SUMITOMO
CARBIDE - CBN - DIAMOND
Global Support, Global Solutions.

Coated SUMIBORON

Coated SUMIBORON series for Hardened Steel

Rev. 2

The Pinnacle of High-speed / High-precision / High-efficiency Cutting

2015-007 JTA ECO PRODUCT (一社)日本機械工具工業会(JTA) 環境調和製品 ☆☆☆ (BNC2010)
2015-008 JTA ECO PRODUCT (一社)日本機械工具工業会(JTA) 環境調和製品 ☆☆☆ (BNC2020)
2022-004 JTA ECO PRODUCT (一社)日本機械工具工業会(JTA) 環境調和製品 ☆☆ (BNC2115/BNC2125)

LINEUP

General-purpose Machining	BNC2125	
	BNC2020	
High-precision Machining	BNC2115	
	BNC2010	
High-speed Machining	New BNC2105	
Heavy Interrupted Machining	BNC300	

New High-speed Machining Grade
Introducing BNC2105

P M K N S H

SUMITOMO ELECTRIC GROUP

BNC2115 / BNC2125 VIDEO OF CUTTING

BNC2010 / BNC2020 VIDEO OF CUTTING

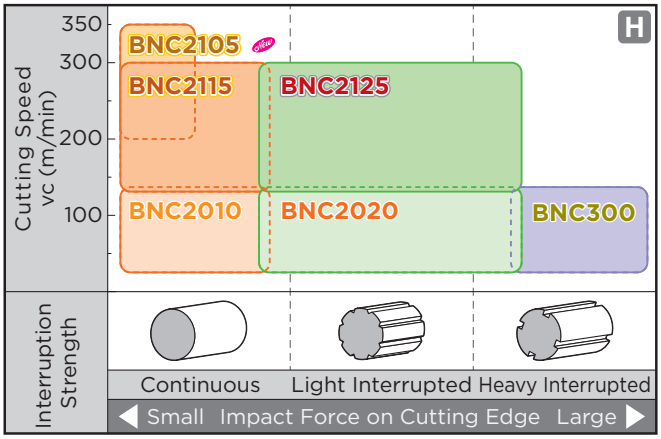
Coated SUMIBORON for Hardened Steel Machining

BNC2105 / BNC2115 / BNC2125 BNC2010 / BNC2020 / BNC300

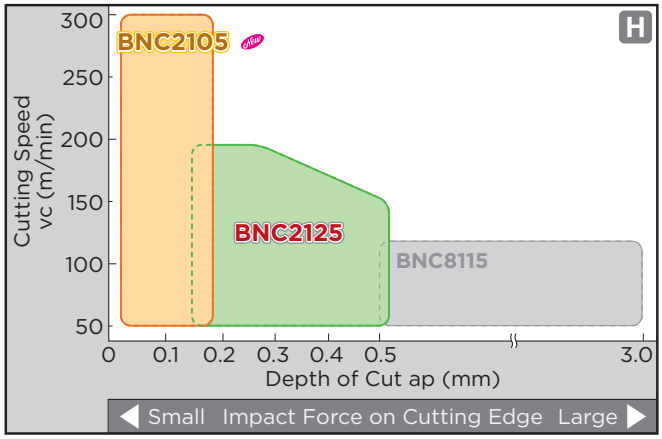
The Pinnacle of High-speed / High-precision / High-efficiency Cutting

■ Application Range

● Induction Hardened Steel (S45C/S55C, etc.), Carburised Steel



● Bearing Steel (SUJ2, etc.)



■ Features

BNC2105 New

Highly wear-resistant grade for high-speed machining

Excellent wear resistant coating and CBN substrate, achieve stable and long tool life in high-speed machining.

BNC2115

The ultimate in high-precision machining of hardened steel

Utilizing a thick coating with exceptional notch wear resistance and a tough CBN substrate to achieve stable and excellent surface finish.

BNC2125

First recommendation for hardened steel machining

Combination of a tough CBN substrate and a thick coating that has a balance of wear resistance and toughness, to achieve stable machining in a wide range of applications.

BNC2010

High-precision grade for low- to medium-speed machining

Excellent wear resistant CBN substrate and coating layer, for high-precision machining that requires surface roughness and surface finish accuracy.

BNC2020

General-purpose grade for low- to medium-speed machining

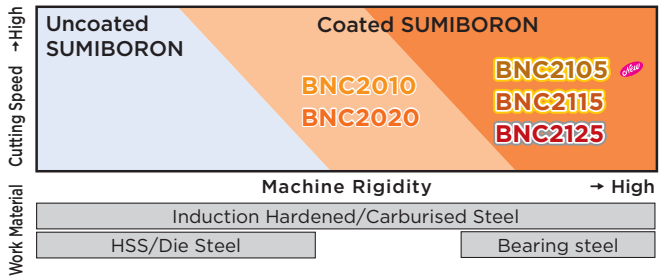
Utilizing an especially high wear resistant coating and a tough CBN substrate. Excellent machining stability in low-rigidity situations and high-load cutting

BNC300

Achieves long, stable tool life even in machining with heavy interrupted cutting

Achieves long, stable tool life even on work pieces with both continuous and interrupted cutting

■ Differentiation



■ Recommended Cutting Conditions

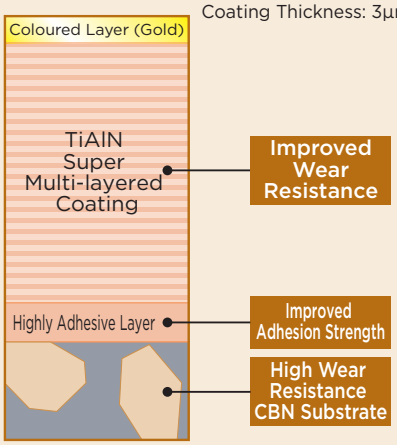
Grade	Cutting Speed (vc) (m/min) Min. - **Optimum** -Max.	Feed Rate f (mm/rev) Min. - **Optimum** -Max.	Depth of Cut ap (mm) Min. - **Optimum** -Max.
BNC2105	150 - **200** - 350	0.03 - **0.10** - 0.15	0.03 - **0.15** - 0.20
BNC2115	110 - **180** - 300	0.03 - **0.10** - 0.20	0.03 - **0.20** - 0.35
BNC2125	110 - **160** - 300	0.05 - **0.20** - 0.40	0.05 - **0.30** - 0.50
BNC2010	50 - **140** - 180	0.03 - **0.10** - 0.20	0.03 - **0.20** - 0.35
BNC2020	50 - **120** - 180	0.03 - **0.20** - 0.40	0.05 - **0.30** - 0.50
BNC300	50 - **100** - 150	0.03 - **0.10** - 0.20	0.03 - **0.20** - 0.30

BNC2105/BNC2115/BNC2125/BNC2010/BNC2020/BNC300

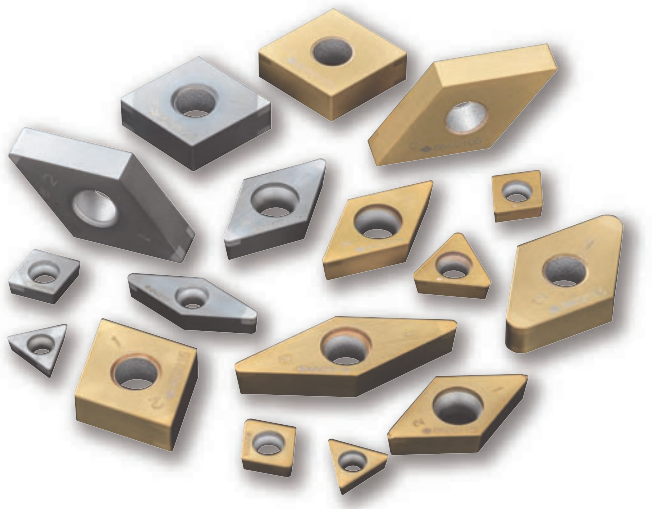
■ CBN Substrate and Coating Structure

BNC2105 New High-precision Machining (High-speed)

Coating Thickness: 3µm

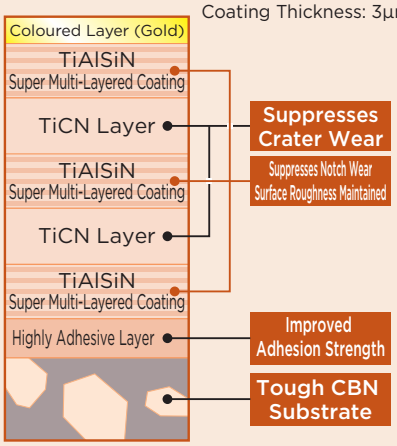


Highly wear-resistant TiAlN super multi-layered coating is made thicker. Realises long tool life in high-speed cutting in combination with a substrate using a newly developed TiCN binder with excellent thermal resistance



BNC2115 High-precision Machining (Medium- to High-speed)

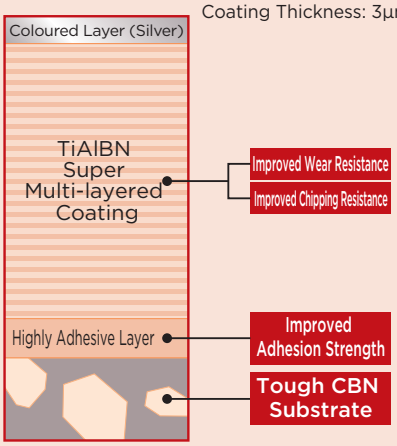
Coating Thickness: 3µm



Thick layers of high-strength TiAlSiN super multi-layered coating and highly heat-resistant TiCN coating are applied to a tough substrate to realise excellent surface finish quality

BNC2125 General-purpose Machining (Medium- to High-speed)

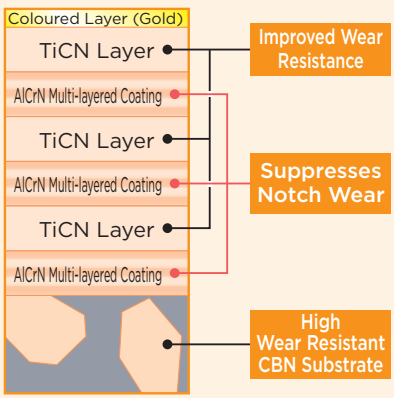
Coating Thickness: 3µm



Thick layer of super multi-layered ultra-fine TiAlBN coating with high strength and high hardness coupled with a tough substrate achieves high performance in a wide range of applications

BNC2010 High-precision Machining (Low- to Medium-speed)

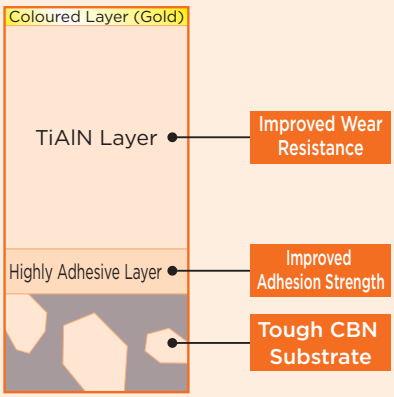
Coating Thickness: 2µm



Stacked high-strength AlCrN multi-layered coating and highly heat-resistant TiCN coating are applied to a highly wear-resistant substrate to maintain excellent surface finish quality

BNC2020 General-purpose Machining (Low- to Medium-speed, Unstable Cutting)

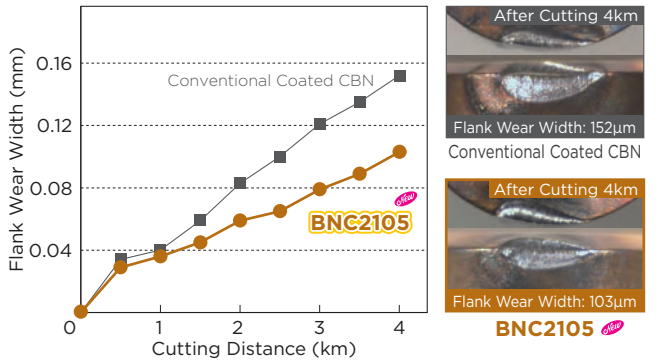
Coating Thickness: 2µm



Application of highly wear-resistant TiAlN coating to a tough substrate dramatically improves machining stability in low-rigidity setups and high-load cutting

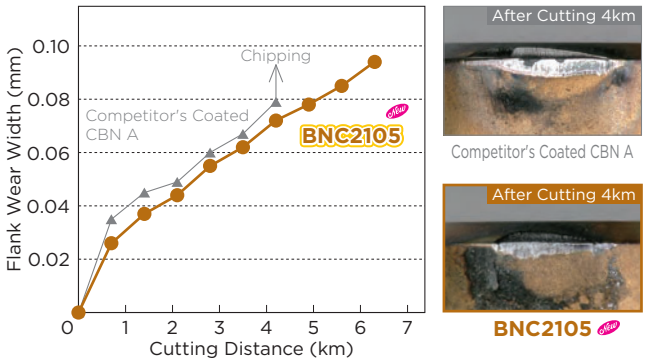
■ Cutting Performance

BNC2105 NEW Continuous Cutting (Wear Resistance)



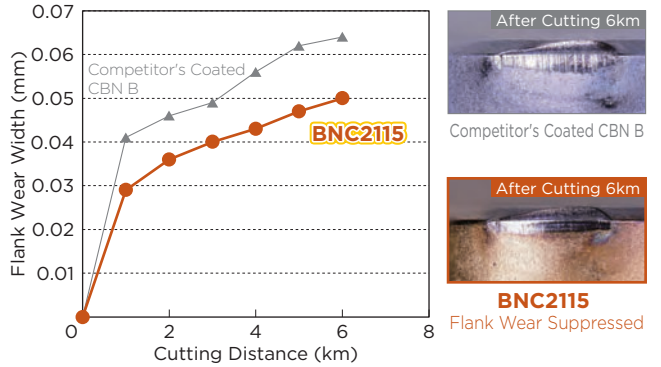
Work Material: SUJ2 (58-62HRC)
Tool Cat. No.: 4NC-DNGA150408
Cutting Conditions: vc = 200m/min, f = 0.1mm/rev, ap = 0.1mm Wet

BNC2105 NEW Continuous Cutting (Wear Resistance)



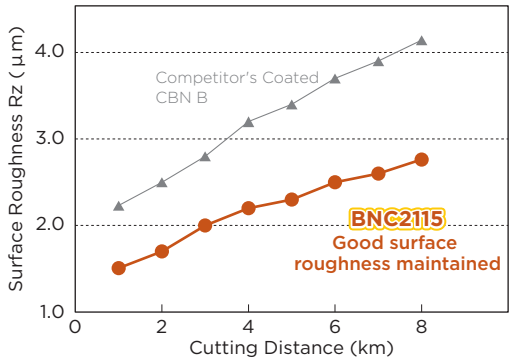
Work Material: SCM415H (58-62HRC)
Tool Cat. No.: 4NC-DNGA150408
Cutting Conditions: vc = 250m/min, f = 0.06mm/rev, ap = 0.1mm Wet

BNC2115 Continuous Cutting (Wear Resistance)



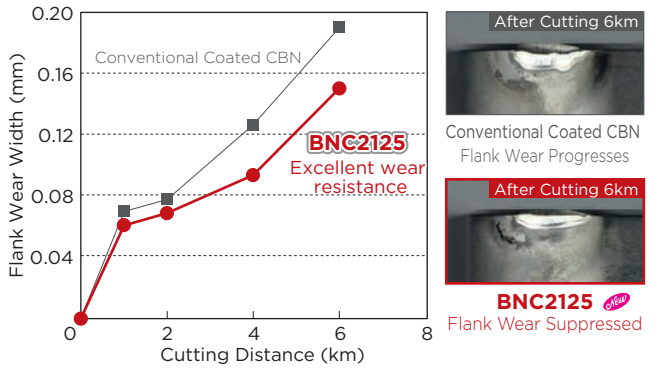
Work Material: SCM415H (58-62HRC)
Tool Cat. No.: 4NC-DNGA150408
Cutting Conditions: vc = 200m/min, f = 0.1mm/rev, ap = 0.15mm Wet

BNC2115 Continuous Cutting (Machined Surface Roughness)



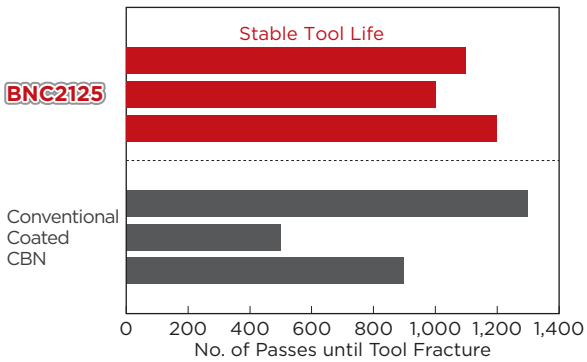
Work Material: SCM415H (58-62HRC)
Tool Cat. No.: 4NC-DNGA150408
Cutting Conditions: vc = 200m/min, f = 0.1mm/rev, ap = 0.15mm Wet

BNC2125 Continuous Cutting (Wear Resistance)



Work Material: SUJ2 (58-62HRC)
Tool Cat. No.: 4NC-DNGA150408
Cutting Conditions: vc = 150m/min, f = 0.1mm/rev, ap = 0.2mm Wet

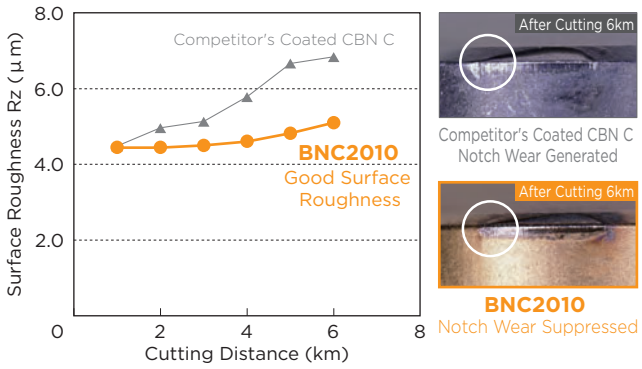
BNC2125 High-load Cutting (Fracture Resistance)



Work Material: SUJ2 (58-62HRC)
Tool Cat. No.: 4NC-DNGA150408
Cutting Conditions: vc = 150m/min, f = 0.15mm/rev, ap = 0.5mm, 63m/time Wet

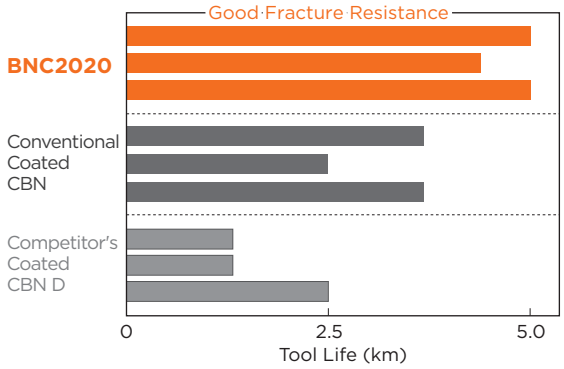
■ Cutting Performance

BNC2010 Continuous Cutting (Machined Surface Roughness)



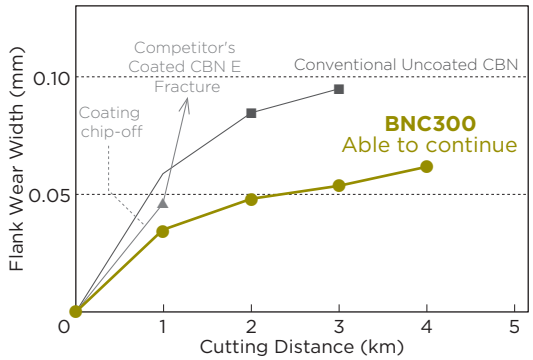
Work Material: SCM415H (58-62HRC)
Tool Cat. No.: 4NC-DNGA150408
Cutting Conditions: vc = 120m/min, f = 0.14mm/rev, ap = 0.15mm Wet

BNC2020 Interrupted Cutting (Fracture Resistance)



Work Material: SCM415H with 5 grooves (58 to 62HRC)
Tool Cat. No.: 4NC-CNGA120412
Cutting Conditions: vc = 130m/min, f = 0.1mm/rev, ap = 0.6mm Dry

BNC300 Interrupted Cutting (Fracture Resistance)

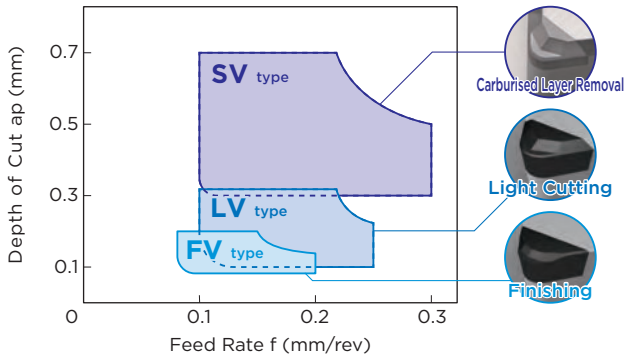


Work Material: Grooved SCr420 (58 to 62 HRC)
Tool Cat. No.: 4NC-CNGA120408
Cutting Conditions: vc = 120m/min, f = 0.1mm/rev, ap = 0.2mm Dry

BNC2105/BNC2115/BNC2125/BNC2010/BNC2020/BNC300

■ One-Use Insert with Chipbreaker BREAK MASTER

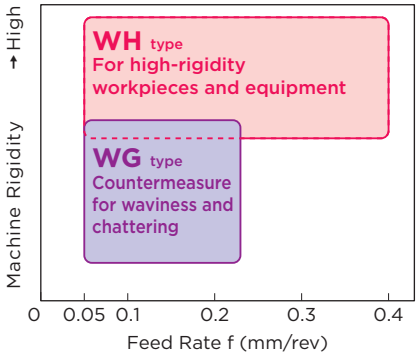
● Application Range



■ One-Use Wiper Insert

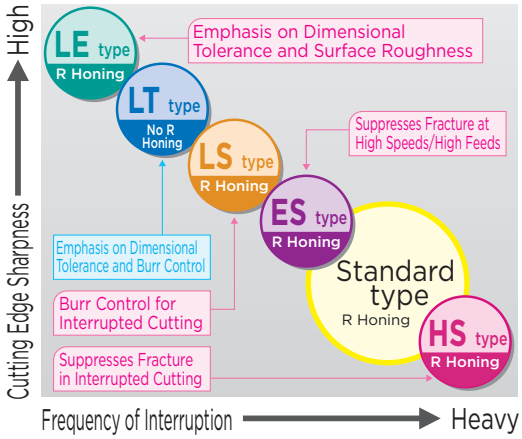
● Application Range

Precautions when Using Wiper Inserts P12



■ Cutting Edge Treatment Specification

Optimal cutting edge treatment applied to various grades and geometries to avoid cutting edge fracture caused by the heavy loads generated during the machining of high-hardness materials such as hardened steel.



High-precision type LE LT LS

World's smallest class edge treatment for coated CBN in hardened steel machining. Lowers cutting force

Strong Edged HS

Suppresses cutting edge chipping and fracture
Stable tool life in interrupted machining

High-efficiency type ES

Suppresses crater wear and its resultant edge chipping
Stable tool life in high-speed, high-feed machining

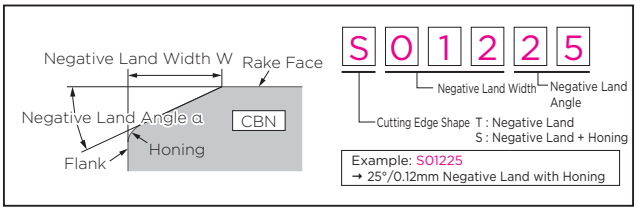
● Cutting Edge Specification List

Work Material	Grade	Neg.-Pos.	Standard				Low Cutting Force L / High-efficiency type E					Strong Edged H				
			Cutting Edge Specification Identification Code	α	W	Honing	Notation	Cutting Edge Specification Identification Code	α	W	Honing	Notation	Cutting Edge Specification Identification Code	α	W	Honing
Hardened Steel	BNC2105	Negative/Positive	S01225	25°	0.12	Yes	LS	S00515	15°	0.05	Yes	-	-	-	-	-
	BNC2115	Negative/Positive	S01225	25°	0.12	Yes	LS	S00515	15°	0.05	Yes	HS	S01730	30°	0.17	Yes
	BNC2125	Negative/Positive	S01225	25°	0.12	Yes	LS	S00515	15°	0.05	Yes	HS	S02735	35°	0.27	Yes
	BNC2010	Negative/Positive	S01225	25°	0.12	Yes	LE	-	0°	0	Yes	HS	S01730	30°	0.17	Yes
	BNC2020	Negative/Positive	S01225	25°	0.12	Yes	LT	T00515	15°	0.05	No	HS	S02735	35°	0.27	Yes
							ES	S00535	35°	0.05	Yes					
	BNC300	Negative/Positive	S01225	25°	0.12	Yes	LS	S00515	15°	0.05	Yes	HS	S01735	35°	0.17	Yes

● Cutting Edge Specification of Wiper/Chipbreaker Inserts (Common)

Type	Notation	Neg.-Pos.	Cutting Edge Specification Identification Code	α	W	Honing
Wiper Inserts	WG	Negative/Positive	S01215	15°	0.12	Yes
	WH	Negative/Positive	S01215	15°	0.12	Yes
Inserts with Chipbreaker	N-FV	Negative/Positive	-	0°	0	Yes
	N-LV	Negative/Positive	S00535	35°	0.05	Yes
	N-SV	Negative	S01235	35°	0.12	Yes

● Cutting Edge Specification Identification Code



BNC2105/BNC2115/BNC2125/BNC2010/BNC2020/BNC300

■ Stock Table: Negative type Multi-Cornered, One-Use Inserts

Negative 80° Diamond type

Appearance	Cat. No.	Stock						Dimensions (mm)				
		BNC2105 (New)	BNC2115	BNC2125	BNC2010	BNC2020	BNC300	No. of Cutting Edges	CBN Cutting Edge Length	Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	2NC-CNGA120404			●	●	●		2	2.5	12.7	4.76	5.16	0.4
	2NC-CNGA120408			●	●	●			2.4				0.8
	2NC-CNGA120412			●	●	●			2.3				1.2
For High-efficiency Machining	2NC-CNGA120416 *1				●	●	●	2	3.3	12.7	4.76	5.16	1.6
	2NC-CNGA120420 *1				●	●	●		3.2				2.0
	2NC-CNGA120424 *1				●	●	●		3.1				2.4
	4NC-CNGA120402		●	●	●	●		4	2.5	12.7	4.76	5.16	0.2
	4NC-CNGA120404	●	●	●	●	●	●		2.5				0.4
	4NC-CNGA120408	●	●	●	●	●	●		2.4				0.8
	4NC-CNGA120412	●	●	●	●	●	●		2.3				1.2
For High-efficiency Machining	4NC-CNGA120416 *1		●	●	●	●	●	4	3.3	12.7	4.76	5.16	1.6
	4NC-CNGA120420 *1		●	●	●	●	●		3.2				2.0
	4NC-CNGA120424 *1		●	●	●	●	●		3.1				2.4
WG	4NC-CNGA120404WG	●	●	●	●	●		4	2.4	12.7	4.76	5.16	0.4
	4NC-CNGA120408WG	●	●	●	●	●			2.4				0.8
	4NC-CNGA120412WG		●	●	●	●			2.3				1.2
WH	4NC-CNGA120404WH	●	●	●	●	●		4	2.4	12.7	4.76	5.16	0.4
	4NC-CNGA120408WH	●	●	●	●	●			2.3				0.8
	4NC-CNGA120412WH		●	●	●	●			2.2				1.2
FV	4NC-CNGG120404N-FV		●	●	●	●	—	4	2.5	12.7	4.76	5.16	0.4
	4NC-CNGG120408N-FV		●	●	●	●	—		2.4				0.8
	4NC-CNGG120412N-FV		●	●	●	●	—		2.3				1.2
LV	4NC-CNGG120404N-LV		●	●	●	●	—	4	2.5	12.7	4.76	5.16	0.4
	4NC-CNGG120408N-LV		●	●	●	●	—		2.4				0.8
	4NC-CNGG120412N-LV		●	●	●	●	—		2.3				1.2
SV	4NC-CNGG120404N-SV						—	4	2.5	12.7	4.76	5.16	0.4
	4NC-CNGG120408N-SV		●	●		●	—		2.4				0.8
	4NC-CNGG120412N-SV		●	●		●	—		2.3				1.2
LE	2NC-CNGA120404LE	—	—	—	●	—	—	2	2.5	12.7	4.76	5.16	0.4
	2NC-CNGA120408LE	—	—	—	●	—	—		2.4				0.8
	2NC-CNGA120412LE	—	—	—	●	—	—		2.3				1.2
LT	2NC-CNGA120402LT	—	—	—	—	●	—	2	2.5	12.7	4.76	5.16	0.2
	2NC-CNGA120404LT	—	—	—	—	●	—		2.5				0.4
	2NC-CNGA120408LT	—	—	—	—	●	—		2.4				0.8
	2NC-CNGA120412LT	—	—	—	—	●	—		2.3				1.2
LS	2NC-CNGA120402LS			●	—	—		2	2.5	12.7	4.76	5.16	0.2
	2NC-CNGA120404LS	●	●	●	—	—	●		2.5				0.4
	2NC-CNGA120408LS	●	●	●	—	—	●		2.4				0.8
	2NC-CNGA120412LS	●	●	●	—	—	●		2.3				1.2
HS	4NC-CNGA120404HS	—	●	●	●	●	●	4	2.5	12.7	4.76	5.16	0.4
	4NC-CNGA120408HS	—	●	●	●	●	●		2.4				0.8
	4NC-CNGA120412HS	—	●	●	●	●	●		2.3				1.2
ES	4NC-CNGA120404ES	—	—	—	—	●	—	4	2.5	12.7	4.76	5.16	0.4
	4NC-CNGA120408ES	—	—	—	—	●	—		2.4				0.8
	4NC-CNGA120412ES	—	—	—	—	●	—		2.3				1.2

*1 For use with SUMIBORON Special Holders for High-Efficiency Machining.

Negative 55° Diamond type

Appearance	Cat. No.	Stock						Dimensions (mm)				
		BNC2105 (New)	BNC2115	BNC2125	BNC2010	BNC2020	BNC300	No. of Cutting Edges	CBN Cutting Edge Length	Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	2NC-DNGA110404		●	●	●	●		2	2.5	9.525	4.76	3.81	0.4
	2NC-DNGA110408		●	●	●	●			2.1				0.8
	2NC-DNGA110412		●	●	●	●			2.0				1.2
	2NC-DNGA150404			●	●	●		2	2.5	12.7	4.76	5.16	0.4
	2NC-DNGA150408			●	●	●			2.1				0.8
	2NC-DNGA150412			●	●	●			2.0				1.2
For High-efficiency Machining	2NC-DNGA150416 *1				●	●	●	2	3.4	12.7	4.76	5.16	1.6
	2NC-DNGA150420 *1				●	●	●		3.0				2.0
	2NC-DNGA150424 *1				●	●	●		2.7				2.4
	4NC-DNGA150402		●	●	●	●		4	2.6	12.7	4.76	5.16	0.2
	4NC-DNGA150404	●	●	●	●	●	●		2.5				0.4
	4NC-DNGA150408	●	●	●	●	●	●		2.1				0.8
	4NC-DNGA150412		●	●	●	●	●		2.0				1.2
For High-efficiency Machining	4NC-DNGA150416 *1		●	●	●	●	●	4	3.4	12.7	4.76	5.16	1.6
	4NC-DNGA150420 *1		●	●	●	●	●		3.0				2.0
	4NC-DNGA150424 *1		●	●	●	●	●		2.7				2.4
	4NC-DNGA150604				●	●		4	2.5	12.7	6.35	5.16	0.4
	4NC-DNGA150608				●	●			2.1				0.8
	4NC-DNGA150612				●	●			2.0				1.2
WG	4NC-DNGA150404WG *2		●	●	●	●		4	2.3	12.7	4.76	5.16	0.4
	4NC-DNGA150408WG *2		●	●	●	●			2.0				0.8
WH	4NC-DNGA150404WH *2		●	●	●	●		4	2.1	12.7	4.76	5.16	0.4
	4NC-DNGA150408WH *2		●	●	●	●			1.8				0.8
FV	4NC-DNGG150404N-FV		●	●	●	●	—	4	2.5	12.7	4.76	5.16	0.4
	4NC-DNGG150408N-FV		●	●	●	●	—		2.1				0.8
	4NC-DNGG150412N-FV		●	●	●	●	—		2.0				1.2
LV	4NC-DNGG150404N-LV		●	●	●	●	—	4	2.5	12.7	4.76	5.16	0.4
	4NC-DNGG150408N-LV		●	●	●	●	—		2.1				0.8
	4NC-DNGG150412N-LV		●	●	●	●	—		2.0				1.2
SV	4NC-DNGG150404N-SV						—	4	2.5	12.7	4.76	5.16	0.4
	4NC-DNGG150408N-SV		●	●	●	●	—		2.1				0.8
	4NC-DNGG150412N-SV		●	●	●	●	—		2.0				1.2
LE	2NC-DNGA150404LE	—	—	—	●	—	—	2	2.5	12.7	4.76	5.16	0.4
	2NC-DNGA150408LE	—	—	—	●	—	—		2.1				0.8
	2NC-DNGA150412LE	—	—	—	●	—	—		2.0				1.2
LT	2NC-DNGA150402LT	—	—	—	—	●	—	2	2.6	12.7	4.76	5.16	0.2
	2NC-DNGA150404LT	—	—	—	—	●	—		2.5				0.4
	2NC-DNGA150408LT	—	—	—	—	●	—		2.1				0.8
	2NC-DNGA150412LT	—	—	—	—	●	—		2.0				1.2
LS	2NC-DNGA150402LS			●	—	—		2	2.5	12.7	4.76	5.16	0.2
	2NC-DNGA150404LS	●	●	●	—	—	●		2.5				0.4
	2NC-DNGA150408LS	●	●	●	—	—	●		2.1				0.8
	2NC-DNGA150412LS	●	●	●	—	—	●		2.0				1.2
HS	4NC-DNGA150404HS	—	●	●	●	●	●	4	2.5	12.7	4.76	5.16	0.4
	4NC-DNGA150408HS	—	●	●	●	●	●		2.1				0.8
	4NC-DNGA150412HS	—	●	●	●	●	●		2.0				1.2
ES	4NC-DNGA150404ES	—	—	—	—	●	—	4	2.5	12.7	4.76	5.16	0.4
	4NC-DNGA150408ES	—	—	—	—	●	—		2.1				0.8
	4NC-DNGA150412ES	—	—	—	—	●	—		2.0				1.2

*1 For use with SUMIBORON Special Holders for High-Efficiency Machining.
*2 Use a holder with a cutting angle of 93°.

Negative Square type

Appearance	Cat. No.	Stock						Dimensions (mm)				
		BNC2105 (New)	BNC2115	BNC2125	BNC2010	BNC2020	BNC300	No. of Cutting Edges	CBN Cutting Edge Length	Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	4NC-SNGA120404		●	●	●	●		4	2.5	12.7	4.76	5.16	0.4
	4NC-SNGA120408		●	●	●	●			2.3				0.8
	4NC-SNGA120412		●	●	●	●			2.1				1.2

Part Number Suffix Code

Detailed Cutting Edge Specifications P6

Type	Symbol	Applications
Wiper Insert	WG	Low-Feed
	WH	High-Feed
With Chipbreaker	FV	Finishing
	LV	Light Cutting
	SV	Carburised Layer Removal

Type	Symbol	Cutting Edge Treatment Specification
Standard type	No	(With) Honing
High-precision type	LE	Low Resistance + With Honing
	LT	Low Resistance + Negative Land
	LS	Low Resistance + Negative Land + With Honing
Strong Edged	HS	Strong Edge + Negative Land + With Honing
High-efficiency type	ES	High Efficiency + Negative Land + With Honing

● mark: Standard stocked item ● mark: Standard stocked item (new product), Blank: Made-to-order item, - mark: Not available

BNC2105/BNC2115/BNC2125/BNC2010/BNC2020/BNC300

■ Stock Table: Negative type Multi-Cornered, One-Use Inserts

Negative Triangular type

Appearance	Cat. No.	Stock BNC2105 (New)	BNC2115	BNC2125	BNC2010	BNC2020	BNC300	No. of Cutting Edges	Dimensions (mm) CBN Cutting Edge Length	Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	3NC-TNGA160404			●	●	●		3	2.3	9.525	4.76	3.81	0.4
	3NC-TNGA160408			●	●	●			2.0				0.8
	3NC-TNGA160412			●	●	●			2.0				1.2
For High-efficiency Machining	3NC-TNGA160416 *1				●	●	●		3.3				1.6
	3NC-TNGA160420*1				●	●	●	3	3.0	9.525	4.76	3.81	2.0
	3NC-TNGA160424*1				●	●	●		2.7				2.4
	6NC-TNGA160402		●	●	●	●		6	2.4	9.525	4.76	3.81	0.2
	6NC-TNGA160404	●	●	●	●	●	●		2.3				0.4
	6NC-TNGA160408	●	●	●	●	●	●		2.0				0.8
	6NC-TNGA160412		●	●	●	●	●		2.0				1.2
For High-efficiency Machining	6NC-TNGA160416 *1		●	●	●	●	●		3.3				1.6
	6NC-TNGA160420*1		●	●	●	●	●	6	3.0	9.525	4.76	3.81	2.0
For High-efficiency Machining	6NC-TNGA160424*1		●	●	●	●	●		2.7				2.4
FV	6NC-TNGG160404N-FV		●	●	●	●	—		2.3	9.525	4.76	3.81	0.4
	6NC-TNGG160408N-FV		●	●	●	●	—	6	2.0				0.8
	6NC-TNGG160412N-FV		●	●	●	●	—		2.0				1.2
LV	6NC-TNGG160404N-LV		●	●	●	●	—		2.3	9.525	4.76	3.81	0.4
	6NC-TNGG160408N-LV		●	●	●	●	—	6	2.0				0.8
	6NC-TNGG160412N-LV		●	●	●	●	—		2.0				1.2
SV	6NC-TNGG160404N-SV						—		2.3	9.525	4.76	3.81	0.4
	6NC-TNGG160408N-SV		●	●	●	●	—	6	2.0				0.8
	6NC-TNGG160412N-SV		●	●	●	●	—		2.0				1.2
LE	3NC-TNGA160404LE	—	—	—	●	—	—	3	2.3	9.525	4.76	3.81	0.4
	3NC-TNGA160408LE	—	—	—	●	—	—		2.0				0.8
	3NC-TNGA160412LE	—	—	—	●	—	—		2.0				1.2
LT	3NC-TNGA160402LT	—	—	—	—	●	—	3	2.4	9.525	4.76	3.81	0.2
	3NC-TNGA160404LT	—	—	—	—	●	—		2.3				0.4
	3NC-TNGA160408LT	—	—	—	—	●	—		2.0				0.8
	3NC-TNGA160412LT	—	—	—	—	●	—		2.0				1.2
LS	3NC-TNGA160402LS			●	—	—		3	2.4	9.525	4.76	3.81	0.2
	3NC-TNGA160404LS	●	●	●	—	—	●		2.3				0.4
	3NC-TNGA160408LS	●	●	●	—	—	●		2.0				0.8
	3NC-TNGA160412LS		●	●	—	—	●		2.0				1.2
HS	6NC-TNGA160404HS	—	●	●	●	●	●	6	2.3	9.525	4.76	3.81	0.4
	6NC-TNGA160408HS	—	●	●	●	●	●		2.0				0.8
	6NC-TNGA160412HS	—	●	●	●	●	●		2.0				1.2
ES	6NC-TNGA160404ES	—	—	—	—	●	—	6	2.3	9.525	4.76	3.81	0.4
	6NC-TNGA160408ES	—	—	—	—	●	—		2.0				0.8
	6NC-TNGA160412ES	—	—	—	—	●	—		2.0				1.2

*1 For use with SUMIBORON Special Holders for High-Efficiency Machining.

Negative Trigon type

Appearance	Cat. No.	Stock BNC2105 (New)	BNC2115	BNC2125	BNC2010	BNC2020	BNC300	No. of Cutting Edges	Dimensions (mm) CBN Cutting Edge Length	Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	6NC-WNGA080404		●	●	●	●			2.3				0.4
	6NC-WNGA080408	●	●	●	●	●		6	2.0	12.7	4.76	5.16	0.8
	6NC-WNGA080412		●	●	●	●			2.0				1.2
WG	6NC-WNGA080408WG		●	●	●	●		6	2.0	12.7	4.76	5.16	0.8
WH	6NC-WNGA080408WH		●	●	●	●		6	1.9	12.7	4.76	5.16	0.8
LT	3NC-WNGA080408LT	—	—	—	—	●	—	3	2.0	12.7	4.76	5.16	0.8
LS	3NC-WNGA080408LS	●	●	●	—	—		3	2.0	12.7	4.76	5.16	0.8
HS	6NC-WNGA080408HS		●	●	●	●		6	2.0	12.7	4.76	5.16	0.8

Negative 35° Diamond type

Appearance	Cat. No.	Stock BNC2105 (New)	BNC2115	BNC2125	BNC2010	BNC2020	BNC300	No. of Cutting Edges	Dimensions (mm) CBN Cutting Edge Length	Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	2NC-VNGA160404			●	●	●		2	2.8	9.525	4.76	3.81	0.4
	2NC-VNGA160408			●	●	●			2.0				0.8
	2NC-VNGA160412			●					1.7				1.2
	4NC-VNGA160402		●	●	●	●		4	3.3	9.525	4.76	3.81	0.2
	4NC-VNGA160404	●	●	●	●	●	●		2.8				0.4
	4NC-VNGA160408	●	●	●	●	●	●		2.0				0.8
	4NC-VNGA160412		●	●		●			1.7				1.2
FV	4NC-VNGG160404N-FV			●	●	●	—	4	2.8	9.525	4.76	3.81	0.4
	4NC-VNGG160408N-FV			●	●	●	—		2.0				0.8
LV	4NC-VNGG160404N-LV			●	●	●	—	4	2.8	9.525	4.76	3.81	0.4
	4NC-VNGG160408N-LV			●	●	●	—		2.0				0.8
LT	2NC-VNGA160402LT	—	—	—	—	●	—	2	3.3	9.525	4.76	3.81	0.2
	2NC-VNGA160404LT	—	—	—	—	●	—		2.8				0.4
	2NC-VNGA160408LT	—	—	—	—	●	—		2.0				0.8
	2NC-VNGA160412LT	—	—	—	—	●	—		1.7				1.2
LS	2NC-VNGA160402LS			●	—	—		2	3.3	9.525	4.76	3.81	0.2
	2NC-VNGA160404LS	●	●	●	—	—			2.8				0.4
	2NC-VNGA160408LS	●	●	●	—	—			2.0				0.8
	2NC-VNGA160412LS		●	●	—	—			1.7				1.2
HS	4NC-VNGA160404HS	—	●	●	●	●	●	4	2.8	9.525	4.76	3.81	0.4
	4NC-VNGA160408HS	—	●	●	●	●	●		2.0				0.8
	4NC-VNGA160412HS	—	●	●		●			1.7				1.2
ES	4NC-VNGA160404ES	—	—	—	—	●	—	4	2.8	9.525	4.76	3.81	0.4
	4NC-VNGA160408ES	—	—	—	—	●	—		2.0				0.8
	4NC-VNGA160412ES	—	—	—	—	●	—		1.7				1.2

Part Number Suffix Code

Detailed Cutting Edge Specifications P6

Type	Symbol	Applications
Wiper Insert	WG	Low-Feed
	WH	High-Feed
With Chipbreaker	FV	Finishing
	LV	Light Cutting
	SV	Carburised Layer Removal

Type	Symbol	Cutting Edge Treatment Specification
Standard type	No	(With) Honing
High-precision type	LE	Low Resistance + With Honing
	LT	Low Resistance + Negative Land
	LS	Low Resistance + Negative Land + With Honing
Strong Edged	HS	Strong Edge + Negative Land + With Honing
High-efficiency type	ES	High Efficiency + Negative Land + With Honing

● mark: Standard stocked item ● mark: Standard stocked item (new product), Blank: Made-to-order item, - mark: Not available

BNC2105/BNC2115/BNC2125/BNC2010/BNC2020/BNC300

■ Stock Table: Positive type Multi-Cornered, One-Use Inserts

Positive 80° Diamond type

Appearance	Relief Angle	Cat. No.	Stock BNC2105 (New)	BNC2115	BNC2125	BNC2010	BNC2020	BNC300	No. of Cutting Edges	Dimensions (mm) CBN Cutting Edge Length	Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	7°	2NC-CCGW060202	●	●	●	●	●			2.4				0.2
		2NC-CCGW060204	●	●	●	●	●		2	2.3	6.35	2.38	2.8	0.4
		2NC-CCGW060208		●	●					2.3				0.8
		2NC-CCGW09T302		●	●	●	●			2.5				0.2
		2NC-CCGW09T304	●	●	●	●	●	●	2	2.5	9.525	3.97	4.4	0.4
		2NC-CCGW09T308	●	●	●	●	●	●		2.4				0.8
WG	7°	2NC-CCGW09T304WG		●	●	●	●		2	2.4	9.525	3.97	4.4	0.4
		2NC-CCGW09T308WG		●	●	●	●			2.4				0.8
WH	7°	2NC-CCGW09T304WH		●	●	●	●		2	2.4	9.525	3.97	4.4	0.4
		2NC-CCGW09T308WH		●	●	●	●			2.3				0.8
FV	7°	2NC-CCGT060204N-FV		●	●	●	●	—	2	2.3	6.35	2.38	2.8	0.4
		2NC-CCGT09T304N-FV		●	●	●	●	—	2	2.4	9.525	3.97	4.4	0.4
		2NC-CCGT09T308N-FV		●	●	●	●	—		2.3				0.8
LV	7°	2NC-CCGT09T304N-LV		●	●	●	●	—	2	2.4	9.525	3.97	4.4	0.4
		2NC-CCGT09T308N-LV		●	●	●	●	—		2.3				0.8
LE	7°	2NC-CCGW060202LE	—	—	—	●	—	—	2	2.4	6.35	2.38	2.8	0.2
		2NC-CCGW060204LE	—	—	—	●	—	—		2.3				0.4
		2NC-CCGW09T302LE	—	—	—	●	—	—		2.5				0.2
		2NC-CCGW09T304LE	—	—	—	●	—	—	2	2.5	9.525	3.97	4.4	0.4
		2NC-CCGW09T308LE	—	—	—	●	—	—		2.4				0.8
LT	7°	2NC-CCGW060202LT	—	—	—	—	●	—	2	2.4	6.35	2.38	2.8	0.2
		2NC-CCGW060204LT	—	—	—	—	●	—		2.3				0.4
		2NC-CCGW09T302LT	—	—	—	—	●	—		2.5				0.2
		2NC-CCGW09T304LT	—	—	—	—	●	—	2	2.5	9.525	3.97	4.4	0.4
		2NC-CCGW09T308LT	—	—	—	—	●	—		2.4				0.8
LS	7°	2NC-CCGW060202LS		●	●	—	—		2	2.4	6.35	2.38	2.8	0.2
		2NC-CCGW060204LS		●	●	—	—			2.3				0.4
		2NC-CCGW060208LS		●	●	—	—			2.3				0.8
		2NC-CCGW09T302LS		●	●	—	—			2.5				0.2
		2NC-CCGW09T304LS	●	●	●	—	—	●	2	2.5	9.525	3.97	4.4	0.4
		2NC-CCGW09T308LS	●	●	●	—	—	●		2.4				0.8
HS	7°	2NC-CCGW09T304HS	—					●	2	2.5	9.525	3.97	4.4	0.4
		2NC-CCGW09T308HS	—					●		2.4				0.8
	11°	2NC-CPGW080202				●	●		2	2.5	7.94	2.38	3.4	0.2
		2NC-CPGW080204				●	●			2.5				0.4
		2NC-CPGW090302				●	●		2	2.5	7.94	2.38	3.4	0.2
		2NC-CPGW090304				●	●			2.5				0.4

Positive 55° Diamond type

Appearance	Relief Angle	Cat. No.	Stock BNC2105 (New)	BNC2115	BNC2125	BNC2010	BNC2020	BNC300	No. of Cutting Edges	Dimensions (mm) CBN Cutting Edge Length	Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	7°	2NC-DCGW070202	●	●	●	●	●			2.6				0.2
		2NC-DCGW070204	●	●	●	●	●		2	2.5	6.35	2.38	2.8	0.4
		2NC-DCGW070208		●	●	●	●			2.1				0.8
		2NC-DCGW11T302		●	●	●	●			2.7				0.2
		2NC-DCGW11T304	●	●	●	●	●	●	2	2.5	9.525	3.97	4.4	0.4
		2NC-DCGW11T308	●	●	●	●	●	●		2.1				0.8
WG	7°	2NC-DCGW11T304WG *2		●	●	●	●		2	2.3	9.525	3.97	4.4	0.4
		2NC-DCGW11T308WG *2		●	●	●	●			2.1				0.8
WH	7°	2NC-DCGW11T304WH *2		●	●	●	●		2	2.1	9.525	3.97	4.4	0.4
		2NC-DCGW11T308WH *2		●	●	●	●			1.8				0.8
FV	7°	2NC-DCGT070204N-FV		●	●	●	●	—	2	2.4	6.35	2.38	2.8	0.4
		2NC-DCGT11T304N-FV		●	●	●	●	—	2	2.4	9.525	3.97	4.4	0.4
		2NC-DCGT11T308N-FV		●	●	●	●	—		2.0				0.8
LV	7°	2NC-DCGT11T304N-LV		●	●	●	●	—	2	2.4	9.525	3.97	4.4	0.4
		2NC-DCGT11T308N-LV		●	●	●	●	—		2.0				0.8
LE	7°	2NC-DCGW11T302LE	—	—	—	●	—	—	2	2.7	9.525	3.18	4.4	0.2
		2NC-DCGW11T304LE	—	—	—	●	—	—		2.5				0.4
		2NC-DCGW11T308LE	—	—	—	●	—	—		2.1				0.8
LT	7°	2NC-DCGW070202LT	—	—	—	—	●	—	2	2.6	6.35	2.38	2.8	0.2
		2NC-DCGW070204LT	—	—	—	—	●	—		2.5				0.4
		2NC-DCGW11T302LT	—	—	—	—	●	—		2.7				0.2
		2NC-DCGW11T304LT	—	—	—	—	●	—	2	2.5	9.525	3.18	4.4	0.4
		2NC-DCGW11T308LT	—	—	—	—	●	—		2.1				0.8
LS	7°	2NC-DCGW070202LS		●	●	—	—		2	2.6	6.35	2.38	2.8	0.2
		2NC-DCGW070204LS		●	●	—	—			2.5				0.4
		2NC-DCGW070208LS		●	●	—	—			2.1				0.8
		2NC-DCGW11T302LS		●	●	—	—			2.7				0.2
		2NC-DCGW11T304LS	●	●	●	—	—	●	2	2.5	9.525	3.97	4.4	0.4
		2NC-DCGW11T308LS	●	●	●	—	—	●		2.1				0.8
HS	7°	2NC-DCGW11T304HS	—					●	2	2.5	9.525	3.97	4.4	0.4
		2NC-DCGW11T308HS	—					●		2.1				0.8

Positive Triangular type

Appearance	Relief Angle	Cat. No.	Stock BNC2105 (New)	BNC2115	BNC2125	BNC2010	BNC2020	BNC300	No. of Cutting Edges	Dimensions (mm) CBN Cutting Edge Length	Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	7°	3NC-TPGW080202		●	●	●	●		3	2.6	4.76	2.38	2.4	0.2
		3NC-TPGW080204		●	●	●	●			2.5				0.4
	7°	3NC-TPGW090202		●	●	●	●		3	2.6	5.56	2.38	2.8	0.2
		3NC-TPGW090204		●	●	●	●			2.5				0.4
	7°	3NC-TPGW110302		●	●	●	●		3	2.4	6.35	3.18	3.4	0.2
		3NC-TPGW110304	●	●	●	●	●	●		2.3				0.4
		3NC-TPGW110308	●	●	●	●	●	●		2.0				0.8
	7°	3NC-TPGW160404	●	●	●	●	●		3	2.3	9.525	4.76	4.4	0.4
		3NC-TPGW160408	●	●	●	●	●			2.0				0.8
FV	7°	3NC-TPGT110304N-FV		●	●	●	●	—	3	2.2	6.35	3.18	3.4	0.4
		3NC-TPGT110308N-FV		●	●	●	●	—		1.9				0.8
LE	7°	3NC-TPGW110302LE	—	—	—	●	—	—	3	2.4	6.35	3.18	3.4	0.2
		3NC-TPGW110304LE	—	—	—	●	—	—		2.3				0.4
		3NC-TPGW110308LE	—	—	—	●	—	—		2.0				0.8
LT	7°	3NC-TPGW110302LT	—	—	—	—	●	—	3	2.4	6.35	3.18	3.4	0.2
		3NC-TPGW110304LT	—	—	—	—	●	—		2.3				0.4
		3NC-TPGW110308LT	—	—	—	—	●	—		2.0				0.8
LS	7°	3NC-TPGW110302LS		●	●	—	—		3	2.6	6.35	3.18	3.4	0.2
		3NC-TPGW110304LS	●	●	●	—	—	●		2.3				0.4
		3NC-TPGW110308LS	●	●	●	—	—	●		2.0				0.8
HS	7°	3NC-TPGW110304HS	—					●	3	2.3	6.35	3.18	3.4	0.4
		3NC-TPGW110308HS	—					●		2.0				0.8
	7°	3NC-TPGW160404HS	—		●	●	●		3	2.3	9.525	4.76	4.4	0.4
		3NC-TPGW160408HS	—		●	●	●			2.0				0.8

Positive 35° Diamond type

Appearance	Relief Angle	Cat. No.	Stock BNC2105 (New)	BNC2115	BNC2125	BNC2010	BNC2020	BNC300	No. of Cutting Edges	Dimensions (mm) CBN Cutting Edge Length	Inscribed Circle	Thickness	Hole Dia.	Corner Radius
	5°	2NC-VBGW110302		●	●	●	●		2	3.2	6.35	3.18	2.8	0.2
		2NC-VBGW110304		●	●	●	●			2.8	6.35	3.18	2.8	0.4
		2NC-VBGW110308		●	●	●	●			2.0	6.35	3.18	2.8	0.8
	5°	2NC-VBGW160402		●	●	●	●		2	3.8	9.525	4.76	4.4	0.2
		2NC-VBGW160404	●	●	●	●	●			3.3	9.525	4.76	4.4	0.4
		2NC-VBGW160408	●	●	●	●	●			2.5	9.525	4.76	4.4	0.8
LE	5°	2NC-VBGW160402LE	—	—	—	●	—	—	2	3.8	9.525	4.76	4.4	0.2
		2NC-VBGW160404LE	—	—	—	●	—	—		3.3	9.525	4.76	4.4	0.4
		2NC-VBGW160408LE	—	—	—	●	—	—		2.5	9.525	4.76	4.4	0.8
LT	5°	2NC-VBGW110302LT	—	—	—	—	●	—	2	3.2	6.35	3.18	2.8	0.2
		2NC-VBGW110304LT	—	—	—	—	●	—		2.8	6.35	3.18	2.8	0.4
	5°	2NC-VBGW160402LT	—	—	—	—	●	—	2	3.8	9.525	4.76	4.4	0.2
		2NC-VBGW160404LT	—	—	—	—	●	—		3.3	9.525	4.76	4.4	0.4
		2NC-VBGW160408LT	—	—	—	—	●	—		2.5	9.525	4.76	4.4	0.8
LS	5°	2NC-VBGW110302LS		●	●	—	—		2	3.2	6.35	3.18	2.8	0.2
		2NC-VBGW110304LS		●	●	—	—			2.8	6.35	3.18	2.8	0.4
		2NC-VBGW110308LS		●	●	—	—			2.0	6.35	3.18	2.8	0.8
	5°	2NC-VBGW160402LS		●	●	—	—		2	3.8	9.525	4.76	4.4	0.2
		2NC-VBGW160404LS	●	●	●	—	—			3.3	9.525	4.76	4.4	0.4
		2NC-VBGW160408LS	●	●	●	—	—			2.5	9.525	4.76	4.4	0.8
	7°	2NC-VCGW080202				●	●		2	3.3	4.76	2.38	2.3	0.2
		2NC-VCGW080204				●	●			2.8	4.76	2.38	2.3	0.4
	7°	2NC-VCGW160404	●	●	●	●	●		2	2.8	9.525	4.76	4.4	0.4
		2NC-VCGW160408	●	●	●	●	●			1.9	9.525	4.76	4.4	0.8
LS	7°	2NC-VCGW160404LS	●	●	●	—	—		2	2.8	9.525	4.76	4.4	0.4
		2NC-VCGW160408LS	●	●	●	—	—			1.9	9.525	4.76	4.4	0.8
HS	7°	2NC-VCGW160404HS	—		●	●	●		2	2.8	9.525	4.76	4.4	0.4
		2NC-VCGW160408HS	—		●	●	●			1.9	9.525	4.76	4.4	0.8

Part Number Suffix Code

Detailed Cutting Edge Specifications P6

Type	Symbol	Applications
Wiper Insert	WG	Low-Feed
	WH	High-Feed
With Chipbreaker	FV	Finishing
	LV	Light Cutting
	SV	Carburised Layer Removal

Type	Symbol	Cutting Edge Treatment Specification
Standard type	No	(With) Honing
High-precision type	LE	Low Resistance + With Honing
	LT	Low Resistance + Negative Land
	LS	Low Resistance + Negative Land + With Honing
Strong Edged	HS	Strong Edge + Negative Land + With Honing

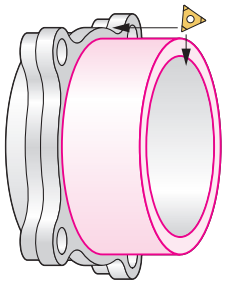
*2: Use a holder with a cutting angle of 93°.

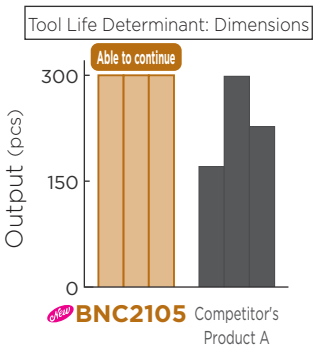
● mark: Standard stocked item ● mark: Standard stocked item (new product), Blank: Made-to-order item, - mark: Not available

■ Application Examples of BNC2105 / BNC2115 / BNC2125

SUJ2 Bearing Steel Hub (60HRC) H

BNC2105 suppresses fractures due to crater wear and realises stable machining

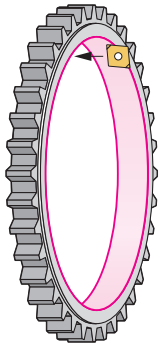


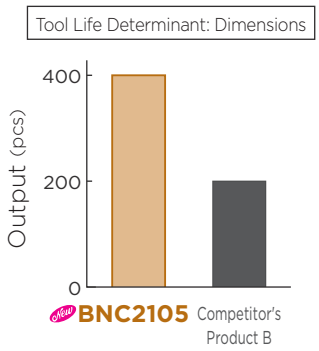


Tool: 6NC-TNGA160408 (BNC2105)
Cutting Conditions: vc = 230m/min, f = 0.12mm/rev, ap = 0.10mm Wet

SCr420H Hardened Steel Ring Gear (60HRC) H

BNC2105 maintains excellent wear resistance for a long time compared to competitors' coated CBN

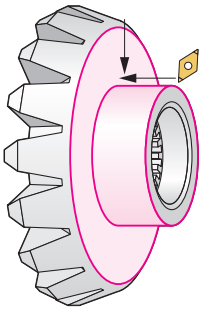


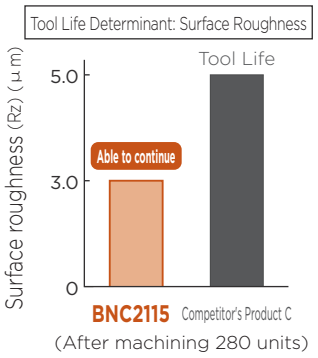


Tool: 4NC-CNGA120412 (BNC2105)
Cutting Conditions: vc = 200m/min, f = 0.10mm/rev, ap = 0.10mm Wet

SCM415H Hardened Steel Gear (60HRC) H

Compared to competitors' coated CBN, BNC2115 reduces flank wear width by 30%, able to continue with good surface roughness

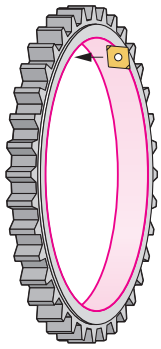


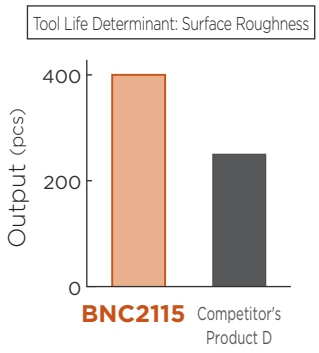


Tool: 4NC-DNGA150404 (BNC2115)
Cutting Conditions: vc = 160m/min, f = 0.10mm/rev, ap = 0.25mm Wet

SCr440H Hardened Steel Ring Gear (60HRC) H

BNC2115 WH type wiper insert maintains excellent surface roughness for a long time compared to competitors' coated CBN (wiper insert)

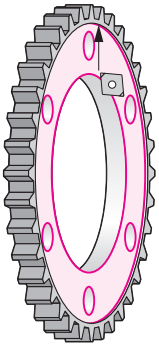


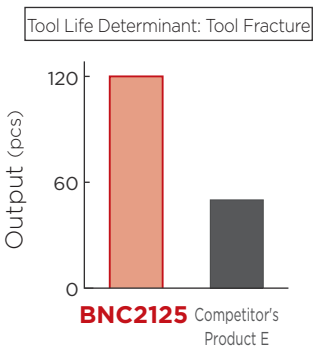


Tool: 2NC-CCGW09T308WH (BNC2115)
Cutting Conditions: vc = 150m/min, f = 0.12mm/rev, ap = 0.10mm Wet

SCr420H Hardened Steel Ring Gear (60HRC) H

BNC2125 suppresses fractures due to crater wear and realises at least double the tool life

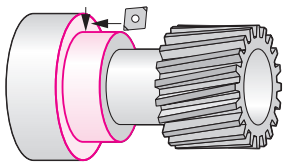


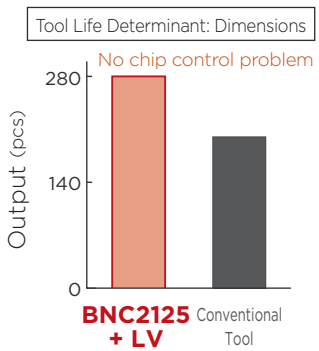


Tool: 4NC-CNGA120412 (BNC2125)
Cutting Conditions: vc = 150m/min, f = 0.2mm/rev, ap = 0.3mm Dry

S15C Hardened Steel Sun Gear (60HRC) H

BNC2125 BREAK MASTER LV type offers long tool life and resolves chip control problems



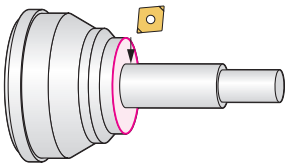


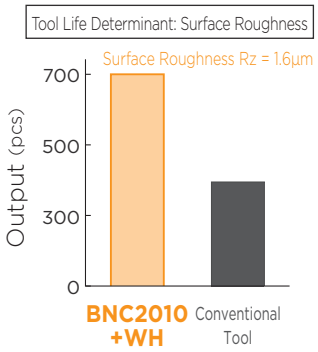
Tool: 4NC-CNGG120408N-LV (BNC2125)
Cutting Conditions: vc = 190m/min, f = 0.13mm/rev, ap = 0.30mm Wet

■ Application Examples of BNC2010 / BNC2020 / BNC300

S45C Hardened Steel CVJ Outer Race (60HRC) H

BNC2010 WH type wiper insert maintains excellent surface roughness for a long time

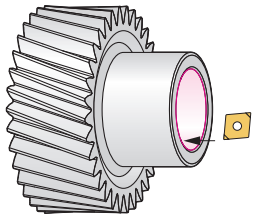


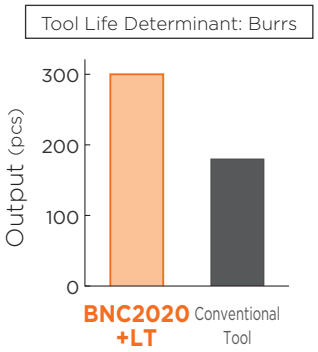


Tool: 2NC-CNGA120412WH (BNC2010)
Cutting Conditions: vc = 150m/min, f = 0.2mm/rev, ap = 0.2mm Dry

SCr420H Hardened Steel Gear (60HRC) H

BNC2020 with high-precision LT type cutting edge treatment suppresses burrs and improves tool life

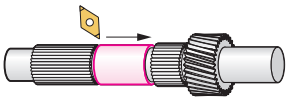


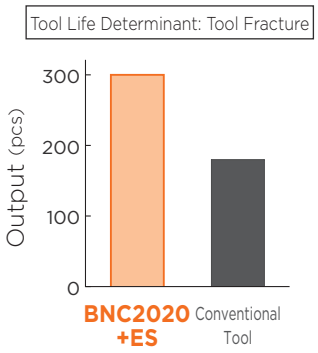


Tool: 2NC-CNGA120408LT (BNC2020)
Cutting Conditions: vc = 100m/min, f = 0.10mm/rev, ap = 0.15mm Dry

SCr420H Hardened Steel Shaft (60HRC) H

BNC2020 with high-efficiency ES type cutting edge treatment suppresses fractures due to crater wear and offers long tool life

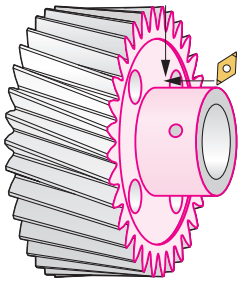


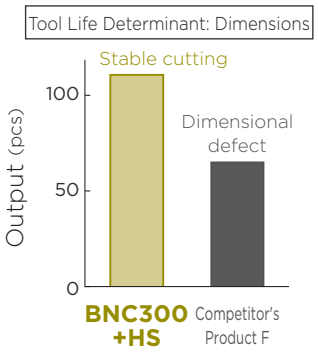


Tool: 4NC-DNGA150408ES (BNC2020)
Cutting Conditions: vc = 150m/min, f = 0.15mm/rev, ap = 0.10mm Dry

SCM420H Hardened Steel Gear (62HRC) H

BNC300 with strong edged HS type cutting edge treatment enables stable machining without fractures in interrupted cutting



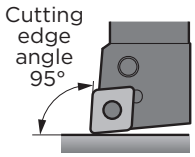


Tool: 4NC-DNGA150408HS (BNC300)
Cutting Conditions: vc = 100m/min, f = 0.1mm/rev, ap = 0.3mm Dry

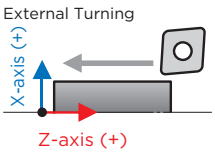
■ Precautions when Using Wiper Inserts

When using CNGA type / CCGW type / WNGA type Wiper Inserts

Use a holder with a cutting angle of 95°.
Machining program modification is required.
CNGA, CCGW and WNGA type wiper inserts do not comply with the ISO standard profiles. Correct the cutting edge position (tool offset) as explained on the right.



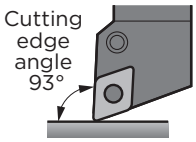
Cutting Edge Position Correction for CNGA type / CCGW type / WNGA type (WG type / WH type)



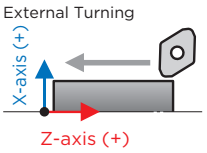
Corner Radius	Type	X-axis direction	Z-axis direction
R0.4	WG type	-0.02	-0.02
	WH type	-0.06	-0.06
R0.8 / R1.2	WG type	-0.01	-0.01
	WH type	-0.06	-0.06

When using DNGA type / DCGW type Wiper Inserts

Use a holder with a cutting angle of 93°.
Machining program modification is required.
DNGA and DCGW type wiper inserts do not comply with the ISO standard profiles. Correct the cutting edge position (tool offset) as explained on the right.



Cutting Edge Position Correction for DNGA type / DCGW type (WG type / WH type)



Corner Radius	Type	X-axis direction	Z-axis direction
R0.4	WG type	-0.17	-0.01
	WH type	-0.70	-0.06
R0.8	WG type	-0.05	0
	WH type	-0.58	-0.05

Note: Unlike other contour shapes, the DNGA/DCGW types can only exhibit wiper effect for external and internal diameter machining, and cannot be used for facing.

< SAFETY NOTES >

- Very hot or lengthy chips may be discharged while the machine is in operation. Therefore, machine guards, safety goggles or other protective covers must be used. Fire safety precautions must also be considered.
- Please handle with care as this product has sharp edges.
- Improper cutting conditions or mis-handling of the tool may result in breakages or projectiles. Therefore, please use the tool within its recommended conditions.
- When using non-water soluble cutting oil, precautions against fire must be taken and please ensure that a fire extinguisher is placed near the machine.

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