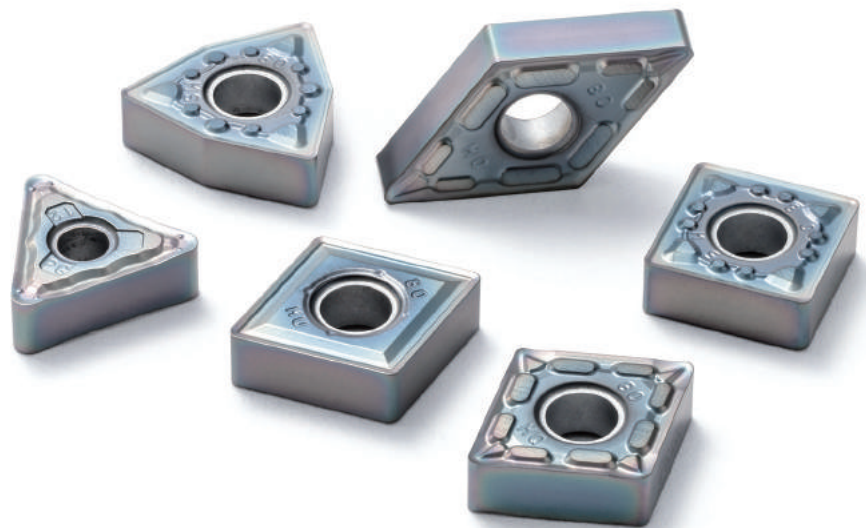
- CA510: High speed and high efficiency machining
- CA515: Continuous to light interrupted cutting
- CA525: 1st choice for general use
- CA530: General to heavy interrupted turning



For difficult-to-cut materials and stainless steels

PR1535 - MEGACOAT NANO

- Most suitable for heat resistant alloy, titanium alloy and stainless steel
- Reduction of sudden fracturing when machining scale or interrupted cutting
- Reliable new tough grade for difficult-to-cut materials (for S35/M35/P35)



CA65 Series and PR1125

CVD and PVD coated carbide for stainless steel

