New CVD Coated Carbide Grade for Steel

CA115P/CA125P

NEW

Longer tool life in various steel machining environments

New coating and carbide substrate provide excellent wear and fracture resistance

Longer tool life for a wide range of machining applications
Introducing PMG Chipbreaker for medium-roughing

CA115P

Continuous to light interrupted machining
Highly-efficient machining

CA125P

Continuous to heavy interrupted machining
General purpose

New CVD Coated Carbide Grade for Steel

CA115P/CA125P

The new standard for steel machining. Longer tool life in a wide range of machining environments
Expanded lineup of chipbreakers for steel machining in various applications

CA115P/CA125P drastically extends tool life

- Cost savings
- Reduced downtime
- Reduced inventory needed on hand
- Consistent machining quality
- Line automation and labor savings
- Promotes a carbon neutral society by reducing the amount of waste

Advancing technologies improve tool longevity

Advanced technology

New coating & New carbide substrate

CVD TECHNOLOGY

Black & Gold
Excellent wear and fracture resistance

Innovative Layering Technology

Ultra-uniform alumina layering

Proprietary crystal forming technology
Achieving significant crystal growth uniformity and direction
Reduces crater wear and extends tool life

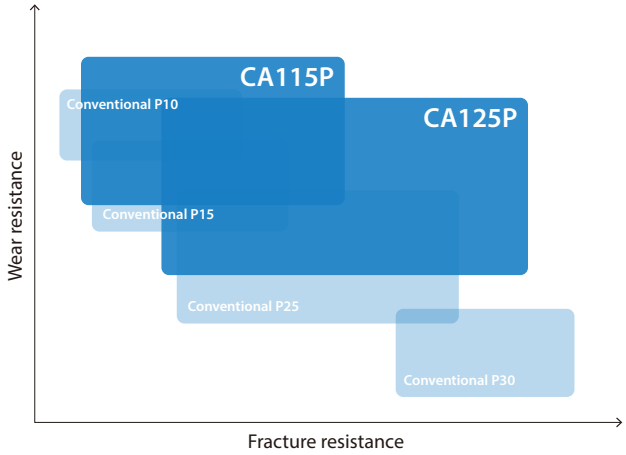
New development

PMG Chipbreaker for Medium-Roughing

Unique design covers a wide range of machining applications
Maintains excellent chip control

1 Extended tool life in a wide variety of applications

Application Map



CA115P

Continuous-light interrupted machining of steel

For high-efficient machining
with wear and chipping resistance

CA125P

Continuous-heavy interrupted steel machining

First recommendation for steel machining
High versatility

Solution Long tool life in various machining environments from roughing to finishing

1 Shaft S43C

Good
Edge condition

CA125P maintained stability and achieved less wear than competitor A.

Edge condition

CA125P

Competitor A

Cutting Conditions :
Vc = 200 m/min, ap = 0.5 mm
f = 0.3 mm/rev, Wet DNMG150408PP
Tool life : 150 pcs/corner

(User evaluation)

2 Sleeve HMM45

Tool life
2 times

CA115P provides 2 times longer tool life than competitor B and maintained better edge wear.

Number of parts

CA115P	200 pcs/corner
Competitor B	100 pcs/corner

Cutting Conditions :
Vc = 210 m/min, ap = 0.5 mm
f = 0.35 mm/rev, Wet DNMG150408PQ

(User evaluation)

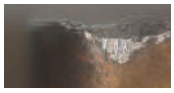
3 Automotive parts SCM420H

Good
Edge condition

CA125P provides stable machining without chipping even after reaching the end of estimated tool life.

Edge condition

CA125P



Competitor C

Cutting Conditions :
Vc = 160 m/min, ap = 1.0 mm
f = 0.32 mm/rev, Wet CNMG120412PG
Tool life : 100 pcs/corner

(User evaluation)

4 Automotive parts Non-tempered steel

Tool life
1.4 times

CA125P shows 1.4 times longer tool life than competitor D.

Number of parts

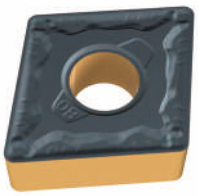
CA125P	80 pcs/corner
Competitor D	55 pcs/corner

Cutting Conditions :
Vc = 160 m/min, ap = 0.2 mm
f = 0.32 mm/rev, Wet CNMG120408PG

(User evaluation)

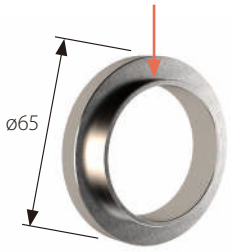
Solution

New PMG Chipbreaker provides up to 4 times longer tool life



5 Nut S45C

Tool life 4 times



CA115P provides 4 times longer tool life than competitor E. The amount of wear after machining is also comparable.

Number of parts

CA115P	1,440 pcs/corner
Competitor E	360 pcs/corner

Cutting Conditions :
Vc = 190 m/min, ap = 1.3 mm
f = 0.2 mm/rev, Wet CNMG120408PMG

(User evaluation)

6 Gear S35C

Tool life 2 times

CA125P shows 2 times longer tool life than competitor F for stable machining even in interrupted machining sections.

Number of parts

CA125P	200 pcs/corner
Competitor F	100 pcs/corner

Cutting Conditions :
Vc = 260 m/min, ap = 1.5 mm
f = 0.3 mm/rev, Wet CNMG120412PMG

(User evaluation)

7 Bearing SCM415

Good Edge condition

CA125P maintained machining without fractures compared to competitor G, which was damaged frequently during machining.

Edge condition

CA125P Competitor G

Cutting Conditions :
Vc = 270 m/min, ap = 1.3 mm
f = 0.25 mm/rev, Wet WNMG080408PMG
Tool life : 300 pcs/corner

(User evaluation)

8 Yoke S45C

Tool life 2 times

CA125P shows 2 times longer tool life than competitor H.

Number of parts

CA125P	100 pcs/corner
Competitor H	50 pcs/corner

Cutting Conditions :
Vc = 160 m/min, ap = 1.0 mm
f = 0.37 mm/rev, Wet WNMG080408PMG

(User evaluation)

9 Bolt SCM440H

Good Edge condition

CA125P has better chipping resistance against competitor I.

Edge condition

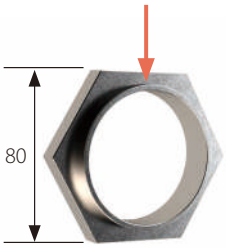
CA125P Competitor I

Cutting Conditions :
Vc = 200 m/min, ap = 2.0 mm
f = 0.3 mm/rev, Wet TNMG160408PMG
Tool life : 130 pcs/corner

(User evaluation)

10 Nut S45C

Tool life 2 times



CA125P shows 2 times longer tool life than competitor J due to improved wear resistance.

Number of parts

CA125P	720 pcs/corner
Competitor J	360 pcs/corner

Cutting Conditions :
Vc = 200 m/min, ap = 2.2 mm
f = 0.2 mm/rev, Wet WNMG080408PMG

(User evaluation)

2 Newly developed proprietary coating and carbide substrate with superior wear and fracture resistance.

Optimized coating properties on rake and flank faces provides wear resistance and fracture resistance

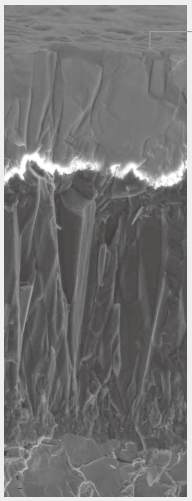
The industry's most uniform alumina film* reduces crater wear

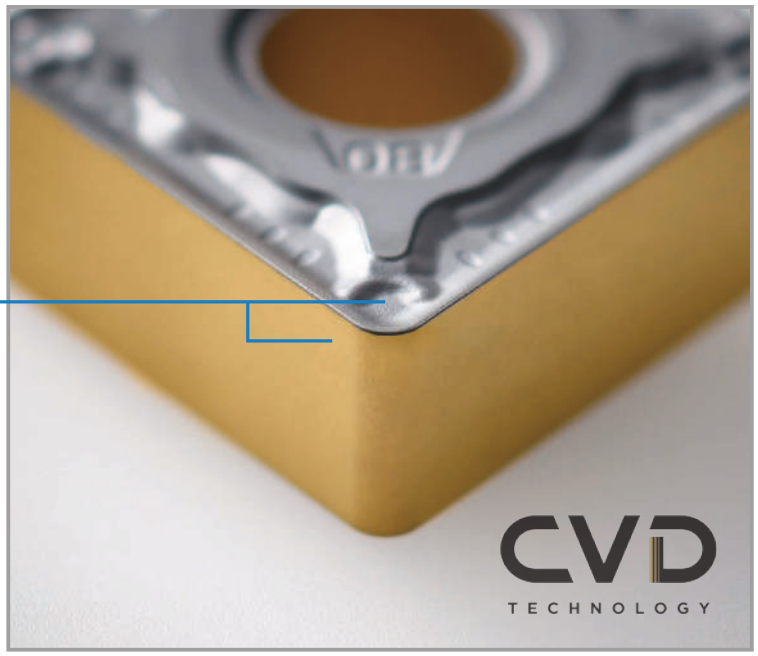
*March 2023, by Kyocera research

Black & Gold

Rake face
Suppresses crater wear and fracturing

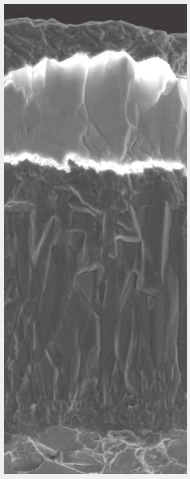
- New surface treatment technology improves fracture resistance
- Highly uniform alumina layer reduces wear



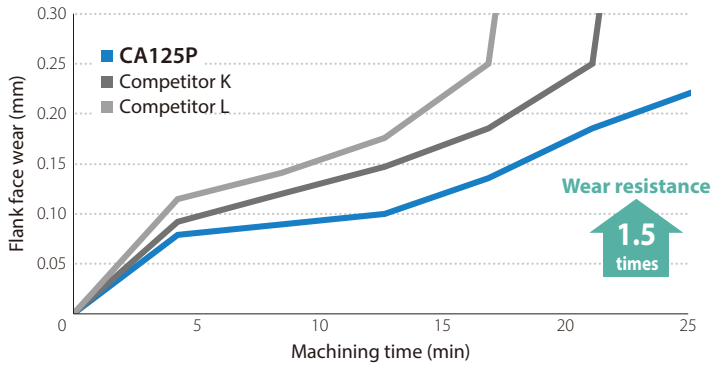


Flank face
Improved wear resistance

- High hardness surface layer suppresses abrasion
- Uniform alumina layer reduces wear
- Easy to see edge defects with golden surface

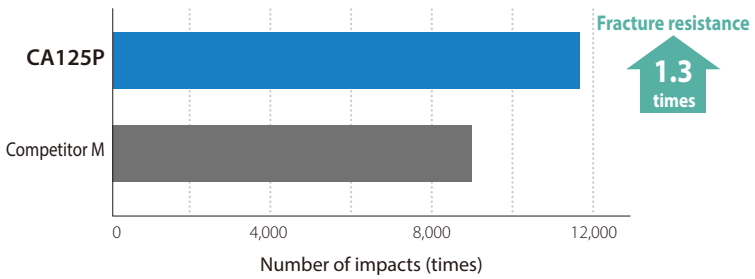


Wear resistance comparison (Internal evaluation)



Cutting Conditions : Vc = 300 m/min, ap = 1.5 mm, f = 0.3 mm/rev, Wet Workpiece : SCM435

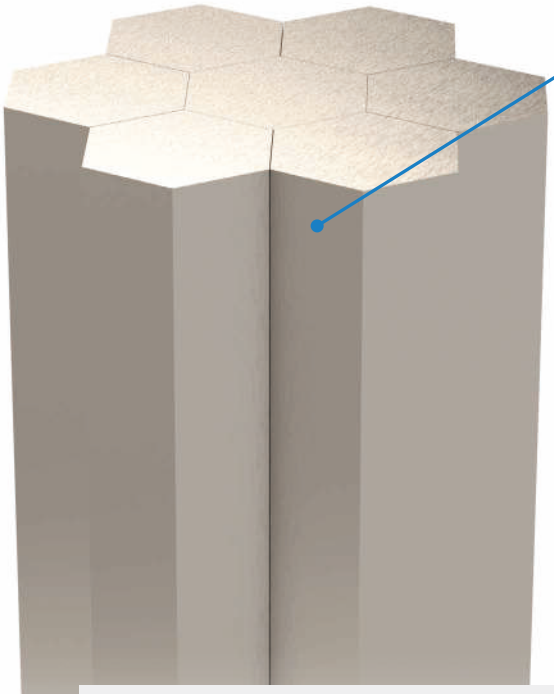
Fracture resistance comparison (Internal evaluation) Interrupted machining n = 3 mean



Cutting Conditions : Vc = 300 m/min, ap = 1.5 mm, f = 0.35 mm/rev, Wet Workpiece : S45C (4 grooves)

Highly uniform alumina layer

Excellent wear resistance due to the most uniform crystal orientation in the industry. *



Alumina film crystal structure (CG image)

Uniform crystal orientation

New crystal control technology provides industry-leading Al_2O_3 orientation

Comparison of cutting edge conditions (Internal evaluation)
After machining for 16.9 minutes

Improved wear resistance

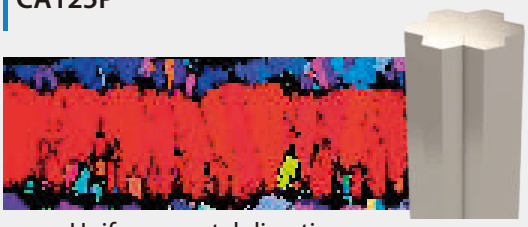
Reduces crater wear and external abrasion caused by chip scraping

Cutting Conditions : Vc = 300 m/min, ap = 1.5 mm, f = 0.3 mm/rev, Wet Workpiece : SCM435

*March 2023, by Kyocera research

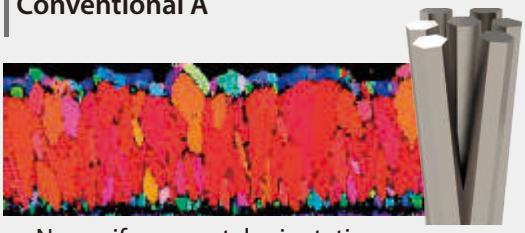
Crystal orientation analysis (EBSD pattern) A higher percentage of red indicates a more uniform growth pattern

CA125P



Uniform crystal direction (CG image)

Conventional A

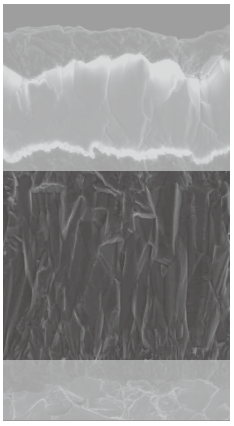


Nonuniform crystal orientation (CG image)

Unique TiCN layer

Proper TiCN particle size with proprietary crystal control technology
Greatly improved chipping resistance

TiCN layer (CA125P)



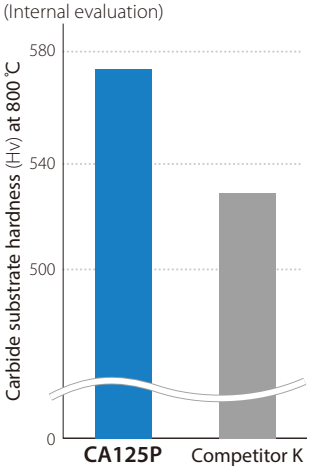
Edge condition comparison
(Internal evaluation)
After machining 70 mm

Cutting Conditions : Vc = 250 m/min
ap = 1.0 mm, f = 0.4 mm/rev
L = 1.0 mm, Wet, Workpiece : SUJ2

New carbide substrate

Improved resistance to plastic deformation with an increased temperature strength

Comparison of carbide substrate hardness
(Internal evaluation)



Edge condition comparison
(Internal evaluation)

Cutting Conditions : Vc = 300 m/min
ap = 1.0 mm, f = 0.4 mm/rev
Dry, Workpiece : SCM435

3 A large variety of chipbreakers cover a wide range of machining applications and conditions

New lineup with expanded PMG Chipbreakers for medium machining to roughing
Covers a wide area from finishing to roughing

Negative Type

Smart chipbreaker P series for steel machining

PP
For finishing
Low resistance

PQ
For finishing-medium
Sharpness and strength

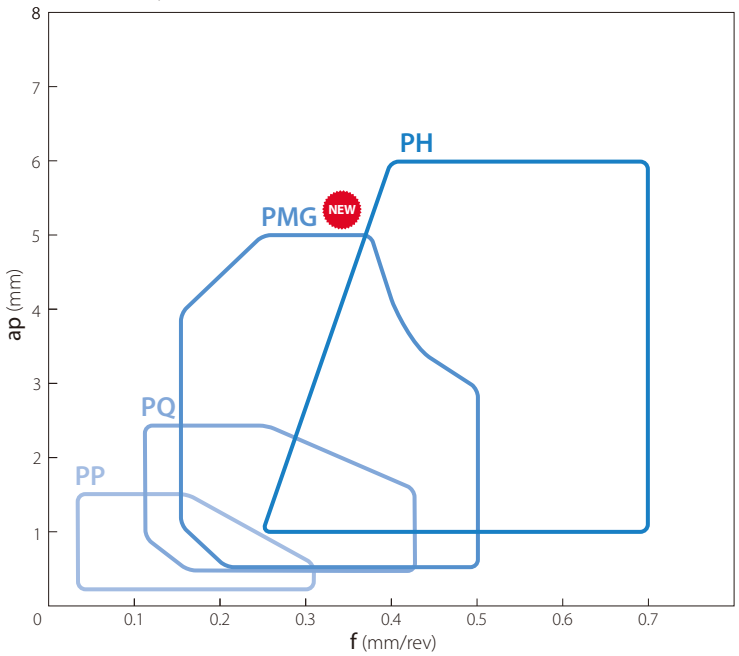
PMG NEW
For medium-roughing
Covers a wide range of machining areas

PG
For medium-roughing
Stability-oriented

PH
For roughing
Tough edge design

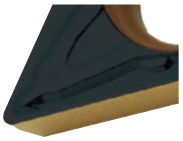
Applicable Chipbreaker Range (ap indicates radius)

CNMG12 Type

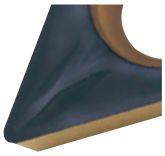


Positive Type

For finishing
PP
High reliability
Improving the productivity of finishing

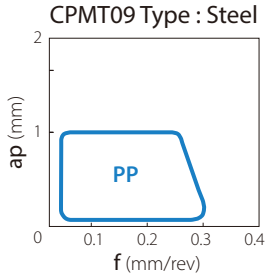


Wiper insert
WP
Newly designed wiper edge geometry
High productivity

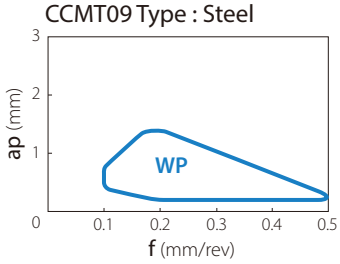


Applicable Chipbreaker Range (ap indicates radius)

CPMT09 Type : Steel



CCMT09 Type : Steel



For medium-roughing

PMG Chipbreaker NEW

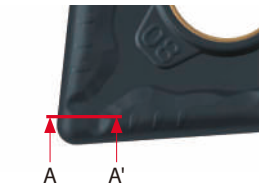
Covers a wide range of machining applications from medium machining to roughing
Excellent wear resistance with low cutting force design. Reduces chip shape inconsistencies and improves tool life

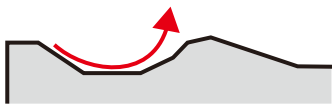
Step breaker structure

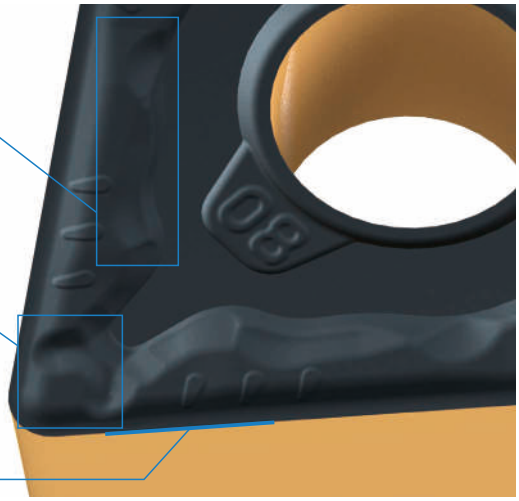
Suppresses chip entanglement during large D.O.C. machining with a gently rising surface

Circle Dot

Control chips during small D.O.C. machining







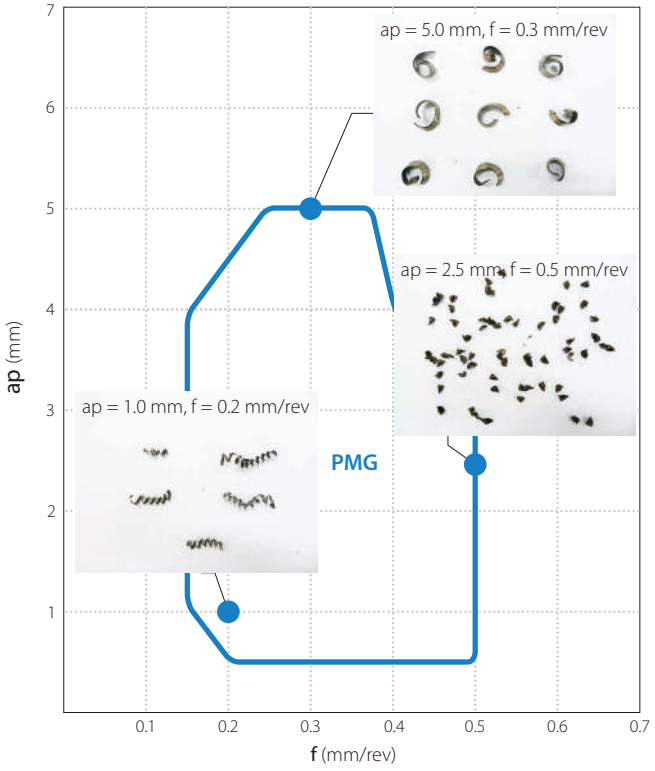
High Rake Perimeter

Low resistance design suppresses rake face temperature rise
Reduces chipbreakers wear and chip shape changes

Excellent chip control

Good chip control in a wide range of machining areas

Applicable Chipbreaker Range



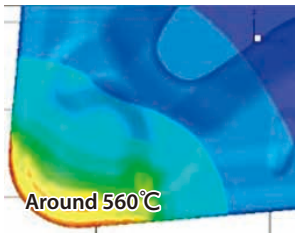
Cutting Conditions : Vc = 300 m/min, ap = 0.5~5.0 mm, f = 0.1~0.5 mm/rev
Workpiece : SCr420 CNMG120408PMG

Achieves longer tool life

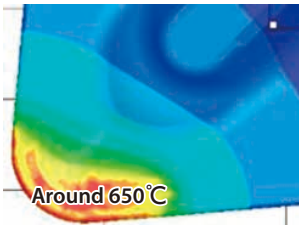
Suppresses rise in rake face temperature. Reduces crater wear

Edge temperature simulation comparison (Internal evaluation)

PMG Chipbreaker



Conventional B



Cutting Conditions : Vc = 270 m/min, ap = 1.5 mm, f = 0.3 mm/rev
Workpiece : SCM430

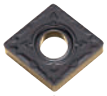
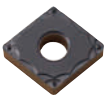
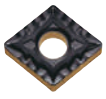
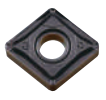
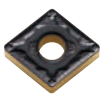
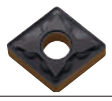
Consistent, small, and even chip shapes

Chip shape

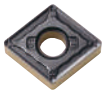
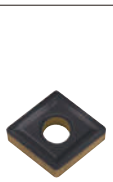
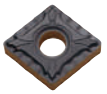
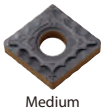
	PMG Chipbreaker		Conventional B	
Initial machining			Initial machining	
After 27.2 min machining			After 25.0 min machining	

Cutting Conditions : Vc = 300 m/min, ap = 1.5 mm, f = 0.3 mm/rev
Wet (External coolant) Workpiece : SCM435 WNMG080408PMG

Stock Items (Negative)

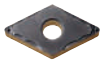
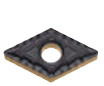
Shape		Description		Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	CA115P	CA125P
Wiper Edge	 Finishing	CNMG	120404WF	12.70	4.76	5.16	0.4	●	●
			120408WF				0.8	●	●
Wiper Edge	 Finishing	CNMG	120404WP	12.70	4.76	5.16	0.4	●	●
			120408WP				0.8	●	●
Wiper Edge	 Finishing-Medium	CNMG	120404WE	12.70	4.76	5.16	0.4	●	●
			120408WE				0.8	●	●
			120412WE				1.2	●	●
Wiper Edge	 Finishing-Medium	CNMG	120404WQ	12.70	4.76	5.16	0.4	●	●
			120408WQ				0.8	●	●
			120412WQ				1.2	●	●
Finishing		CNMG	120402PP	12.70	4.76	5.16	0.2	●	●
			120404PP				0.4	●	●
			120408PP				0.8	●	●
			120412PP				1.2	●	●
Finishing		CNMG	120402GP	12.70	4.76	5.16	0.2	●	●
			120404GP				0.4	●	●
			120408GP				0.8	●	●
Finishing-Medium		CNMG	120404PQ	12.70	4.76	5.16	0.4	●	●
			120408PQ				0.8	●	●
			120412PQ				1.2	●	●
Finishing-Medium		CNMG	090404HQ	9.525	4.76	3.81	0.4	●	●
			090408HQ				0.8	●	●
		CNMG	120404HQ	12.70	4.76	5.16	0.4	●	●
			120408HQ				0.8	●	●
			120412HQ				1.2	●	●
Finishing-Medium / Up Facing		CNMG	120404CQ	12.70	4.76	5.16	0.4	●	●
			120408CQ				0.8	●	●
			120412CQ				1.2	●	●
		CNMG	160608CQ	15.875	6.35	6.35	0.8	●	●
			160612CQ				1.2	●	●
Finishing-Medium / Up Facing		CNMG	120408CJ	12.70	4.76	5.16	0.8	●	●
			120412CJ				1.2	●	●
		CNMG	160612CJ	15.875	6.35	6.35	1.2	●	●
			160616CJ				1.6	●	●
Medium-Roughing		CNMG	120404PMG	12.70	4.76	5.16	0.4	●	●
			120408PMG				0.8	●	●
			120412PMG				1.2	●	●
			120416PMG				1.6	●	●
		CNMG	160608PMG	15.875	6.35	6.35	0.8	●	●
			160612PMG				1.2	●	●
			160616PMG				1.6	●	●
Medium-Roughing (Continuous)		CNMG	090404GS	9.525	4.76	3.81	0.4	●	●
			090408GS				0.8	●	●

● : Standard Stock

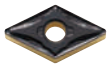
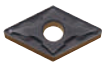
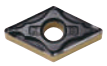
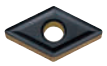
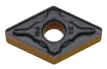
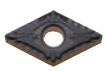
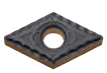
Shape		Description		Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	CA115P	CA125P
Medium-Roughing (Interruption)		CNMG	120404PG	12.70	4.76	5.16	0.4	●	●
			120408PG				0.8	●	●
			120412PG				1.2	●	●
			120416PG				1.6	●	●
Roughing		CNMG	120404	12.70	4.76	5.16	0.4	●	●
			120408				0.8	●	●
			120412				1.2	●	●
		CNMG	160608	15.875	6.35	6.35	0.8	●	●
			160612				1.2	●	●
		CNMG	190612	19.05	6.35	7.94	1.2	●	●
			190616				1.6	●	●
Roughing		CNMG	120408PH	12.70	4.76	5.16	0.8	●	●
			120412PH				1.2	●	●
			120416PH				1.6	●	●
		CNMG	160608PH	15.875	6.35	6.35	0.8	●	●
			160612PH				1.2	●	●
			160616PH				1.6	●	●
		CNMG	190608PH	19.05	6.35	7.94	0.8	●	●
			190612PH				1.2	●	●
			190616PH				1.6	●	●
			190624PH				2.4	●	●
Single Sided Roughing / High Feed		CNMM	120408PX	12.70	4.76	5.16	0.8	●	●
			120412PX				1.2	●	●
			120416PX				1.6	●	●
		CNMM	160608PX	15.875	6.35	6.35	0.8	●	●
			160612PX				1.2	●	●
			160616PX				1.6	●	●
		CNMM	190608PX	19.05	6.35	7.94	0.8	●	●
			190612PX				1.2	●	●
			190616PX				1.6	●	●
			190624PX				2.4	●	●
Low Carbon Steel	 Finishing	CNMG	120404XP	12.70	4.76	5.16	0.4	●	●
			120408XP				0.8	●	●
Low Carbon Steel	 Medium	CNMG	120404XQ	12.70	4.76	5.16	0.4	●	●
			120408XQ				0.8	●	●
Low Carbon Steel	 Roughing	CNMG	120408XS	12.70	4.76	5.16	0.8	●	●

● : Standard Stock

Stock Items (Negative)

Shape		Description		Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	CA115P	CA125P
Wiper Edge	 Finishing	DNMX	150404WF	12.70	4.76	5.16	0.4	●	●
			150408WF				0.8	●	●
			150412WF				1.2	●	●
		DNMX	150604WF	12.70	6.35	5.16	0.4	●	●
			150608WF				0.8	●	●
			150612WF				1.2	●	●
Finishing		DNMG	150402PP	12.70	4.76	5.16	0.2	●	●
			150404PP				0.4	●	●
			150408PP				0.8	●	●
			150412PP				1.2	●	●
		DNMG	150602PP	12.70	6.35	5.16	0.2	●	●
			150604PP				0.4	●	●
			150608PP				0.8	●	●
			150612PP				1.2	●	●
Finishing		DNMG	110404GP	9.525	4.76	3.81	0.4	●	●
			110408GP				0.8	●	●
		DNMG	150402GP	12.70	4.76	5.16	0.2	●	●
			150404GP				0.4	●	●
			150408GP				0.8	●	●
Finishing-Medium		DNMG	150404PQ	12.70	4.76	5.16	0.4	●	●
			150408PQ				0.8	●	●
			150412PQ				1.2	●	●
		DNMG	150604PQ	12.70	6.35	5.16	0.4	●	●
			150608PQ				0.8	●	●
			150612PQ				1.2	●	●
Finishing-Medium		DNMG	110402HQ	9.525	4.76	3.81	0.2	●	●
			110404HQ				0.4	●	●
		DNMG	150404HQ	12.70	4.76	5.16	0.4	●	●
			150408HQ				0.8	●	●
			150412HQ				1.2	●	●
		DNMG	150604HQ	12.70	6.35	5.16	0.4	●	●
			150608HQ				0.8	●	●
			150612HQ				1.2	●	●
Finishing-Medium / Up Facing		DNMG	150404CQ	12.70	4.76	5.16	0.4	●	●
			150408CQ				0.8	●	●
			150412CQ				1.2	●	●
		DNMG	150604CQ	12.70	6.35	5.16	0.4	●	●
			150608CQ				0.8	●	●
			150612CQ				1.2	●	●
Finishing-Medium / Up Facing		DNMG	150408CJ	12.70	4.76	5.16	0.8	●	●
			150412CJ				1.2	●	●
		DNMG	150608CJ	12.70	6.35	5.16	0.8	●	●
			150612CJ				1.2	●	●

● : Standard Stock

Shape		Description		Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	CA115P	CA125P
Medium-Roughing		DNMG	150404PMG	12.70	4.76	5.16	0.4	●	●
			150408PMG				0.8	●	●
			150412PMG				1.2	●	●
			150416PMG				1.6	●	●
		DNMG	150604PMG	12.70	6.35	5.16	0.4	●	●
			150608PMG				0.8	●	●
			150612PMG				1.2	●	●
			150616PMG				1.6	●	●
Medium-Roughing Continuous		DNMG	110404GS	9.525	4.76	3.81	0.4	●	●
			110408GS				0.8	●	●
Medium-Roughing (Interruption)		DNMG	150404PG	12.70	4.76	5.16	0.4	●	●
			150408PG				0.8	●	●
			150412PG				1.2	●	●
			150416PG				1.6	●	●
		DNMG	150604PG	12.70	6.35	5.16	0.4	●	●
			150608PG				0.8	●	●
			150612PG				1.2	●	●
			150616PG				1.6	●	●
Roughing		DNMG	150404	12.70	4.76	5.16	0.4	●	●
			150408				0.8	●	●
		DNMG	150608	12.70	6.35	5.16	0.8	●	●
			150612				1.2	●	●
Roughing		DNMG	150408PH	12.70	4.76	5.16	0.8	●	●
			150412PH				1.2	●	●
			150416PH				1.6	●	●
		DNMG	150608PH	12.70	6.35	5.16	0.8	●	●
			150612PH				1.2	●	●
			150616PH				1.6	●	●
Roughing / High Feed Single Sided		DNMM	150408PX	12.70	4.76	5.16	0.8	●	●
			150412PX				1.2	●	●
			150416PX				1.6	●	●
		DNMM	150608PX	12.70	6.35	5.16	0.8	●	●
			150612PX				1.2	●	●
			150616PX				1.6	●	●
Low Carbon Steel	 Finishing	DNMG	150404XP	12.70	4.76	5.16	0.4	●	●
			150408XP				0.8	●	●
Low Carbon Steel	 Medium	DNMG	150404XQ	12.70	4.76	5.16	0.4	●	●
			150408XQ				0.8	●	●
Low Carbon Steel	 Roughing	DNMG	150408XS	12.70	4.76	5.16	0.8	●	●

● : Standard Stock

Stock Items (Negative)

Shape		Description		Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	CA115P	CA125P
Medium-Roughing		RNMG	090300	9.525	3.18	3.81	—	●	●
		RNMG	120400	12.70	4.76	5.16	—	●	●
		RNMG	150600	15.875	6.35	6.35	—	●	●
Finishing-Medium		SNMG	120404PQ	12.70	4.76	5.16	0.4	●	●
			120408PQ				0.8	●	●
			120412PQ				1.2	●	●
Finishing-Medium		SNMG	120404HQ	12.70	4.76	5.16	0.4	●	●
			120408HQ				0.8	●	●
			120412HQ				1.2	●	●
Medium-Roughing		SNMG	120408PMG	12.70	4.76	5.16	0.8	●	●
			120412PMG				1.2	●	●
			120416PMG				1.6	●	●
Medium-Roughing (Interruption)		SNMG	120408PG	12.70	4.76	5.16	0.8	●	●
			120412PG				1.2	●	●
			120416PG				1.6	●	●
Roughing		SNMG	090304	9.525	3.18	3.81	0.4	●	●
			090308				0.8	●	●
		SNMG	120408	12.70	4.76	5.16	0.8	●	●
			120412				1.2	●	●
			120416				1.6	●	●
Roughing		SNMG	120408PH	12.70	4.76	5.16	0.8	●	●
			120412PH				1.2	●	●
			120416PH				1.6	●	●
		SNMG	150612PH	15.875	6.35	6.35	1.2	●	●
			150616PH				1.6	●	●
		SNMG	190612PH	19.05	6.35	7.94	1.2	●	●
			190616PH				1.6	●	●
Roughing / High Feed Single Sided		SNMM	120408PX	12.70	4.76	5.16	0.8	●	●
			120412PX				1.2	●	●
			120416PX				1.6	●	●
		SNMM	150612PX	15.875	6.35	6.35	1.2	●	●
			150616PX				1.6	●	●
		SNMM	190612PX	19.05	6.35	7.94	1.2	●	●
			190616PX				1.6	●	●
			190624PX				2.4	●	●
Low Carbon Steel	 Finishing	SNMG	120408XP	12.70	4.76	5.16	0.8	●	●
Low Carbon Steel	 Medium	SNMG	120408XQ	12.70	4.76	5.16	0.8	●	●
Low Carbon Steel	 Roughing	SNMG	120408XS	12.70	4.76	5.16	0.8	●	●

● : Standard Stock

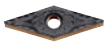
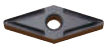
Shape		Description		Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	CA115P	CA125P
Wiper Edge	 Finishing	TNMX	160404WF	9.525	4.76	3.81	0.4	●	●
			160408WF				0.8	●	●
			160412WF				1.2	●	●
Finishing		TNMG	160402PP	9.525	4.76	3.81	0.2	●	●
			160404PP				0.4	●	●
			160408PP				0.8	●	●
			160412PP				1.2	●	●
Finishing		TNMG	160402GP	9.525	4.76	3.81	0.2	●	●
			160404GP				0.4	●	●
			160408GP				0.8	●	●
Finishing-Medium		TNMG	160404PQ	9.525	4.76	3.81	0.4	●	●
			160408PQ				0.8	●	●
			160412PQ				1.2	●	●
Finishing-Medium		TNMG	110404HQ	6.35	4.76	2.26	0.4	●	●
			110408HQ				0.8	●	●
		TNMG	160404HQ	9.525	4.76	3.81	0.4	●	●
			160408HQ				0.8	●	●
			160412HQ				1.2	●	●
Finishing-Medium / Up Facing		TNMG	160404CQ	9.525	4.76	3.81	0.4	●	●
			160408CQ				0.8	●	●
			160412CQ				1.2	●	●
		TNMG	220408CQ	12.70	4.76	5.16	0.8	●	●
			220412CQ				1.2	●	●
Medium-Roughing		TNMG	160404PMG	9.525	4.76	3.81	0.4	●	●
			160408PMG				0.8	●	●
			160412PMG				1.2	●	●
		TNMG	220404PMG	12.70	4.76	5.16	0.4	●	●
			220408PMG				0.8	●	●
			220412PMG				1.2	●	●
			220416PMG				1.6	●	●
Medium-Roughing (Continuous)		TNMG	110404GS	6.35	4.76	2.26	0.4	●	●
			110408GS				0.8	●	●
Medium-Roughing (Interruption)		TNMG	160404PG	9.525	4.76	3.81	0.4	●	●
			160408PG				0.8	●	●
			160412PG				1.2	●	●
Roughing		TNMG	160404	9.525	4.76	3.81	0.4	●	●
			160408				0.8	●	●
			160412				1.2	●	●
		TNMG	220408	12.70	4.76	5.16	0.8	●	●
			220412				1.2	●	●

● : Standard Stock

Stock Items (Negative)

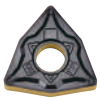
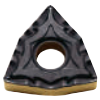
Shape (Handed insert shows Right-hand)		Description		Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	CA115P	CA125P
Roughing		TNMG	160408PH	9.525	4.76	3.81	0.8	●	●
			160412PH				1.2	●	●
		TNMG	220408PH	12.70	4.76	5.16	0.8	●	●
			220412PH				1.2	●	●
			220416PH				1.6	●	●
Roughing / High Feed Single Sided		TNMM	160408PX	9.525	4.76	3.81	0.8	●	●
			160412PX				1.2	●	●
		TNMM	220408PX	12.70	4.76	5.16	0.8	●	●
			220412PX				1.2	●	●
			220416PX				1.6	●	●
Low Carbon Steel	 Finishing	TNMG	160404XP	9.525	4.76	3.81	0.4	●	●
			160408XP				0.8	●	●
Low Carbon Steel	 Medium	TNMG	160404XQ	9.525	4.76	3.81	0.4	●	●
			160408XQ				0.8	●	●
Low Carbon Steel	 Roughing	TNMG	160408XS	9.525	4.76	3.81	0.8	●	●
Medium-Roughing		TNMG	160404 R/L-ST	9.525	4.76	3.81	0.4	●	●
			160408 R/L-ST				0.8	●	●

● : Standard Stock

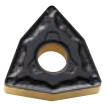
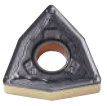
Shape (Handed insert shows Right-hand)		Description		Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	CA115P	CA125P
Finishing		VNMG	160402PP	9.525	4.76	3.81	0.2	●	●
			160404PP				0.4	●	●
			160408PP				0.8	●	●
			160412PP				1.2	●	●
Finishing		VNMG	160402GP	9.525	4.76	3.81	0.2	●	●
			160404GP				0.4	●	●
			160408GP				0.8	●	●
Finishing-Medium		VNMG	160404 R/L-VC	9.525	4.76	3.81	0.4	●	●
			160408 R/L-VC				0.8	●	●
			160412R/L-VC				1.2	●	●
Finishing-Medium		VNMG	160404VF	9.525	4.76	3.81	0.4	●	●
			160408VF				0.8	●	●
			160412VF				1.2	●	●
Finishing-Medium		VNMG	160404PQ	9.525	4.76	3.81	0.4	●	●
			160408PQ				0.8	●	●
			160412PQ				1.2	●	●
Finishing-Medium		VNMG	160404HQ	9.525	4.76	3.81	0.4	●	●
			160408HQ				0.8	●	●
			160412HQ				1.2	●	●
Roughing		VNMG	160404	9.525	4.76	3.81	0.4	●	●
			160408				0.8	●	●

● : Standard Stock

Stock Items (Negative)

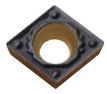
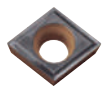
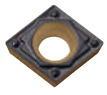
Shape		Description	Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	CA115P	CA125P
Wiper Edge	 Finishing	WNMG 080404WF	12.70	4.76	5.16	0.4	●	●
		080408WF				0.8	●	●
Wiper Edge	 Finishing	WNMG 080404WP	12.70	4.76	5.16	0.4	●	●
		080408WP				0.8	●	●
Wiper Edge	 Finishing-Medium	WNMG 080404WE	12.70	4.76	5.16	0.4	●	●
		080408WE				0.8	●	●
		080412WE				1.2	●	●
Wiper Edge	 Finishing-Medium	WNMG 080404WQ	12.70	4.76	5.16	0.4	●	●
		080408WQ				0.8	●	●
		080412WQ				1.2	●	●
Finishing		WNMG 080402PP	12.70	4.76	5.16	0.2	●	●
		080404PP				0.4	●	●
		080408PP				0.8	●	●
		080412PP				1.2	●	●
Finishing-Medium		WNMG 080404PQ	12.70	4.76	5.16	0.4	●	●
		080408PQ				0.8	●	●
		080412PQ				1.2	●	●
Finishing-Medium		WNMG 06T304HQ	9.525	3.97	3.81	0.4	●	●
		06T308HQ				0.8	●	●
		WNMG 060404HQ	9.525	4.76	3.81	0.4	●	●
		060408HQ				0.8	●	●
		WNMG 080404HQ	12.70	4.76	5.16	0.4	●	●
		080408HQ				0.8	●	●
		080412HQ				1.2	●	●
Finishing-Medium / Up Facing		WNMG 080404CQ	12.70	4.76	5.16	0.4	●	●
		080408CQ				0.8	●	●
		080412CQ				1.2	●	●
Finishing-Medium / Up Facing		WNMG 080408CJ	12.70	4.76	5.16	0.8	●	●
		080412CJ				1.2	●	●

● : Standard Stock

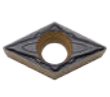
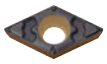
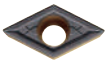
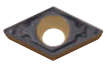
Shape		Description	Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	CA115P	CA125P
Medium-Roughing		WNMG 080404PMG	12.70	4.76	5.16	0.4	●	●
		080408PMG				0.8	●	●
		080412PMG				1.2	●	●
		080416PMG				1.6	●	●
Medium-Roughing (Continuous)		WNMG 060404GS	9.525	4.76	3.81	0.4	●	●
		060408GS				0.8	●	●
Medium-Roughing (Interruption)		WNMG 080404PG	12.70	4.76	5.16	0.4	●	●
		080408PG				0.8	●	●
		080412PG				1.2	●	●
		080416PG				1.6	●	●
Roughing		WNMG 080404	12.70	4.76	5.16	0.4	●	●
		080408				0.8	●	●
		080412				1.2	●	●
Roughing		WNMG 080408PH	12.70	4.76	5.16	0.8	●	●
		080412PH				1.2	●	●
Low Carbon Steel	 Finishing	WNMG 080404XP	12.70	4.76	5.16	0.4	●	●
		080408XP				0.8	●	●
Low Carbon Steel	 Medium	WNMG 080404XQ	12.70	4.76	5.16	0.4	●	●
		080408XQ				0.8	●	●
Low Carbon Steel	 Roughing	WNMG 080408XS	12.70	4.76	5.16	0.8	●	●

● : Standard Stock

Stock Items (Positive)

Shape		Description	Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	Relief Angle	CA115P	CA125P
Wiper Edge	 Finishing	CCMT 060202WP	6.35	2.38	2.8	0.2	7°	●	●
		CCMT 060204WP				0.4		●	●
		CCMT 060208WP				0.8		●	●
		CCMT 09T302WP	9.525	3.97	4.4	0.2	7°	●	●
		CCMT 09T304WP				0.4		●	●
		CCMT 09T308WP				0.8		●	●
Finishing		CCMT 060202PP	6.35	2.38	2.8	0.2	7°	●	●
		CCMT 060204PP				0.4		●	●
		CCMT 09T302PP	9.525	3.97	4.4	0.2	7°	●	●
		CCMT 09T304PP				0.4		●	●
		CCMT 09T308PP				0.8		●	●
Finishing-Medium		CCMT 060202GK	6.35	2.38	2.8	0.2	7°	●	●
		CCMT 060204GK				0.4		●	●
		CCMT 09T302GK	9.525	3.97	4.4	0.2	7°	●	●
		CCMT 09T304GK				0.4		●	●
		CCMT 120404GK	12.70	4.76	5.5	0.4	7°	●	●
		CCMT 120408GK				0.8		●	●
		CCMT 120412GK				1.2		●	●
Finishing-Medium		CCMT 060202HQ	6.35	2.38	2.8	0.2	7°	●	●
		CCMT 060204HQ				0.4		●	●
		CCMT 09T302HQ	9.525	3.97	4.4	0.2	7°	●	●
		CCMT 09T304HQ				0.4		●	●
		CCMT 09T308HQ				0.8		●	●
Medium		CCMT 09T308	9.525	3.97	4.4	0.8	7°	●	●
Finishing		CPMT 080202PP	7.94	2.38	3.3	0.2	11°	●	●
		CPMT 080204PP				0.4		●	●
		CPMT 090302PP	9.525	3.18	4.4	0.2	11°	●	●
		CPMT 090304PP				0.4		●	●
		CPMT 090308PP				0.8		●	●
Finishing		CPMT 080204GP	7.94	2.38	3.3	0.4	11°	●	●
		CPMT 090304GP	9.525	3.18	4.4	0.4	11°	●	●
		CPMT 090308GP				0.8		●	●
Finishing-Medium		CPMH 080204HQ	7.94	2.38	3.5	0.4	11°	●	●
		CPMH 080208HQ				0.8		●	●
		CPMH 090304HQ	9.525	3.18	4.5	0.4	11°	●	●
		CPMH 090308HQ				0.8		●	●
Medium		CPMH 080204	7.94	2.38	3.5	0.4	11°	●	●
		CPMH 080208				0.8		●	●
		CPMH 090304	9.525	3.18	4.5	0.4	11°	●	●
		CPMH 090308				0.8		●	●
Low Carbon Steel	 Finishing	CPMT 080204XP	7.94	2.38	3.3	0.4	11°	●	●
		CPMT 090304XP	9.525	3.18	4.4	0.4	11°	●	●
		CPMT 090308XP				0.8		●	●
Low Carbon Steel	 Finishing-Medium	CPMT 090304XQ	9.525	3.18	4.4	0.4	11°	●	●
		090308XQ				0.8		●	●

● : Standard Stock

Shape		Description	Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	Relief Angle	CA115P	CA125P
Wiper Edge	 Finishing	DCMX 070202WP	6.35	2.38	2.8	0.2	7°	●	●
		DCMX 070204WP				0.4		●	●
		DCMX 070208WP				0.8		●	●
		DCMX 11T302WP	9.525	3.97	4.4	0.2	7°	●	●
		DCMX 11T304WP				0.4		●	●
		DCMX 11T308WP				0.8		●	●
Finishing		DCMT 070202PP	6.35	2.38	2.8	0.2	7°	●	●
		DCMT 070204PP				0.4		●	●
		DCMT 11T302PP	9.525	3.97	4.4	0.2	7°	●	●
		DCMT 11T304PP				0.4		●	●
		DCMT 11T308PP				0.8		●	●
Finishing		DCMT 070202GP	6.35	2.38	2.8	0.2	7°	●	●
		DCMT 070204GP				0.4		●	●
		DCMT 11T304GP	9.525	3.97	4.4	0.4	7°	●	●
		DCMT 11T308GP				0.8		●	●
Finishing-Medium		DCMT 070202GK	6.35	2.38	2.8	0.2	7°	●	●
		DCMT 070204GK				0.4		●	●
		DCMT 070208GK				0.8		●	●
		DCMT 11T302GK	9.525	3.97	4.4	0.2	7°	●	●
		DCMT 11T304GK				0.4		●	●
		DCMT 11T308GK				0.8		●	●
Finishing-Medium		DCMT 070202HQ	6.35	2.38	2.8	0.2	7°	●	●
		DCMT 070204HQ				0.4		●	●
		DCMT 070208HQ				0.8		●	●
		DCMT 11T302HQ	9.525	3.97	4.4	0.2	7°	●	●
		DCMT 11T304HQ				0.4		●	●
		DCMT 11T308HQ				0.8		●	●
Low Carbon Steel	 Finishing	DCMT 070204XP	6.35	2.38	2.8	0.4	7°	●	●
		DCMT 11T302XP	9.525	3.97	4.4	0.2	7°	●	●
		DCMT 11T304XP				0.4		●	●
		DCMT 11T308XP				0.8		●	●
Low Carbon Steel	 Finishing-Medium	DCMT 11T304XQ	9.525	3.97	4.4	0.4	7°	●	●
		11T308XQ				0.8		●	●

● : Standard Stock

Stock Items (Positive)

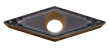
Shape		Description	Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	Relief Angle	CA115P	CA125P
Medium		RCMX 1003M0	10.0	3.18	3.6	—	7°	●	●
		RCMX 1204M0	12.0	4.76	4.2	—		●	●
Finishing-Medium		SCMT 09T304HQ	9.525	3.97	4.4	0.4	7°	●	●
		09T308HQ				0.8		●	●
Medium		SPMR 090304	9.525	3.18	—	0.4	11°	●	●
		090308				0.8		●	●
		SPMR 120304	12.7	3.18	—	0.4	11°	●	●
		120308				0.8		●	●
Finishing		TBMT 060102DP	3.97	1.59	2.3	0.2	5°	●	●
		060104DP				0.4		●	●
Wiper Edge	 Finishing	TCMX 090204WP	5.56	2.38	2.5	0.4	7°	●	●
		TCMX 110204WP	6.35	2.38	2.8	0.4	7°	●	●
Finishing-Medium		TCMT 110204HQ	6.35	2.38	2.8	0.4	7°	●	●
		110208HQ				0.8		●	●
Wiper Edge	 Finishing	TPMX 090202WP	5.56	2.38	2.8	0.2	11°	●	●
		090204WP				0.4		●	●
		090208WP				0.8		●	●
		TPMX 110302WP	6.35	3.18	3.3	0.2	11°	●	●
		110304WP				0.4		●	●
		110308WP				0.8		●	●
Finishing		TPMT 090202PP	5.56	2.38	2.8	0.2	11°	●	●
		090204PP				0.4		●	●
		TPMT 110302PP	6.35	3.18	3.3	0.2	11°	●	●
		110304PP				0.4		●	●
		110308PP				0.8		●	●
Finishing		TPMT 090204GP	5.56	2.38	2.8	0.4	11°	●	●
		TPMT 110304GP	6.35	3.18	3.3	0.4	11°	●	●
		110308GP				0.8		●	●
		TPMT 160304GP	9.525	3.18	4.4	0.4	11°	●	●

● : Standard Stock

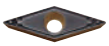
Shape		Description	Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	Relief Angle	CA115P	CA125P
Finishing-Medium		TPMT 090202HQ	5.56	2.38	2.8	0.2	11°	●	●
		090204HQ				0.4		●	●
		TPMT 110302HQ	6.35	3.18	3.3	0.2	11°	●	●
		110304HQ				0.4		●	●
		110308HQ				0.8		●	●
		TPMT 160304HQ	9.525	3.18	4.4	0.4	11°	●	●
		160308HQ				0.8		●	●
Low Carbon Steel	 Finishing	TPMT 090204XP	5.56	2.38	2.8	0.4	11°	●	●
		TPMT 110304XP	6.35	3.18	3.3	0.4	11°	●	●
		110308XP				0.8		●	●
		TPMT 160304XP	9.525	3.18	4.4	0.4	11°	●	●
		160308XP				0.8		●	●
Low Carbon Steel	 Finishing-Medium	TPMT 110304XQ	6.35	3.18	3.3	0.4	11°	●	●
		110308XQ				0.8		●	●
		TPMT 160304XQ	9.525	3.18	4.4	0.4	11°	●	●
		160308XQ				0.8		●	●
Finishing		TPMR 160304GP	9.525	3.18	—	0.4	11°	●	●
Finishing-Medium		TPMR 110304HQ	6.35	3.18	—	0.4	11°	●	●
		110308HQ				0.8		●	●
		TPMR 160304HQ	9.525	3.18	—	0.4	11°	●	●
		160308HQ				0.8		●	●
Medium		TPMR 110304	6.35	3.18	—	0.4	11°	●	●
		110308				0.8		●	●
		TPMR 160304	9.525	3.18	—	0.4	11°	●	●
		160308				0.8		●	●

● : Standard Stock

Stock Items (Positive)

Shape		Description	Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	Relief Angle	CA115P	CA125P
Finishing		VBMT 110302PP	6.35	3.18	2.8	0.2	5°	●	●
		110304PP				0.4		●	●
		110308PP				0.8		●	●
		VBMT 160404PP	9.525	4.76	4.4	0.4	5°	●	●
		160408PP				0.8		●	●
		160412PP				1.2		●	●
Finishing		VBMT 110304GP	6.35	3.18	2.8	0.4	5°	●	●
		VBMT 160404GP	9.525	4.76	4.4	0.4	5°	●	●
		160408GP				0.8		●	●
Finishing		VBMT 110302VF	6.35	3.18	2.8	0.2	5°	●	●
		110304VF				0.4		●	●
		110308VF				0.8		●	●
		VBMT 160402VF	9.525	4.76	4.4	0.2	5°	●	●
		160404VF				0.4		●	●
		160408VF				0.8		●	●
		160412VF				1.2		●	●
Finishing-Medium		VBMT 110304HQ	6.35	3.18	2.8	0.4	5°	●	●
		110308HQ				0.8		●	●
		VBMT 160404HQ	9.525	4.76	4.4	0.4	5°	●	●
		160408HQ				0.8		●	●
		160412HQ				1.2		●	●

● : Standard Stock

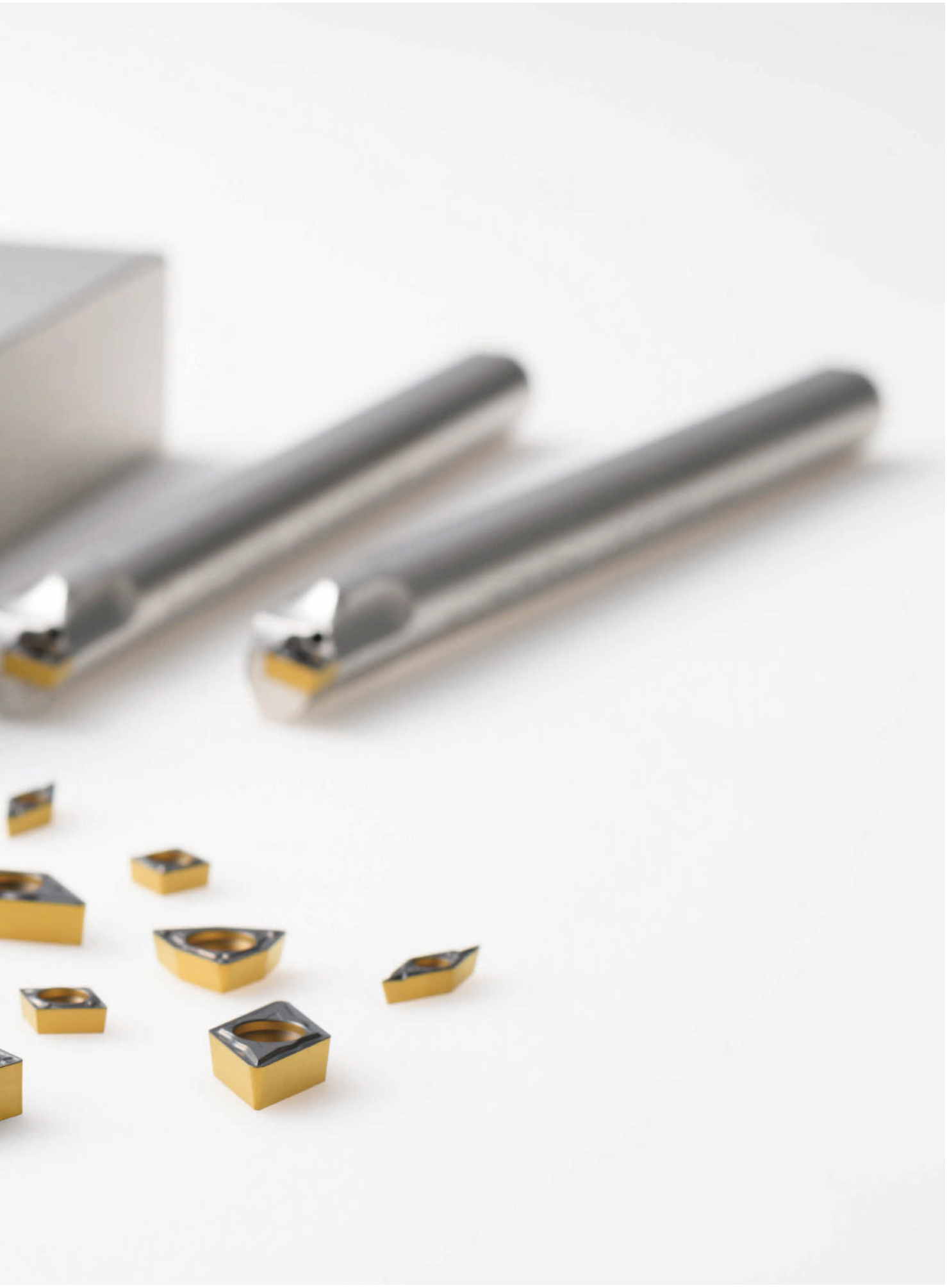
Shape		Description	Dimensions (mm) I.C.	Thickness	Hole Diameter	Corner R (RE)	Relief Angle	CA115P	CA125P
Finishing		VCMT 080202PP	4.76	2.38	2.3	0.2	7°	●	●
		080204PP				0.4		●	●
		VCMT 160404PP	9.525	4.76	4.4	0.4	7°	●	●
		160408PP				0.8		●	●
Finishing		VCMT 080202VF	4.76	2.38	2.3	0.2	7°	●	●
		080204VF				0.4		●	●
Finishing-Medium		VCMT 080202HQ	4.76	2.38	2.3	0.2	7°	●	●
		080204HQ				0.4		●	●
Finishing		WBMT 060102L-DP	3.97	1.59	2.3	0.2	5°	L	L
		060104L-DP				0.4		L	L
		WBMT 080202L-DP	4.76	2.38	2.3	0.2	5°	L	L
		080204L-DP				0.4		L	L
Finishing		WPMT 110204GP	6.35	2.38	2.8	0.4	11°	●	●
		WPMT 160304GP	9.525	3.18	4.4	0.4	11°	●	●
Finishing-Medium		WPMT 110202HQ	6.35	2.38	2.8	0.2	11°	●	●
		110204HQ				0.4		●	●
		WPMT 160304HQ	9.525	3.18	4.4	0.4	11°	●	●
		160308HQ				0.8		●	●

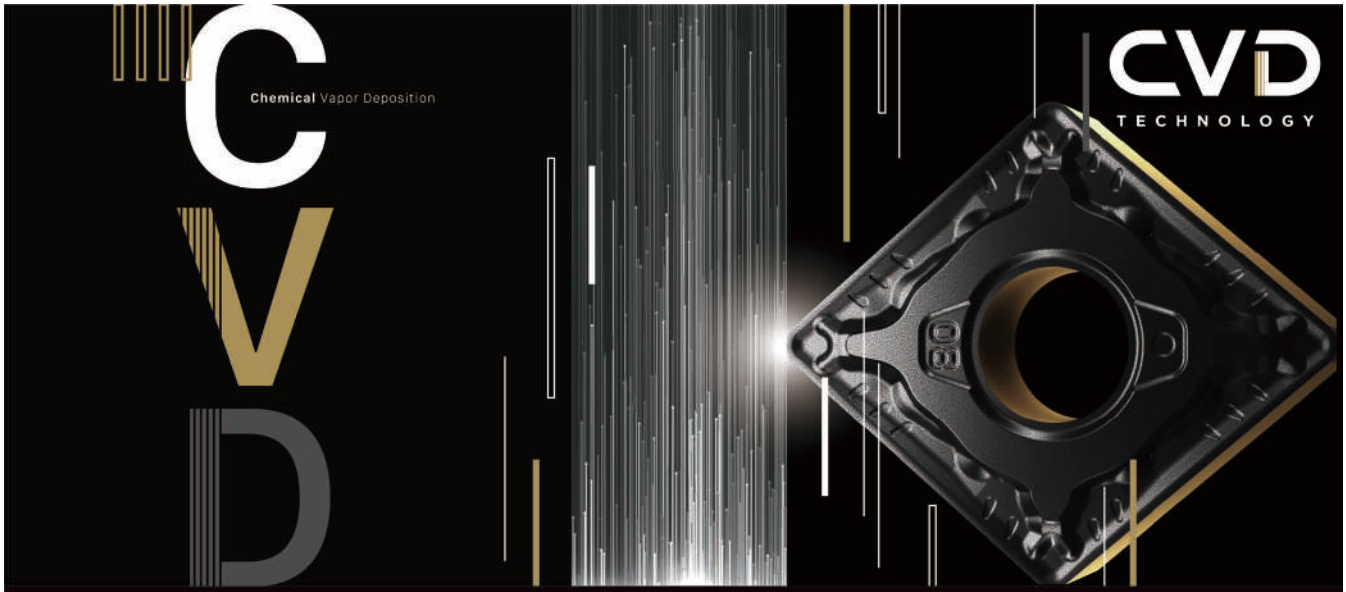
● : Standard Stock
L : Left-hand Only

Recommended Cutting Conditions

Vc (m/min)

		Low Carbon Steel Low Carbon Alloy Steel	Medium Carbon Steel Medium Carbon Alloy Steel	High Carbon Alloy Steel
		150 HB or Below	250 HB or Below	300 HB or Below
CA115P	Negative	150 ~ **300** ~ 400		150 ~ **280** ~ 360
	Positive	120 ~ **240** ~ 320		110 ~ **220** ~ 290
CA125P	Negative	150 ~ **240** ~ 320		150 ~ **220** ~ 280
	Positive	120 ~ **190** ~ 260		110 ~ **170** ~ 230





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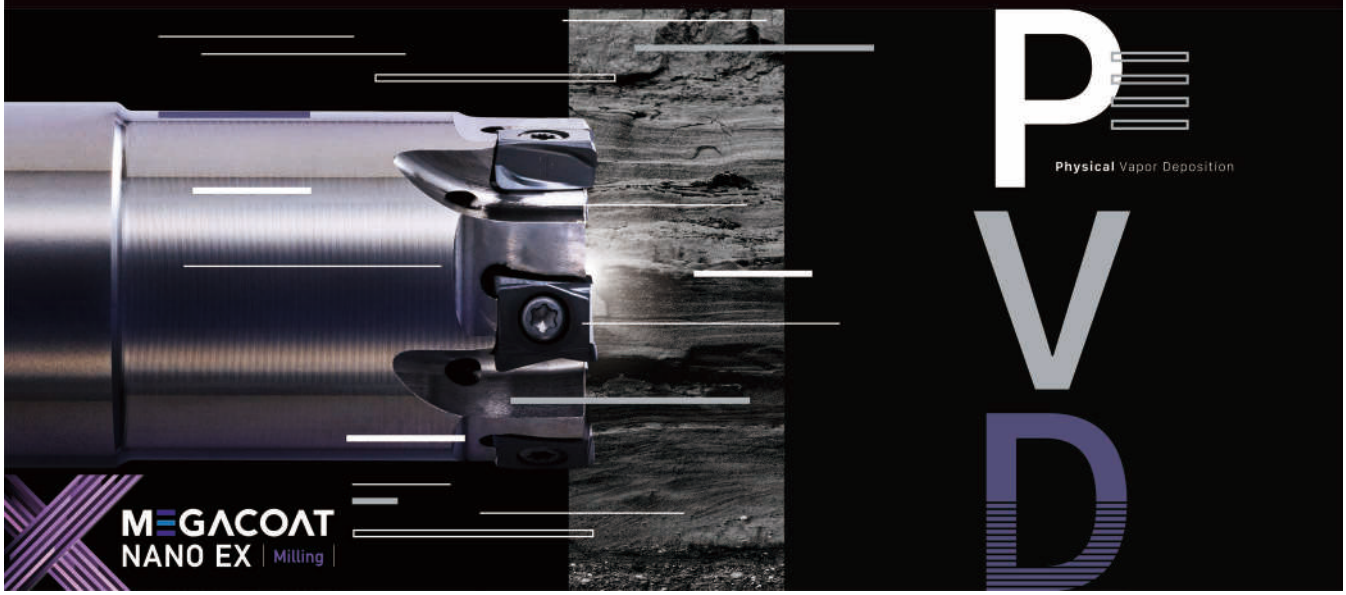

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