THE NEW VALUE FRONTIER

KYOCERA

New CVD Coated Carbides for Cast Iron | CA3 Series

New CVD Coated Carbides for Cast Iron

CA3 Series

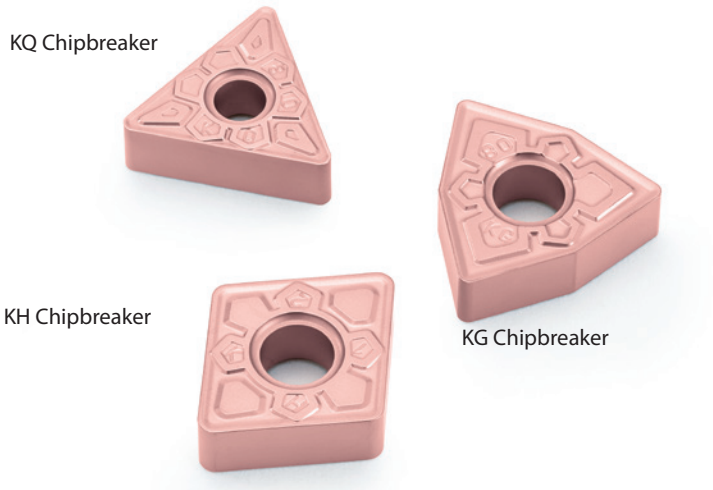
Rose Gold Color Coated Carbide for Highly Stable Cast Iron Machining

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)

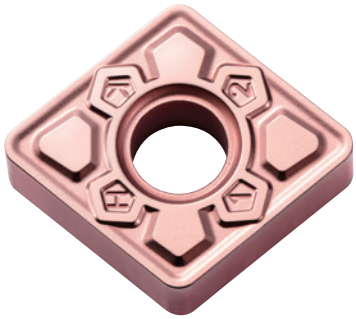
Cast Iron Machining Chipbreaker
K Series



Coated Carbide for Highly Stable Cast Iron Machining

CA3 Series

CA3 Series Coated Carbides Launched



New Coated Carbides 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-Al $_2O_3$ 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

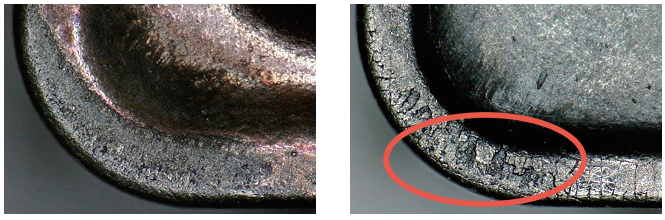
Micro Intra-coating Structure

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)

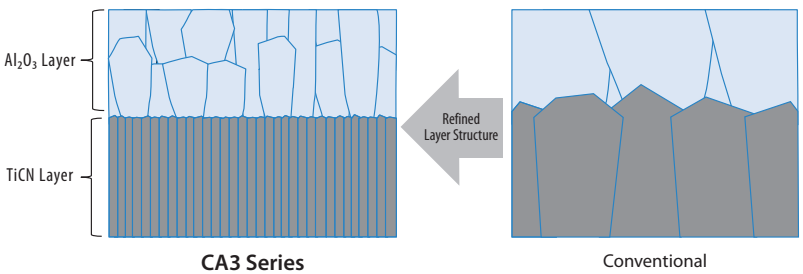


CA3 Series (CA315) | Competitor A

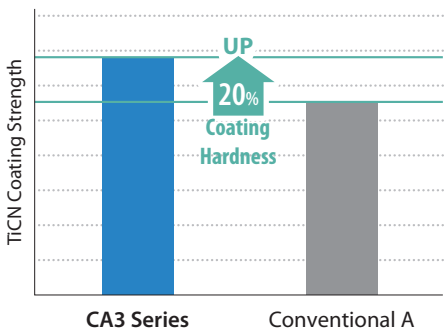
Cutting Conditions: Vc =150 m/min, ap = 1.5 mm,
f = 0.3 mm/rev, Wet, CNMG120412 Type, Facing, (After Withstanding 3,000 Impacts)
Workpiece: FCD700(8 Grooves in Workpiece)

2 Micro TiCN Coating Provides Excellent Wear Resistance

Refined Layer Structure (Pattern diagram)

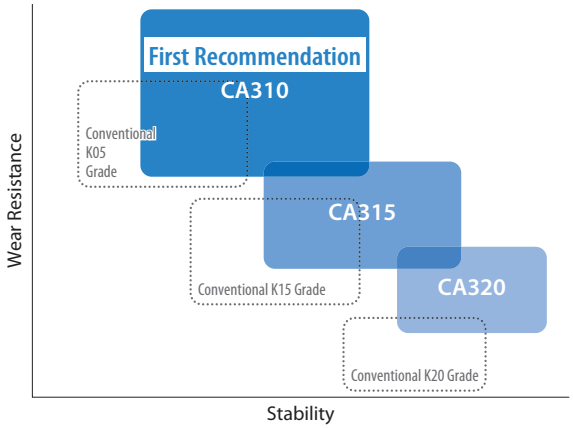


Coating Hardness Comparison (In-house Evaluation)

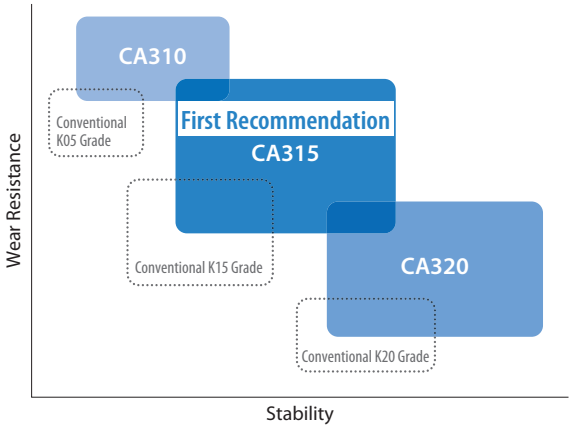


3 Unique Insert Grades For Various Cast Iron Machining Applications

Gray Cast Iron First Recommendation CA310



Nodular Cast Iron First Recommendation CA315

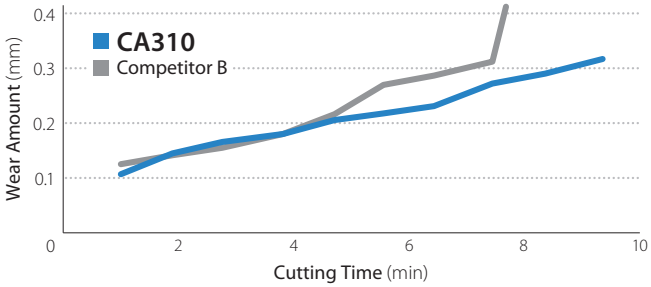


CA310 Gray Cast Iron-First Recommendation

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.

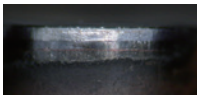
Wear Resistance Comparison (In-house Evaluation)



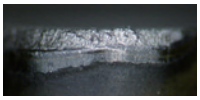
Cutting Conditions: Vc = 300 m/min, ap = 1.5 mm, f = 0.3 mm/rev, Wet CNMG120412 Type
Workpiece: FCD700

Machining Duration: About 7.4 min. Later

CA310



Competitor B



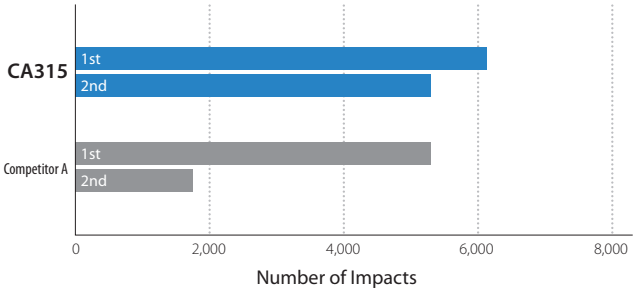
CA315 Nodular Cast Iron-First Recommendation

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)



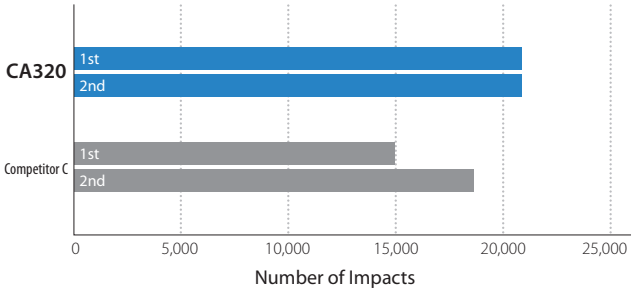
Cutting Conditions: Vc =200 m/min, ap = 1.5 mm, f = 0.45 mm/rev, Wet CNMG120412 Type
Workpiece: FCD700 (8 Grooves in Workpiece) Interruption Evaluation: 2 Times

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)

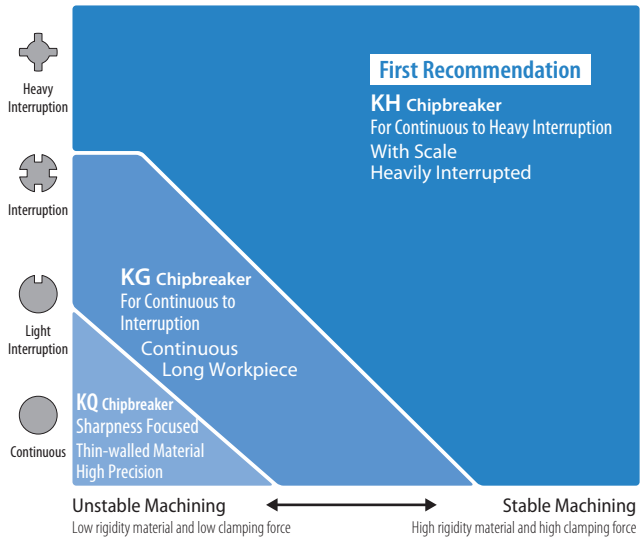


Cutting Conditions: Vc = 150 m/min, ap = 1.5 mm, f = 0.3 mm/rev, Wet CNMG120412 Type
Workpiece: FCD700 (8 Grooves in Workpiece) Interruption Evaluation: 2 Times

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

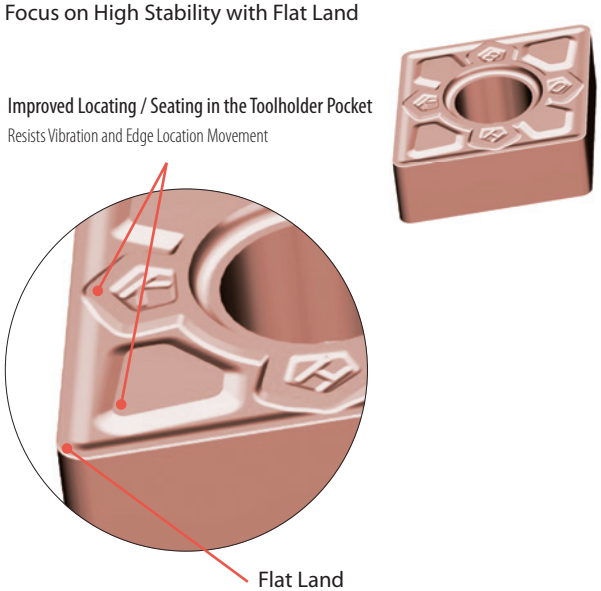
Recommended K-Series Chipbreakers



First Recommendation

KH Chipbreaker (For Continuous to Heavy Interruption)

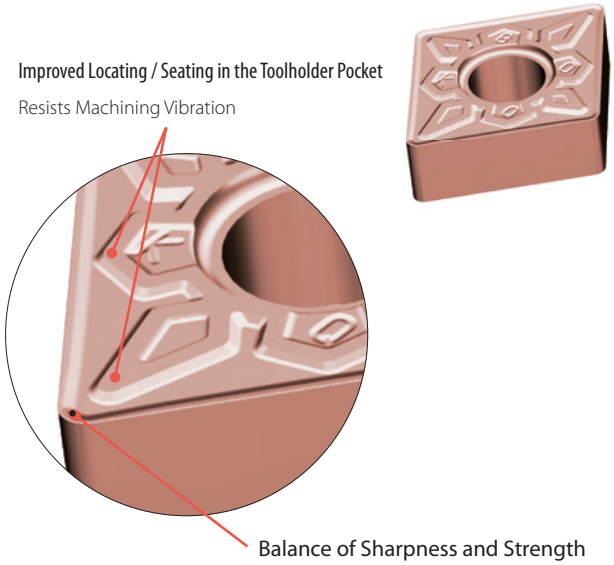
Good for Heavily Interrupted Machining
Focus on High Stability with Flat Land



Tough and Reliable Edge Security
High Feed to Heavily Interrupted Machining
First Recommended Edge Preparation with Breakage Resistance

KQ Chipbreaker (Sharpness Focused)

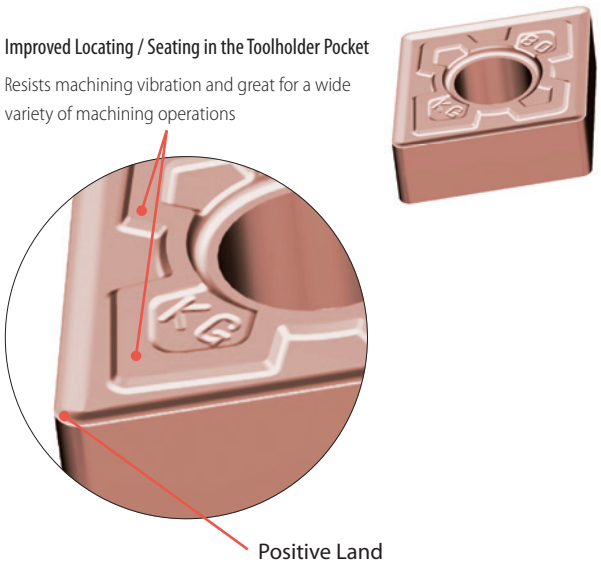
Good for Machining when Sharpness is Necessary Such as Thin-walled Material
Good Balance of Low Cutting Forces and Edge Strength



Edge Geometry is Appropriate for Thin-walled Workpieces

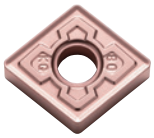
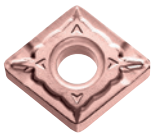
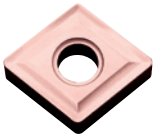
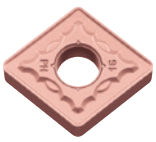
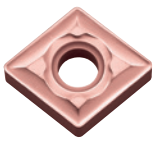
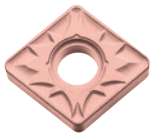
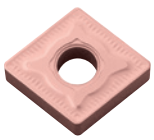
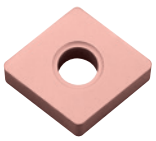
KG Chipbreaker (For Continuous to Interruption)

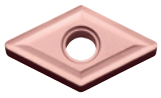
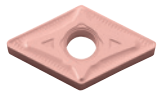
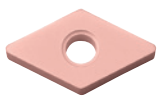
For Various Cast Iron Machining Applications
Chipping resistance is improved in spite of having a positive land



Excellent Balance of Sharpness and Strength
Machining from Continuous to Interruption

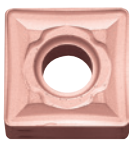
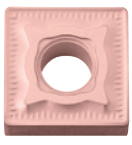
Stock Items (Negative)

Shape	Description	Dimensions (mm) I.C.	Thickness	Hole	Corner-R (rε)	CA310	CA315	CA320
 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 1.6	● ● ● ●	● ● ● ●	● ● ● ●
	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 1.6	● ●	● ●	● ●
 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) I.C.	Thickness	Hole	Corner-R (rε)	CA310	CA315	CA320
 Roughing	DNMG 150408KH 150412KH	12.70	4.76	5.16	0.8 1.2	● ●	● ●	● ●
	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	● ● ●	● ● ●	● ● ●
	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	● ●	● ●	● ●
	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	● ● ●	● ● ●	● ● ●
	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	● ●	● ●	● ●
	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	● ● ●	● ● ●	● ● ●
	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	● ●	● ●	● ●
	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	● ●	● ●	● ●
	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	● ●	● ●	● ●
	DNMA 150604 150608	12.70	6.35	5.16	0.4 0.8	● ●	● ●	● ●
 Medium-Roughing	RNMG 120400	12.70	4.76	5.16	–	●	●	●
	RNMG 150600	15.875	6.35	6.35	–	●	●	●

●: Standard Stock

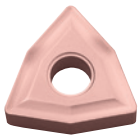
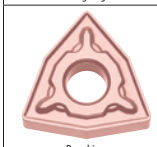
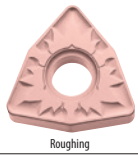
Stock Items (Negative)

Shape	Description	Dimensions (mm) I.C.	Thickness	Hole	Corner-R (rε)	CA310	CA315	CA320
 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	●	●	●
	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	● ● ●	● ● ●	● ● ●
	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) I.C.	Thickness	Hole	Corner-R (rε)	CA310	CA315	CA320
 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	● ● ● ● ●	● ● ● ● ●	● ● ● ● ●
	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	● ● ● ● ●	● ● ● ● ●	● ● ● ● ●

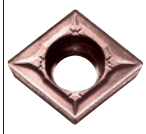
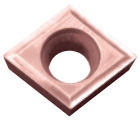
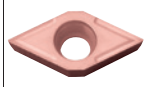
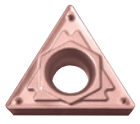
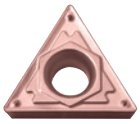
● : Standard Stock

Stock Items (Negative)

Shape	Description	Dimensions (mm) I.C.	Thickness	Hole	Corner-R (rε)	CA310	CA315	CA320
 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	● ●	● ●	● ●

● : Standard Stock

Stock Items (Positive)

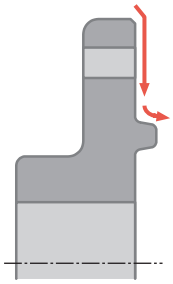
Shape	Description	Dimensions (mm) I.C.	Thickness	Hole	Corner-R (rε)	Relief Angle	CA310	CA315	CA320
 Finishing-Medium	CCMT 060204GK	6.35	2.38	2.8	0.4	7°	●	●	●
	CCMT 09T304GK	9.525	3.97	4.4	0.4	7°	●	●	●
	CCMT 120404GK 120408GK	12.7	4.76	5.5	0.4 0.8	7°	● ●	● ●	● ●
 Medium	CCMT 09T308	9.525	3.97	4.4	0.8	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°	● ● ●	● ● ●	● ● ●

● : Standard Stock

Case Studies

Differential Gear Case FCD450

Vc = 330 - 400 m/min
ap = 1.5 mm
f = 0.15 - 0.25 mm/rev
Wet
CNMG120412KH
CA315



Tool Life

CA315 KH Chipbreaker 100 pcs/edge

Competitor D (Molded Chipbreaker) 50 pcs/edge

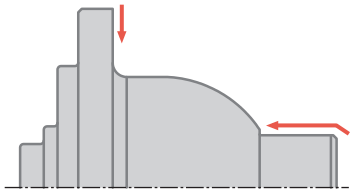
UP x2 Tool Life

CA315 KH Chipbreaker doubled tool life compared to competitor D.

(User evaluation)

Differential Gear Case FCD660

Vc = 180 m/min
ap = 1.8 mm
f = 0.3 mm/rev
Wet
WNMG080408KH
CA315



Tool Life

CA315 KH Chipbreaker 20 pcs/edge

Competitor E (Molded Chipbreaker) 10 pcs/edge

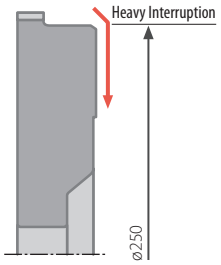
UP x2 Tool Life

Competitor E's insert broke after machining 10 pieces but CA315 with KH Chipbreaker doubled tool life without insert breakage.

(User evaluation)

Flywheel FC230

Vc = 300 m/min
ap = 1.8 mm
f = 0.3 - 0.35 mm/rev
Dry
WNMG080412KH
CA315



Tool Life

CA315 KH Chipbreaker 100 pcs/edge

Competitor F (Molded Chipbreaker) 50 pcs/edge

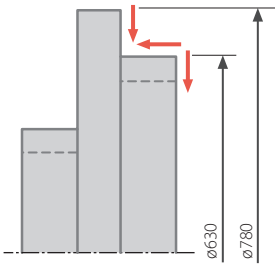
UP x2 Tool Life

Competitor F shows unstable tool life with insert breakage when machining over 50 pieces/edge but CA315 provides stable tool life while machining over 100 pieces/edge.

(User evaluation)

Disc FCD450

Vc = 140 m/min
ap = 2.5 mm
f = 0.28 - 0.45 mm/rev
Wet
CNMG120412KH
CA315



Tool Life

CA315 KH Chipbreaker 10 pcs/edge

Competitor G (Molded Chipbreaker) 7 pcs/edge

UP x1.4 Tool Life

CA315 achieves 1.4 times the tool life of competitor G.

(User evaluation)

CP383-1