

THE NEW VALUE FRONTIER



Hybrid Cermet for Steel Machining

TN620/PV720
TN610/PV710

Hybrid Cermet for Steel Machining

General Use

High Speed / Continuous

TN620/PV720

TN610/PV710

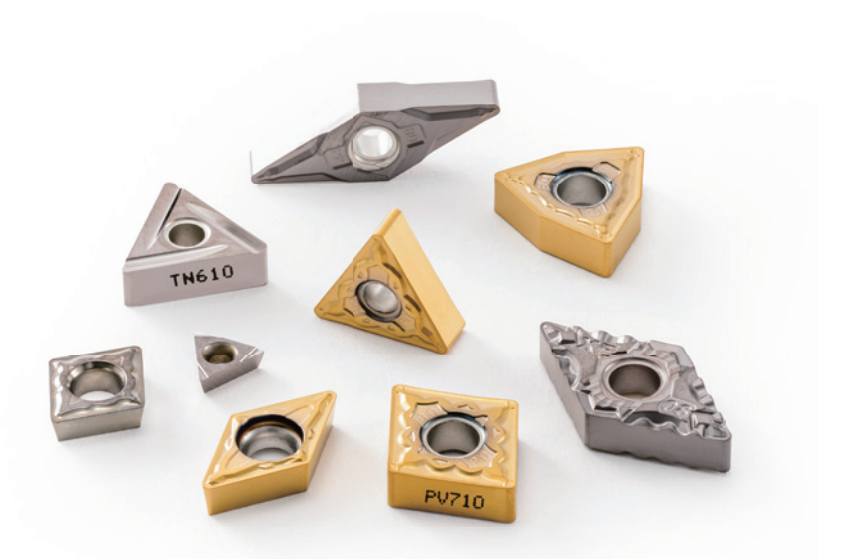


New cermet for high quality surface finish machining

3 Advantages to the Hybrid Coating Technology

NEW Negative Wiper Insert
Finishing WF Chipbreaker
Finishing-Medium WE Chipbreaker

NEW Positive Wiper Insert
Finishing WP Chipbreaker
Corner R (r ϵ) Line-up Expansion



Uncoated CERMET

MEGACOAT NANO CERMET

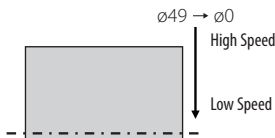
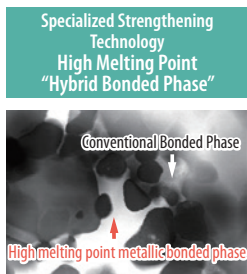
TN610 / TN620 PV710 / PV720

Three attributes of the Hybrid Technology contributes to superior surface finish and machining stability

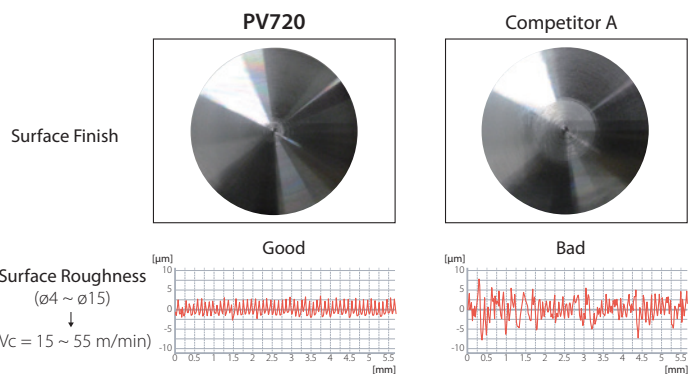
1 Excellent Surface Finish

Combining the conventional cermet bonded phase (nickel, cobalt) and the special high melting point metallic bonded phase

Provides high adhesion resistance to eliminate galling of the work piece



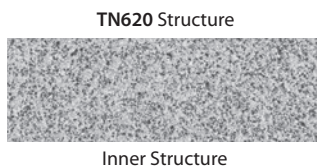
Surface Finish Comparison (In-house Evaluation) Cutting Conditions: $V_c = 180 \sim 0$ m/min (Constant Rate), $a_p = 0.5$ mm $f = 0.1$ mm/rev, Wet, CNMG120404 type Workpiece: S10C



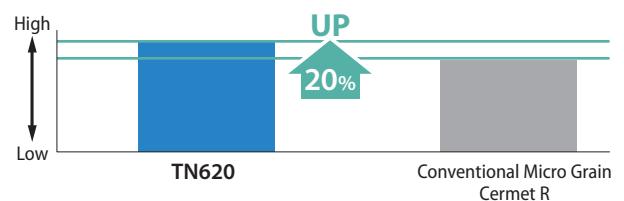
2 Excellent Fracture Resistance

Improved strength with uniform micro grain hard phase and superior compressive stress with high melting point bonded phase. This combination yields greater fracture resistance

Specialized Strengthening Technology Grain "Hybrid Hard Phase"



Compressive Residual Stress in Hard Phase (In-house Evaluation)



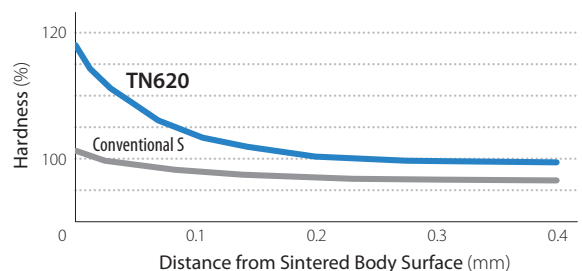
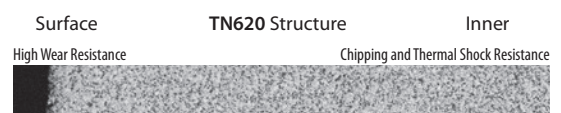
3 Excellent Wear Resistance

Excellent fracture resistance with surface-hardened layer using gradient composition technology

Continuously-varied hardness provides wear and fracture resistance

TN620's inner structure has high toughness and chipping resistance along with thermal and greater wear resistance than that of the conventional micro grain cermet. (See Right Chart) (In-house Evaluation)

Specialized Strengthening Technology Special Surface-Hardened "Hybrid Structure"



Uncoated CERMET

TN610 / TN620

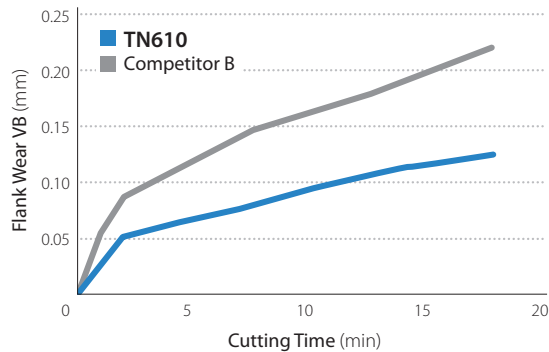
High Speed / Continuous

TN610

Higher wear resistance during continuous and finish machining

High quality / High precision machining

Wear Resistance Comparison (In-house Evaluation)



After Machining 17.9 min.



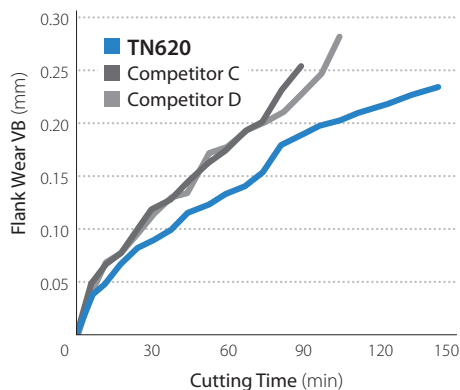
Cutting Conditions: $V_c = 300$ m/min, $a_p = 1.0$ mm, $f = 0.2$ mm/rev
Wet, CNMG120408 type Workpiece: SCM435

General Use

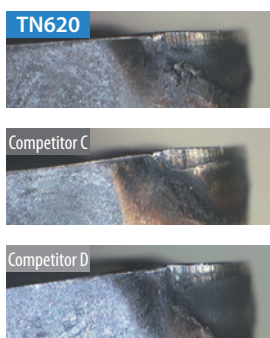
TN620

General use for quality surface finishes with balanced wear and fracture resistance

Wear Resistance Comparison (In-house Evaluation)

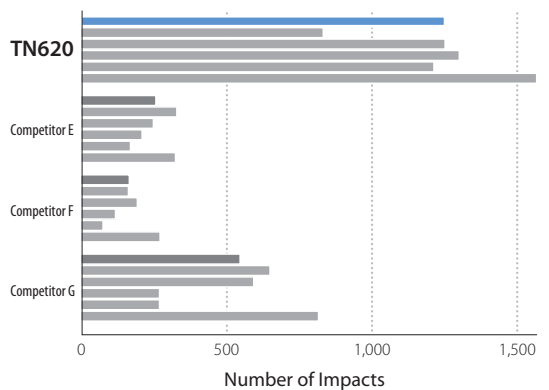


After Machining 89 min.



Cutting Conditions: $V_c = 200$ m/min, $f = 0.2$ mm/rev, $a_p = 1.0$ mm
Wet, CNMG120408 type Workpiece: SCM435

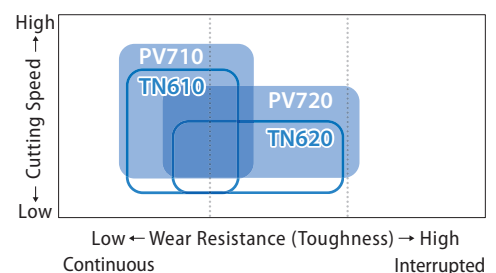
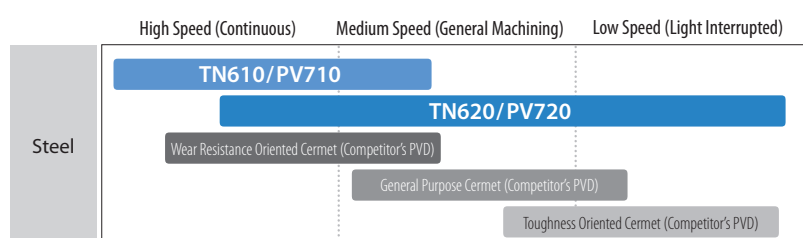
Fracture Resistance Comparison (In-house Evaluation)



Average Values Shown Above

Cutting Conditions: $V_c = 250$ m/min, $a_p = 1.0$ mm, $f = 0.2$ mm/rev
Wet, CNMG120408 type Workpiece: S45C (4 Grooves in Workpiece)

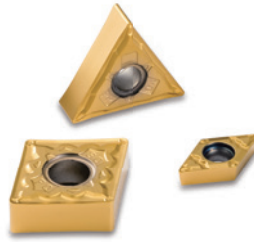
Steel Application Range



MEGACOAT NANO CERMET

PV710 / PV720

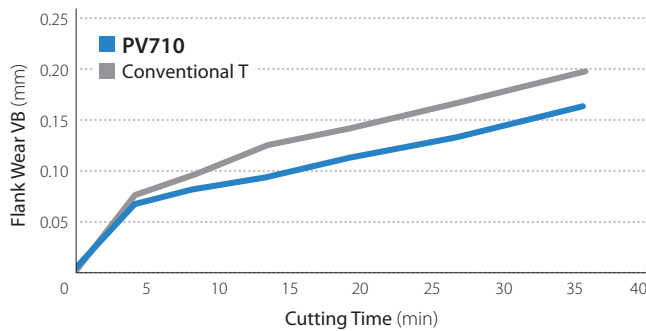
Grades PV710 / PV720 improve performance by composite lamination of MEGACOAT NANO and special TiN coating to combine high adhesion resistance and great visibility of the used cutting edge even in dim light



High Speed / Continuous

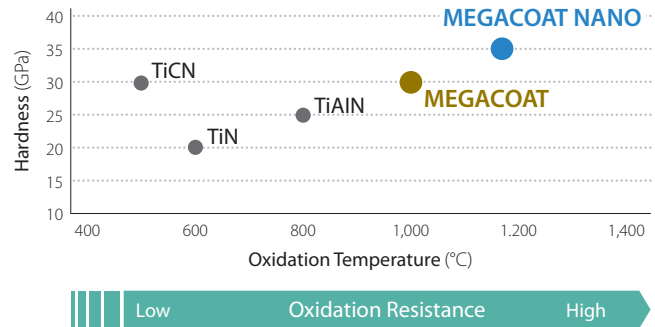
PV710 Long tool life during high speed and continuous machining

Wear Resistance Comparison (In-house Evaluation)



Cutting Conditions: $V_c = 350$ m/min, $a_p = 1.0$ mm, $f = 0.2$ mm/rev, Wet, CNMG120408 type
Workpiece: SCM435

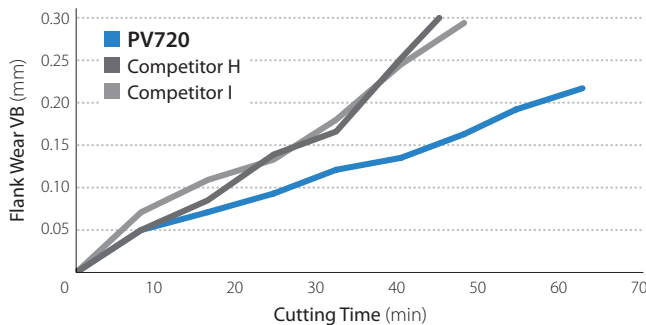
Coating Properties



General Use

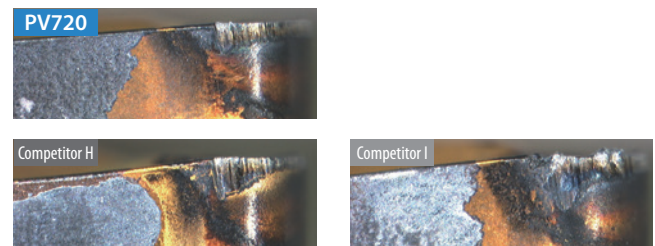
PV720 High efficiency machining and superior surface finish

Wear Resistance Comparison (In-house Evaluation)

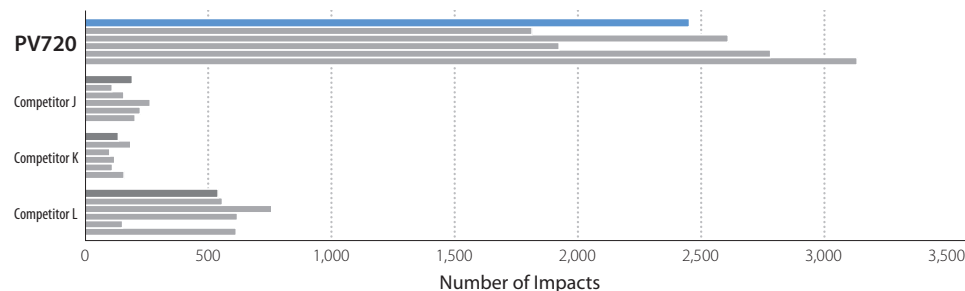


Cutting Conditions: $V = 250$ m/min, $a_p = 1.0$ mm, $f = 0.2$ mm/rev, Wet, CNMG120408 type Workpiece: SCM435

Flank wear condition after machining 48 min



Fracture Resistance Comparison (In-house Evaluation)

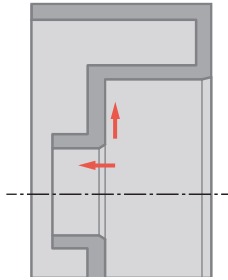


Cutting Conditions: $V = 250$ m/min, $a_p = 1.0$ mm, $f = 0.2$ mm/rev, Wet, CNMG120408 type Workpiece: S45C (4 Grooves in Workpiece)

Case Studies

Drum S30C

Vc = 300 m/min
ap = 0.5 mm
f = 0.2 ~ 0.3 mm/rev
Wet
CNMG090408HQ



Tool Life

TN620

800 pcs/edge

x 1.1
- 1.4
Tool Life

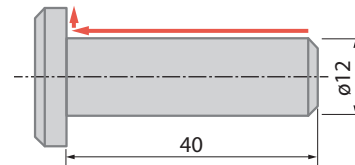
Competitor M
(Cermet)

550 - 750 pcs/edge

TN620 shows 1.1 to 1.4 times longer tool life compared to Competitor M (Cermet).
(User evaluation)

Yoke Pin S35C

Vc = 75 m/min
ap = 0.15 mm
f = 0.12 mm/rev
Wet
TNGG160404R-S



Tool Life

TN620

450 pcs/edge

x 1.5
Tool Life

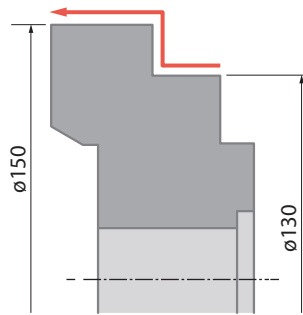
Competitor N
(Cermet)

300 pcs/edge

TN620 shows 1.5 times longer tool life compared to Competitor N (Cermet).
Stable surface roughness and shiny surface finish. No chipping and stable machining.
(User evaluation)

Piston S45C Normalized

Vc = 450 m/min
ap = 0.15 ~ 0.2 mm
f = 0.04 mm/rev
Wet (Water Soluble)
CNMG120404PP



Tool Life

PV710

200 pcs/edge

x 2.2
Tool Life

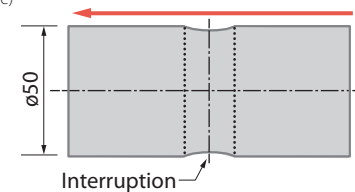
Conventional U
(PVD Coated Cermet)

90 pcs/edge

PV710 shows 2.2 times longer tool life compared to Conventional U (PVD Coated Cermet).
(User evaluation)

Piston SCM415

Vc = 250 m/min
ap = 0.1 ~ 0.2 mm
f = 0.08 mm/rev
Wet (Water Soluble)
CNMG120404PP



Tool Life

PV710

250 pcs/edge

x 1.3
Tool Life

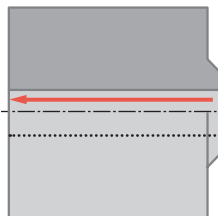
Competitor O
(PVD Coated Cermet)

180 pcs/edge

PV710 shows 1.3 times longer tool life compared to Competitor O (PVD Coated Cermet).
(User evaluation)

Oil pump Sintered Steel

Vc = 160 m/min
ap = 0.2 mm
f = 0.1 mm/rev
Wet
TPGH090204L



Tool Life

PV720

Avg. 800 pcs/edge

x 2.7
Tool Life

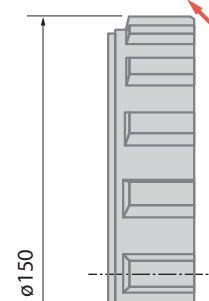
Competitor P
(PVD Coated Cermet)

300 pcs/edge

PV720 shows 2.7 times longer tool life compared to Competitor P (PVD Coated Cermet).
(User evaluation)

Ring gear Special Alloy Steel

Vc = 300 m/min
ap = 0.2 mm
f = 0.2 ~ 0.4 mm/rev
Wet
WNMG080404PP



Tool Life

PV720

Avg. 10,000 pcs/edge

x 3.3
Tool Life

Competitor Q
(PVD Coated Cermet)

3,000 pcs/edge

PV720 shows 3.3 times longer tool life compared to Competitor Q (PVD Coated Cermet).
(User evaluation)

Finishing PP Chipbreaker

Negative Type

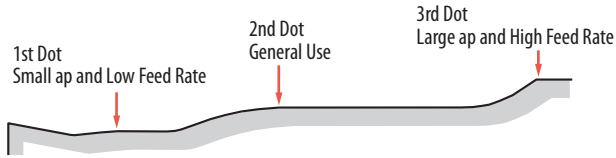
Features

3-Step Smart Dot structure for a wide range of steel finishing feed rates

Smooth taper cutting edge reduces cutting forces

Corner-R(r_e) 0.2 mm - 1.2 mm are available

Each Dot Functions According to the Cutting Conditions



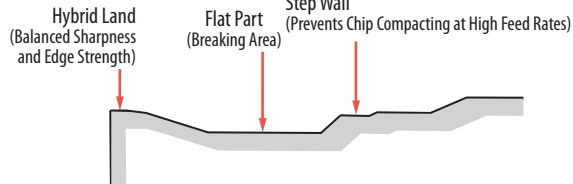
Medium - Roughing PG Chipbreaker

Negative Type

Features

Stable machining with good balance of edge sharpness and strength

Prevents chip compacting at high feed rates with good chip control at low feed rates



Finishing WF Chipbreaker (Wiper Insert)

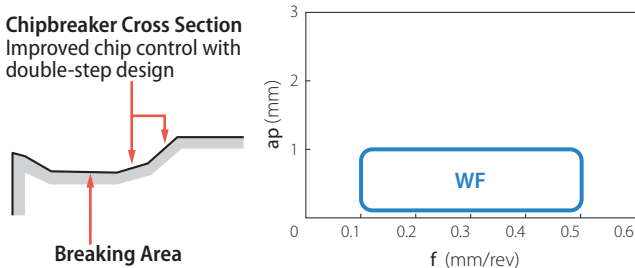
Negative Type

Features

Unique wiper-edge design prevents peeling and provides superior surface finish

Provides excellent chip control with primary & secondary dots and improves cutting performance during finishing operations

Chipbreaker Cross Section
Improved chip control with double-step design



Finishing WP Chipbreaker (Wiper Insert)

Positive Type

Features

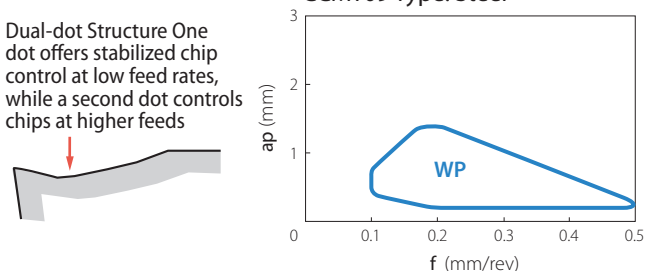
Excellent surface roughness and smooth chip control at high feed rates

High grade surface finish with no tear

High machining accuracy with low cutting forces

CCMT09 Type: Steel

Dual-dot Structure One dot offers stabilized chip control at low feed rates, while a second dot controls chips at higher feeds



Finishing - Medium PQ Chipbreaker

Negative Type

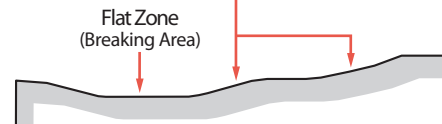
Features

Stable chip control in a wide range of medium-finishing applications with the newly developed "Flat Zone" (Breaking Area) and rising 2-step Smart Wall effect

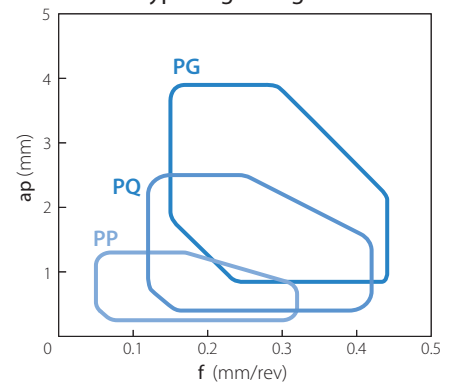
Twin dots on the edge tip provide smooth chip control at smaller a_p during high feed turning and facing

Continuous Variable Land (CVL) with well-balanced edge sharpness and toughness

2-Step Light Rise for Small Chip Evacuation with Smooth Chipbreaking



Steel C-type Edge Length = 12



Finishing - Medium WE Chipbreaker (Wiper Insert)

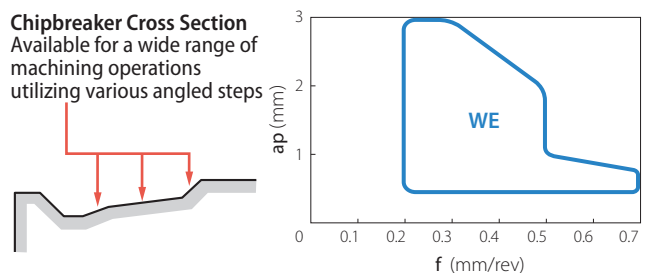
Negative Type

Features

High-quality surface roughness even at high feed rates with unique wiper-edge design

Wide application range is available with improved chip control at low depths of cut preventing chip crunching and running over chipbreaker dots at high feed rates

Chipbreaker Cross Section
Available for a wide range of machining operations utilizing various angled steps



Finishing PP Chipbreaker

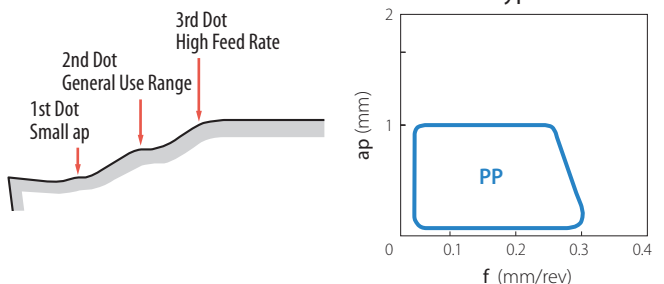
Positive Type

Features

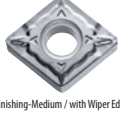
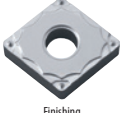
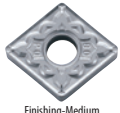
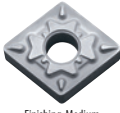
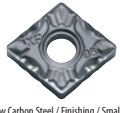
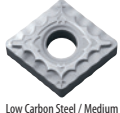
Stable chip control when finishing steel

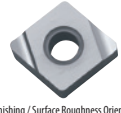
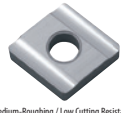
Special edge designed for sharpness and improved strength for stable tool life during high feed machining operations

CPMT09 Type: Steel



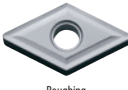
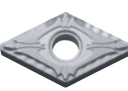
Stock Items (Negative)

Shape Handed Insert shows Right-hand	Description	Dimensions (mm)				TN610	TN620	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (rε)				
 Finishing / with Wiper Edge	CNMG 120404WF 120408WF	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Finishing / with Wiper Edge	CNMG 120404WP 120408WP	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Finishing-Medium / with Wiper Edge	CNMG 120404WE 120408WE 120412WE	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium / with Wiper Edge	CNMG 120404WQ 120408WQ 120412WQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing	CNMG 120402PP 120404PP 120408PP 120412PP	12.70	4.76	5.16	0.2 0.4 0.8 1.2	●	●	●	●
 Finishing	CNMG 090404GP 090408GP	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Finishing	CNMG 120402GP 120404GP 120408GP	12.70	4.76	5.16	0.2 0.4 0.8	●	●	●	●
 Finishing-Medium	CNMG 120404PQ 120408PQ 120412PQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium	CNMG 090404HQ 090408HQ	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Finishing-Medium	CNMG 120404HQ 120408HQ	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Finishing-Medium / Up Facing	CNMG 120404CQ 120408CQ	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Medium-Roughing	CNMG 090404GS 090408GS	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Medium-Roughing	CNMG 120404PG 120408PG 120412PG	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Roughing	CNMG 120404 120408	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Low Carbon Steel / Finishing / Small ap	CNMG 120404XF 120408XF	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Low Carbon Steel / Finishing	CNMG 120404XP 120408XP	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Low Carbon Steel / Medium	CNMG 120404XQ 120408XQ	12.70	4.76	5.16	0.4 0.8	●	●	●	●

Shape Handed Insert shows Right-hand	Description	Dimensions (mm)				TN610	TN620	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (rε)				
 Low Carbon Steel / Roughing	CNMG 120408XS	12.70	4.76	5.16	0.8	●	●	●	●
 Finishing / Surface Roughness Oriented	CNGG 090402 R/L-S 090404 R/L-S 090408 R/L-S	12.70	4.76	3.81	0.2 0.4 0.8	●	●	●	●
 Medium	CNGG 120404 R/L 120408 R/L	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Medium-Roughing / Low Cutting Resistance	CNGG 120404 R/L-25R 120408 R/L-25R	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Finishing / with Wiper Edge	DNMX 150404WF 150408WF 150412WF	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing / with Wiper Edge	DNMX 150604WF 150608WF 150612WF	12.70	6.35	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing	DNMG 150402PP 150404PP 150408PP 150412PP	12.70	4.76	5.16	0.2 0.4 0.8 1.2	●	●	●	●
 Finishing	DNMG 150602PP 150604PP 150608PP 150612PP	12.70	6.35	5.16	0.2 0.4 0.8 1.2	●	●	●	●
 Finishing	DNMG 110404GP 110408GP	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Finishing	DNMG 150402GP 150404GP 150408GP	12.70	4.76	5.16	0.2 0.4 0.8	●	●	●	●
 Finishing	DNMG 150602GP 150604GP 150608GP	12.70	6.35	5.16	0.2 0.4 0.8	●	●	●	●
 Finishing-Medium	DNMG 150404PQ 150408PQ 150412PQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium	DNMG 150604PQ 150608PQ 150612PQ	12.70	6.35	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium	DNMG 110402HQ 110404HQ	9.525	4.76	3.81	0.2 0.4	●	●	●	●
 Finishing-Medium	DNMG 150404HQ 150408HQ 150412HQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium	DNMG 150604HQ 150608HQ 150612HQ	12.70	6.35	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium / Up Facing	DNMG 150404CQ 150408CQ 150412CQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium / Up Facing	DNMG 150604CQ	12.70	6.35	5.16	0.4	●	●	●	●
 Medium-Roughing	DNMG 110404GS 110408GS	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Medium-Roughing	DNMG 150404PG 150408PG 150412PG	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Medium-Roughing	DNMG 150604PG 150608PG 150612PG	12.70	6.35	5.16	0.4 0.8 1.2	●	●	●	●

● : Standard Stock

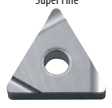
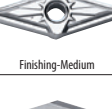
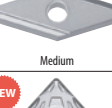
Stock Items (Negative)

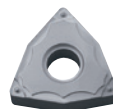
Shape Handed Insert shows Right-hand	Description	Dimensions (mm)				TN610	TN620	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (rε)				
 Roughing	DNMG150404 150408	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Low Carbon Steel / Finishing / Small ap	DNMG150404XF 150408XF	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Low Carbon Steel / Finishing	DNMG150404XP 150408XP	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Low Carbon Steel / Finishing	DNMG150604XP 150608XP	12.70	6.35	5.16	0.4 0.8	●	●	●	●
 Low Carbon Steel / Medium	DNMG150404XQ 150408XQ	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Low Carbon Steel / Roughing	DNMG150408XS	12.70	4.76	5.16	0.8	●	●	●	●
 Medium	DNGG 150404 ^{R/L} 150408 ^{R/L}	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Finishing-Medium	SNMG 120404PQ 120408PQ	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Finishing-Medium	SNMG 120404HQ 120408HQ 120412HQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Medium-Roughing	SNMG 120408PG 120412PG 120416PG	12.70	4.76	5.16	0.8 1.2 1.6	●	●	●	●
 Roughing	SNMG 090304 090308	9.525	3.18	3.81	0.4 0.8	●	●	●	●
 Roughing	SNMG 120404 120408	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 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	●	●	●	●
 B: Finishing-Medium C: Medium-Roughing	SNGG 090304 ^{R/L} -B 090308 ^{R/L} -B	9.525	3.18	3.81	0.4 0.8	●	●	●	●
	SNGG 120404 ^{R/L} -C 120408 ^{R/L} -C	12.70	4.76	5.16	0.4 0.8	●	●	●	●
	SNMG 120404 ^{R/L} -C 120408 ^{R/L} -C	12.70	4.76	5.16	0.4 0.8	●	●	●	●

Shape Handed Insert shows Right-hand	Description	Dimensions (mm)				TN610	TN620	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (rε)				
 Medium-Roughing / Low Cutting Resistance	SNGG 120404 ^{R/L} -25R 120408 ^{R/L} -25R	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 NEW Finishing / with Wiper Edge	TNMX 160404WF 160408WF 160412WF	9.525	4.76	3.81	0.4 0.8 1.2	●	●	●	●
 Finishing	TNMG 160402PP 160404PP 160408PP 160412PP	9.525	4.76	3.81	0.2 0.4 0.8 1.2	●	●	●	●
 Finishing	TNMG 110404GP 110408GP	6.35	4.76	2.26	0.4 0.8	●	●	●	●
 Finishing	TNMG 160402GP 160404GP 160408GP	9.525	4.76	3.81	0.2 0.4 0.8	●	●	●	●
 Finishing-Medium	TNMG 160404PQ 160408PQ 160412PQ	9.525	4.76	3.81	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium	TNMG 110404HQ 110408HQ	6.35	4.76	2.26	0.4 0.8	●	●	●	●
 Finishing-Medium	TNMG 160404HQ 160408HQ	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Finishing-Medium / Up Facing	TNMG 160404CQ 160408CQ 160412CQ	9.525	4.76	3.81	0.4 0.8 1.2	●	●	●	●
 Medium-Roughing	TNMG 110404GS	6.35	4.76	2.26	0.4	●	●	●	●
 Medium-Roughing	TNMG 160404PG 160408PG 160412PG	9.525	4.76	3.81	0.4 0.8 1.2	●	●	●	●
 Roughing	TNMG 160404 160408	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Low Carbon Steel / Finishing / Small ap	TNMG 160404XF 160408XF	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Low Carbon Steel / Finishing	TNMG 160404XP 160408XP	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Low Carbon Steel / Medium	TNMG 160404XQ 160408XQ	9.525	4.76	3.81	0.4 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	●	●	●	●

● : Standard Stock

Stock Items (Negative)

Shape Handed Insert shows Right-hand	Description	Dimensions (mm)				TN610	TN620	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (r _e)				
 Finishing	TNGG 160401 R_{L-S} 160402 R_{L-S} 160404 R_{L-S} 160408 R_{L-S}	9.525	4.76	3.81	0.1 0.2 0.4 0.8	●	●	●	●
 Super Fine Finishing / Sharp Edge / Surface Roughness Oriented	TNEG 160402 R_{L-SSF} 160404 R_{L-SSF}	9.525	4.76	3.81	0.2 0.4	●	●	●	●
 B: Finishing-Medium C: Medium-Roughing	TNGG 110302 R_{L-B} 110304 R_{L-B}	6.35	3.18	2.26	0.2 0.4	●	●	●	●
	TNGG 160402 R_{L-B} 160404 R_{L-B} 160408 R_{L-B}	9.525	4.76	3.81	0.2 0.4 0.8	●	●	●	●
	TNGG 160402 R_{L-C} 160404 R_{L-C} 160408 R_{L-C} 160412 R_{L-C}	9.525	4.76	3.81	0.2 0.4 0.8 1.2	●	●	●	●
	TNGG 220404 R_{L-C} 220408 R_{L-C}	12.70	4.76	5.16	0.4 0.8	●	●	●	●
	TNMG 160404 R_{L-C} 160408 R_{L-C}	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Medium-Roughing / Low Cutting Resistance	TNGG 160404 R_{L-25R} 160408 R_{L-25R}	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Finishing	VNMG 160402PP 160404PP 160408PP 160412PP	9.525	4.76	3.81	0.2 0.4 0.8 1.2	●	●	●	●
 Finishing	VNMG 160402GP 160404GP 160408GP	9.525	4.76	3.81	0.2 0.4 0.8	●	●	●	●
 Finishing-Medium	VNMG 160404R/L-VC 160408R/L-VC 160412R/L-VC	9.525	4.76	3.81	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium	VNMG 160404VF 160408VF 160412VF	9.525	4.76	3.81	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium	VNMG 160404PQ 160408PQ 160412PQ	9.525	4.76	3.81	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium	VNMG 160404HQ 160408HQ 160412HQ	9.525	4.76	3.81	0.4 0.8 1.2	●	●	●	●
 Roughing	VNMG 160404 160408	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Finishing-Medium	VNGG 160402M-SK 160404M-SK	9.525	4.76	3.81	<0.2 <0.4	●	●	●	●
 Medium	VNGG 160402 R_{L-L} 160404 R_{L-L} 160408 R_{L-L}	9.525	4.76	3.81	0.2 0.4 0.8	●	●	●	●
 NEW Finishing / with Wiper Edge	WNMG 080404WF 080408WF	12.70	4.76	5.16	0.4 0.8	●	●	●	●

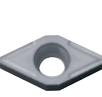
Shape Handed Insert shows Right-hand	Description	Dimensions (mm)				TN610	TN620	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (r _e)				
 Finishing / with Wiper Edge	WNMG 080404WP 080408WP	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 NEW Finishing-Medium / with Wiper Edge	WNMG 080404WE 080408WE 080412WE	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium / with Wiper Edge	WNMG 080404WQ 080408WQ 080412WQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing	WNMG 080402PP 080404PP 080408PP 080412PP	12.70	4.76	5.16	0.2 0.4 0.8 1.2	●	●	●	●
 Finishing	WNMG 060404GP 060408GP	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Finishing-Medium	WNMG 080404PQ 080408PQ	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Finishing-Medium	WNMG 060404HQ 060408HQ	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Finishing-Medium	WNMG 080404HQ 080408HQ 080412HQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Finishing-Medium / Up Facing	WNMG 080404CQ 080408CQ 080412CQ	12.70	4.76	5.16	0.4 0.8 1.2	●	●	●	●
 Medium-Roughing	WNMG 060404GS 060408GS	9.525	4.76	3.81	0.4 0.8	●	●	●	●
 Medium-Roughing	WNMG 080404PG 080408PG	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Roughing	WNMG 080404 080408	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Low Carbon Steel / Finishing	WNMG 080404XP 080408XP	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Low Carbon Steel / Medium	WNMG 080404XQ 080408XQ	12.70	4.76	5.16	0.4 0.8	●	●	●	●
 Low Carbon Steel / Roughing	WNMG 080404XS 080408XS	12.70	4.76	5.16	0.8	●	●	●	●

An insert which corner R(re) dimension is shown with inequality sign (ex. <0.1, <0.2) indicates minus tolerance of corner R(re)

● : Standard Stock

Stock Items (Positive)

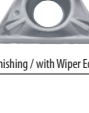
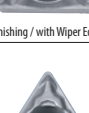
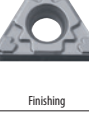
Shape Handed Insert shows Left-hand	Description	Dimensions (mm)					TN610	TN620	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (rε)	Relief Angle				
 Finishing / with Wiper Edge	CCMT 060202WP 060204WP	6.35	2.38	2.8	0.2 0.4	7°	●	●	●	●
	CCMT 09T304WP 09T308WP	9.525	3.97	4.4	0.4 0.8	7°	●	●	●	●
 Finishing	CCMT 060202PP 060204PP	6.35	2.38	2.8	0.2 0.4	7°	●	●	●	●
	CCMT 09T302PP 09T304PP 09T308PP	9.525	3.97	4.4	0.2 0.4 0.8	7°	●	●	●	●
 Finishing-Medium	CCMT 060202GK 060204GK	6.35	2.38	2.8	0.2 0.4	7°	●	●	●	●
	CCMT 09T302GK 09T304GK	9.525	3.97	4.4	0.2 0.4	7°	●	●	●	●
	CCMT 120404GK 120408GK	12.70	4.76	5.5	0.4 0.8	7°	●	●	●	●
 Finishing-Medium	CCMT 060202HQ 060204HQ	6.35	2.38	2.8	0.2 0.4	7°	●	●	●	●
	CCMT 09T302HQ 09T304HQ 09T308HQ	9.525	3.97	4.4	0.2 0.4 0.8	7°	●	●	●	●
 Medium	CCGT 060201 060202 060204	6.35	2.38	2.8	0.1 0.2 0.4	7°	●	●	●	●
	CCGT 09T301 09T302 09T304	9.525	3.97	4.4	0.1 0.2 0.4	7°	●	●	●	●
	CCMT 09T308	9.525	3.97	4.4	0.8	7°	●	●	●	●
 Finishing / Sharp Edge	CCET 030101M ^{R/L} -F 030102M ^{R/L} -F 030104M ^{R/L} -F	3.5	1.4	1.9	<0.1 <0.2 <0.4	7°	●	L	●	L
	CCET 040101M ^{R/L} -F 040102M ^{R/L} -F 040104M ^{R/L} -F	4.3	1.8	2.3	<0.1 <0.2 <0.4	7°	●	L	●	L
 Low Feed / Sharp Edge	CCET 060201MF ^{R/L} -U 060202MF ^{R/L} -U	6.35	2.38	2.8	<0.1 <0.2	7°	●	●	●	●
	CCET 09T301MF ^{R/L} -U 09T302MF ^{R/L} -U	9.525	3.97	4.4	<0.1 <0.2	7°	●	R	●	R
 Low Feed / Honed Edge	CCGT 060201E ^{R/L} -U 060202E ^{R/L} -U 060204E ^{R/L} -U	6.35	2.38	2.8	0.1 0.2 0.4	7°	●	●	●	●
	CCGT 09T301E ^{R/L} -U 09T302E ^{R/L} -U 09T304E ^{R/L} -U	9.525	3.97	4.4	0.1 0.2 0.4	7°	●	R	●	R
 Finishing	CPMT 080202PP 080204PP	7.94	2.38	3.3	0.2 0.4	11°	●	●	●	●
	CPMT 090302PP 090304PP 090308PP	9.525	3.18	4.4	0.2 0.4 0.8	11°	●	●	●	●
 Finishing	CPMT 080204GP	7.94	2.38	3.3	0.4	11°	●	●	●	●
	CPMT 090304GP 090308GP	9.525	3.18	4.4	0.4 0.8	11°	●	●	●	●
 Finishing-Medium	CPMH 080204HQ 080208HQ	7.94	2.38	3.5	0.4 0.8	11°	●	●	●	●
	CPMH 090304HQ 090308HQ	9.525	3.18	4.5	0.4 0.8	11°	●	●	●	●
 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°	●	●	●	●
 Low Carbon Steel / Finishing	CPMT 080204XP	7.94	2.38	3.3	0.4	11°	●	●	●	●
	CPMT 090304XP 090308XP	9.525	3.18	4.4	0.4 0.8	11°	●	●	●	●

Shape Handed Insert shows Left-hand	Description	Dimensions (mm)					TN610	TN620	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (rε)	Relief Angle				
 Low Carbon Steel / Finishing-Medium	CPMT 090304XQ 090308XQ	9.525	3.18	4.4	0.4 0.8	11°	●	●	●	●
 Finishing-Medium	CPMH 080204 ^R / _L -Y	7.94	2.38	3.5	0.4	11°	●		●	
	CPMH 090304 ^R / _L -Y	9.525	3.18	4.5	0.4	11°	●		●	
 Finishing / with Wiper Edge	DCMX 070204WP	6.35	2.38	2.8	0.4	7°	●	●	●	●
	DCMX 11T304WP	9.525	3.97	4.4	0.4	7°	●	●	●	●
 Finishing	DCMT 070202PP 070204PP	6.35	2.38	2.8	0.2 0.4	7°	●	●	●	●
	DCMT 11T302PP 11T304PP 11T308PP	9.525	3.97	4.4	0.2 0.4 0.8	7°	●	●	●	●
 Finishing	DCMT 070202GP 070204GP	6.35	2.38	2.8	0.2 0.4	7°	●	●	●	●
	DCMT 11T304GP 11T308GP	9.525	3.97	0.4	0.4 0.8	7°	●	●	●	●
 Finishing-Medium	DCMT 070202GK 070204GK 070208GK	6.35	2.38	2.8	0.2 0.4 0.8	7°	●	●	●	●
	DCMT 11T302GK 11T304GK 11T308GK	9.525	3.97	4.4	0.2 0.4 0.8	7°	●	●	●	●
 Finishing-Medium	DCMT 070202HQ 070204HQ 070208HQ	6.35	2.38	2.8	0.2 0.4 0.8	7°	●	●	●	●
	DCMT 11T302HQ 11T304HQ 11T308HQ	9.525	3.97	4.4	0.2 0.4 0.8	7°	●	●	●	●
 Medium	DCGT 070201 070202 070204	6.35	2.38	2.8	0.1 0.2 0.4	7°	●	●	●	●
	DCGT 11T301 11T302 11T304	9.525	3.97	4.4	0.1 0.2 0.4	7°	●	●	●	●
	DCMT 11T308	9.525	3.97	4.4	0.8	7°	●	●	●	●
 Low Carbon Steel / Finishing	DCMT 070204XP	6.35	2.38	2.8	0.4	7°	●	●	●	●
	DCMT 11T302XP 11T304XP 11T308XP	9.525	3.97	4.4	0.2 0.4 0.8	7°	●	●	●	●
 Low Carbon Steel / Finishing-Medium	DCMT 11T304XQ 11T308XQ	9.525	3.97	4.4	0.4 0.8	7°	●	●	●	●
 Finishing / Sharp Edge	DCET 070201M ^R / _L -F 070202M ^R / _L -F 070204M ^R / _L -F	6.35	2.38	2.8	<0.1 <0.2 <0.4	7°	●		●	
	DCET 11T301M ^R / _L -F 11T302M ^R / _L -F 11T304M ^R / _L -F	9.525	3.97	4.4	<0.1 <0.2 <0.4	7°	●		●	
 Low Feed / Sharp Edge	DCET 070201MF ^R / _L -U 070202MF ^R / _L -U	6.35	2.38	2.8	<0.1 <0.2	7°	●		●	
	DCET 11T301MF ^R / _L -U 11T302MF ^R / _L -U	9.525	3.97	4.4	<0.1 <0.2	7°	●		●	
 Low Feed / Honed Edge	DCGT 070201E ^R / _L -U 070202E ^R / _L -U 070204E ^R / _L -U	6.35	2.38	2.8	0.1 0.2 0.4	7°	●		●	
	DCGT 11T301E ^R / _L -U 11T302E ^R / _L -U 11T304E ^R / _L -U	9.525	3.97	4.4	0.1 0.2 0.4	7°	●		●	

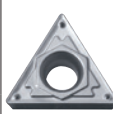
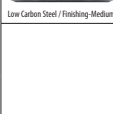
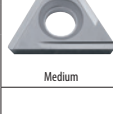
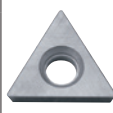
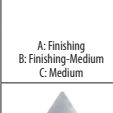
An insert which corner R(rε) dimension is shown with inequality sign (ex. <0.1, <0.2) indicates minus tolerance of corner R(rε)

●: Standard Stock R: R-hand Only L: L-hand Only

Stock Items (Positive)

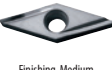
Shape Handed Insert shows Left-hand	Description	Dimensions (mm)					TNG10	TNG20	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (re)	Relief Angle				
 Low Feed / Sharp Edge	DCET 11T301MF ^{R/L-J} 11T302MF ^{R/L-J}	9.525	3.97	4.4	<0.1 <0.2	7°	●	●	●	●
 Low Feed / Honed Edge	DCGT 11T301E ^{R/L-J} 11T302E ^{R/L-J} 11T304E ^{R/L-J}	9.525	3.97	4.4	0.1 0.2 0.4	7°	●	●	●	●
 Medium	RCMX 1003M0 RCMX 1204M0	10.0 12.0	3.18 4.76	3.6 4.2	— —	7°	●	●	●	●
 Finishing-Medium	SCMT 09T304HQ 09T308HQ	9.525	3.97	4.4	0.4 0.8	7°	●	●	●	●
 Finishing	SPGR 090304 ^{R/L} 090308 ^{R/L}	9.525	3.18	—	0.4 0.8	11°	●	●	●	●
 Finishing	SPGR 120304 ^{R/L} 120308 ^{R/L}	12.7	3.18	—	0.4 0.8	11°	●	●	●	●
 Without Chipbreaker	SPMN 120308 120312	12.7	3.18	—	0.8 1.2	11°	●	●	●	●
 Finishing	TBMT 060102DP 060104DP	3.97	1.59	2.3	0.2 0.4	5°	●	●	●	●
 Finishing	TBGT 060102 ^{R/L} 060104 ^{R/L}	3.97	1.59	2.3	0.2 0.4	5°	●	L	●	L
 Finishing / with Wiper Edge	TCMX 090204WP TCMX 110204WP	5.56 6.35	2.38 2.38	2.5 2.8	0.4 0.4	7°	●	●	●	●
 Finishing-Medium	TCMT 090202HQ 090204HQ 110202HQ 110204HQ 110208HQ	5.56 6.35	2.38 2.38	2.5 2.8	0.2 0.4 0.8	7°	●	●	●	●
 Finishing-Medium	TCMT 16T304HQ 16T308HQ	9.525	3.97	4.4	0.4 0.8	7°	●	●	●	●
 Finishing / with Wiper Edge	TPMX 090204WP TPMX 110304WP	5.56 6.35	2.38 3.18	2.8 3.3	0.4 0.4	11°	●	●	●	●
 Finishing	TPMT 090202PP 090204PP 110302PP 110304PP 110308PP	5.56 6.35	2.38 3.18	2.8 3.3	0.2 0.4 0.8	11°	●	●	●	●
 Finishing	TPMT 090202GP 090204GP 110304GP 110308GP	5.56 6.35	2.38 3.18	2.8 3.3	0.2 0.4 0.8	11°	●	●	●	●
	TPMT 160304GP	9.525	3.18	4.4	0.4	11°	●	●	●	●

An insert which corner R(re) dimension is shown with inequality sign (ex. <0.1, <0.2) indicates minus tolerance of corner R(re)

Shape Handed Insert shows Left-hand	Description	Dimensions (mm)					TNG10	TNG20	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (re)	Relief Angle				
 Finishing-Medium	TPMT 090202HQ 090204HQ	5.56	2.38	2.8	0.2 0.4	11°	●	●	●	●
 Finishing-Medium	TPMT 110302HQ 110304HQ 110308HQ	6.35	3.18	3.3	0.2 0.4 0.8	11°	●	●	●	●
 Finishing-Medium	TPMT 160302HQ 160304HQ 160308HQ	9.525	3.18	4.4	0.2 0.4 0.8	11°	●	●	●	●
 Low Carbon Steel / Finishing	TPMT 090204XP TPMT 110304XP 110308XP	5.56 6.35	2.38 3.18	2.8 3.3	0.4 0.8	11°	●	●	●	●
 Low Carbon Steel / Finishing-Medium	TPMT 160304XP 160308XP	9.525	3.18	4.4	0.4 0.8	11°	●	●	●	●
 Low Carbon Steel / Finishing-Medium	TPMT 110304XQ 110308XQ	6.35	3.18	3.3	0.4 0.8	11°	●	●	●	●
 Low Carbon Steel / Finishing-Medium	TPMT 160304XQ 160308XQ	9.525	3.18	4.4	0.4 0.8	11°	●	●	●	●
 Finishing	TPGH 080202 ^{R/L} 080204 ^{R/L}	4.76	2.38	2.3	0.2 0.4	11°	L	●	L	●
 Finishing	TPGH 090202 ^{R/L} 090204 ^{R/L}	5.56	2.38	3.0	0.2 0.4	11°	L	●	L	●
 Finishing	TPGH 110202 ^{R/L} 110204 ^{R/L}	6.35	2.38	3.5	0.2 0.4	11°	L	●	L	●
 Finishing	TPGH 110302 ^{R/L} 110304 ^{R/L} 110308 ^{R/L}	6.35	3.18	3.3	0.2 0.4 0.8	11°	L	●	L	●
 Finishing	TPGH 160302 ^{R/L} 160304 ^{R/L} 160308 ^{R/L}	9.525	3.18	4.5	0.2 0.4 0.8	11°	●	●	●	●
 Medium	TPGH 110302 ^{R/L-H} 110304 ^{R/L-H} 110308 ^{R/L-H}	6.35	3.18	3.3	0.2 0.4 0.8	11°	L	L	L	L
 Medium	TPGH 160304 ^{R/L-H}	9.525	3.18	4.5	0.4	11°	L	L	L	L
 Medium	TPGT 160402 ^{R/L-H} 160404 ^{R/L-H}	9.525	4.76	4.4	0.2 0.4	11°	L	L	L	L
 Without Chipbreaker	TPGB 080204 TPGB 090204 TPGB 110204	4.76 5.56 6.35	2.38 2.38 2.38	2.3 3.0 3.5	0.4 0.4 0.4	11°	●	●	●	●
 Without Chipbreaker	TPGB 110302 110304 110308	6.35	3.18	3.3	0.2 0.4 0.8	11°	●	●	●	●
 Without Chipbreaker	TPGB 160304 160308	9.525	3.18	4.5	0.4 0.8	11°	●	●	●	●
 Finishing	TPMR 110304GP TPMR 160304GP	6.35 9.525	3.18 3.18	— —	0.4 0.4	11°	●	●	●	●
 Finishing-Medium	TPMR 110304HQ 110308HQ	6.35	3.18	—	0.4 0.8	11°	●	●	●	●
 Finishing-Medium	TPMR 160304HQ 160308HQ	9.525	3.18	—	0.4 0.8	11°	●	●	●	●
 Medium	TPMR 110304 110308	6.35	3.18	—	0.4 0.8	11°	●	●	●	●
 Medium	TPMR 160304 160308	9.525	3.18	—	0.4 0.8	11°	●	●	●	●
 Finishing	TPGR 110302 ^{R/L-A} 110304 ^{R/L-A}	6.35	3.18	—	0.2 0.4	11°	L	L	L	L
 Finishing	TPGR 110304 ^{R/L-B} 110308 ^{R/L-B}	6.35	3.18	—	0.4 0.8	11°	L	L	L	L
 Finishing	TPGR 160302 ^{R/L-B} 160304 ^{R/L-B} 160308 ^{R/L-B}	9.525	3.18	—	0.2 0.4 0.8	11°	●	L	●	L
 Finishing	TPGR 160304 ^{R/L-C} 160308 ^{R/L-C}	9.525	3.18	—	0.4 0.8	11°	●	L	●	L
 Without Chipbreaker	TPGN 110304 110308	6.35	3.18	—	0.4 0.8	11°	●	●	●	●
 Without Chipbreaker	TPGN 160304 160308	9.525	3.18	—	0.4 0.8	11°	●	●	●	●

● : Standard Stock R: R-hand Only L: L-hand Only

Stock Items (Positive)

Shape Handed Insert shows Left-hand	Description	Dimensions (mm)					TN610	TN620	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (r _e)	Relief Angle				
 Finishing	VBMT 110302PP 110304PP 110308PP	6.35	3.18	2.8	0.2 0.4 0.8	5°	●	●	●	●
	VBMT 160404PP 160408PP 160412PP	9.525	4.76	4.4	0.4 0.8 1.2	5°	●	●	●	●
	VBMT 110304GP VBMT 160404GP 160408GP	6.35 9.525	3.18 4.76	2.8 4.4	0.4 0.8	5°	●	●	●	●
 Finishing	VBMT 110302VF 110304VF 110308VF	6.35	3.18	2.8	0.2 0.4 0.8	5°	●	●	●	●
	VBMT 160402VF 160404VF 160408VF 160412VF	9.525	4.76	4.4	0.2 0.4 0.8 1.2	5°	●	●	●	●
	VBMT 110304HQ 110308HQ	6.35	3.18	2.8	0.4 0.8	5°	●	●	●	●
 Finishing-Medium	VBMT 160404HQ 160408HQ 160412HQ	9.525	4.76	4.4	0.4 0.8 1.2	5°	●	●	●	●
	VBET 110301M ^{R/L} -F 110302M ^{R/L} -F	6.35	3.18	2.8	<0.1 <0.2	5°	●	●	●	●
	VBET 110302M ^{R/L} -Y 110304M ^{R/L} -Y	6.35	3.18	2.8	<0.2 <0.4	5°	●	●	●	●
 Finishing-Medium	VBGT 160402 ^{R/L} -Y 160404 ^{R/L} -Y	9.525	4.76	4.4	0.2 0.4	5°	●	●	●	●

Shape Handed Insert shows Left-hand	Description	Dimensions (mm)					TN610	TN620	PV710	PV720
		I.C.	Thick- ness	Hole	Corner-R (r _e)	Relief Angle				
 Finishing	VCMT 080202PP 080204PP	4.76	2.38	2.3	0.2 0.4	7°	●	●	●	●
	VCMT 160404PP 160408PP	9.525	4.76	4.4	0.4 0.8	7°	●	●	●	●
 Finishing	VCMT 080202VF 080204VF	4.76	2.38	2.3	0.2 0.4	7°	●	●	●	●
 Finishing-Medium	VCMT 080202HQ 080204HQ	4.76	2.38	2.3	0.2 0.4	7°	●	●	●	●
 Finishing	WBMT 060102 ^{R/L} -DP 060104 ^{R/L} -DP	3.97	1.59	2.3	0.2 0.4	5°	L	L	L	L
	WBMT 080202 ^{R/L} -DP 080204 ^{R/L} -DP	4.76	2.38	2.3	0.2 0.4	5°	L	L	L	L
 Finishing / Sharp Edge	WBET 060102M ^{R/L} -F 060104M ^{R/L} -F	3.97	1.59	2.3	<0.2 <0.4	5°	●	L	●	L
	WBET 080201M ^{R/L} -F 080202M ^{R/L} -F 080204M ^{R/L} -F	4.76	2.38	2.3	<0.1 <0.2 <0.4	5°	●	L	●	L
 Finishing-Medium	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 110204HQ	6.35	2.38	2.8	0.2 0.4	11°	●	●	●	●
	WPMT 160304HQ 160308HQ	9.525	3.18	4.4	0.4 0.8	11°	●	●	●	●

An insert which corner R(r_e) dimension is shown with inequality sign (ex. <0.1, <0.2) indicates minus tolerance of corner R(r_e)

●: Standard Stock R: R-hand Only L: L-hand Only

Recommended Cutting Conditions

V_c (m/min)

	Low Carbon Steel Low Carbon Alloy Steel 150 HB or Below	Medium Carbon Steel Medium Carbon Alloy Steel 250 HB or Below	High Carbon Alloy Steel 300 HB or Below
TN610	150 – 250 – 350		150 – 230 – 300
TN620	100 – 200 – 300		100 – 180 – 250

V_c (m/min)

	Low Carbon Steel Low Carbon Alloy Steel 150 HB or Below	Medium Carbon Steel Medium Carbon Alloy Steel 250 HB or Below	High Carbon Alloy Steel 300 HB or Below
PV710	150 – 300 – 400		150 – 250 – 330
PV720	100 – 250 – 350		100 – 200 – 280