

THE NEW VALUE FRONTIER

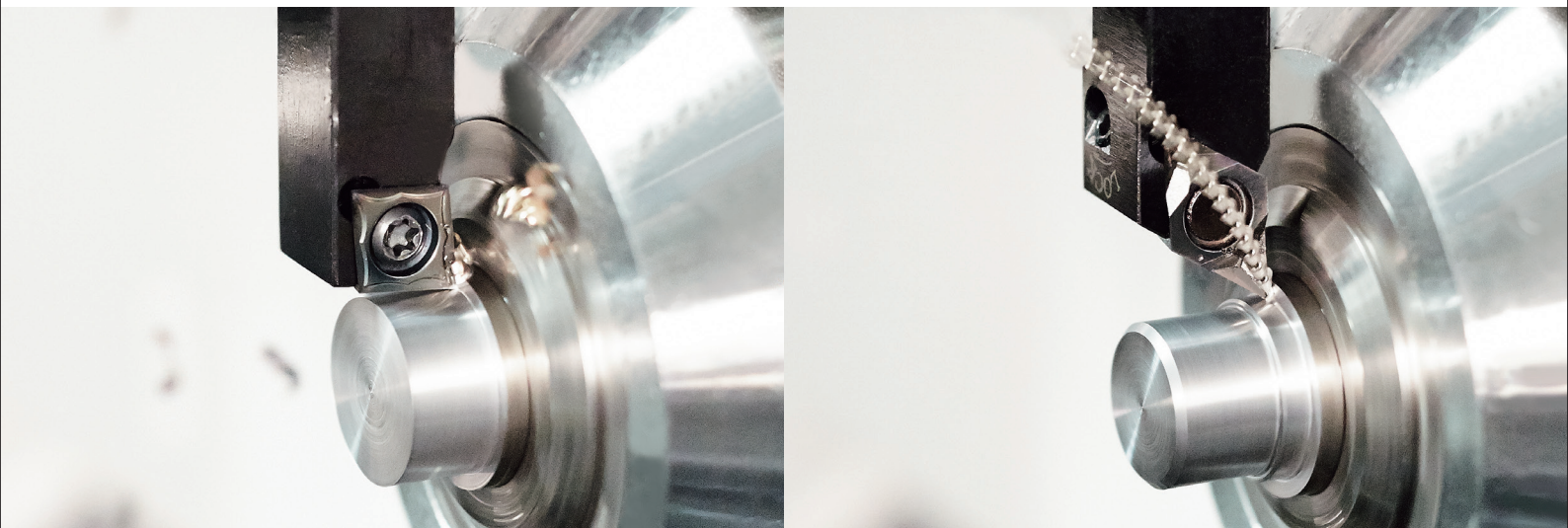


Small Tools

Molded Sharp Edge
Chipbreaker Series

For Automatic Lathes

Molded Sharp Edge Chipbreaker Series

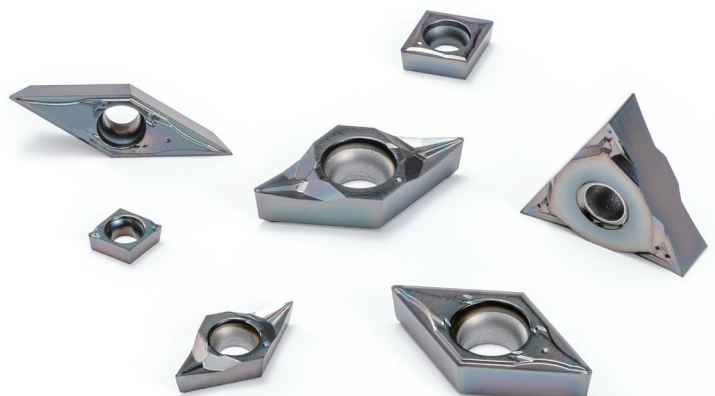


Introducing PR1535 for Long Tool Life and Stable Machining of Stainless Steel

Large Lineup to Solve Common Chip Control Problems

Positive and Negative Inserts Available

High Precision with Periphery Grinding and Sharp Edge Specification



For Automatic Lathes

Molded Sharp Edge Chipbreaker Series

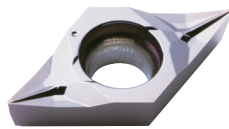
Large Lineup to Solve Common Chip Control Problems
 Long Tool Life and Stable Machining with Grade PR1535

- 1 Excellent Chip Control in a Wide Range of Machining Applications
- 2 High Precision with Periphery Grinding and Sharp Edge Specification
- 3 Anti-welding Properties with Improved Mirror Surface Finish

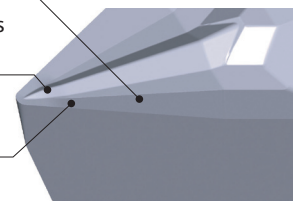
Low Cutting Force Chipbreakers

SK Chipbreaker: For Low Cutting Force Finishing

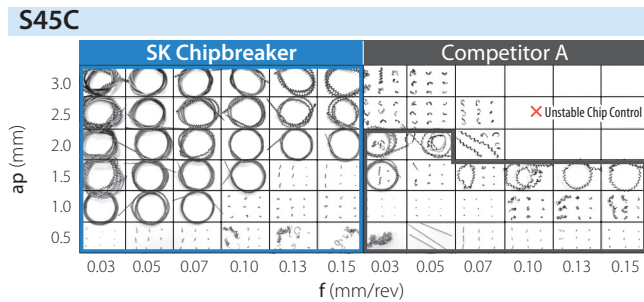
ap: 0.5 mm to 3.0 mm
 The molded chipbreaker addresses both sharpness and chip control



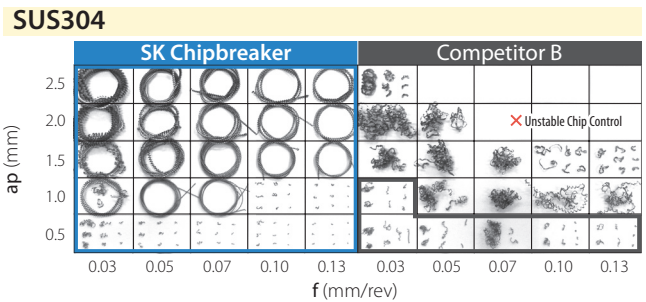
Stable chip evacuation due to large slits and large rake angle
 Chip control is improved in small depths of cut due to chipbreaker projecting to the corner tip
 The cutting force is reduced as the cutting blade is lowered towards the center of the workpiece



Chip Control Comparison (In-house Evaluation)



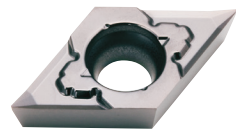
Cutting Conditions: Vc = 100 m/min, wet, DCGT11T302



Cutting Conditions: Vc = 100 m/min, wet, DCGT11T302

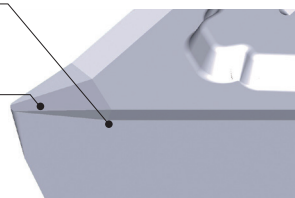
CK Chipbreaker: Low Cutting Force for General Purpose

ap: 1.0 to 2.5 mm
 Smooth Chip Evacuation with a Large Rake Angle

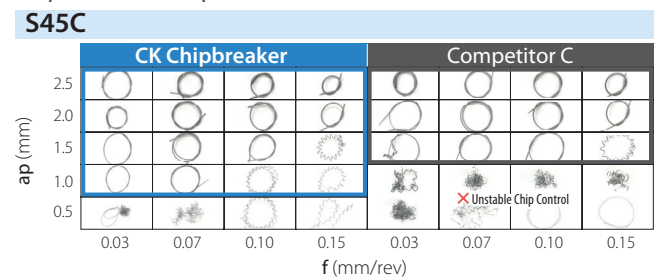


The cutting force is reduced as the cutting blade is lowered towards the center of the workpiece

A large rake angle reduces cutting forces and maintains stable chip evacuation



Chip Control Comparison (In-house Evaluation)



Cutting Conditions: Vc = 100 m/min, wet, CCGT09T302

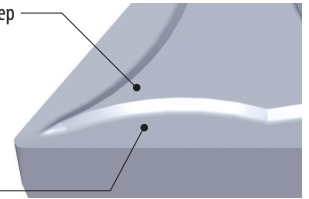
Chip Control Oriented

GQ Chipbreaker: for Small to Large ap

ap: 0.8 to 5.0 mm (Steel)
0.8 to 3.0 mm (Stainless Steel)
For a Wide Range of Applications

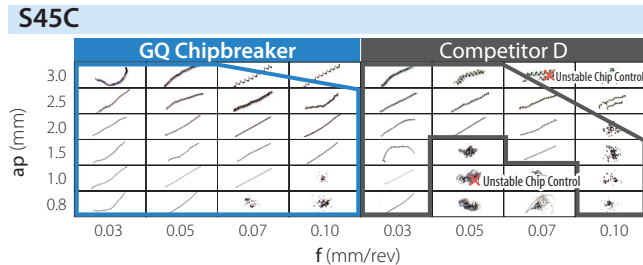


Low cutting force design with a small chipbreaker step
Good chip control in small depths of cut due to the breaker dot projecting to the cutting edge

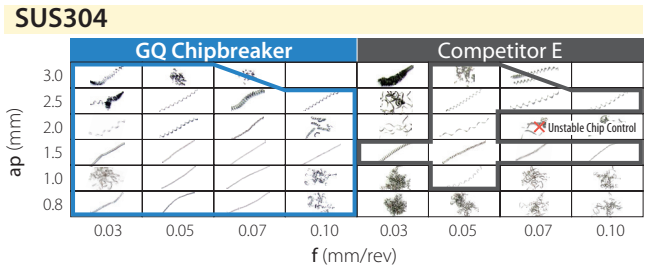


Wide range of acceptable chip control is achieved due to advanced chip breaker design

Chip Control Comparison (In-house Evaluation)



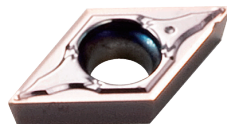
Cutting Conditions: Vc = 100 m/min, wet, DCGT11T302



Cutting Conditions: Vc = 80 m/min, wet, DCGT11T302

GF Chipbreaker: For Finishing

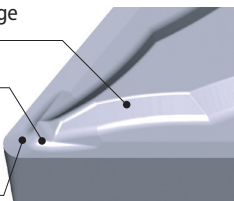
ap: 0.25 to 1.25 mm
Controlled Chips During Finishing



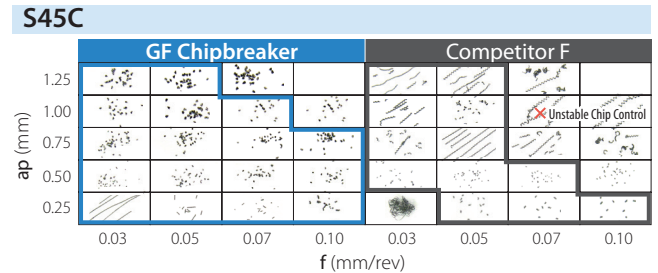
High Slope Recedes Away from the Cutting Edge
⇒ Minimizes Chip Clogging

Improved Sharpness with Large Rake Angle

Chipbreaker Dot Extended to the Cutting Edge
⇒ Divides the Chips into Smaller Pieces



Chip Control Comparison (In-house Evaluation)



Cutting Conditions: Vc = 100 m/min, wet, DCGT11T302

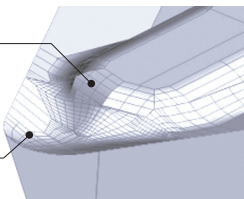
CF Chipbreaker: for Minute ap

ap: 0.02 to 0.2 mm
Excellent Chip Formation in Small Depths of Cut

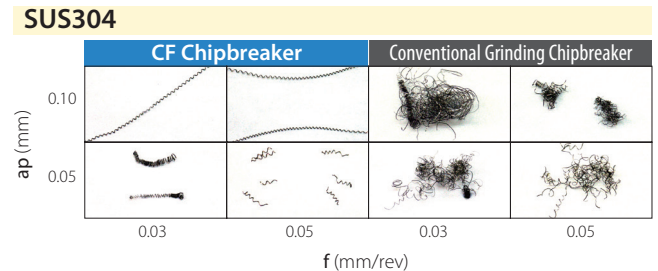


Properly Curled Chips with Special Dot Design

Large Rake Angle Improves Sharpness
Suppresses Burr Formation and Clouding
by Preventing Welding onto the Insert



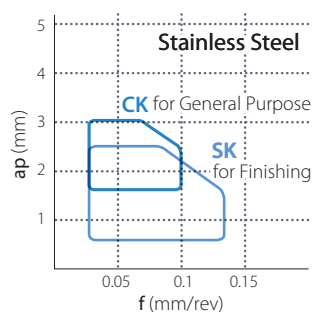
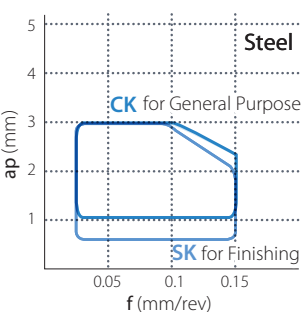
Chip Control Comparison (In-house Evaluation)



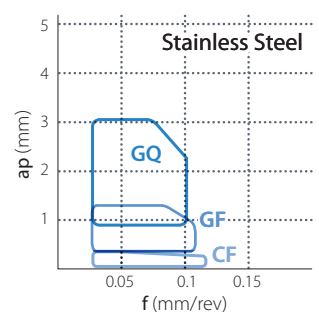
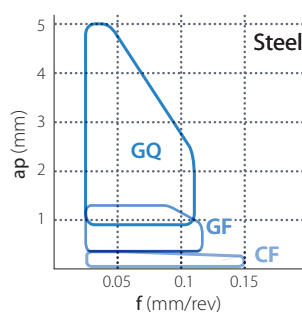
Cutting Conditions: Vc = 100 m/min, Wet, CCGT030102

Chipbreaker Map

Low Cutting Force Oriented



Chip Control Oriented



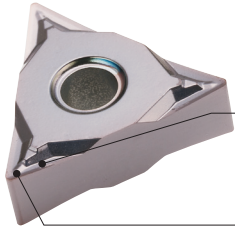
Mirror Surface with Sharp Edge

Negative Inserts for Small Parts Machining Optimal for Workpieces $\phi 16$ or Larger

SK Chipbreaker: For Finishing to Medium Processing

Chipbreaker for Sharpness and Chip Control

NEW VNGG16 Type Added to the Lineup



Good Chip Control in a Wide Range of Machining Applications with Specialized Chipbreaker Design for Small Parts

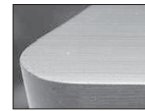
Sharp Edge
Lineup from Corner R (r_c) 0.1 mm

TK Chipbreaker: For Medium to Roughing

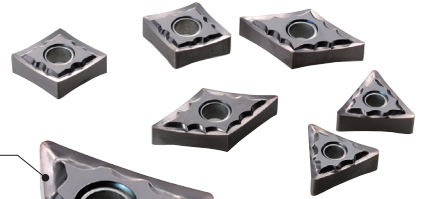
Chipbreaker with Low Cutting Force Design for a Wide Range of Machining Applications

Excellent Anti-welding Properties with Mirror Surface

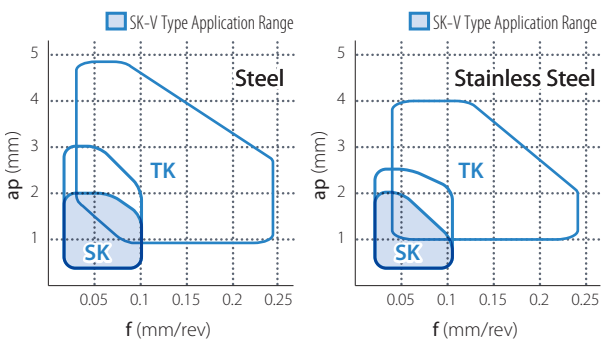
Sharp Edge



Low Cutting Force with Dot-less Structure
Wide Support for Various Depths of Cut



Chipbreaker Map



□ Fully Flush Cutting Edge Holder Design

Positive Insert Holders



Negative Insert Holders



Application Maps

Steel

High Speed ($V_c = 150$ to 200 m/min)	PR1425		
Medium Speed ($V_c = 75$ to 150 m/min)	PR1225		PR1535
Low Speed ($V_c = 75$ m/min and Lower)	PR930	PR1535	
	Continuous	Light Interrupted	Heavy Interrupted

1st Recommendation: PR1425
High Reliability in Light Interrupted Cuts: PR1535
Stable Machining at Low to Medium Speeds: PR1225
Stable Machining at Low Speeds: PR930

Stainless Steel

High Speed ($V_c = 125$ m/min and Higher)	PR1425		
Medium Speed ($V_c = 50$ to 125 m/min)	PR1225		PR1535
Low Speed ($V_c = 50$ m/min and Lower)	PR930	PR1535	
	Continuous	Light Interrupted	Heavy Interrupted

1st Recommendation: PR1535
Stable Machining at Low to Medium Speeds: PR1225
Longer Tool Life at High Speeds: PR1425
Longer Tool Life at Low Speeds: PR930

MEGACOAT NANO PR1535

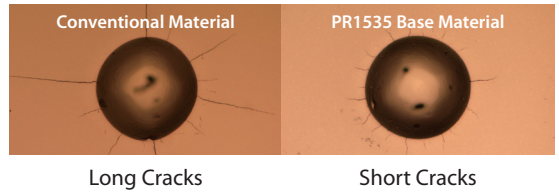
PR1535 achieves long tool life and stable machining of stainless steel with the combination of a tough substrate and a special nano layer coating

- 1 An increase in cobalt content yields a substrate with greater toughness. Fracture toughness values are improved by 23% over previous grades
- 2 The coarse grain structure and uniform particle size correspond to improved heat resistance, with conductivity values decreased by 11%
- 3 MEGACOAT NANO for Long Tool Life and Stable Machining

UP
23%
Fracture
Toughness

UP
High Impact
Improvement

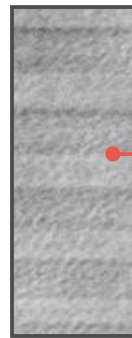
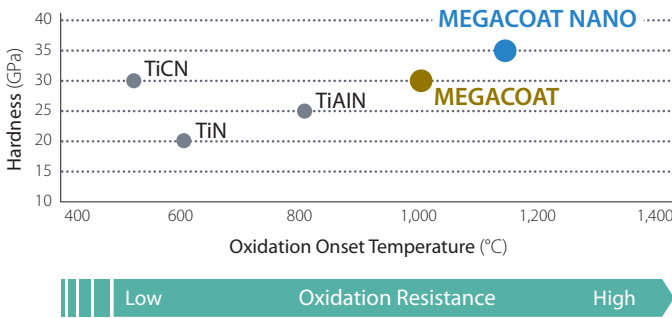
Cracking Comparison by Diamond Indentor (In-house Evaluation)



Long Cracks

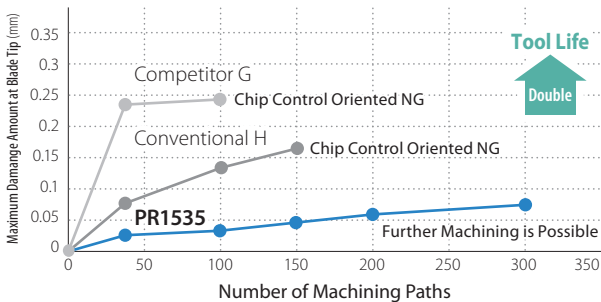
Short Cracks

Coating Properties



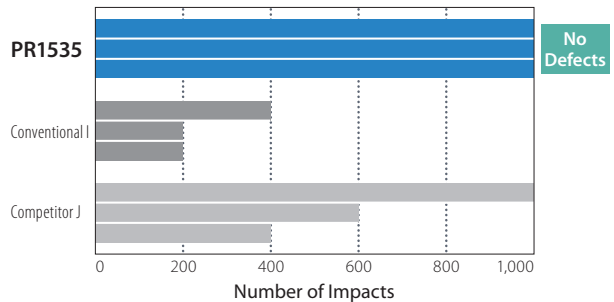
MEGACOAT Laminate Base Layer Structure
PR1535 is a good solution for unstable conditions such as early fracturing and variable tool life during steel machining

Abrasion Resistance Evaluation (In-house Evaluation)



Cutting Conditions: $n = 1,273 \text{ min}^{-1}$ ($V_c = 80 \text{ m/min}$), $f = 0.025 \text{ mm/rev}$, Wet (Oil-based)
Workpiece: SUS304 ($\phi 20$)

Defect Resistance Comparison (In-house Evaluation)



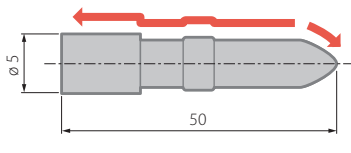
Cutting Conditions: $V_c = 80 \text{ m/min}$, $f = 0.12 \text{ mm/rev}$, Wet (Water-soluble)
Workpiece: SUS304 ($\phi 50$, 10 mm Groove Width 4 Pieces)

The PR1535 lineup development includes grinding chipbreaker, cut-off, and back-turning

Case Studies

Pin SUS630

$V_c = 55 \text{ m/min}$
($n = 3,600 \text{ min}^{-1}$)
 $a_p = 0.1 \sim 0.7 \text{ mm}$
 $f = 0.03 \text{ mm/rev}$
Wet (Oil-based)
DCGT11T302MFP-GQ
PR1535



Number of Processes

GQ Chipbreaker (PR1535) **1,600 pcs/corner**

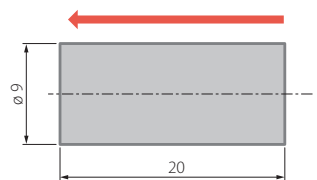
Tool Life
1.3 times

Competitor K **1,200 pcs/corner**

Unstable tool life due to sudden defects for competitor K. GQ chipbreaker (PR1535) is capable of stable machining without defects, with tool life improved to 1.3 times. (User Evaluation)

Valve SUS440C

$V_c = 100 \text{ m/min}$
($n = 3,600 \text{ min}^{-1}$)
 $a_p = 0.1 \text{ mm}$
 $f = 0.06 \text{ mm/rev}$
Wet (Oil-based)
DCGT11T302MFP-SK
PR1535



Number of Processes

SK Chipbreaker (PR1535) **600 pcs/corner**

Tool Life
1.3 times

Competitor L **450 pcs/corner**

SK Chipbreaker (PR1535) Tool Life 1.3 times. (User Evaluation)

Standard Stock Item Description

Positive Insert

Shape	Description	Dimensions (mm)					Material		
		I.C.	Thickness	Hole Diameter	Corner R (re)	Relief Angle	PRI1535	PRI1425	PRI1225
Minute Depth of Cut 	CCGT 030101MP-CF 030102MP-CF	3.5	1.4	1.9	<0.1 <0.2	7°	●	●	●
	CCGT 040101MP-CF 040102MP-CF	4.3	1.8	2.3	<0.1 <0.2	7°	●	●	●
Finishing 	CCGT 060201MFP-GF 060202MFP-GF 060204MFP-GF	6.35	2.38	2.8	<0.1 <0.2 <0.4	7°	●	●	●
	CCGT 09T301MFP-GF 09T302MFP-GF 09T304MFP-GF	9.525	3.97	4.4	<0.1 <0.2 <0.4	7°	●	●	●
Finishing 	CCGT 060201MFP-SK 060202MFP-SK 060204MFP-SK	6.35	2.38	2.8	<0.1 <0.2 <0.4	7°	●	●	●
	CCGT 09T301MFP-SK 09T302MFP-SK 09T304MFP-SK	9.525	3.97	4.4	<0.1 <0.2 <0.4	7°	●	●	●
General Purpose 	CCGT 060201MP-CK 060202MP-CK	6.35	2.38	2.8	<0.1 <0.2	7°	●	●	●
	CCGT 09T301MP-CK 09T302MP-CK	9.525	3.97	4.4	<0.1 <0.2	7°	●	●	●
Finishing to Medium 	CCGT 060201MFP-GQ 060202MFP-GQ 060204MFP-GQ	6.35	2.38	2.8	<0.1 <0.2 <0.4	7°	●	●	●
	CCGT 09T301MFP-GQ 09T302MFP-GQ 09T304MFP-GQ	9.525	3.97	4.4	<0.1 <0.2 <0.4	7°	●	●	●
Minute Depth of Cut 	DCGT 070201MP-CF 070202MP-CF	6.35	2.38	2.8	<0.1 <0.2	7°	●	●	●
	DCGT 11T301MP-CF 11T302MP-CF	9.525	3.97	4.4	<0.1 <0.2	7°	●	●	●
Finishing 	DCGT 070201MFP-GF 070202MFP-GF 070204MFP-GF	6.35	2.38	2.8	<0.1 <0.2 <0.4	7°	●	●	●
	DCGT 11T301MFP-GF 11T302MFP-GF 11T304MFP-GF	9.525	3.97	4.4	<0.1 <0.2 <0.4	7°	●	●	●
Finishing 	DCGT 070201MFP-SK 070202MFP-SK 070204MFP-SK	6.35	2.38	2.8	<0.1 <0.2 <0.4	7°	●	●	●
	DCGT 11T301MFP-SK 11T302MFP-SK 11T304MFP-SK	9.525	3.97	4.4	<0.1 <0.2 <0.4	7°	●	●	●

Shape	Description	Dimensions (mm)					Material		
		I.C.	Thickness	Hole Diameter	Corner R (re)	Relief Angle	PRI1535	PRI1425	PRI1225
General Purpose 	DCGT 070201MP-CK 070202MP-CK	6.35	2.38	2.8	<0.1 <0.2	7°	●	●	●
	DCGT 11T301MP-CK 11T302MP-CK	9.525	3.97	4.4	<0.1 <0.2	7°	●	●	●
Finishing to Medium 	DCGT 070201MFP-GQ 070202MFP-GQ 070204MFP-GQ	6.35	2.38	2.8	<0.1 <0.2 <0.4	7°	●	●	●
	DCGT 11T301MFP-GQ 11T302MFP-GQ 11T304MFP-GQ	9.525	3.97	4.4	<0.1 <0.2 <0.4	7°	●	●	●
Minute Depth of Cut 	TBGT 060101MP-CF 060102MP-CF	3.97	1.59	2.3	<0.1 <0.2	5°	●	●	●
	TPGT 080201MP-CF 080202MP-CF	4.76	2.38	2.3	<0.1 <0.2	11°	●	●	●
Minute Depth of Cut 	TPGT 090201MP-CF 090202MP-CF	5.56	2.38	3.0	<0.1 <0.2	11°	●	●	●
	VPGT 110301MP-CF 110302MP-CF	6.35	3.18	2.8	<0.1 <0.2	11°	●	●	●
Finishing 	VPGT 110301MFP-GF 110302MFP-GF	6.35	3.18	2.8	<0.1 <0.2	11°	●	●	●
	VPGT 080201MP-CK 080202MP-CK	4.76	2.38	2.3	<0.1 <0.2	11°	●	●	●
General Purpose 	VPGT 110301MP-CK 110302MP-CK	6.35	3.18	2.8	<0.1 <0.2	11°	●	●	●
	WBGT 060101MP ^{R/L} -CF 060102MP ^{R/L} -CF	3.97	1.59	2.3	<0.1 <0.2	5°	●	●	●

Inserts with corner R (re) with a sign of inequality (e.g.: < 0.05, < 0.1, and < 0.2) are products with a negative tolerance
● : Standard Stock

Negative Inserts

Shape	Description	Dimensions (mm)					Material		
		I.C.	Thickness	Hole Diameter	Corner R (re)	Relief Angle	PRI1535	PRI1425	PRI1225
Finishing to Medium 	CNGG 120402MFP-SK 120404MFP-SK	12.70	4.76	5.16	<0.2 <0.4	7°	●	●	●
	CNGG 120404FP-TK 120408FP-TK	12.70	4.76	5.16	0.4 0.8	7°	●	●	●
Medium to Roughing 	DNGG 150402MFP-SK 150404MFP-SK	12.70	4.76	5.16	<0.2 <0.4	7°	●	●	●
	DNGG 150404FP-TK 150408FP-TK	12.70	4.76	5.16	0.4 0.8	7°	●	●	●
Finishing to Medium 	TNGG 160401MFP-SK 160402MFP-SK 160404MFP-SK	9.525	4.76	3.81	<0.1 <0.2 <0.4	7°	●	●	●

Shape	Description	Dimensions (mm)					Material			
		I.C.	Thickness	Hole Diameter	Corner R (re)	Relief Angle	PRI1535	PRI1425	TN620	PV720
Medium to Roughing 	TNGG 160404FP-TK 160408FP-TK	9.525	4.76	5.16	0.4 0.8	7°	●	●	●	●
	VNGG 160402MFP-SK 160404MFP-SK	9.525	4.76	3.81	<0.2 <0.4	7°	●	●	●	●
Finishing to Medium 	VNGG 160402M-SK 160404M-SK	9.525	4.76	3.81	0.2 0.4	7°	●	●	●	●
	TNGG 160402 ^{R/L} -S 160404 ^{R/L} -S 160408 ^{R/L} -S	9.525	4.76	3.81	0.2 0.4 0.8	7°	●	●	●	●

Inserts with corner R (re) with a sign of inequality (e.g.: < 0.05, < 0.1, and < 0.2) are products with a negative tolerance

Cermet inserts, (TN620/PV720), are not sharp edge inserts (R honing)

● : Standard Stock