

L-M



SUMITOMO

CARBIDE - CBN - DIAMOND

20|21

CBN/PCD TOOLS

CBN Inserts and Tools | PCD Inserts and Tools

SUMITOMO
ELECTRIC
GROUP

SUMIBORON SUMIDIA

L1–L30



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New generation Sumiboron inserts – an even better way to machine hardened steels







■ General

Building on its global success machining hardened steels with Sumiboron inserts the addition of heat and wear resistant coatings to a variety of tough new CBN substrates has resulted in a new generation of high performance grades. With economy in mind the new inserts are multi cornered.

Choose the coated insert suitable for your application and take your hard part machining operations to the new industry standard.

■ Types and Application

Type	ISO	Grade	Application	Characteristic	Hardness Hv (GPa)	TRS (GPa)
Microstructure  Uncoated CBN	H	BN1000	High speed Continuous cutting	Best wear resistance grade and suitable for high speed continuous cutting	27–31	0,90–1,00
		BN2000	Continuous and Interrupted cutting	Micro-grain CBN with Ceramic binder improves fracture toughness and wear resistance	31–34	1,05–1,15
		BNX25	High efficiency cutting (Continuous–Interrupted)	Binder with high heat resistance improves tool life during high speed machining	31–33	0,95–1,10
		BNX25	High speed Interrupted cutting	Superior fracture toughness in high speed cutting and suitable for high speed interrupted hard turning	29–31	1,00–1,10
		BN350	Interrupted cutting (Heavy)	Micro-grain CBN with higher fracture toughness that improves cutting edge strength	33–35	1,20–1,30
Microstructure  Coated CBN	H	BNC2010	High precision continuous cutting	New generation TiCN layer improves notch wear resistance and provides an excellent surface finish.	30–32	1,10–1,20
		BNC100	High speed continuous and light interrupted cutting	High speed finishing grade for continuous and light interrupted cutting applications	29–32	1,00–1,10
		BNC160	High precision continuous cutting	High precision grade for continuous cutting - ideal when an excellent surface finish is required	31–33	1,10–1,20
		BNC2020	High efficiency general purpose	New coating technology offers excellent adhesion during both continuous and interrupted cut applications.	34–36	1,20–1,30
		BNC200	Continuous and Interrupted cutting (Light–Medium Interrupted)	General purpose grade with low to high speed cutting capability and extended tool life - removes the carburised layer on heat treated components	33–35	1,10–1,20
		BNC300	Interrupted cutting (Heavy)	Tough grade for heavy interrupted cutting applications	33–35	1,15–1,25
		BNC500	GG and GGG machining	For Cast Iron machining with a good balance of wear and fracture resistance	32–34	1,00–1,10
Microstructure  Uncoated CBN	S PM	BN7000	High speed machining of GG Cast Iron machining Iron based products Rolls of high hardness Heat resistant alloy	First choice for high speed finishing of grey cast iron	41–44	1,25–1,35
		BN7500	High efficiency machining of powdered metal	Less burrs when machining sintered parts due to excellent edge sharpness	41–44	1,40–1,50
		BNS800	High speed machining of GG Machining rolls of high hardness Sintered component roughing Special cast Iron machining	High thermal impact resistance with high heat transfer ability and higher CBN content ratio	39–42	0,95–1,10
Binderless CBN 	S K	NCB100	Ultimate CBN grade achieves highly efficient and precise finishing of hard-to-cut materials	Binderless CBN is harder and has better thermal conductivity. Therefore, it enables higher efficiency and longer tool life in machining of hard-to-cut materials, such as titanium alloy and cobalt-chromium alloy.	51–54	1,8–1,9

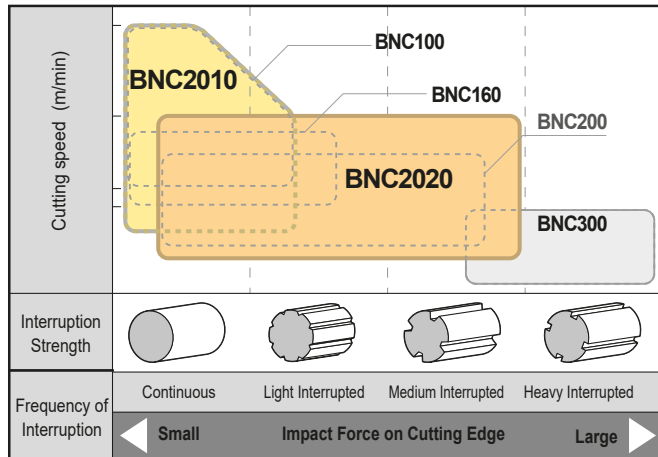
H

HARDENED STEEL MACHINING

Advantages of using CBN

In terms of cost investment, it is much lower in machine cost and overhead cost due to the fact that a CNC lathe is cheaper than a grinding machine. As for the quality of finish, inserts can machine different profiles and the finishing is also commendable as compared to grinding. Environmentally, sludge treatment for grinding is a hazard to the environment but for turning, the chips can be collected and recycled.

Application Range



Application	Conditions	Recommended Cutting Speed (m/min)			
		100	200	300	400
Hardened Steel	General Purpos (Continuous to Light interrupted Rz = above 3,2)	BNC2020 / BNC2010		BNC200 / BNC100	
		BNC300			
	Heavy Interrupted	BNC2010			
	High Precision (Rz = 1,6 to 3,2)	BNC160			
	High Efficiency (Carburized layer removal)	BNC2020		BNC200	
Cast Iron	Ductile Cast Iron	BNC500			

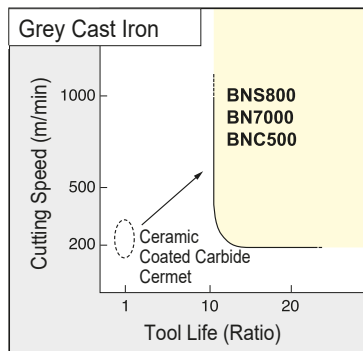
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CAST IRON MACHINING

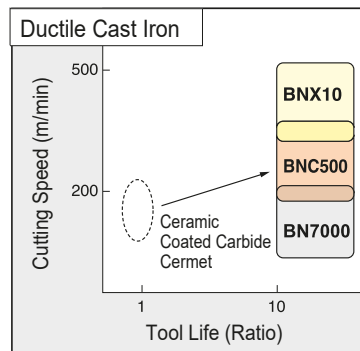
Advantages of using CBN

Following charts show merits of using CBN in cast iron machining compared with conventional tools, such as carbide, cermet or ceramics. SumiBoron performs longer tool life than conventional tools in high speed machining and brings higher efficiency and superior precision.

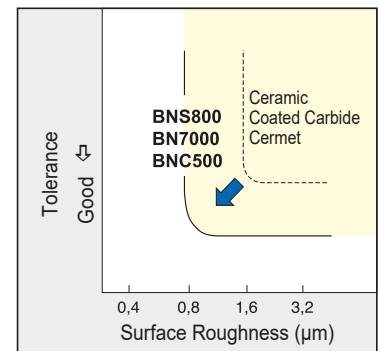
High Speed Machining



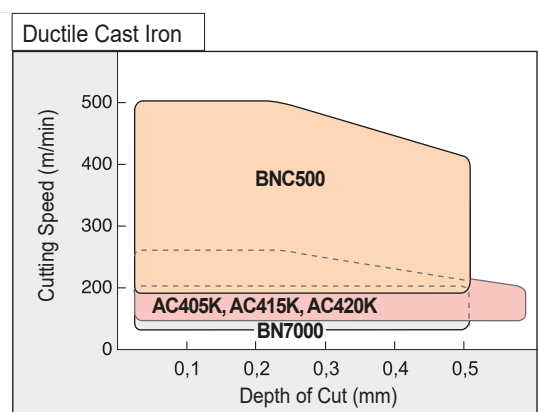
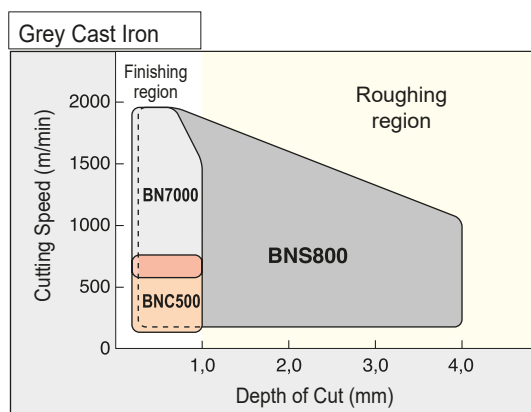
High Speed Machining



High Precision Machining



Application Range



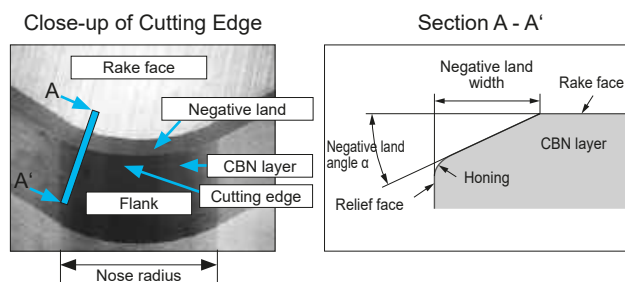
Edge Specification of SUMIBORON Inserts

Sumiboron Inserts and Edge Preparation

All SUMIBORON inserts are enhanced with the optimum cutting edge preparation for various grades and geometries (shown on the right).

This is to avoid cutting edge fracture caused by the heavy loads generated during the machining of high hardness materials such as Hardened Steel.

As the pioneer of CBN tools „SUMIBORON“, various selection of grades and edge preparation combinations is our strong point for Hardened Steel machining.



SUMIBORON Insert Cutting Edge Specification

Series	Work Material	Grade	Negative / Positive	Standard				Low Resistance Type L / High Efficiency Type E				Strong Edge Type H						
				Identification Code	α	W	Honing	Notation	Identification Code	α	W	Honing	Notation	Identification Code	α	W	Honing	
Uncoated SUMIBORON	Hardened Steel	BNX10	Neg./Pos.	T01225	25°	0,12	No	-	-	-	-	-	-	-	-	-	-	
		BNX20	Neg./Pos.	S01225	25°	0,12	Yes	LT	T01215*	15°	0,12	No	-	-	-	-	-	
		BNX25	Neg./Pos.	S01725	25°	0,17	Yes	-	-	-	-	-	-	-	-	-	-	
		BN1000	Neg./Pos.	S01225	25°	0,12	Yes	-	-	-	-	-	-	-	-	-	-	
		BN2000	Neg./Pos.	S01225	25°	0,12	Yes	LT	T01215	15°	0,12	No	HS	S01235	35°	0,12	Yes	
		BN350	Neg. / Pos.	T01225 / T01235	25° / 35°	0,12	No	-	-	-	-	-	-	-	-	-	-	
	Cast Iron	Exotic Alloy	BN700	Neg./Pos.	T01215	15°	0,12	No	LF	(Sharp edge)	0°	0	No	HS	S01225	25°	0,12	Yes
			BN7000	Neg./Pos.	T01215	15°	0,12	No	LF	(Sharp edge)	0°	0	No	HS	S01225	25°	0,12	Yes
		Exotic Alloy	BN7500	Neg./Pos.	T01215	15°	0,12	No	LE	(Sharp edge)	0°	0	No	HS	S00525	25°	0,05	Yes
			BNS800	Neg.	T02020	20°	0,20	No	LF	(Sharp edge)	0°	0	No	-	-	-	-	-
BNS800			Neg.	T02020	20°	0,20	No	LF	(Sharp edge)	0°	0	No	-	-	-	-	-	
Coated SUMIBORON	Hardened Steel	BNC2010	Neg./Pos.	S01225	25°	0,12	Yes	LE	(Sharp edge)	0°	0	Yes	HS	S01730	30°	0,17	Yes	
		BNC2020	Neg./Pos.	S01225	25°	0,12	Yes	LT	T00515	15°	0,05	No	HS	S02735	35°	0,27	Yes	
		BNC100	Neg./Pos.	S01225	25°	0,12	Yes	ES	S00535	35°	0,05	Yes	-	-	-	-		
		BNC160	Neg./Pos.	S01225	25°	0,12	Yes	LS	S01715	15°	0,17	Yes	-	-	-	-		
		BNC200	Neg./Pos.	S01225	25°	0,12	Yes	LS	S01020	20°	0,10	Yes	HS	S01730	30°	0,17	Yes	
		BNC300	Neg./Pos.	S01225	25°	0,12	Yes	LS	S01015	15°	0,10	Yes	HS	S01735	35°	0,17	Yes	
	Cast Iron	BNC500	Neg./Pos.	S01215	15°	0,12	Yes	-	-	-	-	-	HS	S01225	25°	0,12	Yes	
	Binder-less CBN	Cast Iron, Exotic Alloy, Carbide, Cermet	NCB100	Neg./Pos.	T01215	15°	0,12	No	-	-	-	-	-	-	-	-	-	

* BNX20 Identification code will be T00715 for inserts with inscribed circle of less than Ø 4,76.

Cutting Edge Preparation of Inserts with Wiper / Chipbreakers

Series	Work Material	Grade	Other Types						
			Notation	Identification Code	α	W	Honing	Type	
Uncoated SUMIBORON	Hardened Steel	BN2000	WG	S01215	15°	0,12	Yes	Wiper	
			WH	S01215	15°	0,12	Yes	Wiper	
			N-FV	-	0°	0	Yes	With breaker	
			N-LV	S00535	35°	0,05	Yes	With breaker	
	Cast Iron Exotic Alloy	BNS800	W	T02020	20°	0,20	No	Wiper	
			LFW	(Sharp edge)	0°	0	No	With sharpe edge	
Coated SUMIBORON	Hardened Steel	BNC2010 BNC2020	WG	S01215	15°	0,12	Yes	Wiper	
			WH	S01215	15°	0,12	Yes	Wiper	
			N-FV	-	0°	0	Yes	With breaker	
			N-LV	S00535	35°	0,05	Yes	With breaker	
			N-SV	S01235	35°	0,12	Yes	With breaker	
		BNC100	W	S01715	15°	0,17	Yes	Wiper	
		BNC160 BNC200	WG	S01215	15°	0,12	Yes	Wiper	
			WH	S01215	15°	0,12	Yes	Wiper	
			W	S01215	15°	0,12	Yes	Wiper	
			N-FV	-	0°	0	Yes	With breaker	
	N-LV		S00535	35°	0,05	Yes	With breaker		
				N-SV	S01235	35°	0,12	Yes	With breaker
	Cast Iron	BNC500	W	S01215	15°	0,12	Yes	Wiper	

Cutting Edge Specification Identification Code

Notation of Edge Preparation			
No.	Standard Type		
L	Low cutting forces	F	Sharp edge
E		E	Honing
E	High efficiency	T	Negative land
H		S	Negative land + honing
WG / WH / W		Wiper	
N-FV / N-LV / N-SV		With Chipbreaker	

Edge Preparation Identification Code

S 0 1 2 2 5

W: Negative land width α : Negative land angle

Cutting edge: T - Negative land
S - Negative land + R - Honing

Example: **S01225**
→ 25°/0,12 mm width negative land with honing

SUMIBORON

Insert Types and Cutting Edge Geometries

Multi Cornered One-Use Type Inserts

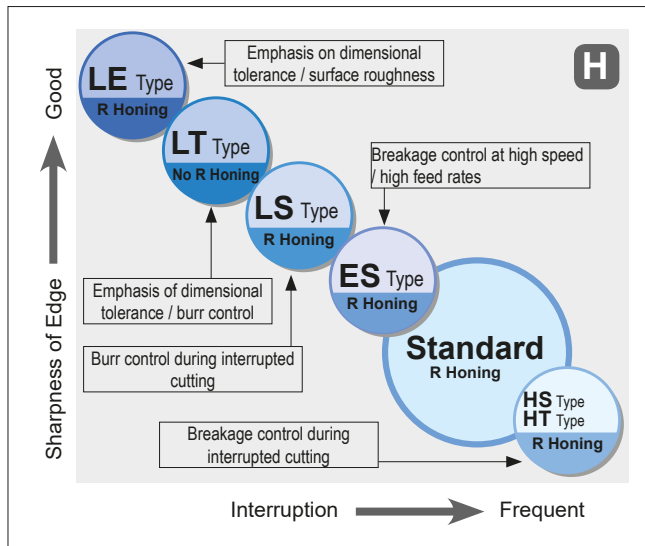


■ Characteristics

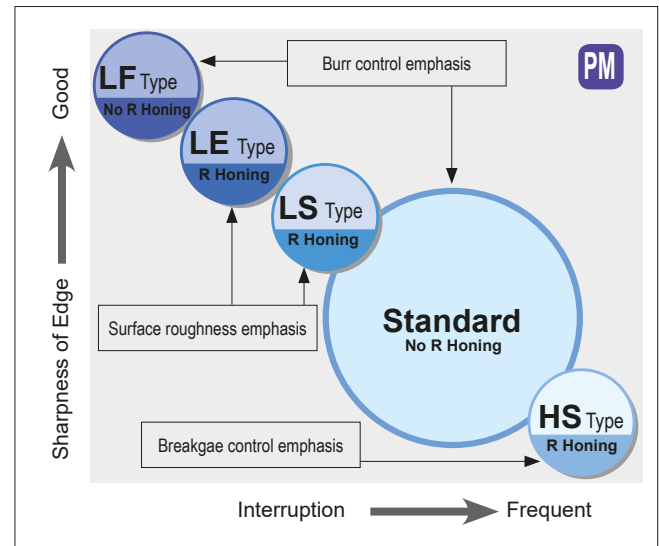
- One-use type inserts improve machining efficiency by using each cutting edge to its full potential following the numbering system on each cutting edge then throwing the insert away.
- Multi cornered inserts have a single piece of Sumiboron mounted on every useable corner. Single sided inserts use the top corners whilst double sided inserts use both top and bottom corners. Diamond shaped inserts have 4 corners and triangular inserts have 6 corners.
- A variety of Sumiboron coated grades readily replace expensive grinding operations for high precision tolerances outstanding surface finish, heavy interrupted cutting and efficient cost effective machining of hardened parts.

Cutting Edge Preparation

Machining of Hardened Steel



Sintered Alloy Machining



One-Use Wiper Insert



■ Characteristics

- New lineup includes:
 - WG Type ⇨ for low-feed cutting
 - WH Type ⇨ for high-feed cutting
- SUMIBORON one-use insert with wiper edge for hardened steel machining
- Excellent surface finish similar to grinding
- Improved efficiency with higher speeds and feeds

Break Master N - FV, N - LV, N - SV



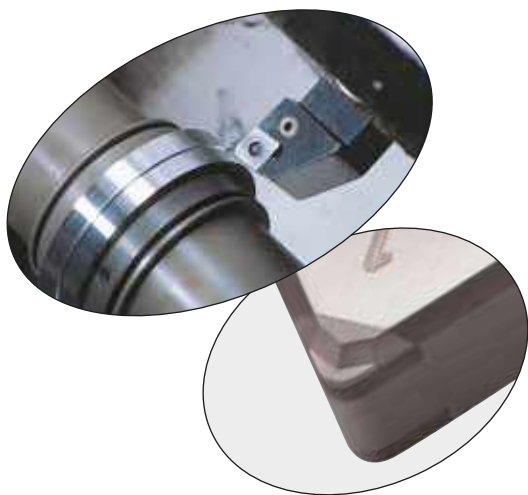
Break Master N-SV Type

■ Characteristics

- N-SV type is perfect for carburised layer removal while N-FV / N-LV types are best suited to finishing of hardened steel.
- First CBN insert to feature an integral chipbreaker
- Ideal for removing carburised layer - can be used on both hardened and unhardened materials.
- Effective chip control solution protects component from swarf damage.

SUMIBORON Insert With Chipbreaker Break Master N-FV /-LV /-SV

H Hardened Steel



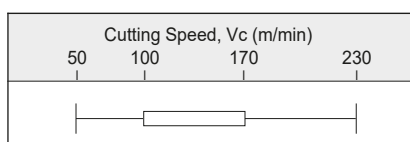
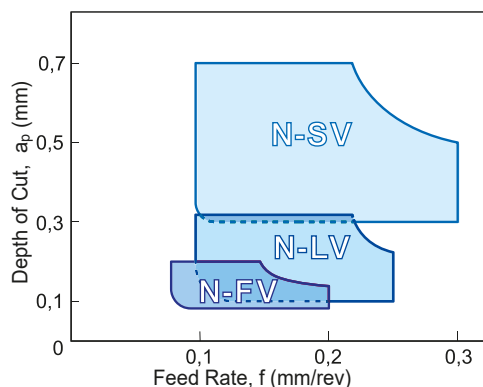
Characteristics

- SUMIBORON one-use insert with chipbreaker.
- N-SV type is perfect for carburised layer removal while N-FV/N-LV types are best suited to finishing of hardened steel.
- Breaker included on the CBN edge, chipbreaking effect can be maintained throughout machining process.
- Unique breaker design can be applied to both hardened and non-hardened parts with effective chip control.
- SV type lineup now includes BNC2010/BNC160 for good wear resistance, while SUMIBORON BNC2020/BNC200 allows high efficiency machining.

In addition to general purpose SUMIBORON BNC2020/BNC200, the

- N-FV / N-LV type lineup includes BNC2010/BNC160 for excellent wear resistance and general purpose uncoated SUMIBORON BN2000.

Application Range



* When machining heat treated steel harder than H_RC50 the depth of cut should not exceed 0,5 mm.

Application Examples

External Carburised Layer Removal	
<p>No constant stopages or incorrect part dimension problem and the chips are small.</p> <p>Double the tool life of competitor's CBN</p> <p>Work material: 42CrMo4, Carburised steel (shaft) Insert: CNGG 120408 N-SV NC4 (BNC200) Conditions: $v_c = 150$ m/min, $f = 0,15$ mm/rev, $a_p = 0,5$mm, x 2 passes, wet</p>	<p>Break Master N-SV Tool life = 200 pcs</p>
	<p>BNC200 (no breaker) Tool life = 200 pcs</p>
	<p>Comp. CBN (no breaker) Tool life = 100 pcs</p>

Carburised Face Layer Removal	
<p>Break Master N-SV type improves chip control with increased productivity until the pre-set tool life.</p>	<p>Break Master N-SV: No chip control problem</p> <p>No breaker: Constant chip control problem</p> <p>No. of pcs / unit of time (relative)</p>
	<p>Work material: 42CrMo4 (HRC30-62) Insert: CNGG 120408 N-SV NC4 (BNC200) Conditions: $v_c = 140$ m/min, $f = 0,15$ mm/rev, $a_p = 0,3$ mm, wet</p>

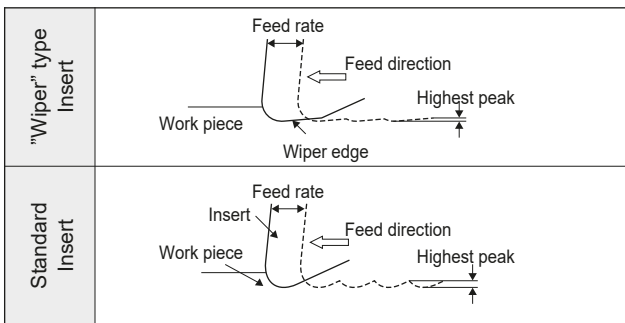


■ Characteristics

- SUMIBORON one-use insert with wiper edge for hardened steel machining
- Excellent surface finish similar to grinding
- Improved efficiency with higher speeds and feeds
- New lineup includes:
 - WG** type ⇨ for low-feed cutting
 - WH** type ⇨ for high-feed cutting



■ Purpose of Wiper Edge



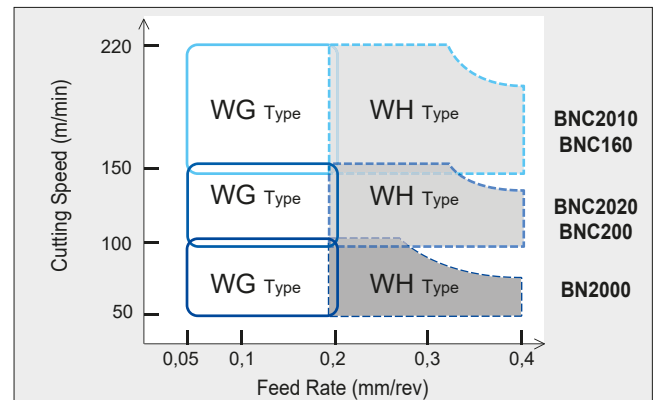
■ Surface Roughness of Wiper Insert

	"Wiper" Insert (RE 0,8)		Standard Insert (RE0,8)	
	Finishing (f = 0,10 mm/rev)	High feed cutting (f = 0,30 mm/rev)	Finishing (f = 0,10 mm/rev)	High feed cutting (f = 0,30 mm/rev)
Surface Roughness Profile	WG Type	WH Type		
Surface Roughness Rz	0,63 µm	1,39 µm	1,98 µm	9,20 µm

■ Recommended Cutting Conditions (Surface Roughness Standard: Rz = 1,6–3,2 µm)

- For optimum effectiveness, use wiper inserts for continuous cutting.
- For copy turning, inserts with nose-radius is recommended.
- Chattering and undulation may occur, please use work and machine with high rigidity.

Two types are available depending on the feed rate:
 WG type: Recommended feed rate: less than $f \leq 0,20$ mm/rev
 WH type: Recommended feed rate: more than $f \geq 0,20$ mm/rev
 Range of good surface roughness: Rz = 1,6 µm to 3,2 µm
 Available grades: BN2000, BNC2010, BNC160, BNC2020, BNC200

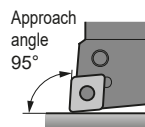


■ Tool-Setup WG / WH Wiper

CNGA / CCGW / WNGA Type Wiper

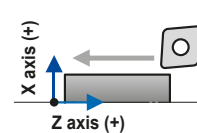
1. Use a holder with a 95° approach angle.
2. Tool compensation required.

CNGA / CCGW / WNGA type wiper inserts do not follow the ISO standard. Correction of the tool offset of the cutting edge as explained on the right.



Cutting Edge Position Compensation, Outer Processing

External Turning



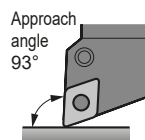
Nose Radius	Type	X-Direction	Z-Direction
RE 0,4	WG	-0,02	-0,02
	WH	-0,06	-0,06
RE 0,8/1,2	WG	-0,01	-0,01
	WH	-0,06	-0,06

DNGA / DCGW Type Wiper

1. Use a holder with a 93° approach angle.
2. Tool compensation required.

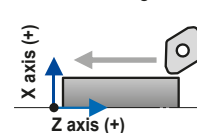
DNGA / DCGW type wiper inserts do not follow the ISO standard. Correction of the tool offset of the cutting edge as explained on the right.

Note: DNGA/DCGW type wiper inserts are only possible for external and internal turning, not for facing.



Cutting Edge Position Compensation, Outer Processing

External Turning



Nose Radius	Type	X-Direction	Z-Direction
RE 0,4	WG	-0,17	-0,01
	WH	-0,70	-0,06
RE 0,8	WG	-0,05	0
	WH	-0,58	-0,05

Uncoated SUMIBORON BN1000/BN2000

H Hardened Steel



Uncoated CBN grades for hardened steel machining

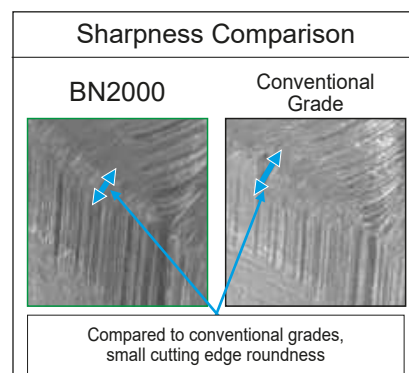
General Features

A new uncoated type of SUMIBORON that has a newly developed high-purity ceramic binder. Both fracture and wear resistance are combined to achieve a stable tool life in a wide variety of hardened steel machining.

Available in single corner and multi-corner type inserts.

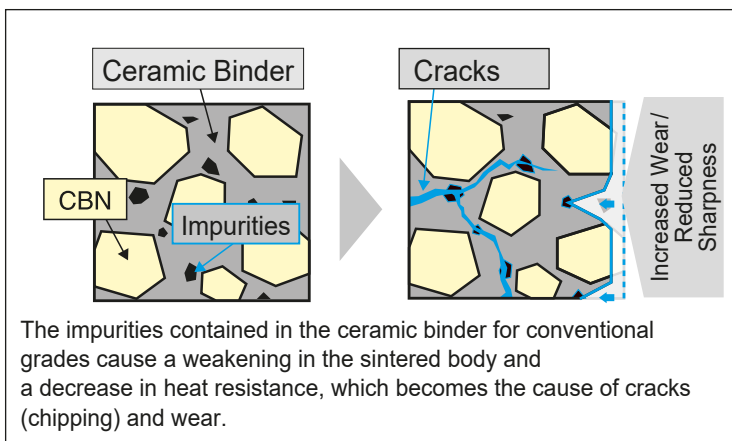
Characteristics

- BN1000** - Superior high-speed machining grade with the highest wear resistance of any uncoated SUMIBORON. Delivers excellent tool life in continuous cutting to light-interrupted cutting.
 - Improved fracture resistance while also emphasizing wear resistance.
 - Improved hardness and heat resistance from the high-purity TiCN ceramic binder.
- BN2000** - General purpose grade suitable for typical hardened steel machining applications. Provides stable tool life in everything from continuous cutting to light-to-medium interrupted cutting.
 - High degrees of both fracture resistance and wear resistance.
 - Significant improvements in the performance of both by employing a high-purity ceramic binder.
 - Stable surface roughness by increasing sharpness (Figure on right).

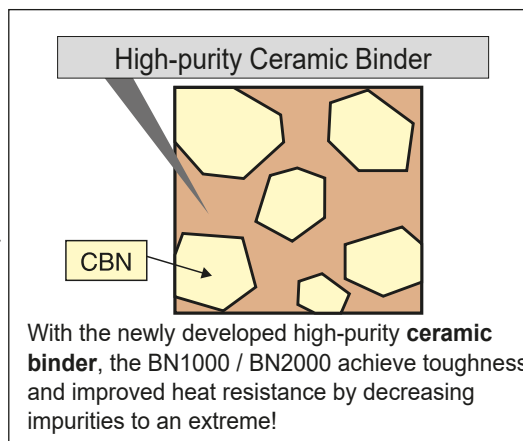


Newly Developed High-Purity Ceramic Binder

Conventional Grade

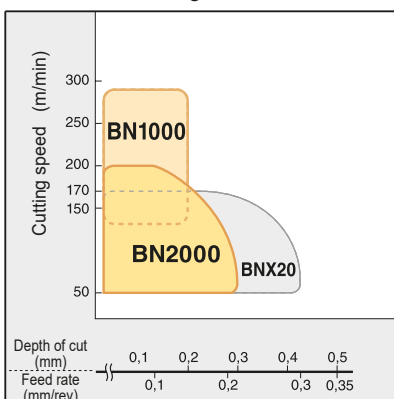


BN1000/BN2000

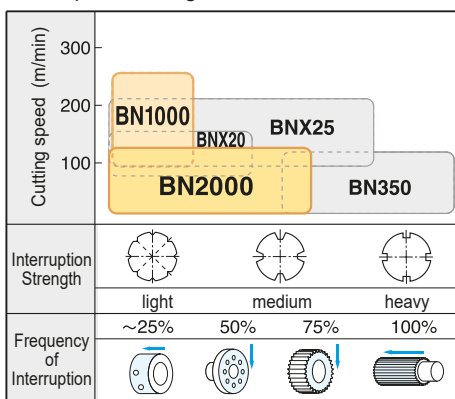


Recommended Application Range

Continuous Cutting



Interrupted Cutting



Cutting Conditions

BN1000

v_c (m/min)	f (mm/rev)	a_p (mm)
100 150 200 250 300		
120	0,03-0,15	0,03-0,2

BN2000

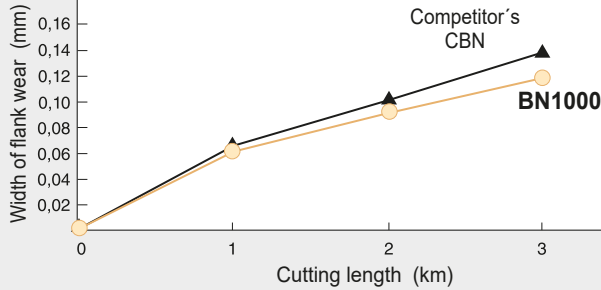
v_c (m/min)	f (mm/rev)	a_p (mm)
50 100 150 200 250		
80 120	0,03-0,2	0,0-0,3

* Coolant ... Continuous cutting: dry or wet
Interrupted cutting: dry

Cutting Performance

BN1000

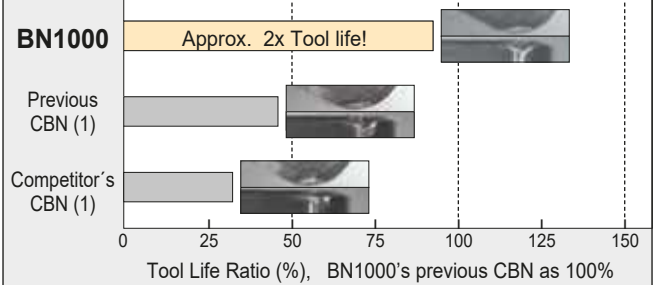
Wear Resistance Comparison



Work material: 100Cr6 (H_RC58-62), Round Bar
Insert: CNGA 120408 NU-2
Cutting data: v_c = 150 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, dry

BN1000

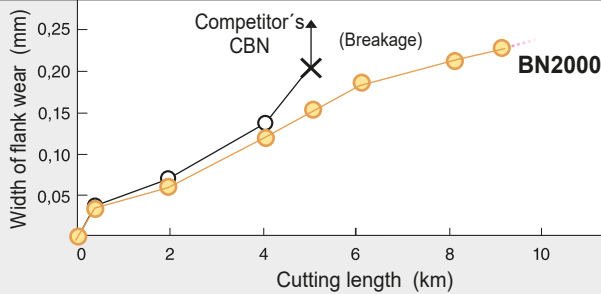
Chipping Resistance Comparison



Work material: 15CrMo5 (H_RC58-62), 8 Grooves
Insert: CNGA 120408 NU-2
Cutting data: v_c = 150 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, dry

BN2000

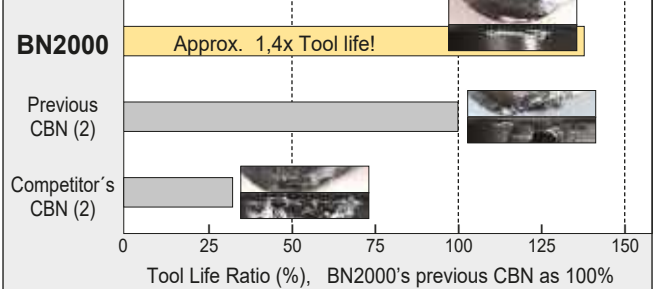
Wear Resistance Comparison



Work material: 15CrMo5 (H_RC58-62), Round Bar
Insert: CNGA 120408 NU-2
Cutting data: v_c = 100 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, dry

BN2000

Chipping Resistance Comparison

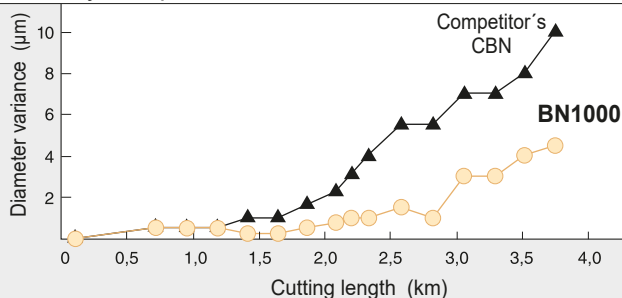


Work material: 15CrMo5 (H_RC58-62), 8 Grooves
Insert: CNGA 120408 NU-2
Cutting data: v_c = 150 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, dry

Machining Precision

BN1000

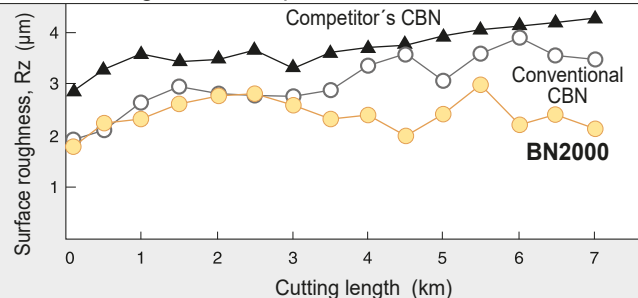
Accuracy Comparison



Work material: 15CrMo5 (H_RC58-62), Round Bar Ø 130
Insert: CNGA 120408 NU-2
Cutting data: v_c = 200 m/min, f = 0,1 mm/rev, a_p = 0,1 mm, wet

BN2000

Surface Roughness Comparison



Work material: 15CrMo5 (H_RC58-62), Round Bar
Insert: CNGA 120408 NU-2
Cutting data: v_c = 100 m/min, f = 0,08 mm/rev, a_p = 0,2 mm, dry

Coated SUMIBORON Characteristics

H Hardened Steel



BNC2010

BNC2020



BNC100

BNC160

BNC200

BNC300

BNC500

New Coated SUMIBORON Series achieving

- higher speed
- higher efficiency and
- higher precision

■ General Features

Using a high heat resistant and tough CBN substrate coupled with a special ceramic coating, this series caters to a wide variety of applications with improved precision and longer tool life as compared to conventional CBN.

There is a comprehensive lineup of economical and easy-to-use insert selection, such as the cost effective double-sided, multi-cornered, one-use type inserts.

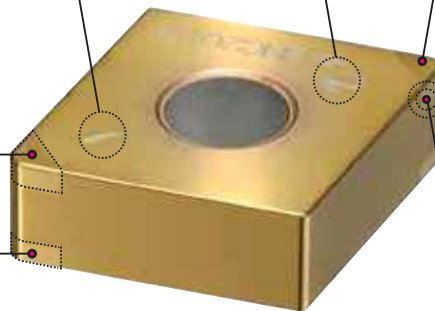
BNC2010 and BNC2020 are the latest additions to the Coated SUMIBORON series, to provide even better stability and longer tool life for hardened steel machining.

■ Characteristics

Double sided, Multi-cornered One-use Insert
More cost effective than conventional one-use inserts.

Easy Edge Management
Numbering of cutting edges.

Strong Brazing
Utilizing a new brazing method with improved strength.



Special Ceramic Coating and Newly Developed CBN Substrate
Provides longer tool life.

■ Cutting Performance

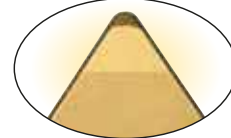
Application		Conditions	Recommended Cutting Speed (m/min)			
			100	200	300	400
Hardened Steel	Finishing	General Purpos (Continuous to Light interrupted Rz = above 3,2)	BNC2020 / BNC2010		BNC200 / BNC100	
		Heavy Interrupted	BNC300			
	High Precision (Rz = 1,6 to 3,2)		BNC2010		BNC160	
		High Efficiency (Carburized layer removal)	BNC2020		BNC200	
Cast Iron	Ductile Cast Iron	BNC500				

■ Cutting Edge Management

Before usage

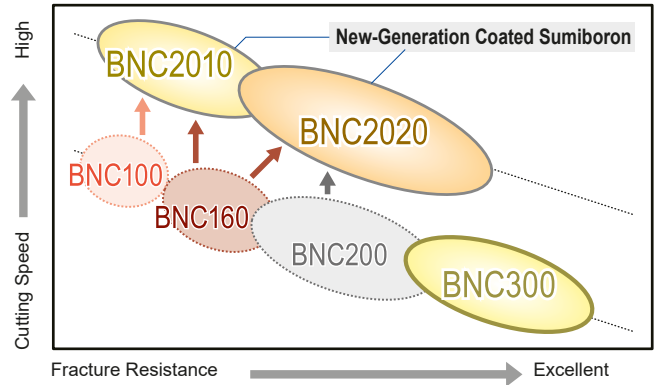


After usage



The edge numbers are still visible after machining, which makes the management of used cutting edges easy.

BNC2010 and BNC2020 are coated in gold, which makes it easy to distinguish used edges.



Characteristics of Grades

BNC2010

CBN Content: 50 ~ 55 %
Grain Size: 2 μm
Hardness HV: 30 ~ 32 GPa
TRS: 1,10 ~ 1,20 GPa
Main Coating Components: Multi-layered TiCN
Coating Thickness: 1,5 μm



High Precision Machining

Newly developed CBN substrate with high crater wear resistance coated with special multi-layered TiCN, which exhibits excellent notch wear resistance. Ideal for finishing of hardened steel requiring excellent accuracy or surface roughness. Able to stably maintain 1,6 R_z finishing.

BNC2020

CBN Content: 70 ~ 75 %
Grain Size: 5 μm
Hardness HV: 34 ~ 36 GPa
TRS: 1,20 ~ 1,30 GPa
Main Coating Components: Multi-layered TiAlN
Coating Thickness: 1,5 μm



General and High Efficiency Cutting

Newly developed tough CBN substrate with highly wear resistant TiAlN coating. Provides improved stability by inserting a highly adhesive layer between the substrate and the TiAlN layer. Ideal for general machining including finishing and interrupted cutting as well as high-efficiency machining such as carburi- sed layer removal.

BNC100

CBN Content: 40 ~ 45 %
Grain Size: 1 μm
Hardness HV: 29 ~ 32 GPa
TRS: 1,05-1,15GPa
Main Coating Components: TiAlN/TiCN
Coating Thickness: 2,5 μm



High Speed Cutting

BNC160

CBN Content: 60 ~ 65 %
Grain Size: 3 μm
Hardness HV: 31 ~ 33 GPa
TRS: 1,10-1,20GPa
Main Coating Components: TiAlN/TiCN
Coating Thickness: 2,0 μm



High Precision Machining

BNC200

CBN Content: 65 ~ 70 %
Grain Size: 4 μm
Hardness HV: 33 ~ 35 GPa
TRS: 1,15-1,25GPa
Main Coating Components: TiAlN
Coating Thickness: 2,0 μm



General and High Efficiency Cutting

BNC300

CBN Content: 60 ~ 65 %
Grain Size: 1 μm
Hardness HV: 33 ~ 35 GPa
TRS: 1,15-1,25GPa
Main Coating Components: TiAlN
Coating Thickness: 1,0 μm

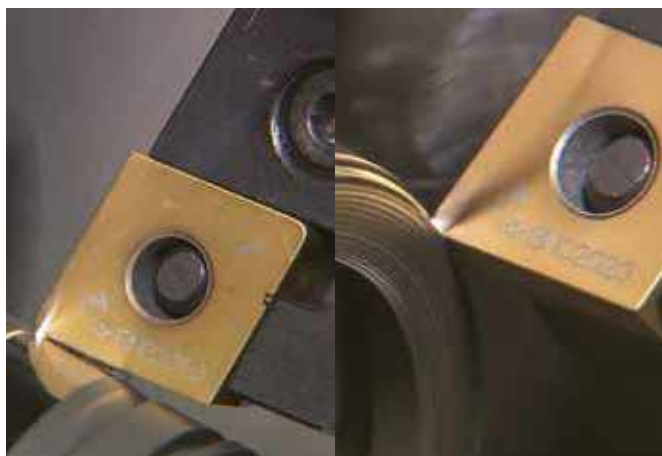


Heavy Interrupted Cutting

Recommended Cutting Conditions

Grade	Cutting Speed v _c (m/min)								
	50	100	(120)	150	(180)	200	(220)	250	300
BNC2010									
BNC2020									
BNC300									
BNC100									
BNC160									
BNC200									

Grade	Feed Rate (mm/rev)		Depth of Cut (mm)			
	0	0,1	0,2	0,3	0,4	0,5
BNC2010	0,03	0,03	0,25			0,35
BNC2020	0,03	0,03	0,40			0,50
BNC300	0,03	0,03	0,20			0,30
BNC100	0,03	0,03	0,20			0,30
BNC160	0,03	0,03	0,20			0,35
BNC200	0,05	0,05	0,35			0,50



■ Characteristics

BNC2010 - High Precision

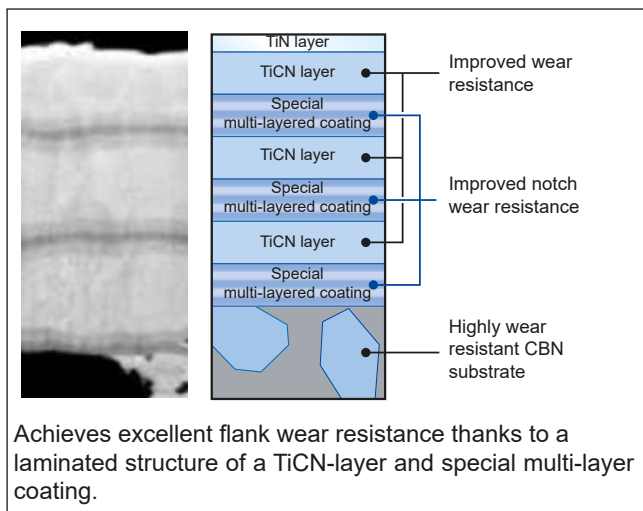
A grade for high-precision machining applicable for finishing requiring good surface roughness and dimensional accuracy. Provides further improved wear resistance thanks to a newly developed CBN substrate coated with a TiCN layer. Reduces flank wear and achieves excellent surface finish thanks to newly developed special stable multi-layered coating.

BNC2020 - General Purpose & High Efficiency

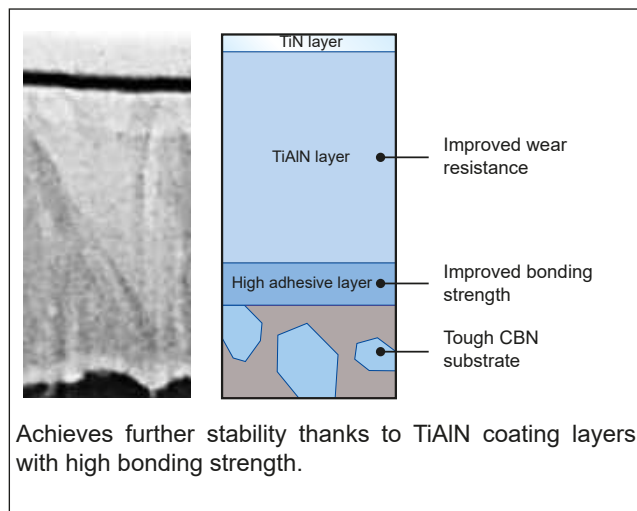
A general-purpose grade applicable to general hardened steel machining. A newly developed tough CBN-substrate coated with a highly wear-resistant TiAlN layer. Achieves more stable machining and longer tool life by employing a highly adhesive layer for high chipping resistance.

■ CBN-Substrate and Coating Structure of BNC2010 and BNC2020

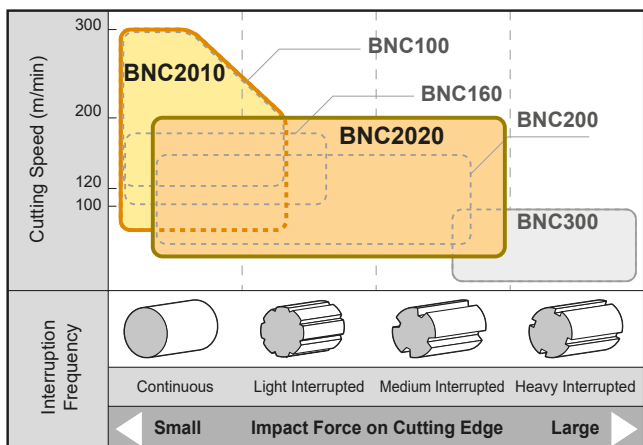
BNC2010



BNC2020



■ Application Range

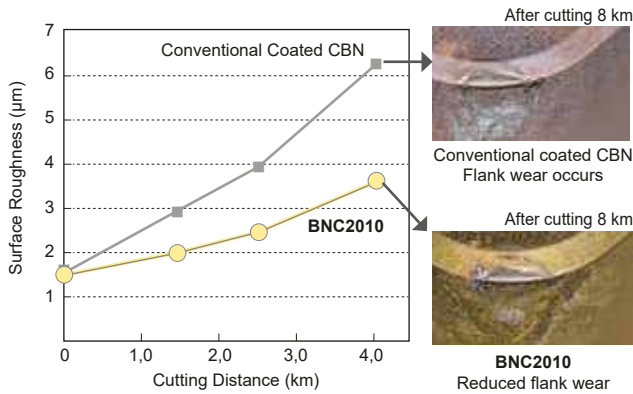


■ Recommended Cutting Conditions

BNC2010		BNC2020	
Cutting Speed (m/min)		Cutting Speed (m/min)	
120	150	50	100
200	250	150	200
300			220
Feed Rate (mm/rev)	Depth of Cut (mm)	Feed Rate (mm/rev)	Depth of Cut (mm)
0,03-0,25	0,03-0,35	0,03-0,40	0,03-0,50

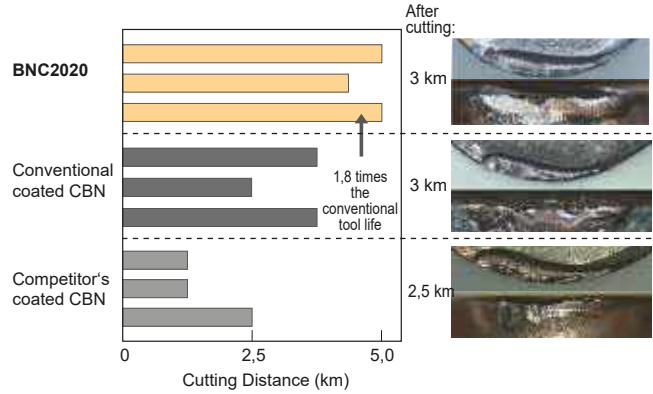
Cutting Performance

BNC2010



Work Material: 15CrMo5, 58-62HRC, Continuous
 Insert: DNGA150408NC4 (BNC2010)
 Cutting Edge Treatment: S01225
 Cutting Conditions: $v_c = 160$ m/min, $f = 0,08$ mm/rev, $a_p = 0,1$ mm, wet

BNC2020

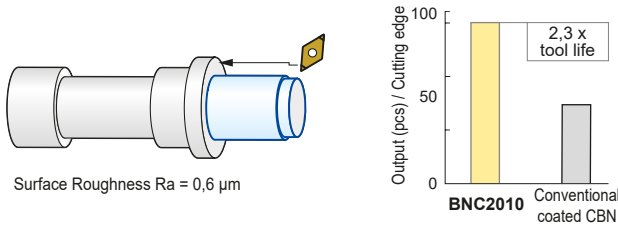


Work Material: SCM415-5V, 58-62HRC, Interrupted
 Insert: CNGA120412NC4 (BNC2020)
 Cutting Edge Treatment: S01225
 Cutting Conditions: $v_c = 130$ m/min, $f = 0,1$ mm/rev, $a_p = 0,6$ mm, dry

Application Example

Continuous External Turning of Main Shaft

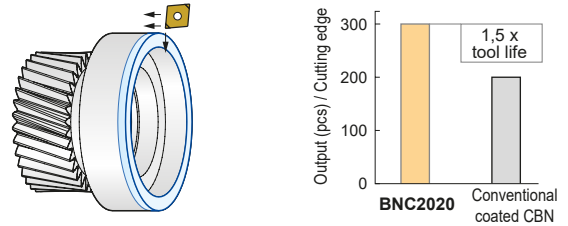
BNC2010 provides excellent wear resistance and achieves excellent surface roughness.



Insert: DNGA150408NC4 (BNC2010)
 Cutting Conditions: $v_c = 200$ m/min, $f = 0,10$ mm/rev, $a_p = 0,35$ mm, dry

Carburised Layer Removal for Sun Gears

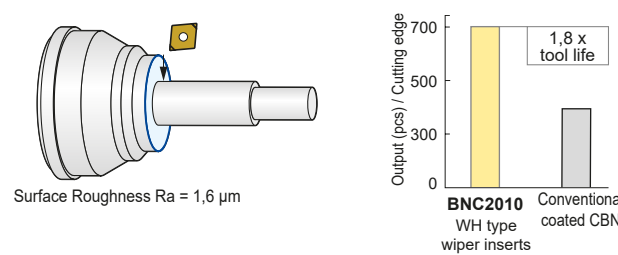
BNC2020 achieves a longer tool life in high load cutting.



Insert: DNGA120408NC4 (BNC2020)
 Cutting Conditions: $v_c = 100$ m/min, $f = 0,15$ mm/rev, $a_p = 0,5$ mm, wet

Facing of CVJ Outer Race

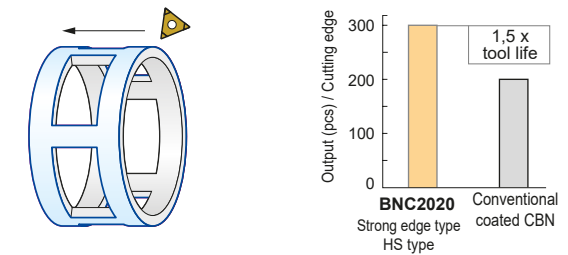
BNC2010 with a WH type wiper insert maintains excellent surface finish for an extended time.



Insert: CNGA120412NCWH2 (BNC2010)
 Cutting Conditions: $v_c = 150$ m/min, $f = 0,2$ mm/rev, $a_p = 0,2$ mm, dry

Interrupted Machining of CVJ Cage Window

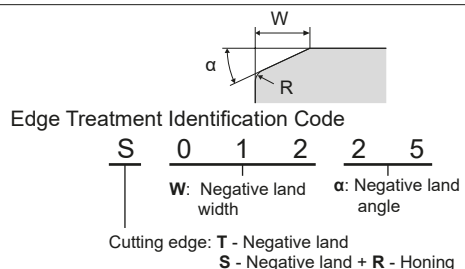
BNC2020 strong edge HS type provides stable performance in interrupted cutting.



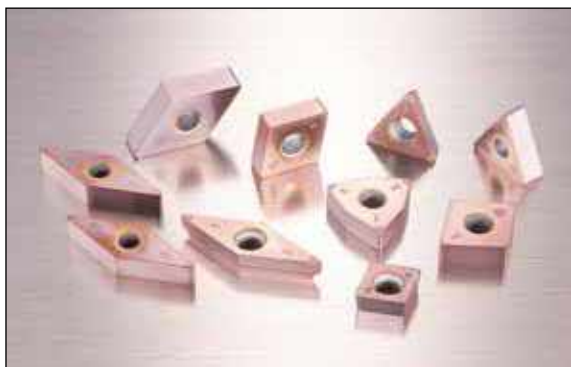
Insert: TNGA160420HSNC3 (BNC2020)
 Cutting Conditions: $v_c = 120$ m/min, $f = 0,10$ mm/rev, $a_p = 0,15$ mm, dry

Cutting Edge Preparation

Grade	General Edge Treatment	Strong Edge Type: HS
	Edge Treatment	Edge Treatment
BNC2010	S01225	S01730
BNC2020	S01225	S02735



Coated Sumiboron premium grade for high speed machining of hardened steels



General Features

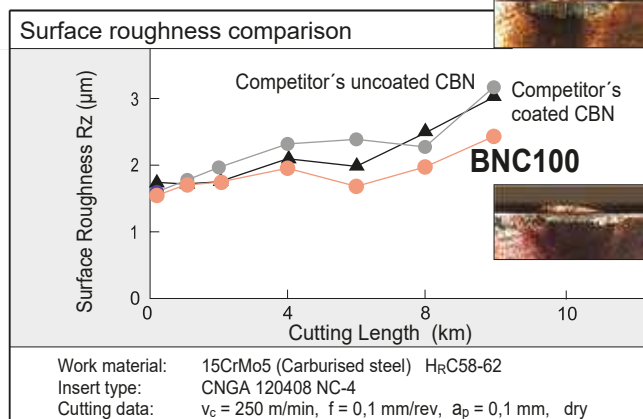
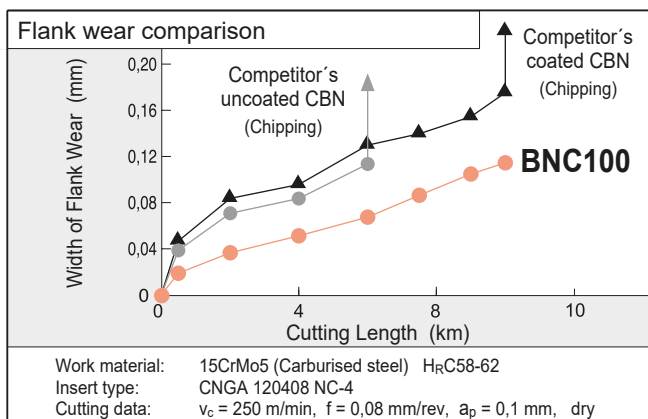
Our copper coloured Sumiboron grade BNC 100 resists premature plastic deformation of the cutting edge by withstanding the high temperatures that occur when machining hardened steels. This new grade features a heat resistant CBN substrate and a special TiCN based ceramic coating to enhance surface finish across a broad range of finishing applications at elevated cutting speeds.

Ideal for higher speed machining and suitable for continuous or light interrupted cuts BNC100 delivers reliable performance and excellent tool life

Advantages

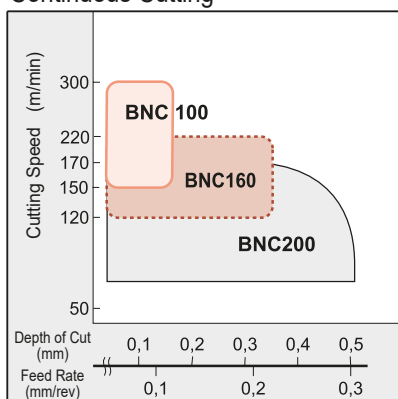
- High speed machining!
Suitable for continuous to light interrupted high speed cutting with $v_c = 150 \sim 300$ m/min.
- Extended tool life!
Wear resistant ceramic coating and tough CBN substrate considerably extends tool life.
- Excellent surface finish!
A consistent surface finish to values less than 6,3 Rz is easily achieved on both continuous and light interrupted cut applications.

Performance

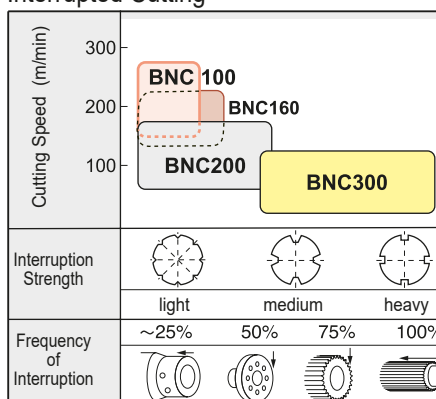


Application Range

Continuous Cutting



Interrupted Cutting



Recommended Cutting Conditions

v_c (m/min)	f (mm/rev)	d_{oc} (mm)
100 - 300	0,03-0,2	0,03-0,3

Coolant ... Continuous cutting: dry or wet
 Interrupted cutting: dry

High precision machining with surface finishes down to 1,6 Rz possible thanks to smooth coating!



■ General

Use the copper coloured Sumiboron grade BNC160 to improve surface integrity as well as machining accuracy. The TiCN based smooth surface ceramic coating and the newly developed Sumiboron substrate enhances edge strength and wear resistance making high precision machining with surface finishes as low as 1,6 Rz readily achievable.

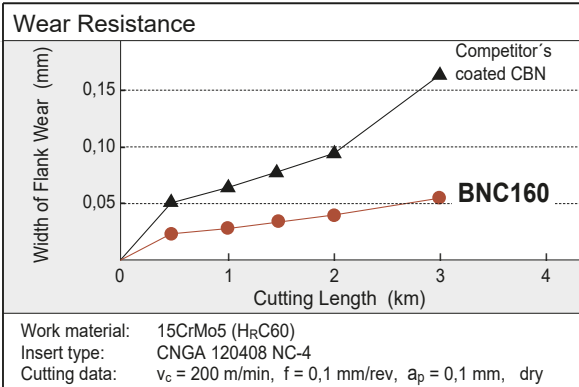
This new grade is ideal for turning components that previously relied on precision grinding machines for final machining.

■ Advantages

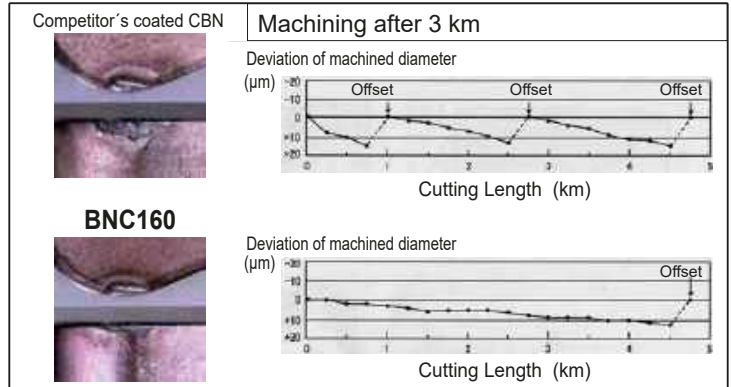
- Excellent surface roughness!
A consistent surface roughness is maintained for hours because wear at the boundary is so gradual.
- High Precision Machining
High precision work previously ground, can now be turned.
- Enlarged scope of application!
A wider range of hardened steels can be cut using Sumiboron the result being high productivity on close tolerance machining applications.

■ Performance

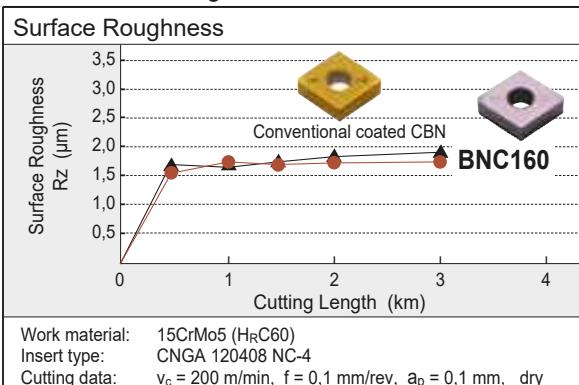
Continuous Cutting



Machining Accuracy



Continuous Cutting



■ Recommended cutting Conditions

v _c (m/min)					f (mm/rev)	d _{oc} (mm)
120	150	200	220	250		
----- ----- ----- ----- -----					0,03–0,2	0,03–0,35

Feed rate and nose radius are set such that the theoretical surface roughness is 1/2 to 1/3 of the required surface roughness.

Coolant ... Continuous cutting: Dry or Wet
Interrupted cutting: Dry

Most suitable for high speed finishing !

**Excellent wear and fracture resistance!
Predictable tool life on a wide range of applications!**



General

Our silver coloured Sumiboron insert grade BNC200 offers safe reliable cutting and predictable tool life.

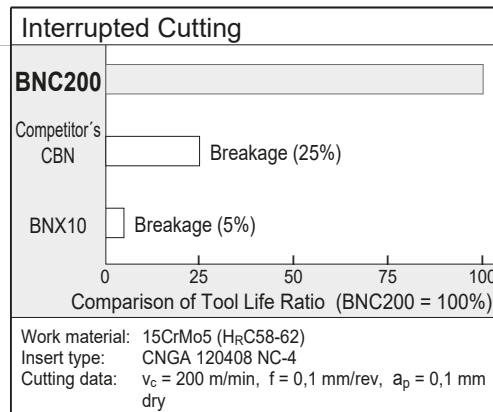
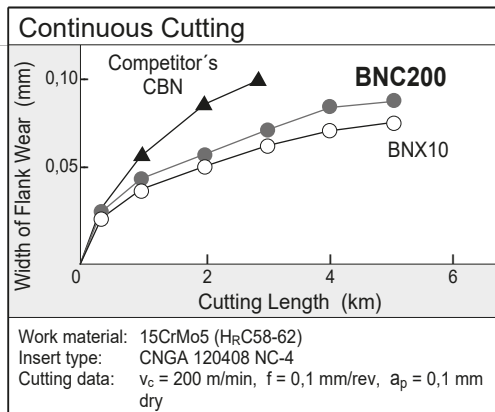
The newly developed cutting material with enhanced edge strength is coated with TiAlN based ceramic for excellent wear resistance and realises extended tool life even when interrupted cutting.

This grade is especially suitable for medium speed machining of carburised surfaces.

Advantages

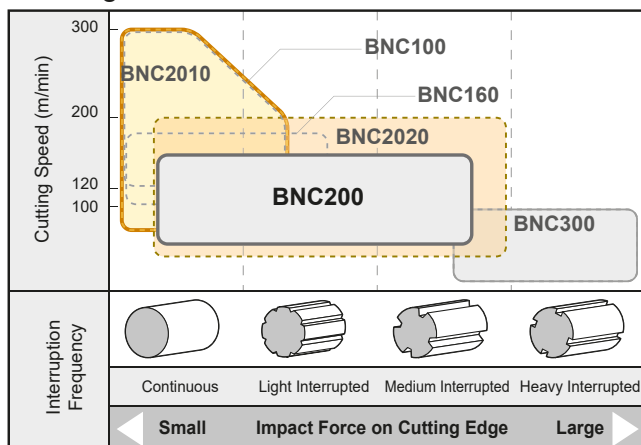
- Predictable tool life!
Extended tool life is realised even when high speed cutting thanks to excellent wear resistance.
- Wide range of applications!
Sumiboron is suitable for a wide range of applications eg. from low to high speed interrupted cutting.
- The newly developed brazing technology maximises edge strength making Sumiboron suitable for interrupted and continuous cutting.

Performance



- BNC200 features excellent wear resistance comparable with BNX10, plus outstanding fracture resistance.

Application Range



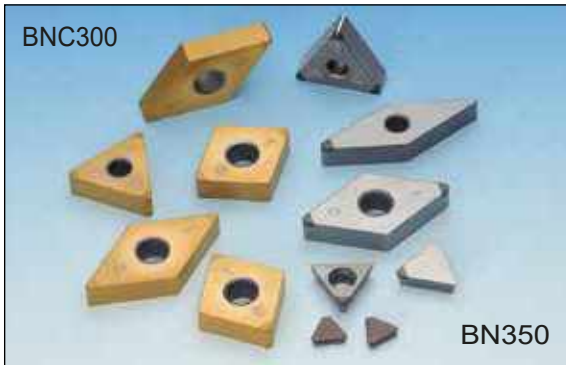
Recommended Cutting Conditions

v_c (m/min)	f (mm/rev)	d_{oc} (mm)
50 80 170 220	0,03-0,25	0,05-0,5

Coolant ... Continuous cutting: dry or wet
Interrupted cutting: dry

Can be used in a wide range of applications from low to high speed operation.

The ultimate grades BNC300 and BN350 in interrupted machining of hardened steel



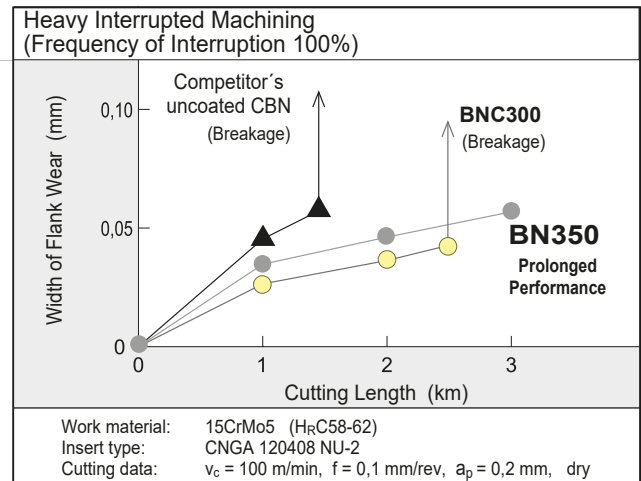
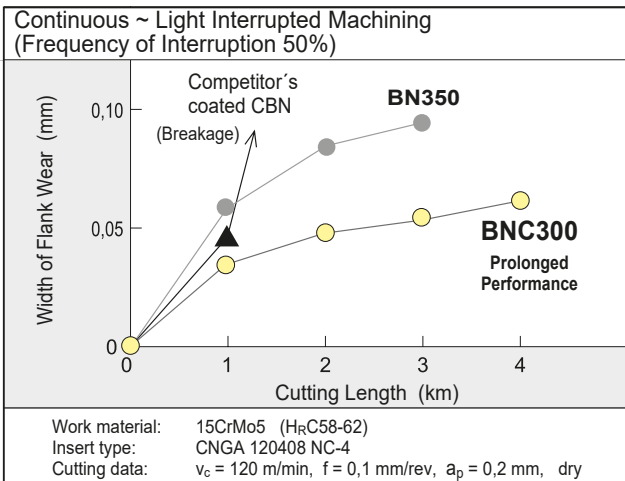
General Features

- **BNC300**
CBN substrate that emphasizes on toughness coupled with a highly wear resistant TiAlN based coating layer that has improved adhesion strength. With a good balance of fracture and wear resistance, stable and longer tool life can be achieved in interrupted cut or in a mixture of continuous and interrupted cutting.
- **BN350**
SUMIBORON series highest fracture resistance and toughest CBN. Reliable grade for achieving stable tool life in heavy interrupted cutting conditions.

Characteristics

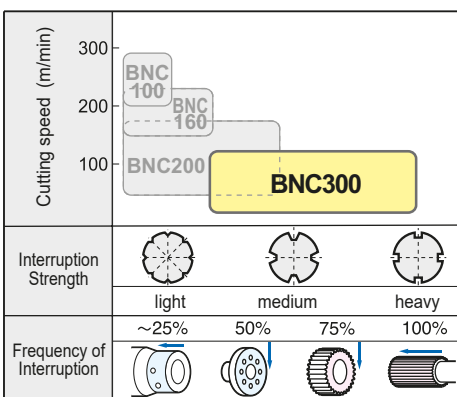
- BNC300**
- Stable and long tool life in interrupted cutting
Achieving stable and long tool life in heavy interrupted cutting, with superior fracture resistance.
 - Superior dimensional precision
Good adhesion strength, TiAlN based, high wear resistance coating. Achieving superior dimensional precision even in interrupted cutting.
 - Suitable for different types of workpieces
Achieving significantly longer tool life even on workpieces that have a mixture of continuous and interrupted cutting.
- BN350**
- Stable and long tool life in interrupted cutting
Stable and long tool life with superior fracture resistance, that prevents fractures which commonly occurs during interrupted cutting.

Performance

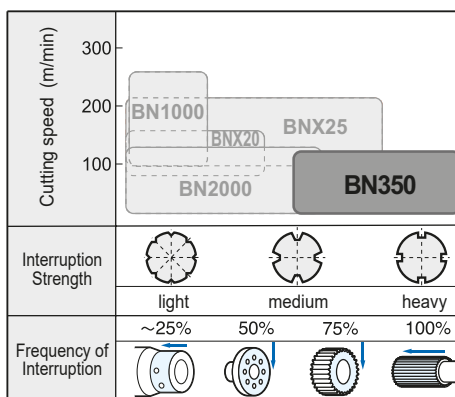


Recommended Application Range

Coated SUMIBORON



Uncoated SUMIBORON

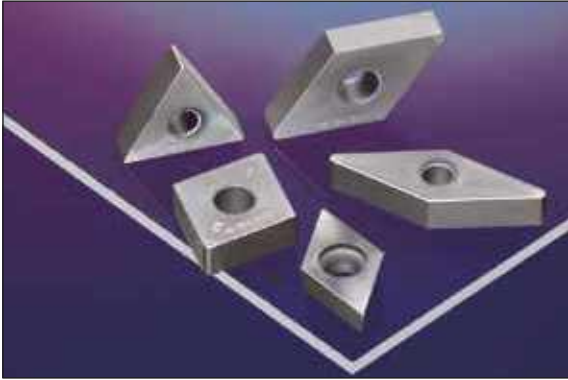


Recommended Cutting Conditions (BNC300, BN350)

v _c (m/min)	f (mm/rev)	d _{oc} (mm)
50 100 150 200	80 120	0,03-0,2 0,03-0,3

● Coolant ... Interrupted cutting: dry

Coated CBN grade for ductile cast iron machining

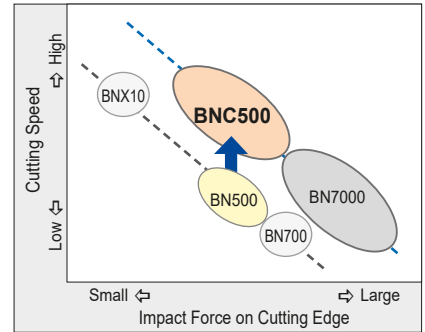


General Features

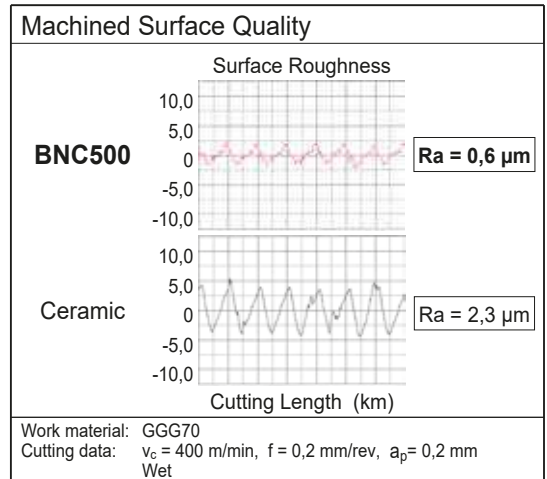
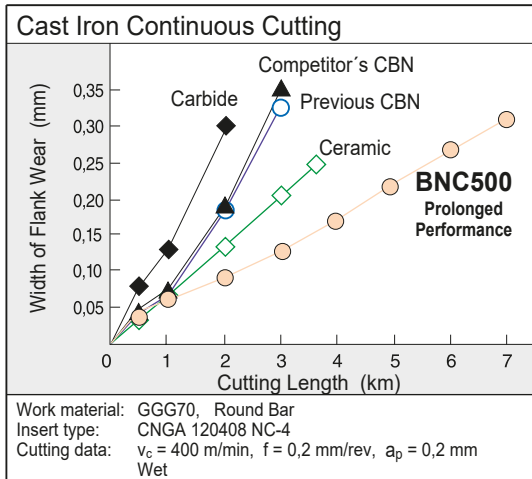
Further improvements in the toughness of the sintered CBN and wear resistance from the application of a newly developed high-purity TiC binder. In addition, it demonstrates exceptional wear resistance by combining a ceramic coating with excellent heat resistance. High-speed and high-precision machining is achieved when finishing ductile cast iron. It also provides a long, stable tool life in machining high-strength ductile cast iron, special cast irons such as vermicular cast iron, and centrifugal cast iron.

Characteristics

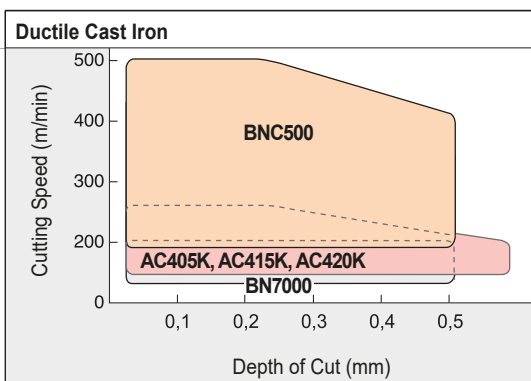
- Achieves a Long, Stable Tool Life at $v_c = 400$ m/min
Superior wear resistance, makes stable machining possible under high-speed conditions.
- Supports High-precision Machining
Can maintain excellent dimensional tolerance and surface roughness.



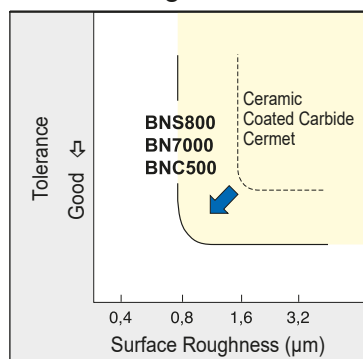
Cutting Performance



Application Range



High Precision Machining

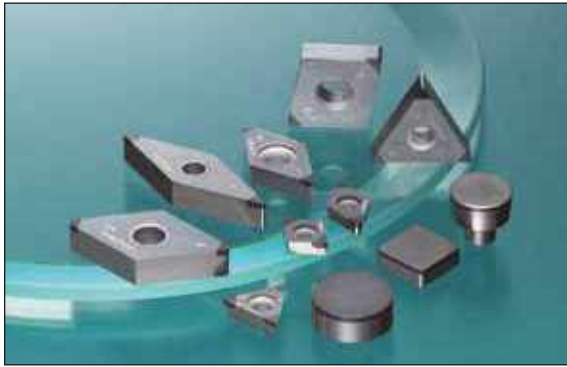


Recommended Cutting Conditions

v_c (m/min)	
100	200
[Graph showing recommended cutting speed range]	
f (mm/rev)	a_p (mm)
0,1-0,4	0,03-0,5

* Coolant ... Wet

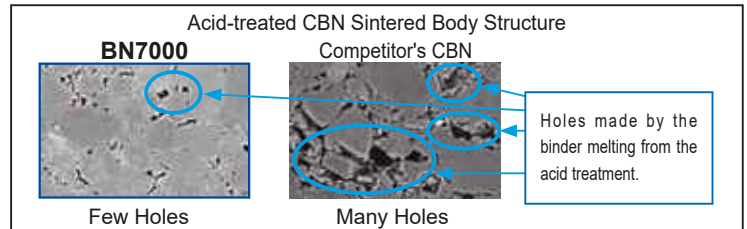
Uncoated CBN grade for high-speed finishing of cast iron, powdered metals, and difficult-to-machine materials!



General Features

Medium-grain CBN sintered to a high density to achieve the maximum content percentage.

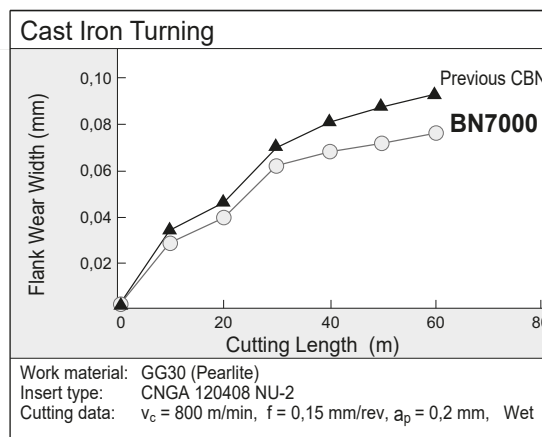
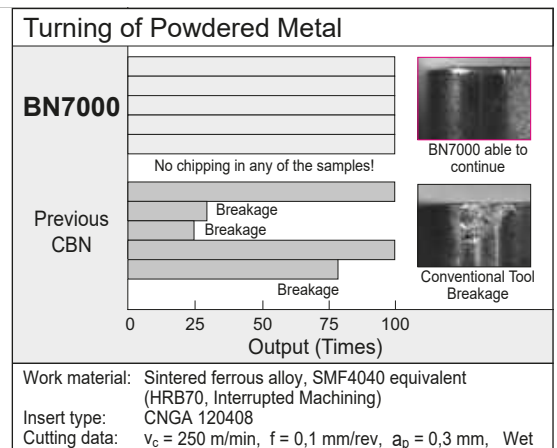
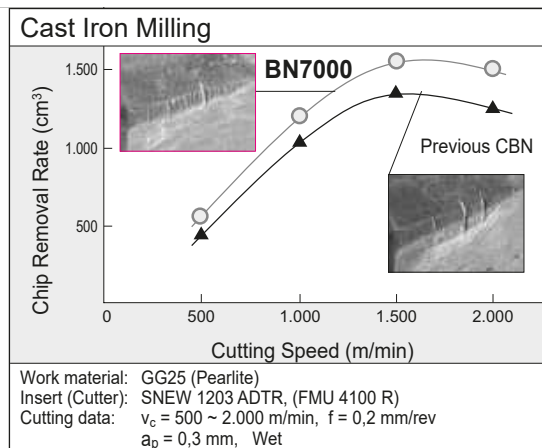
Also delivers superior fracture resistance by increasing the binding strength between CBN particles. Provides stable, long tool life for high-speed finishing work with cast iron, powdered metals, and difficult-to-machine materials.



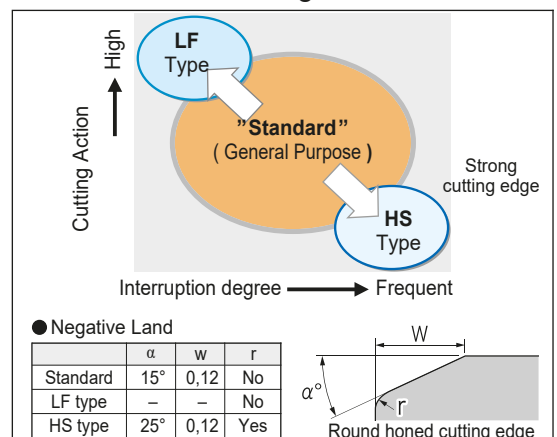
Characteristics

- Excellent for high speed finishing of Cast Iron!
Good wear and fracture resistance in high speed machining of Grey Cast Iron.
- High efficiency machining of powdered metal
With 4 different types of edge treatment, stable and long tool life can be achieved from machining of Sintered Alloys of any shape or hardness.
- Able to machine any Exotic Metals.
Long tool life can also be achieved for the machining of exotic materials such as Roll, HSS and Heat-Resistive Alloy etc.

Cutting Performance



Recommended Edge Treatment

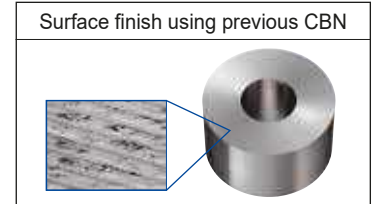
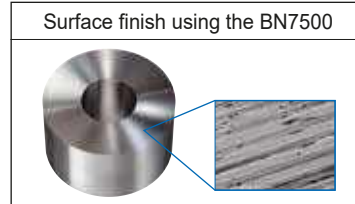


Uncoated CBN grade for high precision and high efficiency machining of powdered metal



General Features

High density sintered material made of micro-grained CBN grains provide excellent sharpness and wear resistance for high quality surfaces in sintered alloy finishing.

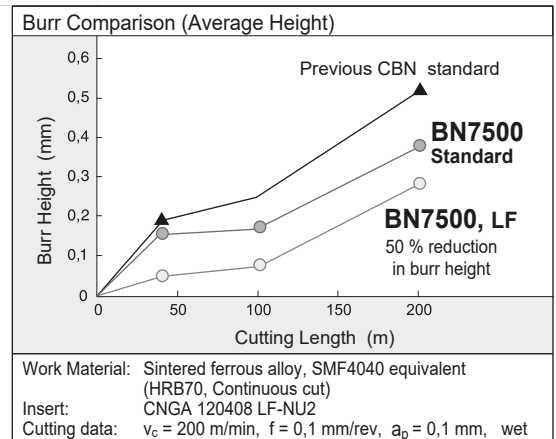
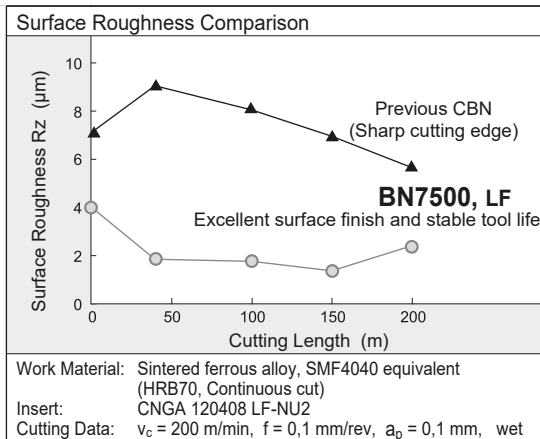


The previous CBN left white blemishes on the finished surface whereas the BN7500 leaves a better, glossy surface finish.

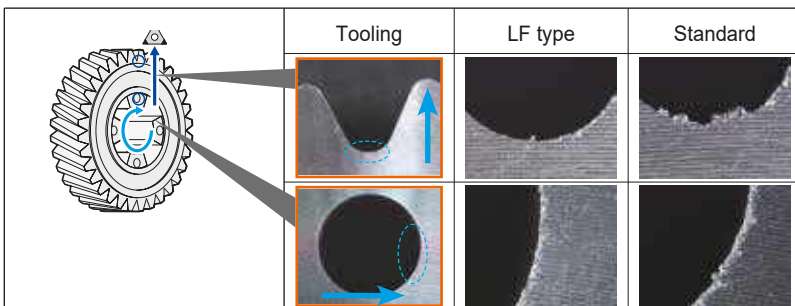
Characteristics

- Excellent for finishing of powdered metal
Excellent machined surface finish and surface appearance.
- Available with 5 different types of edge treatment for machining sintered alloys of any shape or hardness
The LF type has a sharper edge designed specifically for machining sintered alloys with minimal burr and improved machining precision.
The HS Type has a strengthened cutting edge for stable chipping resistance during interrupted cutting and finishing.

Cutting Performance



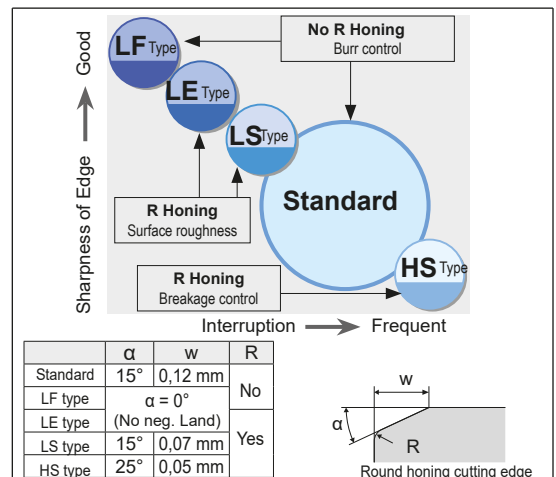
Feed and Burr Relationship



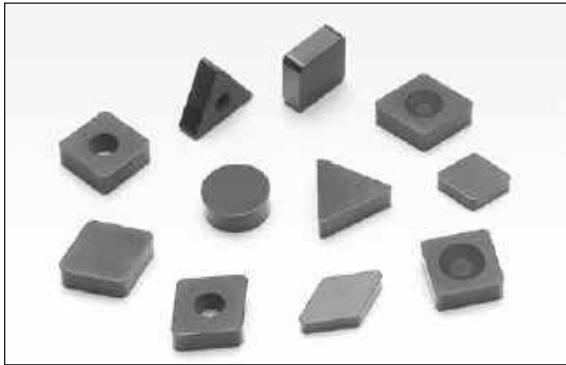
The LF Type without negative land has a cutting edge sharpness superior to the standard type and can control burrs better.

Work Material: VVT Facing
Insert: TNGA 160404 NU3
Cutting Data: $v_c = 200$ m/min, $f = 0,1$ mm/rev, $a_p = 0,1$ mm, wet

Recommended Edge Treatment



Solid CBN grade for high speed rough and finish machining of cast iron



General

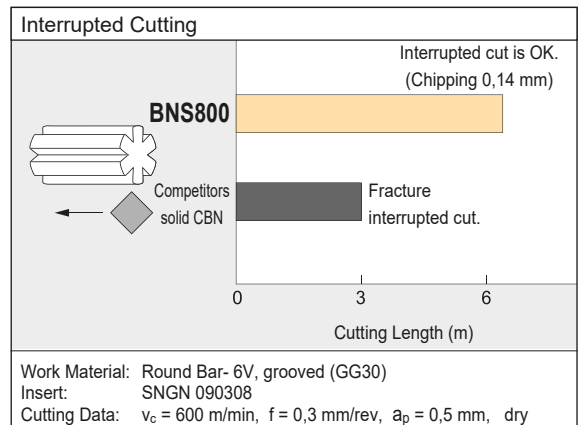
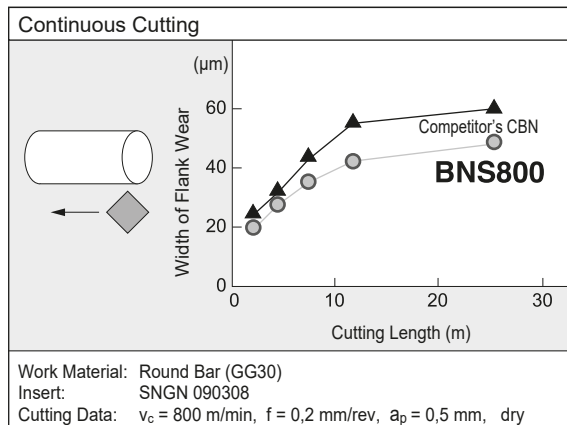
Solid CBN grade with high content CBN and special binder phase provide high fracture toughness and high thermal conductivity.

Solid inserts for roughing with high depth of cut and also for finishing of cast iron and alloyed cast iron at wet and dry conditions.

Advantages

- High wear resistance !
High CBN-content and special binder phase provide a excellent wear resistance and a tight dimensional control in finish machining.
- High edge stability !
High thermal conductivity of BNS800 and high edge stability provide a long tool life at wet and dry machining.

Performance



Application Example

Cylinder Bore		Brake Disc		Carbide Roll		Sprayed Face Bore		
<p>Light Cut GG25 Finishing</p>		<p>GG25 Turning</p>		<p>Carbide (Co 15%) Turning</p>		<p>Colmonoy Boring</p>		
<p>Tool life criteria: Finishing</p> <p>BNS800 7500 Bore Comp. sold CBN 2500 Bore</p>		<p>Tool life criteria: Breakage</p> <p>BNS800 400 pcs Comp. sold CBN 200 pcs</p>		<p>Tool life criteria: Breakage</p> <p>BNS800 5 pass Comp. CBN 1 pass Breakage</p>		<p>Tool life criteria: Breakage</p> <p>BNS800 10 pcs Comp. CBN 6 pcs</p>		
Tooling	Light Cut	Tooling	Finishing	Tooling	Finishing	Tooling	Roughing	Finishing
Grade	BNS800	Grade	BNS800	Grade	BNS800	Grade	BNS800	
Insert	SNGN090308	Insert	DNGN110312	Insert	RNGN090300	Insert	SNGN090312 SNGN090308	
v_c	1000 m/min	v_c	600 m/min	v_c	40 m/min	v_c	80 m/min	
f	0,3 mm/rev 0,25 mm/rev	f	0,3 mm/rev	f	0,15 mm/rev	f	0,04 mm/rev	0,03 mm/rev
a_p	0,2 mm	a_p	0,5 mm	a_p	0,2 mm	a_p	~3 mm	0,5 mm
Coolant	wet	Coolant	dry	Coolant	wet	Coolant	wet	

SUMIBORON Binderless NCB100



Cemented Carbide

Brittle Materials

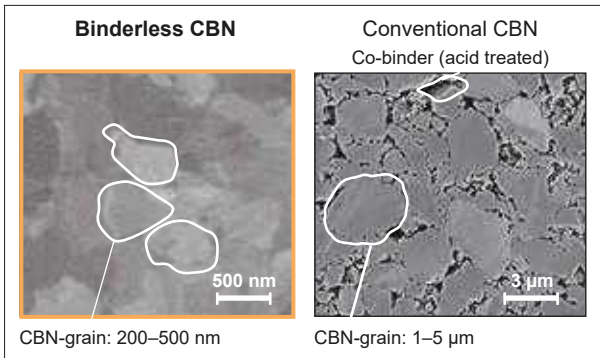


■ Features

SUMIBORON Binderless is a polycrystalline cubic boron nitrid (CBN) that directly binds nanometer- or sub-micron-level CBN particles without binder materials.

Binderless CBN is harder and has better thermal conductivity. Therefore, it enables higher efficiency and longer tool life in machining of hard-to-cut materials, such as titanium alloy and cobalt-chromium alloy.

■ Mikrostructure of Sintered Body



■ Physical Properties

	Binderless CBN	Conventional CBN
CBN Content (%)	100	90–95
Binder Material	–	WC–Co
Hardness (GPa)	51–54	41–44
Thermal Conductivity (W/m·K)	180–200	100–120

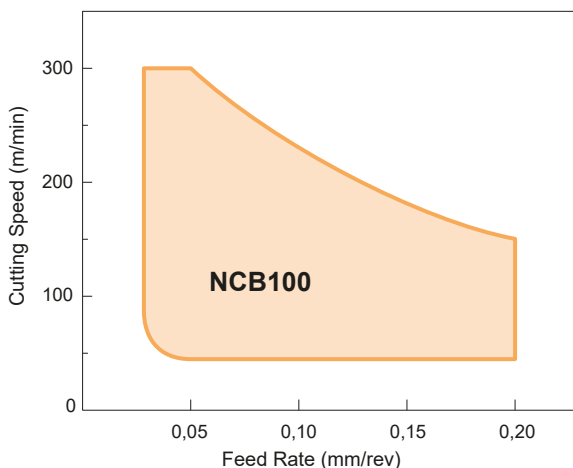
SUMIBORON Binderless CBN

■ Advantages

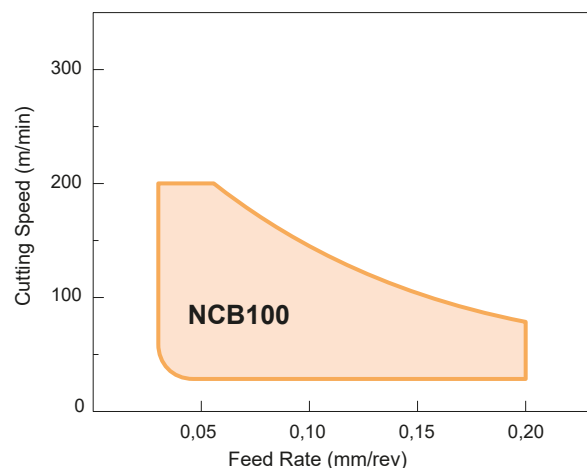
- Higher efficient machining and longer tool life have been realized by the effects of higher hardness and thermal conductivity than conventional CBN grades.
- Achieves high precise machining and better surface integrity because of less adhesion by not containing any binder materials.
- Ideal tool material for high-efficient finishing of hard-to-cut materials, such as titanium alloy and cobalt-chromium alloy, cemented carbides and cermets.
- NBC100 is able to maintain excellent dimensional accuracy and surface roughness for a long period.
- Shows improved work efficiency and cost reduction by less frequency of exchanging inserts compared to conventional tool grades.

■ Application Range and Performance

Turning of Titanium Alloy (Ti-6Al-4V)

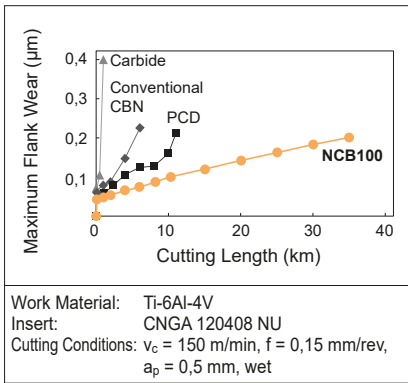


Turning of Cobalt-Chromium Alloy (Co-Cr)

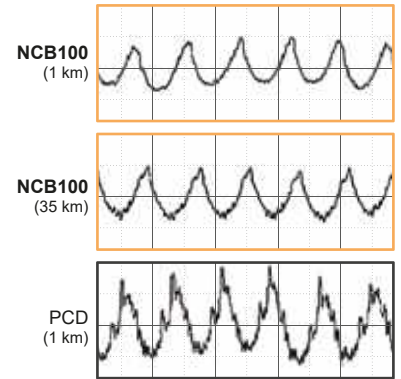
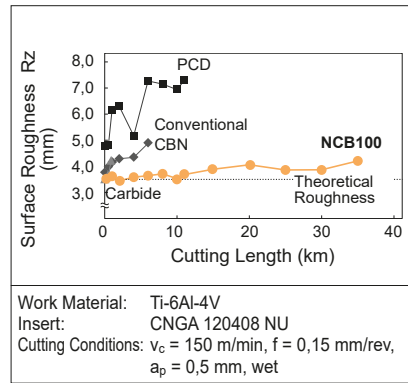


Turning of Titanium Alloy (Ti-6Al-4V)

Wear Resistance

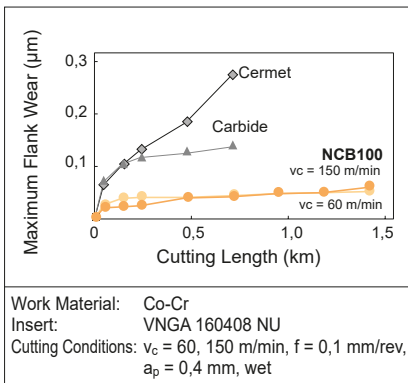


Surface Roughness

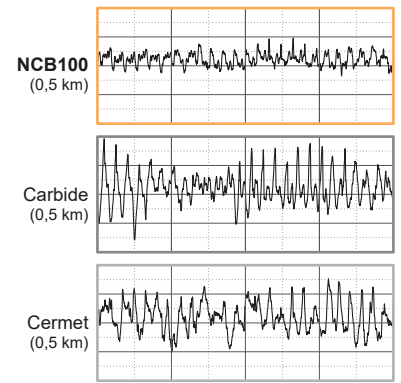
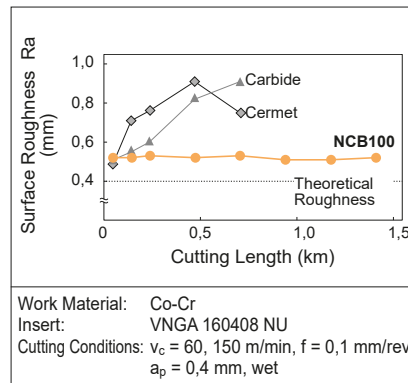


Turning of Cobalt-Chromium Alloy (Co-Cr)

Wear Resistance



Surface Roughness



Recommended Cutting Conditions

Titanium Alloys

Work Material		Grade	Cutting Conditions		
Composition	Hardness (HRC)		Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
Ti-6Al-4V	30-35	NCB100	0,1-0,3-0,5	0,05-0,15-0,20	50-200-300
Ti-5Al-5V-5Mo-3Cr	32-38	NCB100	0,1-0,3-0,5	0,05-0,10-0,20	50-150-250
Ti-10V-2Fe-3Al	32-38	NCB100	0,1-0,3-0,5	0,05-0,10-0,20	50-150-250

Min. - Optimum - Max.

Cobalt-Chromium Alloys

Work Material		Grade	Cutting Conditions		
Composition	Hardness (HRC)		Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
Co-30Cr-5Mo	35-45	NCB100	0,10-0,15-0,30	0,05-0,15-0,20	50-200-300

Min. - Optimum - Max.

Carbides

Work Material		Grade	Cutting Conditions		
Composition	Hardness (HRC)		Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
WC-20Co	<85	NCB100	0,03-0,10-0,20	0,03-0,10-0,20	5-20-40

Min. - Optimum - Max.

SUMIDIA BINDERLESS NPD10 is recommended for: > 85 HRA

Other Work Materials

Work Material		Grade	Cutting Conditions		
Composition	Hardness (HRC)		Depth of Cut (mm)	Feed Rate (mm/rev)	Cutting Speed (m/min)
Pure Titanium	130-230	NCB100	0,1-0,3-0,5	0,05-0,10-0,20	100-250-400
Cermet	1.000-1.500	NCB100	0,1-0,2-0,3	0,05-0,10-0,20	10-30-50

Min. - Optimum - Max.

SUMIBORON / SUMIDIA Production Process



■ General

Since 1970s, Sumitomo has pioneered the development of sintered cubic boron nitride (CBN) and sintered diamond (PCD) tools successfully used in the tool making industries. These tool materials can be epoch-making in a sense of broadening the cutting application range.

■ Production Process

In the production process of **SUMIBORON / SUMIDIA**, CBN powder / diamond powder is firstly synthesized under the ultra - high pressure, and secondly, the synthesized crystalline grains are sintered.

Fig. 2 shows a diagram of high temperature high pressure apparatus for processing the ultra - high pressure sintering operation.

This apparatus is basically composed of a piston and a cylinder to generate ultra - high pressure as high as 5000 N/mm² with a special device. The piston and cylinder are made of cemented carbide.

To manufacture final products round discs of SUMIBORON and SUMIDIA material are cut into specific shapes and brazed on to tool bodies made of cemented carbide, or steel, etc., and after that finished by grinding the edge. In another process the final product can be obtained only by cutting blanks and finishing them.

Fig. 1

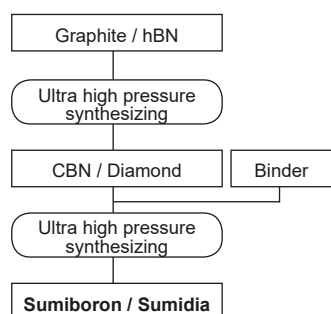
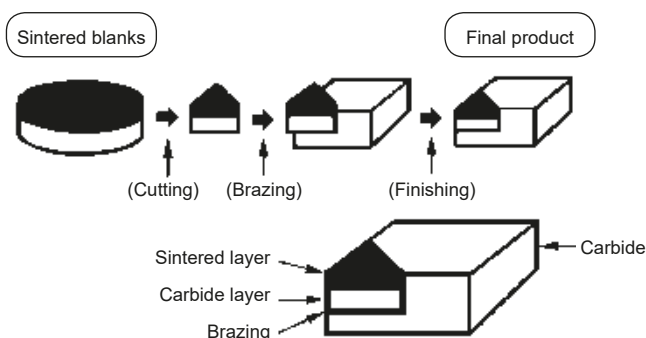
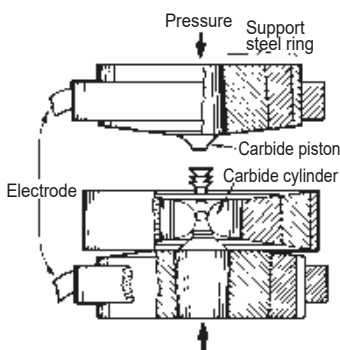


Fig. 2



■ SumiBoron / SumiDia Grinding Method

Items		SumiBoron	SumiDia
Grinding machine	-	1) Carbide grinding machine is applicable. 2) R Pointer should be used. 3) Should be wet grinding.	1) Special-purpose high rigidity grinding machine is desirable. 2) Be sure of applying with wet system.
Wheel	Abrasive	Diamond	Diamond
	Grain size	D 25 - medium, D20 - fine (#400-800)	Rough grinding: D 35 (#400 mesh) Finish grinding: D 25 (#800-1500 mesh)
	Bond	Resinoid or vitrified	Special-purpose metal bond for diamond sintered tool or vitrified
	Concentration	100	100-125
	Dressing	Use #400 WA stick	Execute dressing with a WA stick of about 400 mesh.
Grinding condition	Wheel speed	800-1000 m/min.	800-1000 m/min.
	Table cycle	30-60 cycles/min.	30-60 cycles/min.
	Grinding oil	Water soluble grinding coolant oil	Water soluble grinding coolant (Solution type)
Others	-	1) Check chipping of the cutting edge with microscope after finishing. 2) Blank surface cut by EDM should be ground more than 0,05 mm	1) Rake surface is lapped generally 2) Inspect with microscope of magnification of 30-50 times if there is edge chipping. 3) Edge treatment of tool should be sharp for cutting non-ferrous metals. 4) Remove the wire-cut surface of blank by 0,05 mm or more in grinding operation.

SUMIDIA Series



General Features

SUMIDIA sintered diamond series has 3 grades (DA1000, DA150, DA90) with individual features depending on the optimum combination of diamond particle size and binder, as well as the NPD10 grade (nano-polycrystalline diamond) where nano-order diamond particles are directly bound with high strength without using binders.

This series is suited to a wide range of applications from machining of aluminium alloy to machining of hard brittle materials and cemented carbide.

Series • Features • Application

Grade	Features	Application	Average size of Diamond grains (µm)	Hardness Hv	TRS (GPa)
SUMIDIA	DA1000	High density sintered material made of ultra-fine diamond particles that demonstrates optimum wear resistance and excellent edge sharpness.	< 0,5	50 ~ 60	≈ 2,60
	DA150	Micro-grained sintered diamond grade with strong diamond-to-diamond bonding. It is suitable for the machining of non-ferrous metals and other very hard materials.	5	50 ~ 60	≈ 1,95
	New DA90	Contains coarser diamond particles than other grades, giving it good wear resistance suitable for the machining of carbides and high-silicon aluminium. Shows the highest diamond content for excellent wear resistance.	< 50	50 ~ 60	≈ 1,10
SUMIDIA Binderless	NPD10	A 100% diamond grade made by nano-level diamond grains with direct conversion sintering. Has the highest wear resistance and fracture resistance and the best edge sharpness.	< 0,05	120 ~ 130	≈ 3,15

Application Range

Machinability	Work Material	Turning		Milling	Example Part
		Roughing	Finishing		
Good ↑ ↓ Difficult	Sintered aluminium	DA1000			Cylinder liner
	Die cast aluminium (ADC12)				Transmission case, oil pan, cylinder block, aluminium wheel
	Low silicon (AC2B-T6, AC4C-T6)				Cylinder head
	High silicon (T6)				Cylinder block
					DA150

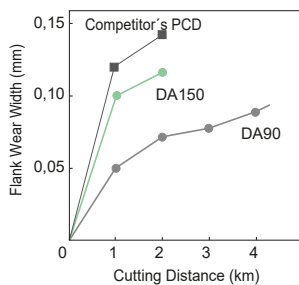
Aluminium

Non-Aluminium

Machinability	Work Material	Turning		Milling	Example Part
		Roughing	Finishing		
Good ↑ ↓ Difficult	Non-ferrous sintered alloy	DA1000			Bushing
	Gunmetal carbon				Connection rod
	Carbide	DA90	NPD10		Punches, dies, rolls
	Iron combined	DA90	DA150		Cylinder block, bearing cap

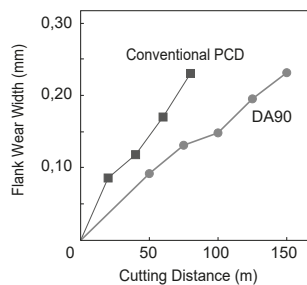
Cutting Performance

Continuous Cutting



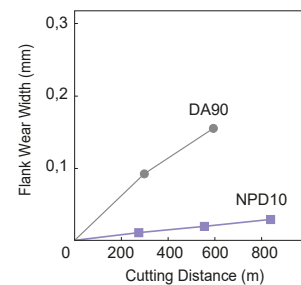
Work Material: MMC (Al-20% SiC)
Insert: CNMX 120408, Holder: PCLN2525
Cutting Cond.: $v_c = 350$ m/min, $f = 0,2$ mm/rev, $a_p = 0,18$ mm, wet

Continuous Cutting



Work Material: Cemented Carbide (87 HRA)
Insert: DCMW 070204 NF
Cutting Cond.: $v_c = 20$ m/min, $f = 0,1$ mm/rev, $a_p = 0,2$ mm, wet

Continuous Cutting



Work Material: Cemented Carbide (91 HRA)
Insert: DCMW 11T304 RH (NPD10), DCMW 11T304 NF (DA90)
Cutting Cond.: $v_c = 20$ m/min, $f = 0,05$ mm/rev, $a_p = 0,05$ mm, dry

Recommended Cutting Conditions

Cutting Conditions	Work Materials	Aluminium Alloys	Copper Alloy	Reinforced Plastics	Wood or Organic Materials	Carbide	Carbon
		Cutting Speed	v_c (m/min)	~ 3.000	~ 1.000	~ 1.000	~ 4.000
Feed rate	f (mm/rev)	~ 0.2	~ 0.2	~ 0.4	~ 0.4	~ 0.2	~ 1.0
Depth of cut	a_p (mm)	~ 3.0	~ 3.0	~ 2.0	-	~ 0.5	~ 2.0

SUMIDIA Binderless

Nano-Polycrystalline Diamond



■ General Features

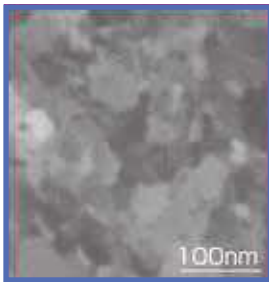
Nano-polycrystalline diamond is a type of polycrystalline diamond, produced by directly binding nano-level diamond grains without using any binders.

This material is unique to our company and as compared to conventional diamond grades containing binders, it exhibits higher strength, excellent wear resistance and fracture resistance.

SUMIDIA Binderless is the series of tools with cutting edges made from this high performance nano-polycrystalline diamond.

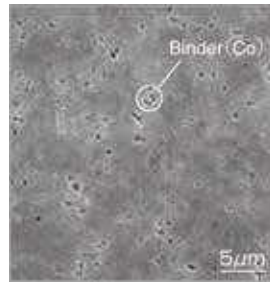
■ Micro-Structure Comparison

Nano-Polycrystalline Diamond
SEM Structure



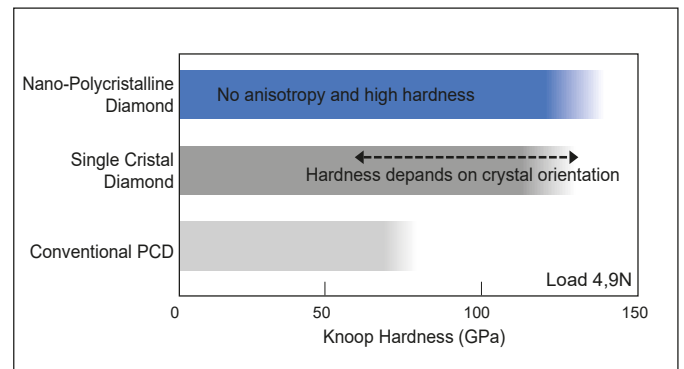
Diamond particle average grain diameter (30 - 50 nm)

Conventional PCD
SEM Structure



Diamond particle average grain diameter (1 - 10 µm)

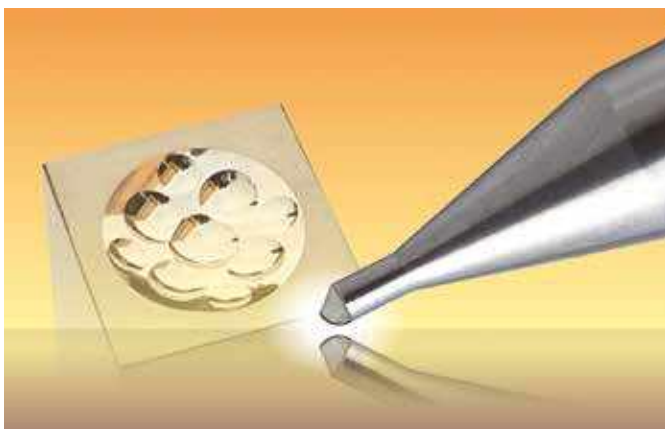
■ Hardness



SUMIDIA Binderless

■ Application Examples

- Ballnose Endmill / Radius Endmill (Carbide Machining)



- Indexable Inserts (Carbide Machining)





General Features

NPD10 is made from high-hardness nano-polycrystalline diamond. This is a pure diamond material, but unlike single-crystal diamonds, it has no anisotropy.

It achieves extended tool life and machining accuracy superior to conventional diamond tools when machining hard brittle materials such as cemented carbide.

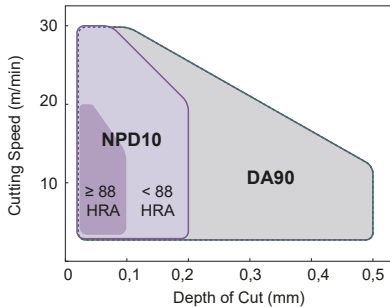
DA90 is a polycrystalline diamond grade in which coarse diamond particles have been sintered to form a dense structure. The high diamond content, with high wear resistance, makes it ideal for roughing of cemented carbide and hard brittle material.

Optimized design and mass production technology have been developed, achieving the same performance as conventional tools with higher cost performance.

Characteristics

- **Ideal for Finishing of Hard Brittle Materials Including Cemented Carbide (NPD10)**
High-precision cutting of cemented carbide thanks to the outstanding wear resistance of nano-polycrystalline diamond.
- **Superior Dimensional Tolerance Maintained for a Long Time (NPD10)**
Tool replacement count can be drastically reduced compared to conventional diamond tools, enabling work efficiency to be improved and total costs to be reduced.
- **Ideal for Roughing of Hard Brittle Materials Including Cemented Carbide (DA90)**
Stable tool life in sintered surface machining of cemented carbide and roughing of hard brittle materials thanks to the outstanding wear resistance of the coarse-grained polycrystalline diamond.
- **Uses SUMIDIA NF Insert (DA90)**
Optimized design and mass production technology have been developed, achieving the same performance as conventional tools with higher cost-performance.

Applicable Range (Cemented Carbide)



Applications of NPD10 and DA90 (Cemented Carbide)

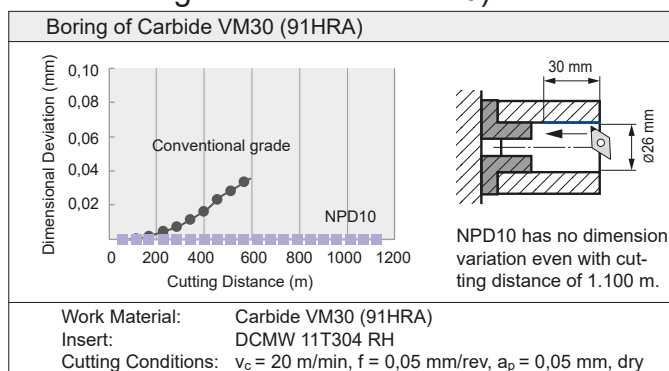
Grade	SUMIDIA Binderless NPD10	SUMIDIA DA90
Dimensional Tolerance	⊙ Best	△ The first recommendation is NPD10
Tool Life (Wear Resistance)	⊙ Best $a_p \leq 0,2 \text{ mm}, f \leq 0,1 \text{ mm/rev}$	○ $a_p \geq 0,2 \text{ mm}$ can also be used
Sintered Surface Machining of Cemented Carbide	⊗ Impossible	⊙ Best
Machined Surface Quality	⊙ Best	△ The first recommendation is NPD10

Recommended Cutting Conditions (Carbide Machining)

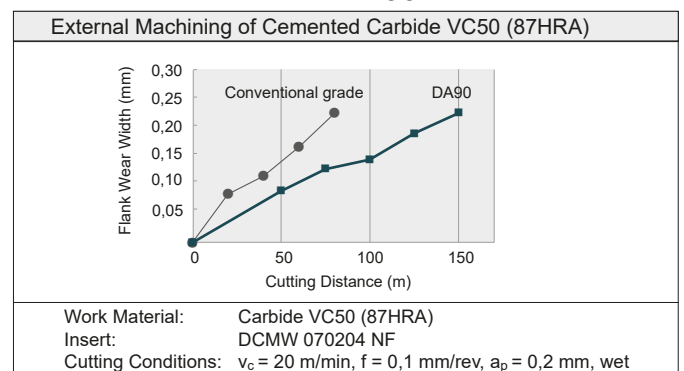
Work Material			Grade	Cutting Conditions			
Class	Hardness (HRA)	SEI Grades		Cutting Speed v_c (m/min)	Feed Rate f (mm/rev)	Depth of Cut a_p (mm/rev)	
VM, VC	40	≥ 88	G5, D2	NPD10	5-15-20	0,03-0,05-0,07	0,03-0,05-0,07
VM, VC	70, 60, 50	83 - <88	G7, G6	NPD10	5-20-30	0,03-0,10-0,20	0,03-0,10-0,20
VM, VC	-	≥ 83	G7, G6, G5, D2	DA90	5-20-30	0,03-0,10-0,20	0,03-0,20-0,50

Min. - Optimum - Max., Cutting conditions: NPD10: dry, DA90: wet

Machining Precision of NPD10



Wear Resistance of DA90





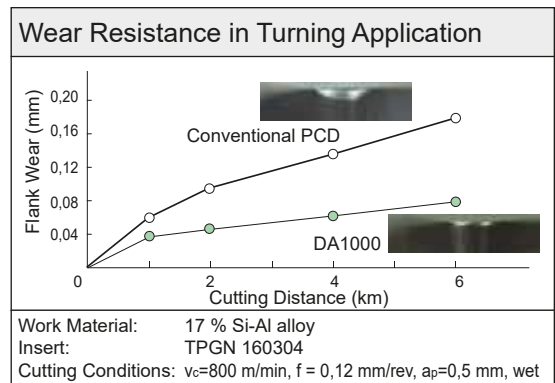
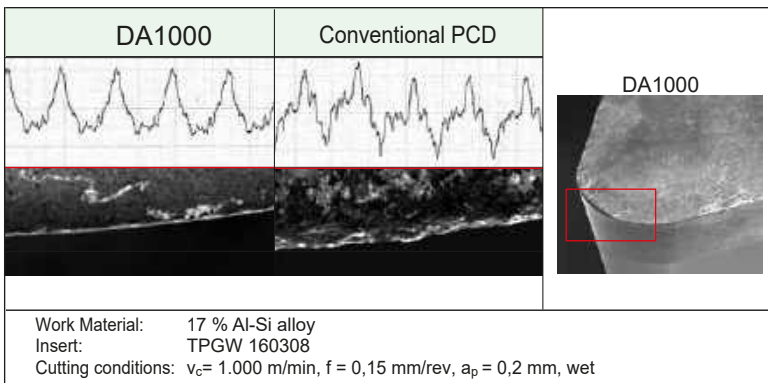
General Features

SumiDia DA1000 is a high density, ultra fine grained sintered PCD with high toughness similar to that of cemented carbides.

SumiDia DA1000, with its great improvement in fracture resistance, eliminates the breakage problems faced by conventional PCD tools especially during the milling of Aluminium alloys and achieves a longer and more stable tool life.

Furthermore, the NF type inserts makes it even more cost effective.

Cutting Performance



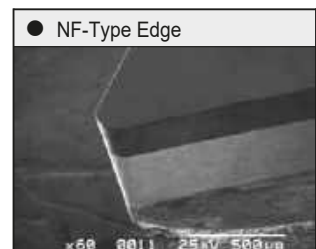
NF Type Inserts

General Features

- Total Cost Effectiveness with High Performance and Lower Price
 - Optimum design utilizing improved mass production techniques provides a relatively lower cost.
 - Regrindable type results in huge total cost reduction.
- Wide Application Range
 - Wide range of stocked items for small hole boring, OD turning to milling processes.
 - Negative and positive type inserts that are applicable on standard lever-lock, pin-lock type holders.

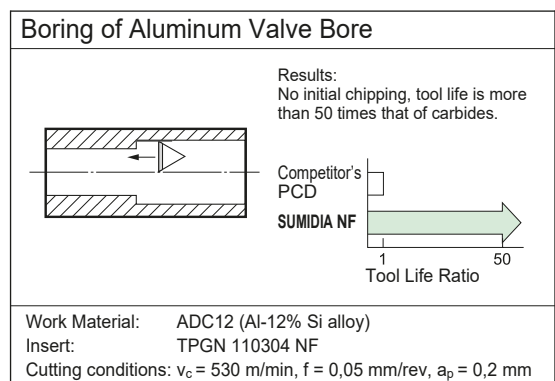
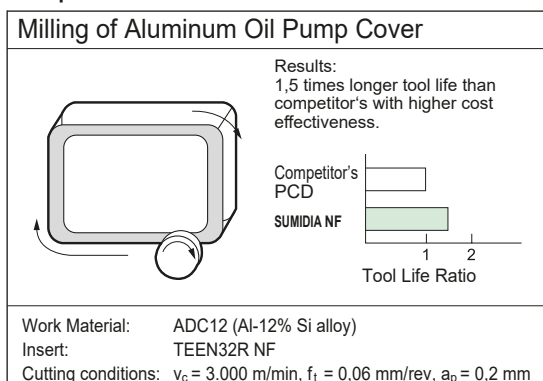
Efficiency

SumiDia NF-type inserts preserve the excellent basic performance of DA1000 while achieving high cost performance through optimal design and development of mass production technology. These inserts achieve the high performance of SUMIDIA DA1000, including excellent fracture resistance, wear resistance and smooth work material surface finishing.



(NF-type is precision ground just like conventional inserts.)

Application Examples



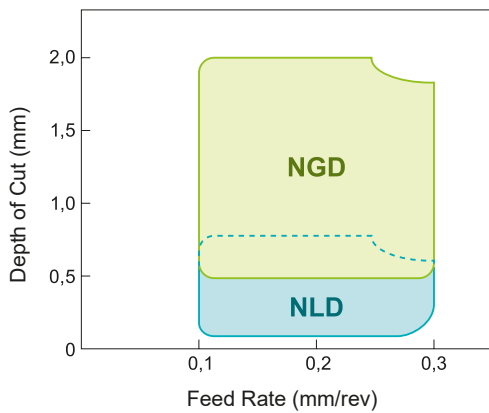


■ Characteristics

- Provides excellent chip control in semi finishing and finishing of aluminium alloy.
- Solves chip control problems and dramatically improves work efficiency.
- Achieves stable tool life by employing high toughness grade DA1000.

■ Applications Range

Wrought Aluminium Alloy (A6061)

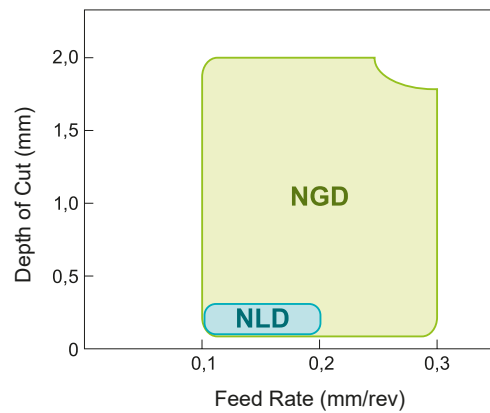


NLD Type Chipbreaker

Achieves excellent chip control for finishing.



Casted Aluminium Alloy (ADC12)



NGD Type Chipbreaker

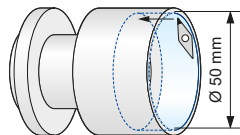
Achieves excellent chip control for semi finishing.



■ Application Examples

Internal Turning of Machine Component

Provides good chip control in small-depth cutting of wrought Al alloy.



Breakmaster **NLD** type

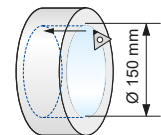


Without chip breaker

Work Material: A6061
Insert: VCMT110302 **NLD** NF (DA1000)
Cutting Conditions: $v_c = 200$ m/min, $f = 0,20$ mm/rev, $a_p = 0,10$ mm, wet

Internal Turning of Transmission Component

Offers good chip control in casted material. Small chips - easy to remove.



Breakmaster **NGD** type



Without chip breaker

Work Material: ADC12
Insert: TPMT110304 **NGD** NF (DA1000)
Cutting Conditions: $v_c = 400$ m/min, $f = 0,23$ mm/rev, $a_p = 1,20$ mm, wet

SUMIDIA One-Use Inserts Break Master DM Type

N Non-ferrous Metal



General Features

Economy One-Use Insert

- Similar to SumiBoron One-Use type inserts

With Built-in Chipbreaker for Effective Chip Removal

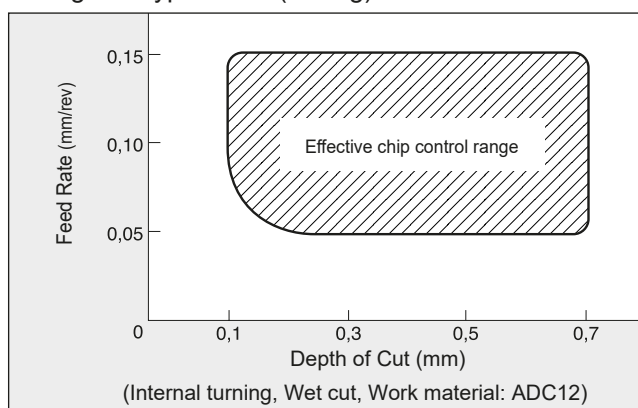
- Solving chip control problems and improving efficiency with DM-type chipbreaker.

Extensive Insert Range for External and Facing Operation

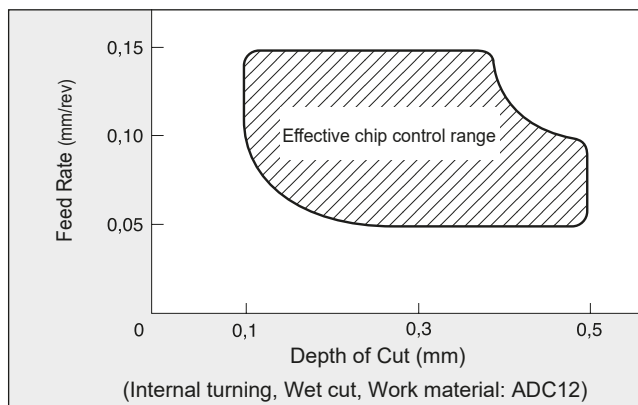
- 80° and 55° diamond shaped inserts are added to expand the application range of this series.

Application Range

Triangular Type Insert (Boring)



CCMT/DCMT Type (External Turning & Facing)



Chip Control

Break Master



No Chipbreaker



Application

Machining Details	Cutting Conditions	Results
Work Material: AC2A-T6	$v_c = 300$ m/min $f = 0,06$ mm/rev $a_p = 0,35$ mm	Surface finish of the bore hole was less than $Ra = 1 \mu\text{m}$.
Operation: Internal Boring	Wet cut	Chips formed was of a uniform curl of about 2 mm in length. There was almost no chips left inside the bore hole.

Recommended Conditions

Boring (Triangular Insert)

Feed Rate	Depth of Cut	Type
-0.15 mm/rev.	-0,7 mm	Wet cut

External Copying (55°, 80° Diamond Shaped Inserts)

Feed Rate	Depth of Cut	Type
-0.15 mm/rev.	-0,5 mm	Wet cut

For facing process, D.O.C. should be less than 0,4 mm

Series

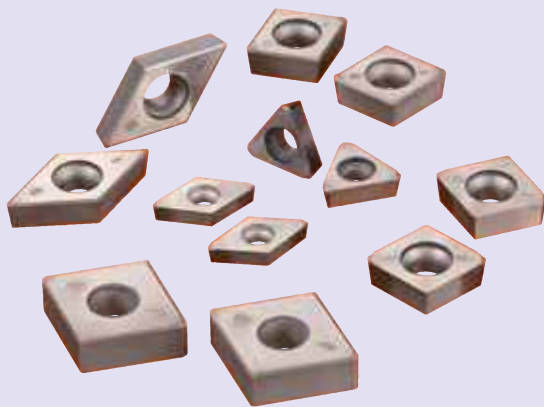
External Turning & Facing		Boring	
	CCMT 0602__ L/R-DM NU		TPMT 0802__ L/R-DM NU
	CCMT 09T3__ L/R-DM NU		TPMT 0902__ L/R-DM NU
	DCMT 0702__ L/R-DM NU		TPMR 1103__ L/R-DM NU ^(*)
	DCMT 11T3__ L/R-DM NU		TPMR 1603__ L/R-DM NU ^(*)

(*) Stock in Japan
Delivery on request

SUMIBORON / SUMIDIA Indexable Inserts & Tools

M1-M62

M



SUMIBORON / SUMIDIA Insert

C / 80° Diamond

D / 55° Diamond

R / Round

S / Square

T / Triangle

V / 35° Diamond

W / Polygon

Special

SUMIDIA Binderless

SUMIBORON / SUMIDIA Precision Tools

SUMIBORON

SUMIDIA

High Speed Non-Ferrous Mill ^{New}

SUMIBORON "BN Finish Mill"

"Helical Master"

"Mould Finish Master"

SUMIDIA "Mould Finish Master" Binderless

SUMIDIA Drills

Insert Identification M2-3

CC_ 7° pos. Type M4,6-8

CP_ 11° pos. Type M5

CN_ neg. Type M9-11

DC_ 7° pos. Type M12-14

DN_ neg. Type M15-18

RN_ neg. Type M18

SC_ 7° pos. Type M19

SN_ neg. Type M19-20

TB_ 5° pos. Type M20

TC_ 7° pos. Type M21

TN_ neg. Type M22-24

TP_ 11° pos. Type (Without Hole) M24

TP_ 11° pos. Type (With Hole) M25-27

VB_ 5° pos. Type M28

VC_ 7° pos. Type M29

VN_ neg. Type M30-31

WN_ neg. Type M32

ZNEX neg.-pos. Type M32

Neg.-pos. Type M33

Guidance M34-35

BSME / SEXC Type Small Hole Boring Bars M36-39

BNBB Type Small Hole Boring Bars M40

BNZ / BNB Type Small Hole Boring Bars M41

GWB / PSC Type Grooving Holder M42-43

BNGG Type Threading Holder M44

DABB Type Small Hole Boring Bars M45

ANX Type Face Mill M46-51

RF Type Face Mill M52

SRF Type Face Mill M52

FMU Type Face Mill M54-55

BNES Type Endmill M56

BNBP Type Micro Ball Nose Endmill M57

NPDRS / NPDB(S) Type M58-59

DAL / DDL / DML Type Drills M60-61



Sumiboron / Sumidia
Inserts/Tools

SUMIBORON Insert Identification

Regrindable Type

CNMA 120408

B

①

Insert ISO Code
ISO ⇨ C2/C3

②

Additional Information
Chart 1

Chart 1

Symbol	Description
B	Full-top CBN insert

One-Use Type

CNGG 120408

N-SV

NC

WG

4

①

Insert ISO Code
ISO ⇨ C2/C3

②

Chip Breaker
Chart 2

③

One-Use Type
Chart 3

④

Wiper Insert
Chart 4

Chart 2

Symbol	Description
—	Standard Type
LF LE	Sharp cutting edge
LT	Small edge treatment type
LS	Low cutting force
ES	High efficiency type
HS	Strong cutting edge
N-FV N-LV N-SV	Chipbreaker Type

Chart 3

Symbol	One-Use Type	Grade
NC	Coated SUMIBORON	BNC2010, 2020 BNC100, 160 BNC200, 300 BNC500
NU	Uncoated CBN	BNX10, 20 BN1000, 2000 BN350, BN7000, 7500
NS		BNX25

Chart 4

Symbol	Wiper Insert
WG	Finishing $0,05 \leq f \leq 0,20$
WH	High feed cutting $0,20 \leq f < 0,40$
W	Surface Roughness Standard: $R_z 1,6 \sim 3,2\mu\text{m}$

f : Feed Rate (mm/rev)

⑤

No. of Cutting Edges
Chart 5

Chart 5

Symbol	No. of Cutting Edges	Type
—	1 cutting edge	Single-corner
2	2 cutting edges	Multi-corner
3	3 cutting edges	
4	4 cutting edges	
6	6 cutting edges	

- C
- D
- R
- S
- T
- V
- W
- Z

Regrindable Type

CNMA 120408

RH

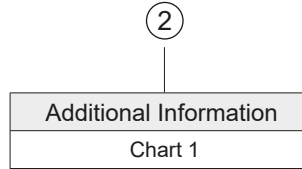
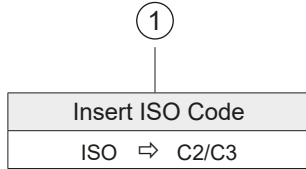


Chart 1

Symbol	Description
RH	Honing specification (treated cutting edge)

One-Use Type

CNMA 120408

N-LD

NF

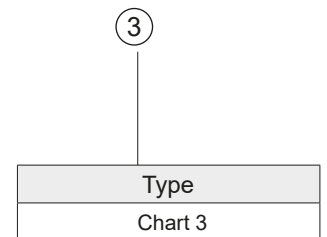
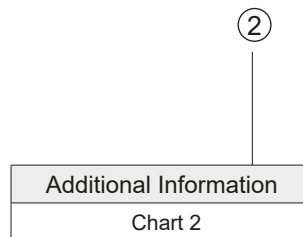
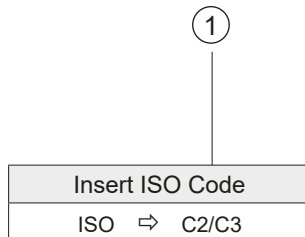


Chart 2

Symbol	Description
N-LD	Chipbreaker type (neutral)
N-GD	
R-DM	Chipbreaker type (right handed)
L-DM	Chipbreaker type (left handed)

Chart 3

Symbol	Description
NF	NF insert ⇨ L26
NU	One use insert

C

D

R

S

T

V

W

Z

80° Diamond Type 11° Relief
With Insert Hole


Coated

Dimensions (mm)				
CP--	L	IC	S	D ₁
0602--	6,45	6,35	2,38	2,8
0802--		7,94	2,38	3,4
0903--		9,525	3,18	4,4

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

CPGW


● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	RE	Material																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
	CPGW 080202 NC2 CPGW 080204 NC2	0,2	○	○																							
		0,4	○	○																							
		0,2	○	○																							
		0,4	○	○																							

Uncoated

CPMW

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	Material																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
	CPMW 060202 NF CPMW 060204 NF CPMW 060208 NF	0,2																									
		0,4																									
		0,8																								●	●
																										●	●

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

 L4, L5 Edge Specification of SUMIBORON Inserts

- C**
- D**
- R**
- S**
- T**
- V**
- W**
- Z**

SumiBoron / SumiDia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

CC-- Type 7° pos. Inserts

80° Diamond Type 7° Relief
With Insert Hole








Uncoated

Dimensions (mm)				
CC--	L	IC	S	D ₁
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

CCGT / CCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	RE	H		K		H		K		S		N															
			Coated		Uncoated		Uncoated		Uncoated		Uncoated		Uncoated															
			CBN																									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
 CBN with chipbreaker with 2 CBN cutting edges	CCGT 060204 N-FV NU2	0,4								●																		
	CCGT 09T304 N-FV NU2	0,4								●																		
	CCGT 09T308 N-FV NU2	0,8								●																		
 with 2 CBN cutting edges	CCGT 09T304 N-LV NU2	0,4								●																		
	CCGT 09T308 N-LV NU2	0,8								●																		
	CCGW 060204 NU2	0,4																			●							
 with 2 CBN cutting edges	CCGW 060208 NU2	0,8																		●								
	CCGW 09T304 NU2	0,4								●	●	▲	●		▲	▲	●			●								
	CCGW 09T308 NU2	0,8								●	●	●		▲	▲	●			●	●								
 (Wiper Type)	CCGW 09T304 NU-WG2	0,4								●																		
	CCGW 09T308 NU-WG2	0,8								●																		
 (Wiper Type)	CCGW 09T304 NU-WH2	0,4								●																		
	CCGW 09T308 NU-WH2	0,8								●																		
 LF - Type Sharp cutting edge with 2 CBN cutting edges	CCGW 09T304 LF-NU2	0,4																		●								
	CCGW 09T308 LF-NU2	0,8																		●								
 HS - Type Strong cutting edge with 2 CBN cutting edges	CCGW 09T304 HS-NU2	0,4																		●								
	CCGW 09T308 HS-NU2	0,8																		●								

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

 Edge Specification of SUMIBORON Inserts

80° Diamond Type

7° Relief
With Insert Hole

Uncoated

CCGW

● G-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	RE	Dimensions (mm)																							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN8000	NCB100	DA90	DA150	DA1000	NPD10
	CCGW 09T304	0,4																								
	CCGW 09T308	0,8										●	●		▲											

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	Material Compatibility																						
			H	K	H	K	S	N	Sintered	Carbide	Hard	Brittle	Material												
	CCGW 060204 NS	0,4																							
	CCGW 060208 NS	0,8										●	●												
	CCGW 09T304 NS	0,4										●	●												
	CCGW 09T308 NS	0,8										●	●												
	CCGW 060202 NU	0,2							●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	CCGW 060204 NU	0,4							●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	CCGW 060208 NU	0,8							●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	CCGW 09T302 NU	0,2							●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	CCGW 09T304 NU	0,4							●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	CCGW 09T308 NU	0,8							●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	CCGW 120408 NU	0,8							●	●	●	●	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲

Dimensions (mm)				
CC--	L	IC	S	D ₁
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4
1204--	12,9	12,7	4,76	5,5

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

Material	H		K		S		N	
	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated
CBN								
BNC2010								
BNC2020								
BNC100								
BNC160								
BNC200								
BNC300								
BNC500								
BN1000								
BN2000								
BNX10								
BNX20								
BNX25								
BN250								
BN300								
BN350								
BN700								
BN7000								
BN7500								
BN8000								
NCB100								
DA90								
DA150								
DA1000								
NPD10								

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

L4, L5 Edge Specification of SUMIBORON Inserts

C

D

R

S

T

V

W

Z

SumiBoron / Sumidia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

CC-- Type 7° pos. Inserts

80° Diamond Type 7° Relief
With Insert Hole

Uncoated

Dimensions (mm)				
CC--	L	IC	S	D ₁
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

CCMT / CCMW

● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	RE	Material Compatibility																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN750	BN800	NCB100	DA90	DA150	DA1000	NPD10
	CCMT 060202	0,2																							
	CCMT 060204	0,4																							
	CCMT 09T302	0,2																							

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	Material Compatibility																						
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN750	BN800	NCB100	DA90	DA150	DA1000	NPD10
	CCMT 060201 NF	0,1																							
	CCMT 060202 NF	0,2																							
	CCMT 060204 NF	0,4																							
	CCMT 09T301 NF	0,1																							
	CCMT 09T302 NF	0,2																							
	CCMT 09T308 NF	0,8																							

● M-Class SumiDia (PCD, One-Use "Break Master" Type)

Break Master - DM	Shape	ISO Cat. No.	RE	Material Compatibility																							
Break Master - DM	Shape	ISO Cat. No.	RE	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN750	BN800	NCB100	DA90	DA150	DA1000	NPD10	
		CCMT 060202 L-DM NU	0,2																								
		CCMT 060204 L-DM NU	0,4																								
		CCMT 09T302 L-DM NU	0,2																								
		CCMT 09T304 L-DM NU	0,4																								
		CCMT 060202 R-DM NU	0,2																								
		CCMT 060204 R-DM NU	0,4																								
		CCMT 09T302 R-DM NU	0,2																								
		CCMT 09T304 R-DM NU	0,4																								
		CCMT 060202 N-LD NF	0,2																								
		CCMT 060204 N-LD NF	0,4																								
		CCMT 09T302 N-LD NF	0,2																								
		CCMT 09T304 N-LD NF	0,4																								
		CCMT 09T308 N-LD NF	0,8																								
		CCMT 09T308 N-LD NF	0,8																								
		CCMT 060202 N-GD NF	0,2																								
		CCMT 060204 N-GD NF	0,4																								
		CCMT 09T302 N-GD NF	0,2																								
		CCMT 09T304 N-GD NF	0,4																								
		CCMT 09T308 N-GD NF	0,8																								
		CCMT 09T308 N-GD NF	0,8																								

● M-Class SumiDia (PCD, Binderless)

Shape	ISO Cat. No.	RE	Material Compatibility																							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN750	BN800	NCB100	DA90	DA150	DA1000	NPD10	
	CCMW 03X102 RH	0,2																								
	CCMW 03X104 RH	0,4																								
	CCMW 04X102 RH	0,2																								
	CCMW 04X104 RH	0,4																								
	CCMW 060202 RH	0,2																								
	CCMW 060204 RH	0,4																								
	CCMW 09T302 RH	0,2																								
	CCMW 09T304 RH	0,4																								
	CCMW 09T308 RH	0,8																								
	CCMW 09T308 RH	0,8																								

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

L4, L5 Edge Specification of SUMIBORON Inserts

C
D
R
S
T
V
W
Z
SumiDia
Inserts

80° Diamond Type 0° Relief
With Insert Hole










Coated

CNGA / CNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Dimensions (mm)				
CN--	L	IC	S	D ₁
1204--	12,9	12,7	4,76	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
■ Carbide/Hard Brittle Material

Shape	ISO Cat. No.	RE	Material																									
			Coated			Uncoated																						
			CBN										Bi-Ingress CBN	Uncoated PCD	Uncoated PCBN	Sumidias												
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
 Standard - Normal cut geometry  (Wiper Type)	CNGA 120402 NC4 CNGA 120404 NC4 CNGA 120408 NC4 CNGA 120412 NC4 with 4 CBN cutting edges	0,2 0,4 0,8 1,2	●	○	●	●	●	●	○	○																		
	CNGA 120404 NC-W4 CNGA 120408 NC-W4 CNGA 120412 NC-W4	0,4 0,8 1,2			▲	▲	▲		▲																			
	CNGA 120404 NC-WG4 CNGA 120408 NC-WG4 CNGA 120412 NC-WG4	0,4 0,8 1,2	●	●	●	●	●	●	●																			
	CNGA 120404 NC-WH4 CNGA 120408 NC-WH4 CNGA 120412 NC-WH4	0,4 0,8 1,2	○	●	●	●	●	●	●																			
 LE - Type Low cutting force	CNGA 120404 LE-NC2 CNGA 120408 LE-NC2 CNGA 120412 LE-NC2 with 2 CBN cutting edges	0,4 0,8 1,2	●																									
 LT - Type Sharp cutting edge	CNGA 120402 LT-NC2 CNGA 120404 LT-NC2 CNGA 120408 LT-NC2 CNGA 120412 LT-NC2 with 2 CBN cutting edges	0,2 0,4 0,8 1,2	○	●																								
 LS - Type Low cutting force	CNGA 120404 LS-NC2 CNGA 120408 LS-NC2 CNGA 120412 LS-NC2 with 2 CBN cutting edges	0,4 0,8 1,2			●	●	●	○																				
 ES - Type Crater wear stability	CNGA 120404 ES-NC4 CNGA 120408 ES-NC4 CNGA 120412 ES-NC4 with 4 CBN cutting edges	0,4 0,8 1,2	●	●																								
 HS - Type Strong cutting edge	CNGA 120404 HS-NC2 CNGA 120408 HS-NC2 CNGA 120412 HS-NC2 with 2 CBN cutting edges	0,4 0,8 1,2	●	●	●	●	●	●																				
 Break Master - FV, LV, SV  CBN with chipbreaker	CNGG 120404 N-FV NC4 CNGG 120408 N-FV NC4 CNGG 120412 N-FV NC4	0,4 0,8 1,2	●	●	□	●																						
	CNGG 120404 N-LV NC4 CNGG 120408 N-LV NC4 CNGG 120412 N-LV NC4	0,4 0,8 1,2	○	●	□	●																						
	CNGG 120408 N-SV NC4 CNGG 120412 N-SV NC4	0,8 1,2	●		●																							

● = Euro stock
 ○ = Stock item in Japan

▲ = To be replaced by new item
 □ = Delivery on request

 Edge Specification of SUMIBORON Inserts

C
D
R
S
T
V
W
Z

Sumiboron Sumidia Inserts

SUMIBORON / SUMIDIA Indexable Inserts

CN- Type neg. Inserts

80° Diamond Type 0° Relief
With Insert Hole







Uncoated

Dimensions (mm)				
CN--	L	IC	S	D ₁
1204--	12,9	12,7	4,76	5,16

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

CNGA / CNGM

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	RE	H		K		H		K		S		N															
			Coated		Uncoated		Uncoated		Uncoated		Uncoated		Uncoated															
			CBN												PCD	Sumidia												
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
 with 2 CBN cutting edges	CNGA 120404 NS2	0,4																										
	CNGA 120408 NS2	0,8																										
	CNGA 120412 NS2	1,2																										
	CNGA 120404 NU2	0,4																										
 (Wiper Type)	CNGA 120408 NU2	0,8																										
	CNGA 120412 NU2	1,2																										
	CNGA 120404 NU-W2	0,4																										
	CNGA 120408 NU-W2	0,8																										
 (Wiper Type)	CNGA 120412 NU-WG2	1,2																										
	CNGA 120404 NU-WH2	0,4																										
	CNGA 120408 NU-WH2	0,8																										
	CNGA 120412 NU-WH2	1,2																										
 LF - Type Sharp cutting edge	CNGA 120404 LF-NU2	0,4																										
	CNGA 120408 LF-NU2	0,8																										
 HS - Type Strong cutting edge	CNGA 120408 HS-NU2	0,8																										
 Break Master - LV CBN with chipbreaker	CNGM 120404 N-LV NU2	0,4																										
	CNGM 120408 N-LV NU2	0,8																										
	CNGM 120412 N-LV NU2	1,2																										

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

 L4, L5 Edge Specification of SUMIBORON Inserts

80° Diamond Type	0° Relief
	—

Uncoated

Dimensions (mm)				
CN_-	L	IC	S	D ₁
0903--	9,7	9,525	3,18	4,4
1204--	12,9	12,7	4,76	5,16

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

CNGN / CNGX

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	RE	Material																								
			Coated		Uncoated										Uncoated												
			CBN																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN5800	NCB100	DA90	DA150	DA1000	NPD10	
	CNGN 090308 CNGN 090312	0,8 1,2																				●					
	CNGN 120412 CNGN 120416	1,2 1,6																				●					

● G-Class SumiBoron (Solid CBN, "Dimple" Type)

Shape	ISO Cat. No.	RE	Material																								
			Coated		Uncoated										Uncoated												
			CBN																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN5800	NCB100	DA90	DA150	DA1000	NPD10	
	CNGX 120412 CNGX 120416	1,2 1,6																				○					

CNMA / CNMX

● M-Class SumiBoron (CBN, Re grindable Type)

Shape	ISO Cat. No.	RE	Material																								
			Coated		Uncoated										Uncoated												
			CBN																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN5800	NCB100	DA90	DA150	DA1000	NPD10	
	CNMA 120404 CNMA 120408 CNMA 120412	0,4 0,8 1,2											●			▲											

● M-Class SumiBoron (CBN, One-use Type)

Shape	ISO Cat. No.	RE	Material																								
			Coated		Uncoated										Uncoated												
			CBN																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN5800	NCB100	DA90	DA150	DA1000	NPD10	
	CNMA 120404 NS CNMA 120408 NS CNMA 120412 NS	0,4 0,8 1,2											●														
	CNMA 120404 NU CNMA 120408 NU CNMA 120412 NU	0,4 0,8 1,2								●	●	●	●	●	●	●	●	●	●	●	●	●					
	CNMA 120408 NU-W	0,8									▲	▲															

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	Material																								
			Coated		Uncoated										Uncoated												
			CBN																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN5800	NCB100	DA90	DA150	DA1000	NPD10	
	CNMX 120402 NF CNMX 120404 NF CNMX 120408 NF	0,2 0,4 0,8																									●

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

L4, L5 Edge Specification of SUMIBORON Inserts

- C**
- D**
- R**
- S**
- T**
- V**
- W**
- Z**

Sumiboron / Sumidia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

DC-- Type 7° pos. Inserts

55° Diamond Type 7° Relief With Insert Hole





Coated

Dimensions (mm)				
DC--	L	IC	S	D ₁
0702--	7,75	6,35	2,38	2,8
11T3--	11,6	9,525	3,97	4,4

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

DCGT / DCGW

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	RE	Coated		Uncoated																					
			CBN		Uncoated																					
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN8000	NCB100	DA90	DA150	DA1000	NPD10
Break Master - FV, LV  CBN with chipbreaker with 2 CBN cutting edges	DCGT 070204 N-FV NC2 DCGT 11T304 N-FV NC2 DCGT 11T308 N-FV NC2 DCGT 11T304 N-LV NC2 DCGT 11T308 N-LV NC2	0,4 0,4 0,8 0,4 0,8	●	●	●	●																				
 Standard - Normal cut geometry (Wiper Type)	DCGW 070202 NC2 DCGW 070204 NC2 DCGW 070208 NC2 DCGW 11T302 NC2 DCGW 11T304 NC2 DCGW 11T308 NC2	0,2 0,4 0,8 0,2 0,4 0,8	●	●	●	●	●	●																		
	DCGW 11T304 NC-WG2 DCGW 11T308 NC-WG2	0,4 0,8	●	●	●	●																				
 LE - Type Low cutting force	DCGW 11T302 LE-NC2 DCGW 11T304 LE-NC2 DCGW 11T308 LE-NC2	0,2 0,4 0,8	○	●																						
	DCGW 070202 LT-NC2 DCGW 070204 LT-NC2 DCGW 11T302 LT-NC2 DCGW 11T304 LT-NC2 DCGW 11T308 LT-NC2	0,2 0,4 0,2 0,4 0,8	●	●																						
 LS - Type Low cutting force with 2 CBN cutting edges	DCGW 070202 LS-NC2 DCGW 070204 LS-NC2 DCGW 11T304 LS-NC2 DCGW 11T308 LS-NC2	0,2 0,4 0,4 0,8		●	●	●																				
	DCGW 11T304 HS-NC2 DCGW 11T308 HS-NC2	0,4 0,8	●	●			●	●																		

● = Euro stock
 ○ = Stock item in Japan

▲ = To be replaced by new item
 □ = Delivery on request

 L4, L5 Edge Specification of SUMIBORON Inserts

SUMIBORON / SUMIDIA Indexable Inserts

DC-- Type 7° pos. Inserts

55° Diamond Type 7° Relief With Insert Hole

Uncoated

Dimensions (mm)				
DC--	L	IC	S	D ₁
0702--	7,75	6,35	2,38	2,8
11T3--	11,6	9,525	3,97	4,4

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

DCMT / DCMW

Shape	ISO Cat. No.	RE	H		K		H		K		S		N													
			Coated		Uncoated		Coated		Uncoated		Coated		Uncoated													
			CBN												PCD		Sumidia									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10

● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	RE	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10
	DCMT 070202	0,2																								
	DCMT 070204	0,4																								
	DCMT 11T302	0,2																								
	DCMT 11T304	0,4																								
	DCMT 11T308	0,8																								

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10
	DCMT 070201 NF	0,1																								
	DCMT 070202 NF	0,2																								
	DCMT 070204 NF	0,4																								
	DCMT 070208 NF	0,8																								
	DCMT 11T301 NF	0,1																								
	DCMT 11T302 NF	0,2																								
	DCMT 11T304 NF	0,4																								
	DCMT 11T308 NF	0,8																								

● M-Class SumiDia (PCD, One-Use "Break Master" Type)

Break Master Type	Shape	ISO Cat. No.	RE	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
Break Master - DM		DCMT 070202 L-DM NU	0,2																									
		DCMT 070204 L-DM NU	0,4																									
Break Master - DM		DCMT 11T302 L-DM NU	0,2																									
		DCMT 11T304 L-DM NU	0,4																									
Break Master - DM		DCMT 070202 R-DM NU	0,2																									
		DCMT 070204 R-DM NU	0,4																									
Break Master - DM		DCMT 11T302 R-DM NU	0,2																									
		DCMT 11T304 R-DM NU	0,4																									
Break Master - LD		DCMT 070202 N-LD NF	0,2																									
		DCMT 070204 N-LD NF	0,4																									
Break Master - LD		DCMT 11T302 N-LD NF	0,2																									
		DCMT 11T304 N-LD NF	0,4																									
Break Master - LD		DCMT 11T308 N-LD NF	0,8																									
Break Master - GD		DCMT 070202 N-GD NF	0,2																									
		DCMT 070204 N-GD NF	0,4																									
Break Master - GD		DCMT 11T302 N-GD NF	0,2																									
		DCMT 11T304 N-GD NF	0,4																									
Break Master - GD		DCMT 11T308 N-GD NF	0,8																									

● M-Class SumiDia (PCD, Binderless)

Shape	ISO Cat. No.	RE	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10
	DCMW 070202 RH	0,2																								
	DCMW 070204 RH	0,4																								
	DCMW 11T302 RH	0,2																								
	DCMW 11T304 RH	0,4																								
	DCMW 11T308 RH	0,8																								

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

L4, L5 Edge Specification of SUMIBORON Inserts

C
D
R
S
T
V
W
Z
Sumiboron / SumiDia Inserts

55° Diamond Type 0° Relief
With Insert Hole

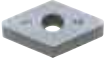

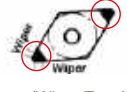



Coated

Dimensions (mm)				
DN_	L	IC	S	D ₁
1104--	11,6	9,525	4,76	3,81
1504--	15,5	12,7	4,76	5,16
1506--	15,5	12,7	6,35	5,16

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

DNGA ○○○○○○

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	RE	Material																							
			Coated		Uncoated										Uncoated											
			BNC2010	BNC2020	CBN										BNCB100	PCD										
				BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA90	DA150	DA1000	NPD10		
 Standard - Normal cut geometry with 2 CBN cutting edges	DNGA 110404 NC2 DNGA 110408 NC2 DNGA 110412 NC2	0,4 0,8 1,2	● ● ○	● ● ○		●																				
	 Standard - Normal cut geometry with 4 CBN cutting edges	DNGA 150402 NC4 DNGA 150404 NC4 DNGA 150408 NC4 DNGA 150412 NC4	0,2 0,4 0,8 1,2	○ ○ ○ ○																						
		DNGA 150604 NC4 DNGA 150608 NC4 DNGA 150612 NC4	0,4 0,8 1,2	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●																	
 Standard - Normal cut geometry (Wiper Type)		DNGA 150404 NC-WG4 DNGA 150408 NC-WG4	0,4 0,8			○ ○	○ ○																			
	DNGA 150604 NC-WG4 DNGA 150608 NC-WG4 DNGA 150612 NC-WG4	0,4 0,8 1,2	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●																			
	DNGA 150404 NC-WH4 DNGA 150408 NC-WH4	0,4 0,8			○ ○	○ ○																				
 LE - Type Low cutting force with 2 CBN cutting edges	DNGA 150404 LE-NC2 DNGA 150408 LE-NC2 DNGA 150412 LE-NC2	0,4 0,8 1,2	○ ○ ○																							
	DNGA 150604 LE-NC2 DNGA 150608 LE-NC2 DNGA 150612 LE-NC2	0,4 0,8 1,2	● ● ●																							
	 LT - Type Sharp cutting edge with 2 CBN cutting edges	DNGA 150402 LT-NC2 DNGA 150404 LT-NC2 DNGA 150408 LT-NC2 DNGA 150412 LT-NC2	0,2 0,4 0,8 1,2	○ ○ ○ ○																						
DNGA 150604 LT-NC2 DNGA 150608 LT-NC2 DNGA 150612 LT-NC2		0,4 0,8 1,2	● ● ●																							
 LS - Type Low cutting force with 2 CBN cutting edges		DNGA 150404 LS-NC2 DNGA 150408 LS-NC2 DNGA 150412 LS-NC2	0,4 0,8 1,2																							
	DNGA 150604 LS-NC2 DNGA 150608 LS-NC2 DNGA 150612 LS-NC2	0,4 0,8 1,2		□ □ □	● ● ●	● ● ●	● ● ●	○ ○ ○																		

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

 L4, L5

- C
- D
- R
- S
- T
- V
- W
- Z

Sumiboron / Sumidia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

DN_ - Type neg. Inserts

55° Diamond Type 0° Relief
With Insert Hole

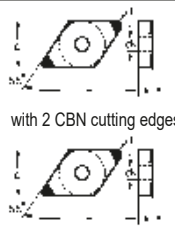
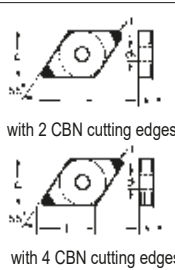
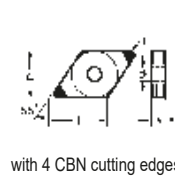
Coated

Dimensions (mm)				
DN_	L	IC	S	D ₁
1504--	15,5	12,7	4,76	5,16
1506--	15,5	12,7	6,35	5,16

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

DNGA / DNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	RE	Coated		Uncoated																								
			CBN													PCD	Sumidia												
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250			BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
ES - Type Crater wear stability 	DNGA 150604 ES-NC2 DNGA 150608 ES-NC2 DNGA 150612 ES-NC2	0,4 0,8 1,2	● ● ●																										
	DNGA 150404 ES-NC4 DNGA 150408 ES-NC4 DNGA 150412 ES-NC4	0,4 0,8 1,2	○ ○ ○																										
HS - Type Strong cutting edge 	DNGA 150604 HS-NC2 DNGA 150608 HS-NC2 DNGA 150612 HS-NC2	0,4 0,8 1,2	● ● ●	● ● ●	● ● ●	● ● ●																							
	DNGA 150412 HS-NC4	1,2																											
Break Master - FV, LV, SV  CBN with chipbreaker with 4 CBN cutting edges	DNGG 150404 N-FV NC4 DNGG 150408 N-FV NC4 DNGG 150412 N-FV NC4	0,4 0,8 1,2	○ ○ ○	○ ○ ○	○ ○ ○																								
	DNGG 150604 N-FV NC4 DNGG 150608 N-FV NC4 DNGG 150612 N-FV NC4	0,4 0,8 1,2	● ● ●	● ● ●	□ ● □	● ● ●																							
	DNGG 150404 N-LV NC4 DNGG 150408 N-LV NC4 DNGG 150412 N-LV NC4	0,4 0,8 1,2	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○																							
	DNGG 150604 N-LV NC4 DNGG 150608 N-LV NC4 DNGG 150612 N-LV NC4	0,4 0,8 1,2	● ● ●	● ● ●	● ● □	● ● ●																							
	DNGG 150408 N-SV NC4 DNGG 150412 N-SV NC4	0,8 1,2	○ ○	○ ○																									
	DNGG 150608 N-SV NC4 DNGG 150612 N-SV NC4	0,8 1,2	● ●	● ●		● ●																							

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

 L4, L5 Edge Specification of SUMIBORON Inserts

SUMIBORON / SUMIDIA Indexable Inserts

DN--, RN-- neg. Type and SC-- Type 7° pos. Inserts

55° Diamond Type 0° Relief With Insert Hole


Coated / Uncoated

Dimensions (mm)				
DN--	L	IC	S	D ₁
1506--	15,5	12,7	6,35	5,16


H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
■ Carbide/Hard Brittle Material

DNMA


● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	RE	Material																									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
	DNMA 150604 DNMA 150608 DNMA 150612	0,4																										
		0,8										●																
		1,2										●				▲												

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	Material																									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
	DNMA 150604 NS DNMA 150608 NS	0,4																										
		0,8																										
		1,2									●					▲												

● M-Class SumiDia (PCD, Binderless)

Shape	ISO Cat. No.	RE	Material																									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
	DNMA 150408 RH DNMA 150412 RH	0,8																										
		1,2																										○

Round Type 0° Relief Without Insert Hole


Coated / Uncoated

Dimensions (mm)				
RN--	L	IC	S	D ₁
0903--	9,525	9,525	3,18	-
1203--	12,7	12,7	3,18	-
1204--	12,7	12,7	4,76	-


H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
■ Carbide/Hard Brittle Material

RNGN

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	RE	Material																									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
	RNGN 090300 RNGN 120300 RNGN 120400	-																										
		-																										
		-																										

● G-Class SumiBoron (CBN, Full Top Type)

Shape	ISO Cat. No.	RE	Material																									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
	RNGN 090300 B	-																										
		-																										
		-																										

● = Euro stock
 ○ = Stock item in Japan

▲ = To be replaced by new item
 □ = Delivery on request

 L4, L5 Edge Specification of SUMIBORON Inserts

Square Type 0° Relief
With Insert Hole

Coated / Uncoated

Dimensions (mm)				
SN_	L	IC	S	D ₁
09T3--	9,525	9,525	3,97	4,4
1204--	12,7	12,7	4,76	5,16

- H Hardened Steel
- K Cast Iron
- N Non-Ferrous Metal
- S Exotic Alloy
- PM Sintered Component
- Carbide/Hard Brittle Material

SCGW / SNGA

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	Material																								
			Coated								Uncoated																
			CBN																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN5800	NCB100	DA90	DA150	DA1000	NPD10	
		SCGW 09T304 NU SCGW 09T308 NU	0,4 0,8																								

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	RE	Material																							
			CBN																							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN5800	NCB100	DA90	DA150	DA1000	NPD10
		SNGA 120408 NC4 SNGA 120412 NC4	0,8 1,2	●		●	●																			
		SNGA 120408 HS-NC2 SNGA 120412 HS-NC2	0,8 1,2			●	●																			
		SNGA 120408 HS-NC4 SNGA 120412 HS-NC4	0,8 1,2	□																						

Square Type 0° Relief
Without Insert Hole

Uncoated

Dimensions (mm)				
SN_	L	IC	S	D ₁
0903--	9,525	9,525	3,18	-
1204--	12,7	12,7	4,76	-

- H Hardened Steel
- K Cast Iron
- N Non-Ferrous Metal
- S Exotic Alloy
- PM Sintered Component
- Carbide/Hard Brittle Material

SNGN / SNGX

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	RE	Material																							
			Coated								Uncoated															
			CBN																							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN5800	NCB100	DA90	DA150	DA1000	NPD10
		SNGN 090308 SNGN 090312	0,8 1,2																							
		SNGN 120412 SNGN 120416	1,2 1,6																							

● G-Class SumiBoron (Solid CBN, "Dimple" Type)

Shape	ISO Cat. No.	RE	Material																							
			Coated								Uncoated															
			CBN																							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BN5800	NCB100	DA90	DA150	DA1000	NPD10
		SNGX 120412 SNGX 120416	1,2 1,6																							

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

L4, L5 Edge Specification of SUMIBORON Inserts

- C
- D
- R
- S
- T
- V
- W
- Z

SumiBoron / Sumidia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

SN-- neg. Type and TB-- Type 5° pos. Inserts

Square Type

0° Relief
With Insert Hole

Coated / Uncoated

Dimensions (mm)				
SN--	L	IC	S	D ₁
1204--	12,7	12,7	4,76	5,16

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
■ Carbide/Hard Brittle Material

SNMA

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	Material																							
			Coated								Uncoated															
			CBN																							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10
	SNMA 120408 NS SNMA 120412 NS	0,8 1,2											□													
	SNMA 120408 NU SNMA 120412 NU	0,8 1,2								●		●			▲	▲	●		●							

● M-Class SumiDia (PCD, Binderless)

Shape	ISO Cat. No.	RE	Material																								
			CBN																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
	SNMA 120408 RH SNMA 120412 RH	0,8 1,2																								○	○

60° Triangle Type

5° Relief

Dimensions (mm)				
TBGN	L	IC	S	D ₁
0601--	6,9	3,97	1,59	-
TBGW				
0601--	6,9	3,97	1,59	2,8

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
■ Carbide/Hard Brittle Material

TBGN / TBGW

● G-Class SumiBoron (CBN, Full Top Type)

Shape	ISO Cat. No.	RE	Material																							
			Coated								Uncoated															
			CBN																							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10
	TBGN 060102 B TBGN 060104 B	0,2 0,4					●			●			●													

● G-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	RE	Material																								
			CBN																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
	TBGN 060102 NF TBGN 060104 NF	0,2 0,4																								●	●

● G-Class SumiDIA (PCD, NF Type)

Shape	ISO Cat. No.	RE	Material																								
			CBN																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
	TBGW 060102 NF TBGW 060104 NF	0,2 0,4																								●	●

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

L4, L5 Edge Specification of SUMIBORON Inserts

C
D
R
S
T
V
W
Z
SumiBoron / SumiDia Inserts

60° Triangle Type

7° Relief
With Insert Hole

Coated / Uncoated

Dimensions (mm)				
TC--	L	IC	S	D ₁
0902--	9,62	5,56	2,38	2,5
1102--	11,0	6,35	2,38	2,8
16T3--	16,5	9,525	3,97	4,3

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

TCGW

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	H		K										S		N											
			Coated		Uncoated										Uncoated		Uncoated											
			CBN										Business CBN		PCD		Business Sumidia											
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
	TCGW 090204 NC TCGW 090208 NC	0,4 0,8	●	●			●																					
	TCGW 110202 NC TCGW 110204 NC TCGW 110208 NC	0,2 0,4 0,8	●	●		●		●																				
	TCGW 16T304 NC3 TCGW 16T308 NC3	0,4 0,8	●			●																						
		TCGW 090204 NU TCGW 090208 NU	0,4 0,8																▲	●	●							
	TCGW 110202 NU TCGW 110204 NU TCGW 110208 NU	0,2 0,4 0,8							●	●		▲	●					▲	●	●								
	TCGW 16T304 NU TCGW 16T308 NU	0,4 0,8							●			▲	●					▲	●	●								
																			▲	●	●							

TCMT

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	H		K										S		N										
			Coated		Uncoated										Uncoated		Uncoated										
			CBN										Business CBN		PCD		Business Sumidia										
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
	TCMT 090202 NF TCMT 090204 NF	0,2 0,4																									
	TCMT 110201 NF TCMT 110202 NF TCMT 110204 NF	0,1 0,2 0,4																							○	●	●

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

L4, L5 Edge Specification of SUMIBORON Inserts

- C**
- D**
- R**
- S**
- T**
- V**
- W**
- Z**

SumiBoron / SumiDia
Indexable Inserts

SUMIBORON / SUMIDIA Indexable Inserts

TN-- Type neg. Inserts

60° Triangle Type 0° Relief With Insert Hole









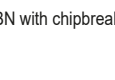
Coated

Dimensions (mm)				
TN--	L	IC	S	D ₁
1604--	16,5	9,525	4,76	3,81

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

TNGA / TNGG

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	RE	Coated		Uncoated																								
			CBN		Uncoated																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10			
 <p>Standard - Normal cut geometry</p> <p>with 6 CBN cutting edges</p>	<p>TNGA 160402 NC6</p> <p>TNGA 160404 NC6</p> <p>TNGA 160408 NC6</p> <p>TNGA 160412 NC6</p>	0,2 0,4 0,8 1,2	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○			
 <p>LE - Type Low cutting force</p> <p>with 3 CBN cutting edges</p>	<p>TNGA 160404 LE-NC3</p> <p>TNGA 160408 LE-NC3</p> <p>TNGA 160412 LE-NC3</p>	0,4 0,8 1,2	● ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○		
 <p>LT - Type Sharp cutting edge</p> <p>with 3 CBN cutting edges</p>	<p>TNGA 160402 LT-NC3</p> <p>TNGA 160404 LT-NC3</p> <p>TNGA 160408 LT-NC3</p> <p>TNGA 160412 LT-NC3</p>	0,2 0,4 0,8 1,2	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○		
 <p>LS - Type Low cutting force</p> <p>with 3 CBN cutting edges</p>	<p>TNGA 160404 LS-NC3</p> <p>TNGA 160408 LS-NC3</p> <p>TNGA 160412 LS-NC3</p>	0,4 0,8 1,2	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	
 <p>ES - Type Crater wear stability</p> <p>with 6 CBN cutting edges</p>	<p>TNGA 160404 ES-NC6</p> <p>TNGA 160408 ES-NC6</p> <p>TNGA 160412 ES-NC6</p>	0,4 0,8 1,2	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	
 <p>HS - Type Strong cutting edge</p> <p>with 3 CBN cutting edges</p>	<p>TNGA 160404 HS-NC3</p> <p>TNGA 160408 HS-NC3</p> <p>TNGA 160412 HS-NC3</p>	0,4 0,8 1,2	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	
 <p>HS - Type Strong cutting edge</p> <p>with 6 CBN cutting edges</p>	<p>TNGA 160412 HS-NC6</p>	1,2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
 <p>Break Master - FV, LV, SV</p> <p>with 6 CBN cutting edges</p>	<p>TNGG 160404 N-FV NC6</p> <p>TNGG 160408 N-FV NC6</p> <p>TNGG 160412 N-FV NC6</p>	0,4 0,8 1,2	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	
 <p>CBN with chipbreaker</p> <p>with 6 CBN cutting edges</p>	<p>TNGG 160404 N-LV NC6</p> <p>TNGG 160408 N-LV NC6</p> <p>TNGG 160412 N-LV NC6</p>	0,4 0,8 1,2	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	
	<p>TNGG 160408 N-SV NC6</p> <p>TNGG 160412 N-SV NC6</p>	0,8 1,2	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○	○ ○

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item
□ = Delivery on request

 L4, L5 Edge Specification of SUMIBORON Inserts

60° Triangle Type 7° Relief
With Insert Hole







Uncoated

Dimensions (mm)				
TN_	L	IC	S	D ₁
1604--	16,5	9,525	4,76	3,81

- H Hardened Steel
- K Cast Iron
- N Non-Ferrous Metal
- S Exotic Alloy
- PM Sintered Component
- Carbide/Hard Brittle Material

TNGA / TNGM

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	RE	Material																								
			H Coated		H Uncoated										K S N												
			CBN																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	Bi-Ingress CBN	Uncoated PCD	Uncoated PCD	Bi-Ingress Sumidia		
 with 3 CBN cutting edges	 with 3 CBN cutting edges	TNGA 160404 NU3 TNGA 160408 NU3 TNGA 160412 NU3	0,4																								
			0,8																		○	○					
			1,2																			○	○				
 LF - Type Sharp cutting edge	 with 3 CBN cutting edges	TNGA 160404 LF-NU3 TNGA 160408 LF-NU3	0,4																								
			0,8																		○	○					
Break Master - LV  with 3 CBN cutting edges	 with 3 CBN cutting edges	TNGM 160404 N-LV NU3 TNGM 160408 N-LV NU3 TNGM 160412 N-LV NU3	0,4							●																	
			0,8								●																
			1,2									●															

● = Euro stock
 ○ = Stock item in Japan

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 L4, L5 Edge Specification of SUMIBORON Inserts

- C
- D
- R
- S
- T
- V
- W
- Z

Sumiboron Sumidia Inserts

SUMIBORON / SUMIDIA Indexable Inserts

TN__ Type neg. Inserts

TP__ Type 11° pos. Inserts

60° Triangle Type

0° Relief
With Insert Hole

Uncoated

Dimensions (mm)				
TN__	L	IC	S	D ₁
1604--	16,5	9,525	4,76	3,81

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

TNMA

● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	RE	Material Compatibility																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
	TNMA 160404 TNMA 160408	0,4																									
		0,8										●				▲											

● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	Material Compatibility																									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
	TNMA 160404 NU TNMA 160408 NU TNMA 160412 NU	0,4																										
		0,8								●		●																
		1,2							●		●	▲	●			▲	▲	●										

60° Triangle Type

11° Relief
Without Insert Hole

Dimensions (mm)				
TP__	L	IC	S	D ₁
1103--	11,0	6,35	3,18	-
1603--	16,5	9,525	3,18	-

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

TPGN

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	Material Compatibility																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
	TPGN 110304 NU TPGN 110308 NU	0,4																									
		0,8										●	●						▲	○							
	TPGN 160304 NU TPGN 160308 NU	0,4										●															
		0,8										●							▲	○							

● G-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	Material Compatibility																									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
	TPGN 110304 NF TPGN 110308 NF	0,4																										
		0,8																										●
	TPGN 160302 NF TPGN 160304 NF TPGN 160308 NF	0,2																									●	
		0,4																										●
		0,4																										●
		0,8																										●

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L4, L5 Edge Specification of SUMIBORON Inserts

C
D
R
S
T
V
W
Z
SumiBoron / SumiDia Inserts

60° Triangle Type 11° Relief
With Insert Hole

Coated

Dimensions (mm)				
TP_ _	L	IC	S	D ₁
0802--	8,2	4,76	2,39	2,3
0902--	9,62	5,56	2,38	2,5
1103--	11,0	6,35	3,18	3,4

H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
■ Carbide/Hard Brittle Material

TPGT / TPGW

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	Material																						
			Coated		Uncoated										Uncoated										
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000
Break Master - FV CBN with chipbreaker with 3 CBN cutting edges	TPGT 110304 N-FV NC3 TPGT 110308 N-FV NC3	0,4 0,8	●	●	□	●																			
 Standard - Normal cut geometry	TPGW 080202 NC TPGW 080204 NC TPGW 110304 NC TPGW 110308 NC	0,2 0,4 0,4 0,8	●	●		●																			
 Standard Type with 3 CBN cutting edges	TPGW 080202 NC3 TPGW 080204 NC3 TPGW 090202 NC3 TPGW 090204 NC3	0,2 0,4 0,2 0,4	○	○																					
 LE - Type Low cutting force with 3 CBN cutting edges	TPGW 110302 LE-NC3 TPGW 110304 LE-NC3 TPGW 110308 LE-NC3	0,2 0,4 0,8	○	○																					
 LT - Type Sharp cutting edge with 3 CBN cutting edges	TPGW 110302 LT-NC3 TPGW 110304 LT-NC3 TPGW 110308 LT-NC3	0,2 0,4 0,8	○	○																					
 LS - Type Low cutting force with 3 CBN cutting edges	TPGW 110304 LS-NC3 TPGW 110308 LS-NC3	0,4 0,8																							

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L4, L5 Edge Specification of SUMIBORON Inserts

C
D
R
S
T
V
W
Z

SumiBoron / Sumidia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

TP-- Type 11° pos. Inserts

60° Triangle Type 11° Relief With Insert Hole

Dimensions (mm)



TP--	L	IC	S	D ₁
0802--	8,2	4,76	2,39	2,3
0902--	9,62	5,56	2,38	2,5
1102--	11,0	6,35	2,38	2,8
1103--			3,18	3,4
1604--	16,5	9,525	4,76	4,3

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material


Uncoated

TPGT / TPGW


● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	Dimensions (mm)																								
			Coated		Uncoated																						
			CBN														PCD		Sumidia								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
Break Master - FV  CBN with chipbreaker with 3 CBN cutting edges	TPGT 110304 N-FV NU3	0,4									●																
	TPGT 110308 N-FV NU3	0,8									●																
 TPGW 080202 NU TPGW 080204 NU TPGW 110304 NU TPGW 110308 NU	TPGW 080202 NU	0,2									●	●	●		▲												
	TPGW 080204 NU	0,4									●	●	●		▲												
	TPGW 110304 NU	0,4									●	●	●		▲	▲	●										
	TPGW 110308 NU	0,8									●	●	●		▲	▲	●										

● G-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	RE	Dimensions (mm)																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
 TPGW 110304 TPGW 110308		0,4 0,8											●		▲												

● G-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	Dimensions (mm)																									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
 TPGW 080202 NF TPGW 080204 NF TPGW 110202 NF TPGW 110204 NF TPGW 110208 NF TPGW 110302 NF TPGW 110304 NF TPGW 110308 NF TPGW 160402 NF TPGW 160404 NF TPGW 160408 NF	TPGW 080202 NF	0,2																									●	
	TPGW 080204 NF	0,4																										●
	TPGW 110202 NF	0,2																									○	
	TPGW 110204 NF	0,4																									○	
	TPGW 110208 NF	0,8																									○	
	TPGW 110302 NF	0,2																									●	
	TPGW 110304 NF	0,4																									●	
	TPGW 110308 NF	0,8																									●	
	TPGW 160402 NF	0,2																									○	
	TPGW 160404 NF	0,4																									○	
TPGW 160408 NF	0,8																									○		

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 L4, L5 Edge Specification of SUMIBORON Inserts

60° Triangle Type 11° Relief
With Insert Hole

Uncoated


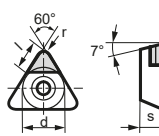
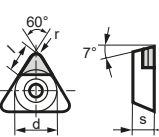
Dimensions (mm)

TP--	L	IC	S	D ₁
0802--	8,2	4,76	2,39	2,3
0902--	9,62	5,56	2,38	2,5
1102--	11,0	6,35	2,38	2,8
1103--			3,18	3,4
1604--	16,5	9,525	4,76	4,3


- H Hardened Steel
- K Cast Iron
- N Non-Ferrous Metal
- S Exotic Alloy
- PM Sintered Component
- Carbide/Hard Brittle Material

TPMT / TPMW

● M-Class SumiDia (PCD, One-Use "Break Master" Type)

Shape	ISO Cat. No.	RE	Material																									
			H Coated		H Uncoated										K S		N Uncoated											
			CBN																									
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10		
Break Master - DM 	TPMT 080204 L-DM NU	0,4																										
	TPMT 090204 L-DM NU	0,4																							○			
Break Master - LD 	TPMT 080202 N-LD NF	0,2																									○	
	TPMT 080204 N-LD NF	0,4																									○	
	TPMT 090202 N-LD NF	0,2																									○	
	TPMT 090204 N-LD NF	0,4																									○	
	TPMT 110202 N-LD NF	0,2																									○	
	TPMT 110204 N-LD NF	0,4																									○	
	TPMT 110302 N-LD NF	0,2																									○	
	TPMT 110304 N-LD NF	0,4																										○
	TPMT 110308 N-LD NF	0,8																										○
	TPMT 160402 N-LD NF	0,2																										○
TPMT 160404 N-LD NF	0,4																										○	
TPMT 160408 N-LD NF	0,8																										○	
Break Master - GD 	TPMT 080202 N-GD NF	0,2																									○	
	TPMT 080204 N-GD NF	0,4																									○	
	TPMT 090202 N-GD NF	0,2																									○	
	TPMT 090204 N-GD NF	0,4																									○	
	TPMT 110202 N-GD NF	0,2																									○	
	TPMT 110204 N-GD NF	0,4																									○	
	TPMT 110302 N-GD NF	0,2																									○	
	TPMT 110304 N-GD NF	0,4																										○
	TPMT 110308 N-GD NF	0,8																										○
	TPMT 160402 N-GD NF	0,2																										○
TPMT 160404 N-GD NF	0,4																										○	
TPMT 160408 N-GD NF	0,8																										○	

● M-Class SumiDia (PCD, Binderless)

	TPMW 080202 RH	0,2																									○	
	TPMW 080204 RH	0,4																									○	
	TPMW 110302 RH	0,2																									○	
	TPMW 110304 RH	0,4																									○	
	TPMW 110308 RH	0,8																									○	
	TPMW 160402 RH	0,2																									○	
	TPMW 160404 RH	0,4																									○	
	TPMW 160408 RH	0,8																									○	
																												○
																												○
																												○

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 L4, L5 Edge Specification of SUMIBORON Inserts

- C
- D
- R
- S
- T
- V
- W
- Z

Sumiboron / Sumidia Inserts

35° Diamond Type 0° Relief
With Insert Hole


Uncoated

Dimensions (mm)				
VN_	L	IC	S	D ₁
1604--	16,6	9,525	4,76	3,81


- H Hardened Steel
- K Cast Iron
- N Non-Ferrous Metal
- S Exotic Alloy
- PM Sintered Component
- Carbide/Hard Brittle Material

VNGM / VNMA


● M-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	RE	H		K		H		K		S		N	
			Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated		
 CBN with chipbreaker with 2 CBN cutting edges	VNGM 160404 N-LV NU2 VNGM 160408 N-LV NU2	0,4												
		0,8												


● M-Class SumiBoron (CBN, Regrindable Type)

 with 2 CBN cutting edges	VNMA 160404 VNMA 160408	0,4												
		0,8												

● M-Class SumiBoron (CBN, One-Use Type)


 with 2 CBN cutting edges	VNMA 160404 NU VNMA 160408 NU	0,4												
		0,8												
	0,8	VNMA 160408 NS												

● M-Class SumiDia (PCD, Binderless)

 with 2 CBN cutting edges	VNMA 160408 RH VNMA 160412 RH	0,8												
		1,2												

VNMX

● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	RE	H		K		H		K		S		N	
			Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated				
 with 2 CBN cutting edges	VNMX 160404 NF VNMX 160408 NF	0,4												
		0,8												

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 L4, L5 Edge Specification of SUMIBORON Inserts

- C
- D
- R
- S
- T
- V
- W
- Z

SumiBoron / SumiDia Inserts

SUMIBORON / SUMIDIA Indexable Inserts

WN-- neg. Type and ZN-- Special Inserts

80° Trigon Type

0° Relief
With Insert Hole





Coated

Dimensions (mm)				
WN--	L	IC	S	D ₁
0804--	8,69	12,7	4,76	5,16

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

WNGA

● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape	ISO Cat. No.	RE	Material																								
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	NCB100	DA90	DA150	DA1000	NPD10	
 WNGA 080408 LT-NC3 0,8			○																								
	 WNGA 080404 NC6 WNGA 080408 NC6 WNGA 080412 NC 6 with 6 CBN cutting edges	0,4	○	●			●																				
		0,8	○	●			●																				
		1,2	○	●			●																				
 WNGA 080408 NC-WG6 0,8			●	●		○	○																				
 WNGA 080408 NC-WH6 (Wiper Type) 0,8			●	●		○	○																				

80° Special Type

7° Relief
With Insert Hole



Coated / Uncoated

Dimensions (mm)				
ZN--	L	IC	S	D ₁
0401--	-	4,76	1,59	2,3

- H** Hardened Steel
- K** Cast Iron
- N** Non-Ferrous Metal
- S** Exotic Alloy
- PM** Sintered Component
- Carbide/Hard Brittle Material

ZNEX

● G-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	Material																							
			BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BN1000	BN2000	BNX10	BNX20	BNX25	BN250	BN300	BN350	BN700	BN7000	BN7500	BNS800	DA150	DA1000			
 ZNEX 040102 NC ZNEX 040104 NC 0,2 0,4			●	▲	▲	▲																				
			●	▲	▲	▲																				
 ZNEX 040102 LE-NC ZNEX 040104 LE-NC 0,2 0,4			○																							
			○																							
ZNEX 040102 LT-NC ZNEX 040104 LT-NC 0,2 0,4			○																							
			○																							
ZNEX 040102 NU ZNEX 040104 NU 0,2 0,4								●	●		●			▲			○									
								●	●		●			▲			○									

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 L4, L5 Edge Specification of SUMIBORON Inserts

SUMIDIA Binderless PCD - Insert Grade NPD10

Negative Inserts


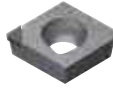






Application: Hard brittle material

	Shape	ISO Cat. No.	Dimensions (mm)					NPD10
			Inscribed Circle (IC)	Thick-ness	Hole Size	Nose Radius	Cutting Edge Length	
 55° Diamond Type		DNMA 150408 RH 150412 RH	12,70	4,76	5,16	0,8	1,8	○
						1,2	1,8	○
 Square Type		SNMA 120408 RH 120412 RH	12,70	4,76	5,16	0,8	1,7	○
						1,2	1,7	○
 35° Diamond Type		VNMA 160408 RH 160412 RH	9,525	4,76	3,81	0,8	1,8	○
						1,2	1,5	○

Note: Clearance angle of cutting edge tip can show deviation due to the production process.

Positive Inserts

Application: Hard brittle material

	Rake Angle	Shape	ISO Cat. No.	Dimensions (mm)					NPD10			
				Inscribed Circle (IC)	Thick-ness	Hole Size	Nose Radius	Cutting Edge Length				
 80° Diamond Type	7°		CCMW 03X102 RH 03X104 RH	3,50	1,40	1,9	0,2	1,3	○			
			CCMW 04X102 RH 04X104 RH				4,30	1,80	2,3	0,2	1,7	○
			CCMW 060202 RH 060204 RH	6,35	2,38	2,8	0,2	1,7	○			
			CCMW 09T302 RH 09T304 RH 09T308 RH				9,525	3,97	4,4	0,2	1,7	○
			7°		DCMW 070202 RH 070204 RH	6,35	2,38	2,8	0,2	2,1	○	
					DCMW 11T302 RH 11T304 RH 11T308 RH				9,525	3,97	4,4	0,2
	7°				TPMW 080202 RH 080204 RH	4,76	2,38	2,3	0,2	1,2	○	
					TPMW 110302 RH 110304 RH 110308 RH				6,35	3,18	3,4	0,2
 Triangular Type	11°		TPMW 160402 RH 160404 RH 160408 RH	9,525	4,76	4,4	0,2	2,2	○			
			VCMW 080201 RH 080202 RH 080204 RH				4,76	2,38	2,3	0,2	1,9	○
			VCMW 110302 RH 110304 RH VCMW 160402 RH 160404 RH 160408 RH 160412 RH							9,525	4,76	4,4
VCMW 160402 RH 160404 RH 160408 RH 160412 RH	9,525	4,76	4,4	0,2	2,1	○						
 35° Diamond Type	7°		VCMW 080201 RH 080202 RH 080204 RH	4,76	2,38	2,3	0,1	2,2	○			
			VCMW 110302 RH 110304 RH				6,35	3,18	2,8	0,2	1,9	○
			VCMW 160402 RH 160404 RH 160408 RH 160412 RH							9,525	4,76	4,4
			VCMW 160402 RH 160404 RH 160408 RH 160412 RH	9,525	4,76	4,4				0,2	2,1	○
			VCMW 160402 RH 160404 RH 160408 RH 160412 RH	9,525	4,76	4,4	0,2	2,1	○			
			VCMW 160402 RH 160404 RH 160408 RH 160412 RH	9,525	4,76	4,4	0,2	2,1	○			

Note: Clearance angle of cutting edge tip can show deviation due to the production process.

C

D

R

S

T

V

W

Z

Sumidia
Inserts



BSME

M36-38

Very small boring bar - brazed type

- Solid carbide shank boring bar with brazed CBN tip and inner coolant supply.
- For tiny hole diameter boring in hardened steel.
- Min. boring dia. is \varnothing 2,5 mm.



SEXC

M36-39

CBN boring tool for small diameter boring

- Solid carbide shank boring bar with indexable CBN insert and inner coolant supply.
- For small hole diameter boring in hardened steel.
- Min. boring dia. is \varnothing 4,0 mm.



BNBB

M40

Small hole boring tools

- CBN cutting edge is brazed on to a solid carbide shank.
- Small hole boring for hardened steels.
- Min. boring dia. is \varnothing 3,5 mm.



BNZ

M41

Small hole boring bars

- Solid carbide boring bars with economical CBN insert.
- Small hole boring for hardened steels.
- Min. boring dia. is \varnothing 7,0 mm.



BNB

M41

Small hole boring bars

- Solid carbide boring bars with economical CBN and PCD insert.
- Min. boring dia. is \varnothing 10,0 mm.



GWB / PSC

M42-43

CBN Grooving System for Hardened Steels

- Tangential Inserts – Double clamp holder
- Groove Widths from 1,5 – 6,0mm
- New CBN grade for interrupted grooving
- ISO-PSC polygon modular grooving system



BNGG

M44

Threading holders

- CBN cutting edge for hardened steel
- Adjustable threading after regrinding.



DABB

M45

Small hole boring tools

- PCD cutting edge for finishing of small non-ferrous parts
- Min. boring dia. is \varnothing 3,0 mm.
- DABB-C for boring
DABB-N for profiling and corner grooving



ANX M46-51

High speed cutter for Non-ferrous Metal

- Achieves feeds of over $v_f = 30.000$ mm/min
- 6 different edge preparations
- Simple screw-fastening structure enables fine adjustments to be made easily
- Precise applications of coolant to the machining point
- Milling cutter range with diameter from $\varnothing 32$ -160 mm



RF M52

High speed face mill for Aluminium

- Finishing and roughing aluminium alloys and non-ferrous materials
- High precision and highspeed machining $vc = 5000$ m/min
- Aluminium alloy body
Run-out less than $10 \mu\text{m}$
- Easy assembling



SRF M53

High speed face mill for Aluminium

- Small diameter cutter for small machines
- High speed roughing and finishing with SumiDia DA2200
- High speed capability of $\text{rpm} = 20.000$
- Economical PCD insert NF type



FMU M54-55

"BN Finish Mill" for finishing grey cast iron

- High speed machining $vc = 1500$ m/min
- Excellent surface roughness $R_z = 3,2$
- Run-out less than $10 \mu\text{m}$
- Easy assembling



BNES M56

"Helical Master" SUMIBORON Endmill

- Spiral CBN brazed cutting edge for super finishing hardened steel (HRC 50 – 60)
- Dry machining
- Stable cutting
- High accuracy
- Excellent swarf evacuation



BNBP M57

"Mould Finish Master" SUMIBORON Micro Ball Nose Endmills

- High precision machining of hardened steels < HRC 70 with long tool life
- Super tough grade SUMIBORON BN350 prevents chipping of the cutting edge
- R accuracy : $\pm 0,005$ mm



NPDRS / NPDB(S) M58-59

"Mould Finish Master" SUMIDIA Binderless Endmills

- NPDRS - radius endmills
- NPDB(S) - ball nose endmills
- For finishing of carbide and brittle materials
- High precision machining and long tool life



DAL / DDL / DML M60-61

High precision SUMIDIA Drills

- PCD cutting edge is brazed on to a solid carbide shank.
- From general to high precision drilling of Aluminium alloys
- DML type is suitable for chamfering and stepped drilling

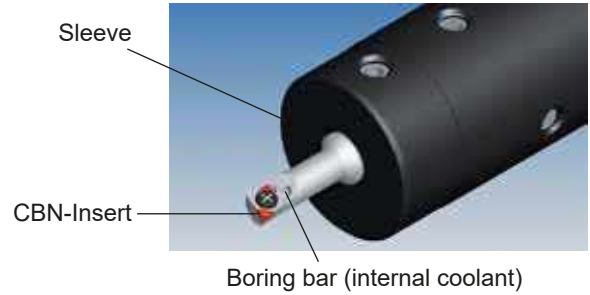
BSME/SEXC Series

■ Features

- New ultra small boring bar with CBN cutting edge
- Internal coolant
- Easy setting and handling
- High accuracy
- Carbide body for high rigidity
- One sleeve for different diameters



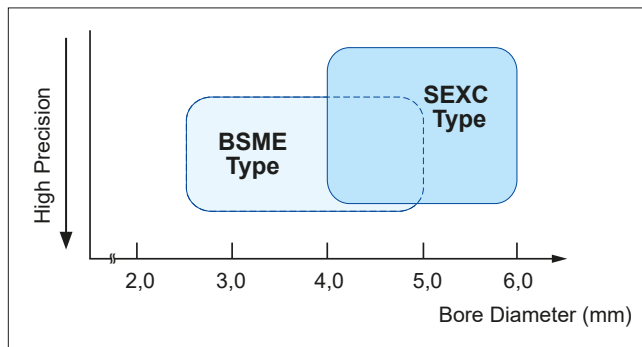
■ Basic System



■ 2 Types of CBN Small Hole Boring Bar System

BSME - CBN Brazed Cutting Edge Type	SEXC - Indexable CBN Insert Type
Min. bore diameter: $\varnothing 2,5 - 5,0$ mm	Min. bore diameter: $\varnothing 4,0 - 6,0$ mm
<p>Unique cutting edge shape with high quality and sharpness</p> <p>Internal coolant hole (standard)</p>	<p>2 corner inserts</p> <p>Internal coolant hole (standard)</p>
<p>Clamp screws Sleeve Location pin Boring bar</p>	<p>Clamp screws Sleeve Location pin Boring bar</p>
<p>Excellent repeatability of boring bar (deviation within 0,020 mm)</p> <p>Clamp screws Location pin for controlled cutting edge position</p>	

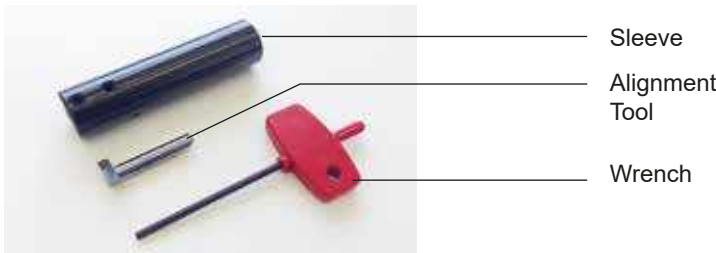
■ Application Range






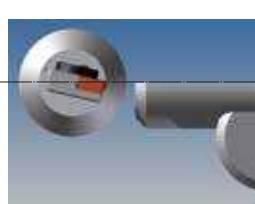
■ Recommended Cutting Conditions

Spindle Speed (n)	$>2000 \text{ min}^{-1}$	Low speed may cause chattering and chipping on the cutting edge.
Depth of Cut (a_p)	0,01 – 0,15 mm	Excessive depth of cut may cause larger tool deflection resulting in deterioration of bore accuracy.
Feed Rate (f)	0,01 – 0,1 mm/rev	-

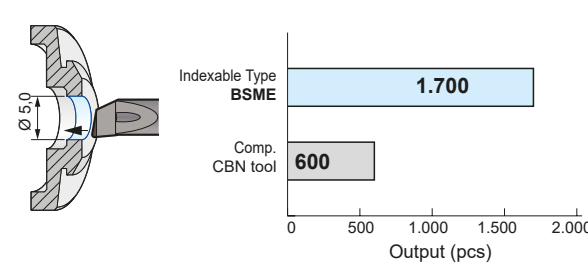
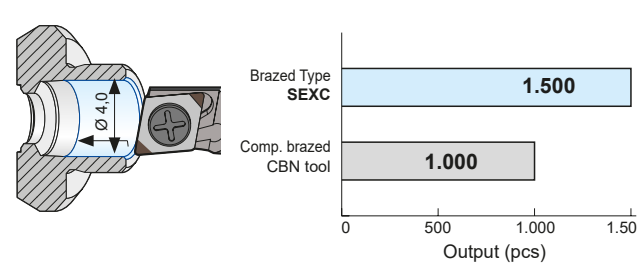
■ Accessories



■ Mounting Instruction

<p>1. Insert alignment tool into the sleeve until you connect with the pin inside. Gently lock the screws to hold.</p>	
<p>2. Locate the sleeve into your tool-holding system. Gently lock the screws to hold.</p>	
<p>3. Clock the flat of the alignment tool into a straight position.</p> 	<p>After adjustment, equipped boring bar has automatically cutting peak height of zero on the center of tool.</p> 
<p>4. Use pre setting machine to set the diameter of the boring bar.</p>	

■ Application Example

BSME Hardened Alloy Steel Valve Component	SEXC Bearing Steel Small Automotive Component
<p>The BSME type provides stable machining. Tool life is over 2 times longer than competitor's CBN tool.</p>  <p>Indexable Type BSME 1.700 Comp. CBN tool 600 Output (pcs)</p>	<p>The SEXC type provides drastically reduced tool costs. Tool life is 1,5 times longer than competitor's brazed CBN tool.</p>  <p>Brazed Type SEXC 1.500 Comp. brazed CBN tool 1.000 Output (pcs)</p>
<p>Work Material: Hardened alloy steel valve component (automotive component) Tool: BSME R50020D2S6 Grade: BN2000 Cutting Conditions: $v_c = 135$ m/min $f = 0,02$ mm/rev $a_p = 0,10$ mm Dry</p>	<p>Work Material: Bearing steel small automotive component (60 HRC) Holder: E06D2 SEXC R/L03-04P Insert: ECXA 030X02LF (BN2000) Cutting Conditions: $v_c = 50$ m/min (4.000 rpm) $f = 0,02$ mm/rev $a_p = 0,02$ mm Wet</p>

BSME Series

BSME-Type with Internal Coolant

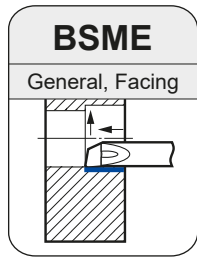


Fig. 1

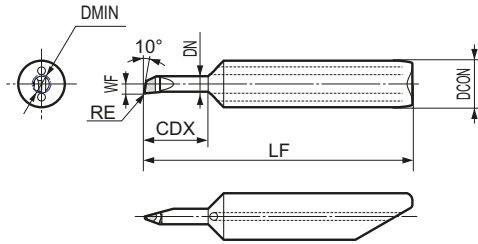
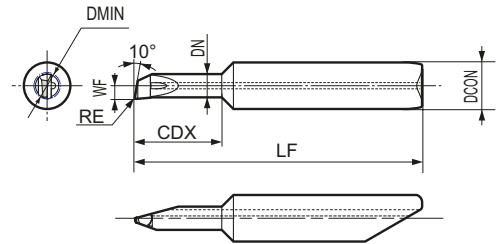


Fig. 2



Sharp edge (no honing)

■ Boring Bar

Description	Grade		Dimensions (mm)							Fig.	Applicable Sleeve
	BN2000		DMIN	DN	WF	CDX	LF	DCON	RE		
	R	L									
BSME R/L 25020D2S6	●	●	2,5	2,0	1,20	5,3	32,0	6,0	0,2	1	HBSM6020
BSME R/L 25020D3S6	●	●				7,8	34,5				
BSME R/L 25020D4S6	□	□				10,3	37,0				
BSME R/L 30020D2S6	●	●	3,0	2,5	1,45	6,3	32,8				
BSME R/L 30020D3S6	●	●				9,3	35,8				
BSME R/L 30020D4S6	□	□				12,3	38,8				
BSME R/L 35020D2S6	●	●	3,5	3,0	1,70	7,3	33,5				
BSME R/L 35020D3S6	●	●				10,8	37,0				
BSME R/L 35020D4S6	□	□				14,3	40,5				
BSME R/L 40020D2S6	●	●	4,0	3,5	1,95	8,3	33,9				
BSME R/L 40020D3S6	●	●				12,3	37,9				
BSME R/L 40020D4S6	□	□				16,3	41,9				
BSME R/L 45020D2S6	●	●	4,5	4,0	2,20	9,3	35,0				
BSME R/L 45020D3S6	●	●				13,8	39,5				
BSME R/L 45020D4S6	□	□				18,3	44,0				
BSME R/L 50020D2S6	●	●	5,0	4,5	2,45	10,3	35,8				
BSME R/L 50020D3S6	●	●				15,3	40,8				
BSME R/L 50020D4S6	□	□				20,3	45,8				

■ Adapter Sleeve and Parts

Description	Stock	Dimensions (mm)		Sleeve Screw	Wrench
		DCB	LF		
HBSM6020	●	6,0	80	BT0506	TH025

■ Alignment Tool

Description	Stock
AFBSM60	●

■ Identification Details

B S M

Sumitomo
CBN Product
Special Mini

E

Solid Carbide
Bar with Inner
Coolant

R/L

R: Right Hand
L: Left Hand

3 5 0

Minimum
Bore Diameter
(ø 3,5 mm)

2 0

Nose Radius
of Edge
(ø 0,20 mm)

D 3

L/D - Ratio of
Working Length

S 6

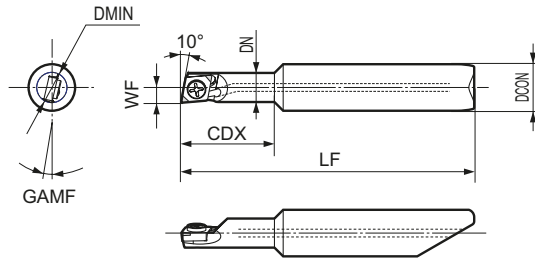
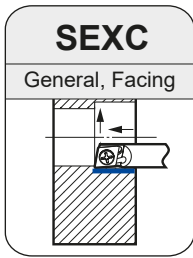
Shank
Diameter

● = Euro stock
□ = Delivery on request

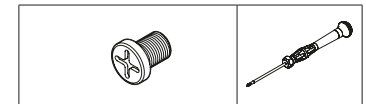
Recommended Tightening Torque (N·m)

SEXC Series

SEXC-Type with Internal Coolant



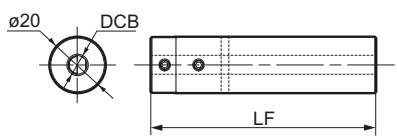
Spare Parts



Boring Bar

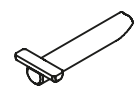
Description	Stock		Dimensions (mm)							Applicable Sleeve	Insert Screw	N·m	Wrench
	R	L	DMIN	DN	WF	CDX	LF	DCON	GAMF				
E06D2 SEXC R/L 03-04P	●	●	4,0	3,75	1,95	8	33,75	6,0	13°	HBSM6020	MIB1,6-2,0	0,2	SDBSM
E06D3 SEXC R/L 03-04P	●	●				12	37,75						
E06D2 SEXC R/L 03-05P	●	●	5,0	4,75	2,45	10	35,25	12°	MIB1,6-2,5				
E06D3 SEXC R/L 03-05P	●	●				15	40,25						
E06D2 SEXC R/L 03-06P	●	●	6,0	5,75	2,95	12	36,75	11°	MIB1,6-3,0				
E06D3 SEXC R/L 03-06P	●	●				18	42,75						

Adapter Sleeve and Parts



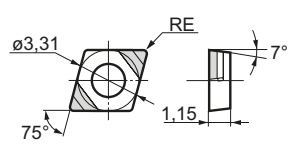
Description	Stock	Dimensions (mm)		Sleeve Screw	Wrench
		DCB	LF		
HBSM6020	●	6,0	80	BT0506	TH025

Alignment Tool



Description	Stock
AFBSM60	●

CBN Insert



Description	Grade		Nose Radius RE (mm)	Cutting Edge Preparation
	BN2000	BN7000		
ECXA030X02 LE NU2	●		0,2	sharp + hone
ECXA030X02 LF NU2	●	●	0,2	sharp

Notes:

Applicable wrench SDBSM is recommended when fastening the insert screw. Please check insert screw occasionally and replace it in time.

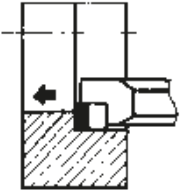
Identification Details

E	06	D2	S	E	X	C	R/L	03	-	04	P
Carbide Bar with Coolant Hole	Shank Diameter (ø 6 mm)	L/D Ratio of Working Length	Insert Clamp System S = Screw Type	Insert Shape E = Diamond 75°	Approach Angle of Main Cutting Edge	Insert Relief Angle C = 7°	R: Right Hand L: Left Hand	Insert Size (ø IC)		Minimum Bore Diameter (ø 4,0 mm)	Standard Content includes Wrench

SUMIBORON Small Hole Boring Tools BNBB Type

For Hardened Steel

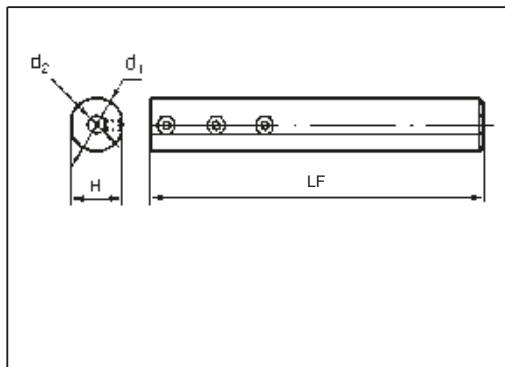
BNBB type small hole boring tools for hardened work pieces up to diameter 3,5 mm



■ „Sumiboron“ Brazed Boring Tools for Small Hole Boring

	Cat. No.	Stock	Dimensions (mm)					Applicable holder	Grade of brazed cutting edge
			DMIN	DCON	LF	H	RE		
BNBB (Carbide shank) 	BNBB 03 R	▲	3,5	3	60	2,4	0,2	HBB 316	SUMIBORON (CBN) BN250
	BNBB 04 R	▲	4,5	4	60	3,4	0,2	HBB 416	
	BNBB 05 R	▲	5,5	5	80	4,4	0,2	HBB 516	
	BNBB 06 R	▲	6,5	6	80	5,4	0,2	HBB 616	
	BNBB 08 R	▲	8,5	8	100	7,4	0,2	HBB 816	

■ Holder



Cat. No.	Stock	Dimensions (mm)			
		d ₁	LF	d ₂	H
HBB 316	●	16	100	3	15
HBB 416	●			4	
HBB 516	●			5	
HBB 616	●			6	
HBB 816	●			8	

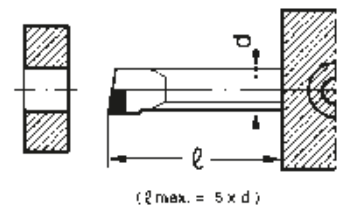
■ Spare Parts

Screw	Wrench
BT 0404	TH 020

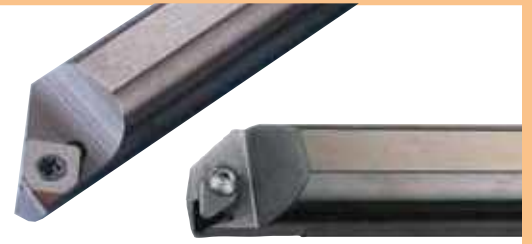
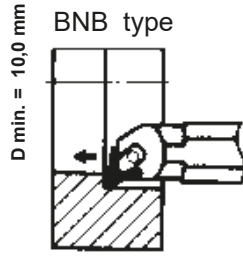
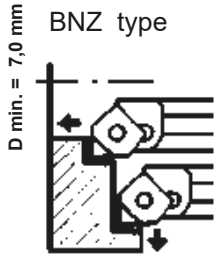
■ Recommended Cutting Conditions

Work Material	SUMIBORON BN250		Notes
Hardened steels (H _R C45-68)	Cutting speed (v _c)	30-150 m/min	Low speed may cause chattering in cutting process and chipping occurrence on the cutting edge.
	Feed rate (f)	0,03-0,1 mm/rev	-
	Depth of cut (a _p)	0,03-0,2 mm	Excessive depth of cut may cause larger deformation of tool, resulting in deterioration of bore accuracy.

■ Precaution On Use



- Adjust overhang to achieve absolute minimum.
- For use of a small diameter brazed boring tool, select high speed and small feed rate, as much as possible.



Boring Bars for Small Hole Boring

	Cat. No.	Stock	Dimensions (mm)					Applicable insert	
			DMIN	DCON	LF	H	GAMF		
BNZ (Carbide shank) 	BNZ 606 R	●	7	6	80	5,5	-14°	ZNEX 040100	 ZNEX (CBN)
	BNZ 608 R	●	9	8	100	7,5	-12°		
	BNZ 610 R	●	11	10	125	9,5	-10°		
	BNZ 612 R	●	13	12	130	11	-8°		
Holder "HBB616" for BNZ606 (ø d = 6 mm) 									
BNB (Carbide shank) 	BNB 508 R/L	● ●	10	8	140	7	-9°	TBGN 060100	 TBGN (CBN)
	BNB 510 R/L	○ ○	12	10	140	9	-8°		
	BNB 512 R/L	● ●	14	12	160	11	-6°		
	BNB 516 R/L	● ●	18	16	180	14	-5°		
	BNB 520 R/L	○ ○	22	20	180	18	-4°		

Spare Parts for BNZ

Holder	Screw	Wrench
BNZ 606 R		
BNZ 608 R	BFTX 0204 N	TRX 06
BNZ 610 R	0,5 (Nm)	

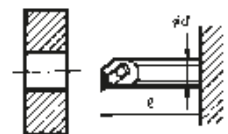
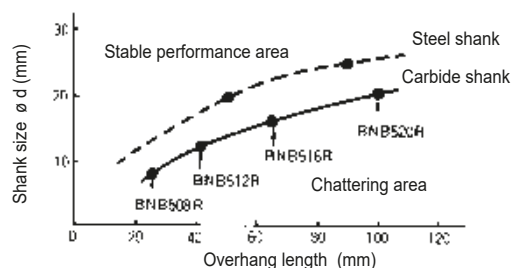
Spare Parts for BNB

Holder	Clamp	Clamp bolt	Nut	Wrench
BNB 508 R/L	BNBC	BH 0306	BNBW-2	TH 020
BNB 512 R/L	BNBC	FBUP-3-A0-9	BNBW-4	TH 020
BNB 516 R/L	BNBC	BH 0310	BNBW-4	TH 020
BNB 520 R/L	BNBC	BH 0310	BNBW-7	TH 020

Recommended Cutting Conditions

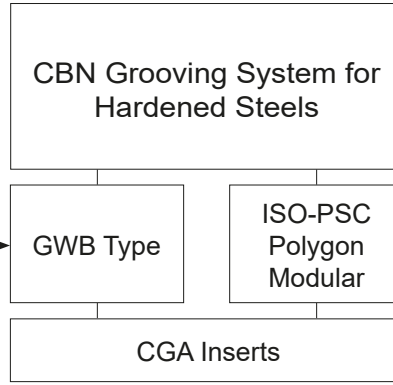
Cutting speed	80–120 m/min
Feed rate	0,03–0,1 mm/rev
Depth of cut	0,03–0,2 mm

Holders Performance Area



Work material: Alloy steel (HRC 60)
 Cutting conditions: $v_c = 100$ m/min
 $f = 0,1$ mm/rev
 $a_p = 0,2$ mm

SUMIBORON Grooving Tool Holder GWB / PSC Type



Features

Tangential insert

80 degree tangentially mounted insert improves rigidity



Double clamping system

The double clamping system increases stability so even axial feeds are possible.

Coated CBN grade BNC30G

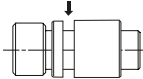
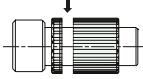
Tough new coated CBN grade for interrupted hard grooving



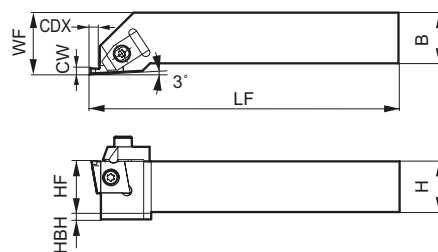
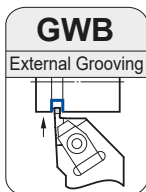
Wide insert range 1,5–6,0 mm

Wide range of width's and grades for continuous and interrupted cut grooving operations






Grades

Grade	Application	Features
BN250	Continuous grooving 	Uncoated CBN grade for continuous cut grooving applications
BNC30G	Interrupted grooving 	Tough new CBN coated grade developed for interrupted cut grooving applications

Grooving Tool Holder GWB Type



Spare Parts

				
	5,0 (N·m)			
TF 72 (Right handed)	BX 0520T	BFTX 0511N	GSP 06	TRX 20
TF 73 (Left handed)				

Holders

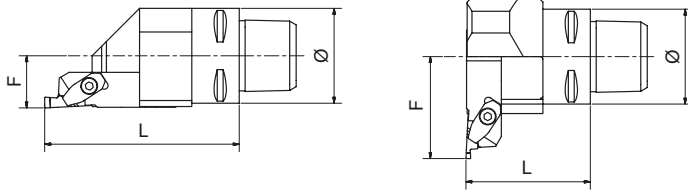
Cat. No.	Stock		Dimensions (mm)								Appl. Insert No.	Clamp finger	Clamp screw	Insert screw	Spring	Wrench
	R	L	H	B	LF	WF	HF	HBH	CW (*)	CDX						
GWB R/L 2020-45	□	□	20	20	151 (150)	25	20	5	1,5 ≤ cw ≤ 4,5	3,5 – 5,0	①	TF 72 (Right handed)	BX 0520T	BFTX 0511N	GSP 06	TRX 20
GWB R/L 2525-45	●	●	25	25	151 (150)	30	25	–								
GWB R/L 2525-60	●	●	25	25	151	30	25	–	4,5 ≤ cw ≤ 6,0	5,0	②	TF 73 (Left handed)				

Right handed tool holders are applicable with right handed inserts.

Remark: Inserts are not included.

SUMIBORON Grooving Tool Holder GWB / PSC Type

ISO-PSC Polygon Modular CGA Grooving System



■ Holders

Cat. No.	R	L	Ø (mm)	F (mm)	L (mm)	7,5 (Nm)	
						Cap Screw	Wrench
PSC 40GM00 R/L	●	●	40	22	82,0	BFTX0619N	LT25
PSC 50GM00 R/L	●	●	50	27			
PSC 40GM90 R/L	●	●	40	43	52,5		
PSC 50GM90 R/L	●	●	50	48	55,0		

■ Cassette

Cat. No.	R	L	Grooving Width (mm)	Grooving Depth (mm)	Inserts	5,0 (Nm)		Spring	Clamp Finger	3,0 (Nm)	
						Insert Screw	Wrench			Cap Screw	Wrench
GWBCM R/L 45	●	●	1,5-2,0	3,5	CGA1504□□□	BFTX0511N	TRX20		SCP4A		LH030
			2,5-3,0	4,0							
GWBCM R/L 60	●	●	3,5-6,0	5,0	CGA1506□□□						

■ CGA Inserts

	Cat. No.	Stock				Dimensions (mm)				Insert No.	Applicable Holder
		BN250		BNC30G		CW	CDX	IC	S		
		R	L	R	L						
	CGA R/L 1504 150	▲	▲	●	●	1,5	3,5	15,875	4,76	GWB R/L 2020-45 GWB R/L 2525-45 GWBCM R/L-45	
	R/L 1504 200	▲	▲	●	●	2,0					
	R/L 1504 250	▲	▲	●	●	2,5					
	R/L 1504 300	▲	▲	●	●	3,0	4,0				
	R/L 1504 350	▲	▲	●	●	3,5					
	R/L 1504 400	▲	▲	●	●	4,0					
	R/L 1504 450	▲	▲	●	●	4,5	5,0				
	CGA R/L 1506 500	▲	▲	●	●	5,0					
	R/L 1506 550	▲	▲	●	●	5,5			6,35		GWB R/L 2525-60 GWBCM R/L-60
	R/L 1506 600	▲	▲	●	●	6,0					

Special widths available on request

■ Recommended Cutting Conditions

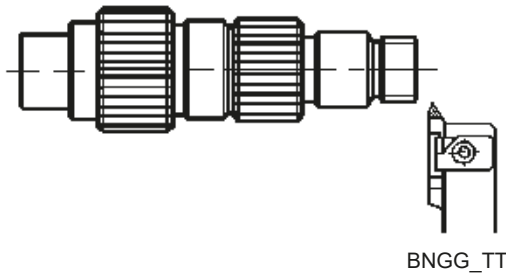
Material	Hardened steel
Cutting speed (m/min)	60 — 80 — 120 — 150
Feed rate (mm/rev)	0,03 — 0,04 — 0,08 — 0,1
Grade	BN250, BNC30G

Coolant:
Dry / wet (for continuous cut)
Dry only (for interrupted cut)

Remarks:
To avoid thermal cracking of the cutting edge when interrupted cutting please ensure workpiece remains dry.

SUMIBORON Threading Tool Holder BNGG Type

For Hardened Steel



„Sumiboron“ Holders

	Cat. No.	Stock		Dimensions (mm)			Applicable Insert
		R	L	WF	CDX	LF	
	BNGG R/L 2525-TT	▲	□	28,5	5	150	BNTT 1020 R/L BNTT 1530 R/L

Inserts

	Cat. No.	Stock				Dimensions (mm)				Applicable Holder
		BN250		BNX20		Pitch	RE	LF	S	
		R	L	R	L					
	BNTT 1020 R/L	▲	▲	▲	□	1,0–2,0	0,14	25	6,0	BNGG R/L 2525 - TT
	BNTT 1530 R/L	▲	▲	▲	□	1,5–3,0	0,2	25	6,0	

• Inserts also suitable for existing BNG2525R type holders

Spare Parts

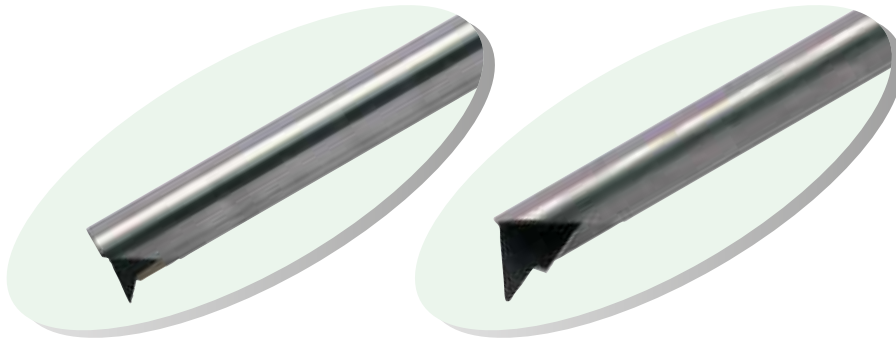
Holder	Support	Clamp	Adjust screw	Spring	Screw	Wrench	
BNGG R/L 2525 - TT	BNGS R/L TT	BNGC R/L	FMJ	GSP 6	BX 0615 LH 050 (for clamp)	LH 050	ø1,8x45
					BX 0414 LH 030 (for support)	LH 030	

Recommended Cutting Conditions

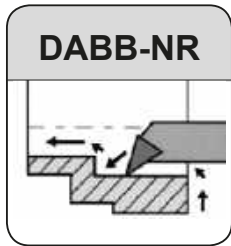
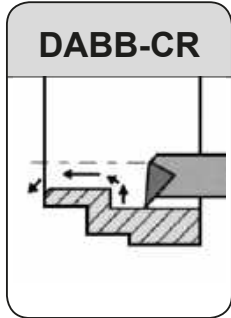
Threading	
Cutting speed (v _c)	80–120 m/min
Feed rate (f)	Max. pitch: 3,0 mm

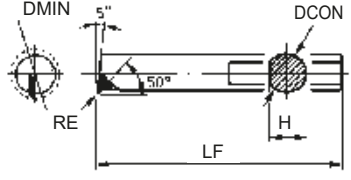
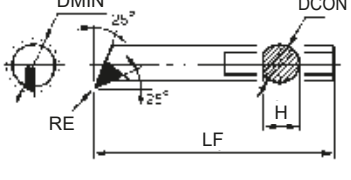
● = Euro stock
□ = Delivery on request

▲ = To be replaced by new item



■ „Sumidia“ Brazed Boring Tools for Small Hole Boring

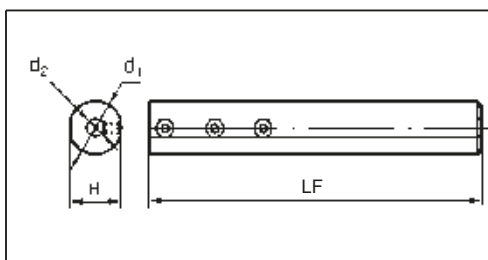


DABB (Solid carbide shank)	Cat. No.	Stock DA2200	Dimensions (mm)					Applicable Holder
			DMIN	DCON	LF	H	RE	
For small boring 	DABB 025 CR	▲	3,0	2,5	60	2,2	0,1	HBB 2516
	DABB 035 CR	▲	4,0	3,5	60	3,2	0,1	HBB 3516
	DABB 045 CR	▲	5,0	4,5	80	4,1	0,1	HBB 4516
	DABB 060 CR	▲	7,0	6,0	80	5,2	0,1	HBB 616
For profiling and corner grooving 	DABB 025 NR	▲	3,0	2,5	60	2,2	0,1	HBB 2516
	DABB 035 NR	▲	4,0	3,5	60	3,2	0,1	HBB 3516
	DABB 045 NR	▲	5,0	4,5	80	4,1	0,1	HBB 4516
	DABB 060 NR	▲	7,0	6,0	80	5,2	0,1	HBB 616

■ Recommended Cutting Conditions


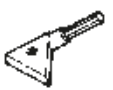
Spindle revolution	Feed rate	Depth of cut	Coolant
> 2000 rpm	0,03 – 0,1 mm/rev	0,03 – 0,2 mm	Wet

■ Holder



Cat. No.	Stock	Dimensions (mm)			
		d ₁	LF	d ₂	H
HBB 2516	●	16	100	2,5	15
HBB 3516	●			3,5	
HBB 4516	●			4,5	
HBB 616	●			6,0	

■ Spare Parts

Screw	Wrench
 BT 0404	 TH 020



■ Features

Drastically Reduced Runout Adjustment Time
Simple screw-fastening structure enables fine adjustments to be made easily.

Blade Through Coolant

Secures a supply of coolant to the cutting edge and breaks chips thoroughly.

Lightweight Aluminum Alloy Body

Utilizing aluminum alloy to achieve a total weight of less than 1,3 kg for a Ø 125 mm cutter with 22 teeth.

■ Product Range

Type	Cat. No.	Body Material	Diameter Range (mm) / No of Teeth							
			Ø32	Ø40	Ø50	Ø63	Ø80	Ø100	Ø125	Ø160
Shell	ANXA 16000RS	Aluminum Alloy					10, 14	12, 18	14, 22	20, 28
	ANXA 16000R (Inch)	Aluminum Alloy					10, 14	12, 18	14, 22	20, 28
	ANXS 16000RS	Steel		6	6, 9	8, 12	10, 14	12, 18	14, 22	
	ANXS 16000R (Inch)	Steel				8, 12	10, 14	12, 18	14, 22	
Shank	ANXS 16000E	Steel	4	6						

[Inch] Inch Bore

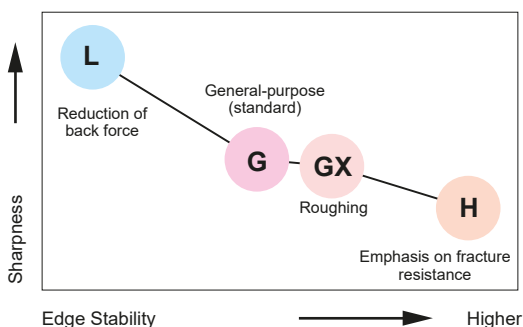
■ Blade Selection Guide

Work Material	N					
Type	L	G	GX	H	—	W
Cutting Edge Shape						
Features	Low Cutting Force	Standard	Long Edge	High Strength		
Applications	Finishing / Light Cutting	General Purpose	Roughing		Corner Radius	Wiper
Edge Length*	6,0 mm	6,0 mm	9,0 mm	6,0 mm		



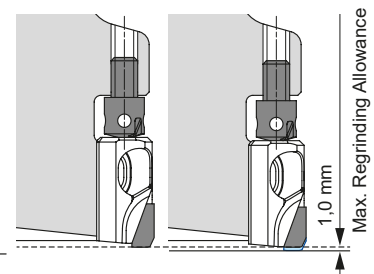
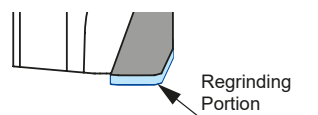
*Edge length
GX type = 9,0 mm

■ Edge Selection Guide



● Reduces Running Costs by Drastically Increasing Blade, Insert Regrinding Allowance (to 1,0 mm)

Assuming 0,2 mm of regrinding each time, an edge can be used up to 6 times. (Peripheral edge cannot be reground.)



If you wish to use reground blades you shall use sets of blades with matching size of the same level in order to keep the balance.

■ Performances

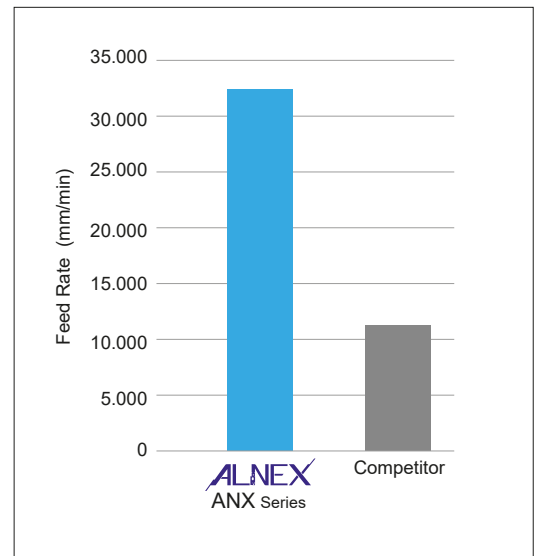
● High-Speed / High-Efficiency Cutting

Realizes ultra-high efficiency machining with $v_f = 30.000$ mm/min



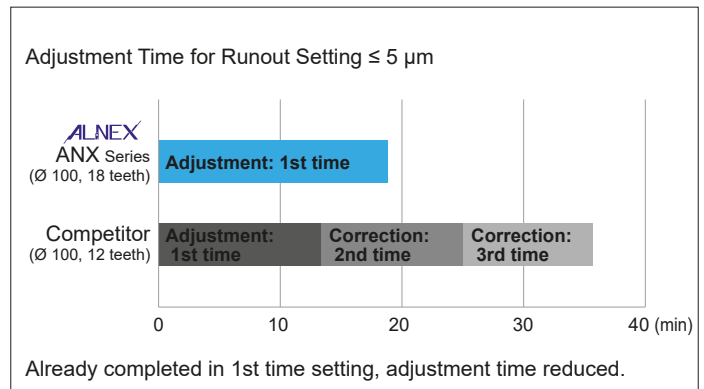
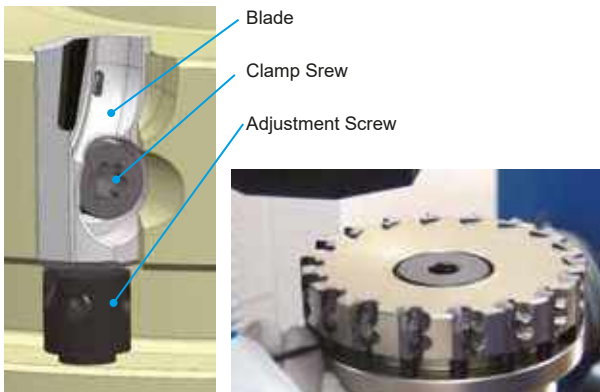
Comparison: Cutter Diameter \varnothing 100 mm

	Spindle Speed min ⁻¹	Number of Teeth	Feed Rate v_f (mm/min)
ANX Series	18.000	18	32.400
Competitor	9.500	12	11.400



● Drastically Reduces Runout Adjustment Time

- Simple screw-fastening structure
- Enables fine adjustments to be made easily
- High-rigidity body



● Chip Control



Blade-Through Coolant Chip Breaking

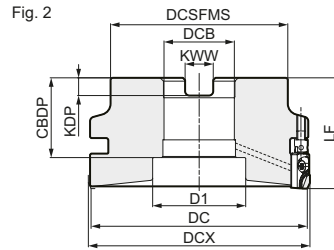
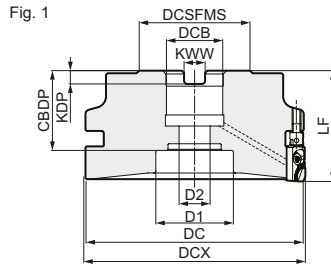


Work Material: G-AlSi12Cu
Cutting Conditions: $v_c = 2500$ m/min, $f_z = 0,05$ mm/t, $a_p = 0,5$ mm, wet

Alnex ANXS 16000 R(S)



Rake Angle	Radial	+5°	3 mm	90°
	Axial	+5°		



Body - ANXS (Steel)

Dimensions (mm)

Cat. No.	Stock	DC	DCX	DCSFMS	LF	DCB	KWW	KDP	CBDP	D1	D2	No. of Teeth	Weight (kg)	Fig.	
Metric	ANXS 16040RS06	○	38	40	38,5	40	16	8,4	5,6	26	14	9	6	0,3	1
	16050RS06	○	48	50	48,5	40	22	10,4	6,3	26	18	11	6	0,4	1
	16050RS09	○	48	50	48,5	40	22	10,4	6,3	26	18	11	9	0,5	1
	16063RS08	○	61	63	50	40	22	10,4	6,3	26	18	11	8	0,7	1
	16063RS12	○	61	63	50	40	22	10,4	6,3	26	18	11	12	0,7	1
	16080RS10	○	78	80	50	50	27	12,4	7	34	35	14	10	1,2	1
	16080RS14	○	78	80	50	50	27	12,4	7	34	35	14	14	1,2	1
	16100RS12	○	98	100	80	50	32	14,4	8	32	46	-	12	2,0	2
	16100RS18	○	98	100	80	50	32	14,4	8	32	46	-	18	2,0	2
	16125RS14	○	123	125	80	63	40	16,4	9	35	52	-	14	3,9	2
16125RS22	○	123	125	80	63	40	16,4	9	35	52	-	22	3,9	2	
Inch	ANXS 16063R08	○	61	63	50	50	25,4	9,5	6	31	20	14	8	0,9	1
	16063R12	○	61	63	50	50	25,4	9,5	6	31	20	14	12	0,9	1
	16080R10	○	78	80	50	50	25,4	9,5	6	34	35	14	10	1,2	1
	16080R14	○	78	80	50	50	25,4	9,5	6	34	35	14	14	1,2	1
	16100R12	○	98	100	80	50	31,75	12,7	8	36	42	-	12	2,0	2
	16100R18	○	98	100	80	50	31,75	12,7	8	36	42	-	18	2,0	2
	16125R14	○	123	125	80	63	38,1	15,9	10	42,5	52	-	14	3,9	2
	16125R22	○	123	125	80	63	38,1	15,9	10	42,5	52	-	22	3,9	2

Blades are sold separately. If using a blade for corner radius machining (ANB1604R), DC = DCX.

Identification Details

ANX S 16 100 R S 18

Cutter Series	Steel Body	Blade Size	Cutter Diameter	Feed Direction	Metric	Number of Teeth
---------------	------------	------------	-----------------	----------------	--------	-----------------

Blades



Recommended Cutting Conditions



Spare Parts

Applicable Cutters	Clamp Screw		Adjustment Screw	Wrench	Adjustment Wrench	Centre Bolt	Assembly Wrench
ANXS 16040RS06	BXA0310IP	2,0	HFJ	TRXW10IP	ANT	BXH0825-D13	HFVT
16050RS__						BXH1030-D16	
16063RS__						BXH1235-D33	
16080RS__						BXH1635-D40	
16100RS__						BXH2036-D50	
16125RS__						BXH1235-D18	
16063R__						BXH1235-D33	
16080R__						BXH1635-D40	
16100R__						BXH2036-D50	
16125R__							

Sold separately.

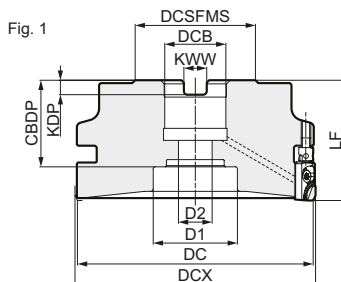
Max. Allowable Spindle Speed

Cat. No.	n max (min ⁻¹)
ANXS 16040RS06	25.000
16050RS06	25.000
16050RS09	25.000
16063RS08	22.000
16063RS12	22.000
16080RS10	20.000
16080RS14	20.000
16100RS12	18.000
16100RS18	18.000
16125RS14	16.000
16125RS22	16.000
ANXS 16063R08	22.000
16063R12	22.000
16080R10	20.000
16080R14	20.000
16100R12	18.000
16100R18	18.000
16125R14	16.000
16125R22	16.000

ANXA 16000 R(S)



Rake Angle	Radial	+5°	3 mm	90°
	Axial	+5°		



Body - ANXA (Aluminum Alloy)

Dimensions (mm)

Cat. No.		Stock	DC	DCX	DCSFMS	Lf	DCB	KWW	KDP	CDBP	D1	D2	No. of Teeth	Weight (kg)
Metric	ANXA 16080RS10	○	78	80	50	50	27	12,4	7	34	35	14	10	0,5
	16080RS14	○	78	80	50	50	27	12,4	7	34	35	14	14	0,5
	16100RS12	○	98	100	50	50	27	12,4	7	34	35	14	12	0,8
	16100RS18	○	98	100	50	50	27	12,4	7	34	35	14	18	0,9
	16125RS14	○	123	125	50	50	27	12,4	7	34	35	14	14	1,2
	16125RS22	○	123	125	50	50	27	12,4	7	34	35	14	22	1,3
	16160RS20	○	158	160	80	63	40	16,4	9	35	52	29	20	2,6
16160RS28	○	158	160	80	63	40	16,4	9	35	52	29	28	2,6	
Inch	ANXA 16080R10	○	78	80	50	50	25,4	9,5	6	34	35	14	10	0,5
	16080R14	○	78	80	50	50	25,4	9,5	6	34	35	14	14	0,5
	16100R12	○	98	100	50	50	25,4	9,5	6	34	35	14	12	0,9
	16100R18	○	98	100	50	50	25,4	9,5	6	34	35	14	18	0,9
	16125R14	○	123	125	50	50	25,4	9,5	6	34	35	14	14	1,2
	16125R22	○	123	125	50	50	25,4	9,5	6	34	35	14	22	1,3
	16160R20	○	158	160	80	63	38,1	15,9	10	42,5	55	30	20	2,4
16160R28	○	158	160	80	63	38,1	15,9	10	42,5	55	30	28	2,6	

Blades are sold separately. If using a blade for corner radius machining (ANB1604R), DC = DCX.

Identification Details

ANX	A	16	100	R	S	18
Cutter Series	Aluminum Alloy Body	Blade Size	Cutter Diameter	Feed Direction	Metric	Number of Teeth

Blades



Recommended Cutting Conditions



Max. Allowable Spindle Speed

Cat. No.	n max (min ⁻¹)
ANXA 16080RS10	20.000
16080RS14	20.000
16100RS12	18.000
16100RS18	18.000
16125RS14	16.000
16125RS22	16.000
16160RS20	14.000
16160RS28	14.000
ANXA 16080R10	20.000
16080R14	20.000
16100R12	18.000
16100R18	18.000
16125R14	16.000
16125R22	16.000
16160R20	14.000
16160R28	14.000

Spare Parts

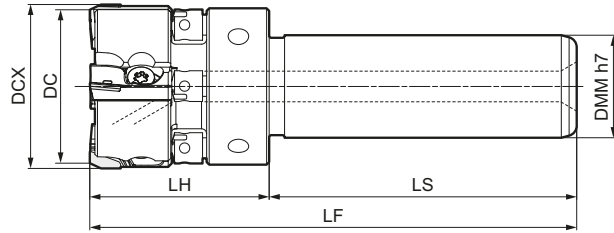
Sold separately.

Applicable Cutters	Clamp Screw		Adjustment Screw	Wrench	Adjustment Wrench	Centre Bolt	Assembly Wrench
ANXA 16080RS_	BXA0310IP	2,0	HFJ	TRXW10IP	ANT	BXH1235-D33	HFVT
16100RS_						BXH2036-D50	
16125RS_						BXH1235-D33	
16160RS_						BXH2036-D50	
16080R_							
16100R_							
16125R_							
16160R_							

Alnex ANXS 16000 E



Rake Angle	Radial	-2 - 0°	3 mm	90°
	Axial	+5°		



Body - ANXS (Steel)

Dimensions (mm)

Cat. No.	Stock	DC	DCX	DMM	LH	LS	LF	No. of Teeth	Weight (kg)
ANXS 16032E04	○	30	32	20	35	60	95	4	0,3
16040E06	○	38	40	20	40	60	100	6	0,5

Blades are sold separately.
If using a blade for corner radius machining (ANB1604R), DC = DCX.

Identification Details

ANX S 16 032 E 04

Cutter Series	Steel Body	Blade Size	Cutter Diameter	Round Shank	Number of Teeth
---------------	------------	------------	-----------------	-------------	-----------------

Spare Parts

Sold separately.

Applicable Cutters	Clamp Screw		Adjustment Screw	Wrench	Adjustment Wrench	Assembly Wrench
	ANXS 16032E04 16040E06	BXA0310IP	2,0	HFJ	TRXW10IP	ANT

Max. Allowable Spindle Speed

Cat. No.	n max (min ⁻¹)
ANXS 16032E04	10.000
16040E06	10.000

Blades

Application	SUMIDIA				
High Speed / Light Cut	N				
General Purpose	N				
Roughing	N				
Cat. No.	DA1000	Cutting Edge Length	Wiper Edge Shape	Applications	Fig.
ANB 1600R-L	○	6,0	Linear	Low Cutting Force	1
1600R-G	○	6,0	Arc-Shaped	General Purpose	1
1600R-H	○	6,0	Arc-Shaped	Strong Edge	1
1600R-GX	○	9,0	Arc-Shaped	Long Edge	2
1604R	○	6,0	Linear	Corner Radius	3
1600R-W	○	—	Arc-Shaped	Wiper	4

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Wiper Blade

Recommended Cutting Conditions

Si content ≤ 12,6 %

Min. - Optimum - Max.

ISO	Work Material	Hardness	Cutting Speed v _c (m/min)	Feed Rate f _z (mm/t)	Grade
N	Aluminum Alloy	—	2.000–2.500–3.000	0,05–0,13–0,20	DA1000

Si content ≥ 12,6 %

Min. - Optimum - Max.

ISO	Work Material	Hardness	Cutting Speed v _c (m/min)	Feed Rate f _z (mm/t)	Grade
N	Aluminum Alloy	—	400–600–800	0,05–0,13–0,20	DA1000

The above recommended cutting conditions are meant as a guide. Actual conditions will depend on the individual machine rigidity, work clamp rigidity, depth of cut and other factors.

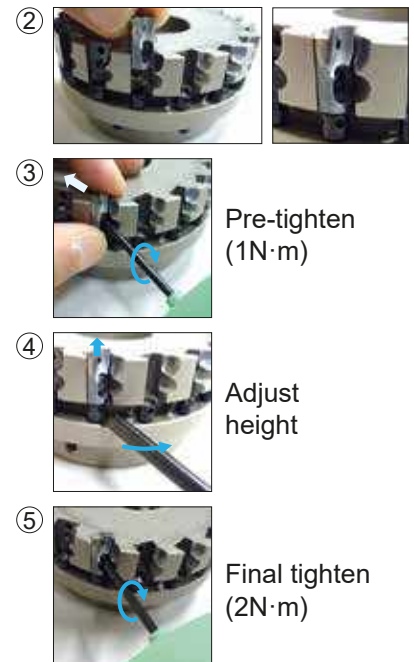
○ = Japan stock

Recommended Tightening Torque (N·m)

■ ALNEX Series Usage Manual

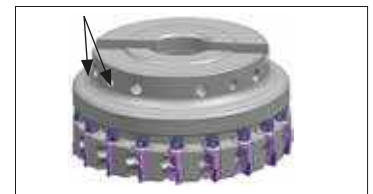
● Adjustment of the Blades, Runout Alignment

- ① Before inserting the blade, make sure that the seat and screws are free of debris by cleaning those areas.
- ② Insert the blade into its seat.
- ③ While holding the blade against the seat, install the clamping bolt using the provided wrench, pre-tightening the bolt (recommended pre-torque is 1 N·m).
- ④ Using the provided wrench for the height adjustment screw, set the height to your predetermined value.
- ⑤ Fully tighten the clamp bolt (recommended torque is 2 N·m).
- ⑥ Use 1 blade as a datum point and adjust all blade heights to match.
- ⑦ After tightening, verify that there is no gap between the seat and blade.



● Balance Adjustments

The cutter comes pre-balanced to a G 6,3 specification. Under normal circumstances, it is not necessary to adjust the balance of the cutter.



● Clamp Bolts for Arbor

Work Material	Dim.			Max. Torque	Applicable Cutters	
	M	L	D			
BXH0825-D13	8	25	13	15	ANXS16040RS_ _	
BXH1030-D16	10	30	16	25	ANXS16040RS_ _ , ANXS16063RS_ _	
BXH1235-D18	12	35	18	40	ANXS16063R_ _	
BXH1235-D33	12	35	33	50	ANXS16080R(S)_ _ , ANXA16080/100/125R(S)_ _	
BXH1635-D40	16	35	40	100	ANXS16100R(S)_ _	
BXH2036-D50	20	36	50	200	ANXS16125R(S)_ _ , ANXA16160R(S)_ _	

● Other Precautions

- Please use only Sumitomo genuine parts.
- Please regularly replace clamp bolts.
- If you wish to reduce the # of effective blades in use, to maintain balance and protect the body, please use dummy blades (set height well below effective blades).
- Please do not operate after releasing the interlock or opening the cover.
- Please avoid use and consult with Sumitomo if you mistakenly crash the body.
- As the blades are very sharp, it is very easy to get hurt when touching the blades with your hands directly, so please wear gloves when taking the blade out of the case to set into the cutter or when setting the cutter into machine tool.

SUMIDIA Face Mill RF Type

High Speed Finishing of Aluminium Alloy



Fig. 1

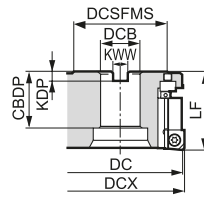
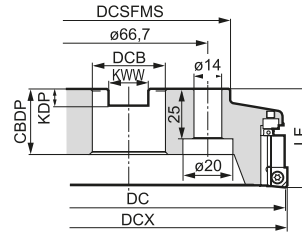


Fig. 2



Body

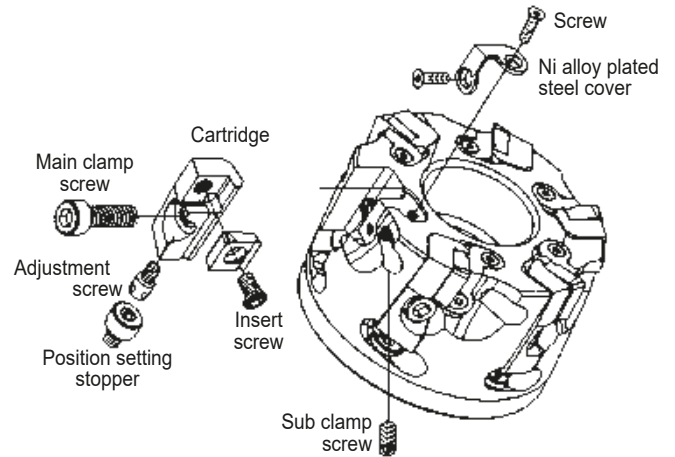
Cat. No.	Stock	Dimensions (mm)								Number of teeth	max. depth of cut	Weight (Kg)	Fig.
		DC	DCX	DCSFMS	LF	DCB	KWW	KDP	CBDP				
RF 4080 RS	●	80	82	60	50	27	12,4	7,0	29	6	3,0	0,7	1
RF 4100 RS	●	100	102	75	50	32	14,4	8,5	29	6		1,0	1
4125 RS	●	125	127	75	63	40	16,4	9,5	29	8		1,6	1
4160 RS	□	160	162	100	63	40	16,4	9,5	29	10		2,6	2

Remark: PCD blades and inserts are not included.

Insert for Roughing and Finishing

Application	Carbide	SUMIDIA		
High Speed / Light cut	N	N	N	
General Purpose	N	N	N	
Roughing	N	N	N	
Cat. No.	H1	DA1000	DA2200	Fig.
SDET 1204 ZDFR	●			1
SNEW 1204 ADFR-NF		●	▲	2
SNEW 1204 ADFR-W-NF		○	▲	3

Structure



"Sumidia" Blade

PCD grade DA2200	Cat. No.	Stock
Standard type	RFB	▲
Wiper type	RFBW	▲

Dummy Blade

	RFD	□
--	-----	---

Cartridge

Shape	Cat. No.	Stock
For carbide insert	RFR	●
For Sumidia insert	RFF	●

Cutting Insert Selection

For easy assembling:

PCD blade RFB
PCD blade RFB (wiper type)

For finishing:

Cartridge RFF
PCD insert SNEW 1204 ADFR-NF (standard type)
SNEW 1204 ADFR-W-NF (wiper type)
PCD grade: DA2200

For roughing:

Cartridge RFR
Uncoated carbide insert
SDET 1204 ZDFR, grade: H1

Spare Parts

RFC	RFS	BX0620	BTD0510	FBUP2-A0-8	RFJ	BFTX0509N	TH050 TH015, TH025	TTX20

Setting Gauge



Dial-gauge is not included.

● = Euro stock
○ = Japan stock

□ = Delivery on request
▲ = To be replaced by new item

SUMIDIA Face Mill SRF Type

High Speed Finishing of Aluminium Alloy



Fig. 1

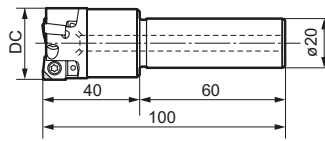
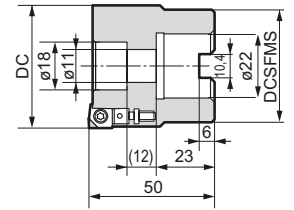


Fig. 2

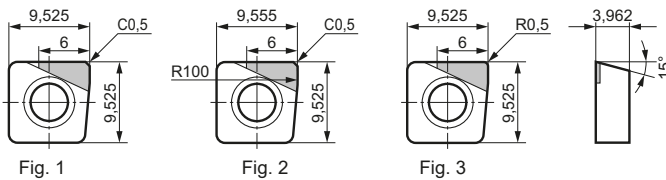


Body

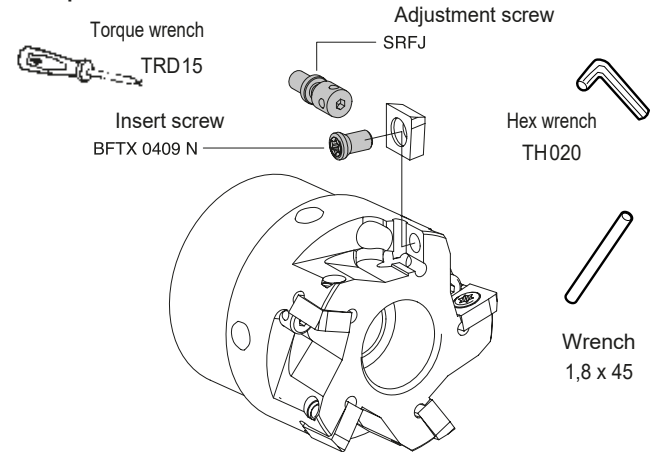
Cat. No.	Stock	Dimensions (mm)		No. of teeth	Fig.	Weight (Kg)
		DC	DCSFMS			
SRF 30 R-ST	○	30	-	3	1	0,34
SRF 40 R-ST	○	40	-	4	1	0,50
SRF 50 RS	□	50	46,5	5	2	0,59
SRF 63 RS	□	63	45,0	6	2	0,67

Inserts are sold separately.

Insert



Spare Parts



Maximum D.O.C. Guide (SRF50RS, 5 teeth)

The contains guidelines on the maximum D.O.C., determined from internal tests. "O" mark indicates the possible application range. Actual cutting conditions should be set, based on actual machine and work characteristics.

Feed D.O.C. (mm)	Feed Speed, v_f (mm/min)		
	2.500	4.000	5.000
	Feed Rate, f_t (mm/tooth)		
	0,05	0,08	0,10
0,5	○	○	○
1,0	○	○	○
1,5	○	○	○
2,0	○	○	○
2,5	○	○	○
3,0	○	○	○
3,5	○	○	-
4,0	○	-	-
4,5	○	-	-
5,0	○	-	-

Cutting Conditions

Cutter: SRF 50 RS
Insert: SNEW 09T3 ADFR-NF (DA1000)
n : 10.000 rpm
Width: 35 mm at D.O.C. indicated above



- Standard inserts and Wiper inserts can be used on the same cutter body.
- Standard inserts with nose radius should be used where vibration is present. As such, Wiper-inserts will not be applicable.
- Inserts can be regrind 3 times (up to minimum IC diameter 9,225 mm).
- When using reground inserts, it is advisable to reconfirm insert height and cutting diameter with a tool pre-setter.
- Do not mix new and reground inserts, or even inserts with different regrind amount on the same cutter.

Recommended Cutting Conditions for RF and SRF Type Cutters

Work Material		Process	Grade	Cutting Speed (m/min)		Feed Rate (mm/tooth)	Depth of Cut (mm)	
				RF Type	SRF Type		RF Type	SRF Type
Aluminium Alloy	Si < 13 %	Finishing	DA1000 (PCD)	2.000-5.000	- 4.000	0,05-0,2	- 3,0	- 5,0
		Roughing	H1 (Carbide)	1.000-2.500	-			
	Si ≥ 13 %	Finishing	DA1000 (PCD)	400-800	- 800			
		Roughing	H1 (Carbide)	200-400	-			

SUMIBORON "BN Finish Mill" FMU Type

High Speed Finishing of Grey Cast Iron



■ Features

- High speed machining $v_c = 1.500 \text{ m/min}$
- Excellent surface roughness $R_z = 3,2$ ($R_a = 1,0$)
- Safety structure for the centrifugal force under high speed cutting conditions
- Run-out is less than $10 \mu\text{m}$
- Easy assembling method using the setting gauge
- Running cost is reduced because of economical insert

■ Application

GG25 – GG30 (HB200 – 250) grey cast iron with pearlite matrix, and ferrite matrix (HB130 – 160)
Application examples: engine block, cylinder block, etc

■ Specifications

FMU Type: $\varnothing 80\text{--}\varnothing 315 \text{ mm}$
Insert: SNEW1203ADTR/L
Low cutting force type: SNEW1203ADTR/L-S

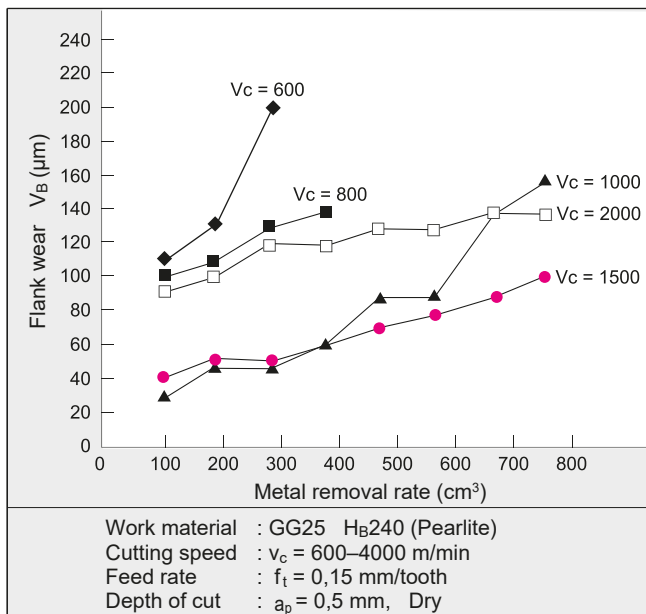
■ Recommended Cutting Conditions

Speed: $v_c = 800\text{--}2000 \text{ m/min}$
Feed: $f_t = 0,1\text{--}0,3 \text{ mm/tooth}$
Depth: $a_p = 0,5 \text{ mm or less}$
Dry cutting

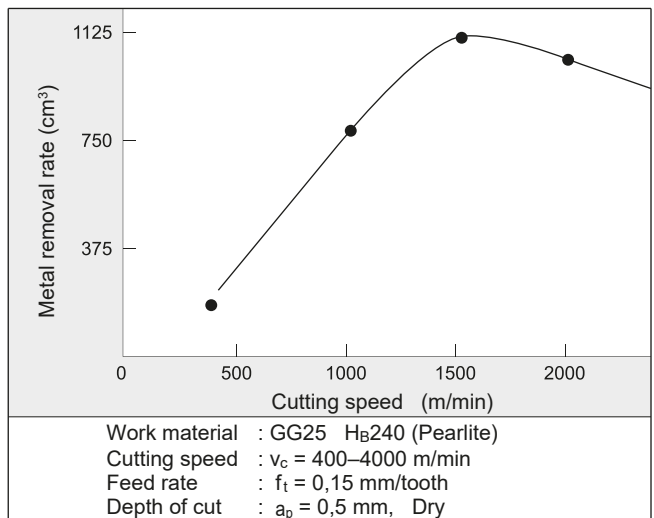


■ Performance

● Tool Life Diagram



● Estimated Tool Life

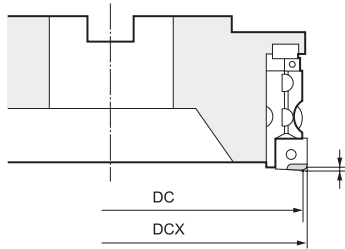


- Milling of ductile cast iron and alloy steel casting do not produce the best results.
- Dry cutting is recommended. Wet cutting will result in chipping of cutting edges in the early stages due to thermal cracking.

SUMIBORON "BN Finish Mill" FMU Type

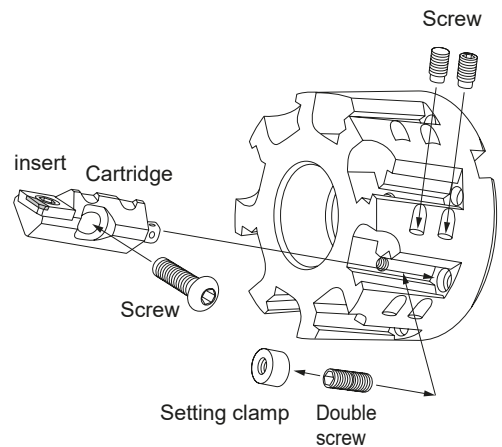
Specifications

Approach angle: 90°
Axial rake angle: + 8°
Radial rake angle: + 2°



Max. depth of cut: 0,5 mm

Structure



Body

Fig. 1

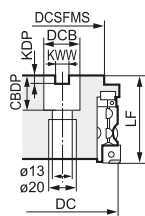


Fig. 2

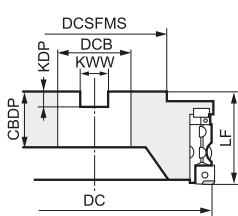


Fig. 3

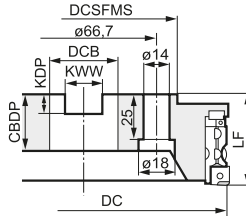


Fig. 4

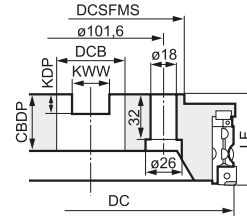
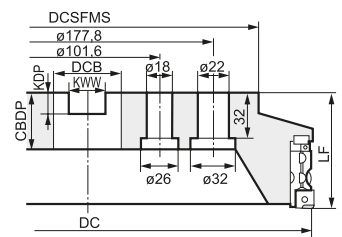


Fig. 5



Cat. No.	Stock	Dimensions (mm)									No. of Teeth	Max. Depth of Cut	Weight (Kg)	Fig.
		DC	DCX	DCSFMS	LF	DCB	KWW	KDP	CBDP					
FMU 4080 RS	●	80	82,8	60	63	27	12,4	7,0	25	6	0,5	1,6	1	
FMU 4100 RS	●	100	102,8	76	63	32	14,4	8,5	29	8		2,4	2	
4125 RS	□	125	127,8	75	63	40	16,4	9,5	29	10		3,4	2	
4160 RS	□	160	162,8	100	63	40	16,4	9,5	29	12		5,6	3	
FMU 4200 RS	□	200	202,8	130	63	60	25,7	14,0	38	16		9,2	4	
4250 RS	□	250	252,8	130	63	60	25,7	14,0	38	20	14,3	4		
FMU 4315 RS		315	317,8	240	80	60	25,7	14,0	40	24	27,8	5		

Inserts

Fig. 1

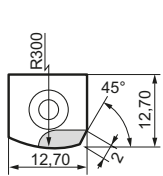
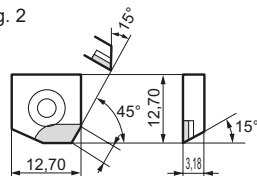


Fig. 2



Application	CBN		Figure
High Speed / Light cut	K	K	
General Purpose	K	K	
Roughing			
Cat. No.	BN700	BN7000	
SNEW 1203 ADT R	▲	○	1
1203 ADT R-S	▲	○	2

Cartridge

Cartridge	Insert Screw	Adjustment Screw	O-ring	Insert Wrench	Pin
FMUU	BFTX0509N	FMUJ	P3	TRX20	1,8 x 45

Spare Parts

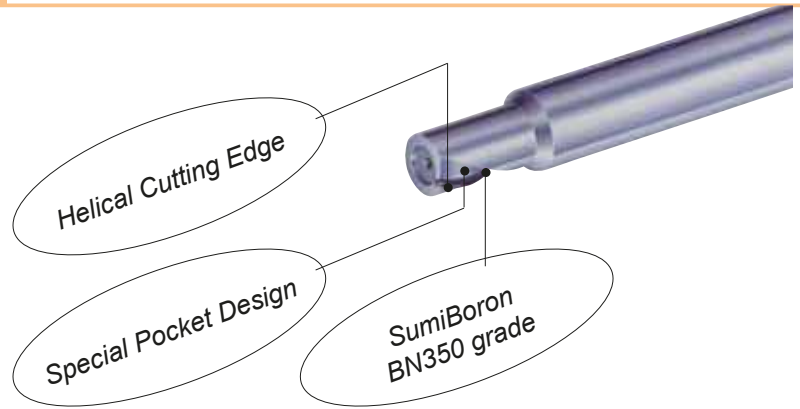
Screw	Screw	Setting clamp	Double screw	Wrench	Wrench	Wrench
BH0620	BTD0609	FMUE	WB5-10	TH040	LH030	LH025

Gauge



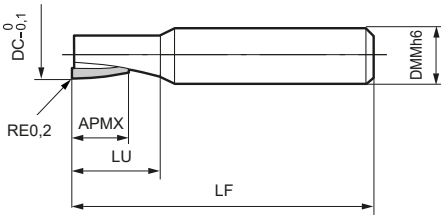
SUMIBORON "Helical Master" BNES Type

Spiral CBN Endmill for Hardened Steel



Endmills BNES Type with 1 Spiral Flute

Cat. No.	Stock	Dimensions (mm)				
	BN350	DC	DMM	APMX	LU	LF
BNES 1060	○	6,0	10	7,0	11	60
BNES 1080	○	8,0	10	10,0	14	70
BNES 1100	○	10,0	12	12,0	17	75
BNES 1120	○	12,0	12	14,0	20	80
BNES 1140	○	14,0	16	16,0	21,5	80



Helix angle : 15°
right-hand cut, right-hand helix

Recommended Cutting Conditions

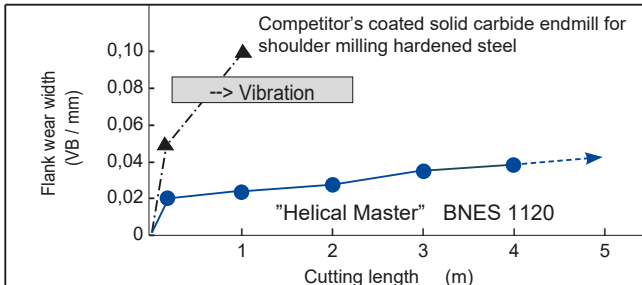
Cutting speed: v_c (m/min), Spindle revolutions: n (rpm), Feed per tooth: f_t (mm/tooth), Feed speed: v_f (mm/min)

Tooling example	DC	Hardened steel (HRC 50–57)			Hardened steel (HRC 58–65)		
		$v_c = 100\text{--}170$ m/min			$v_c = 80\text{--}150$ m/min		
<p>Depth of cut : $a_p \leq DC$</p>	$\phi 6\text{--}8$	$a_e \leq 0,1$ mm	$n = 4000\text{--}9000$	V_f (mm/min) = 240–540	$a_e \leq 0,08$ mm	$n = 3200\text{--}8000$	V_f (mm/min) = 150–370
	$\phi 10\text{--}12$	$a_e \leq 0,15$ mm	$n = 2700\text{--}5400$	V_f (mm/min) = 180–360	$a_e \leq 0,12$ mm	$n = 2100\text{--}4800$	V_f (mm/min) = 120–270
	$\phi 14\text{--}16$	$a_e \leq 0,2$ mm	$n = 2000\text{--}3800$	V_f (mm/min) = 140–260	$a_e \leq 0,15$ mm	$n = 1600\text{--}3400$	V_f (mm/min) = 110–230

Recommendation: Dry cutting (Air coolant)
Down-cut milling
Minimise the overhang
Use a rigid machine

Performance

● Long Tool Life and High Efficiency



Work material: X155CrVMo12-1
Hardness: HRC 60

Cutting data:
 $v_c = 100$ m/min (Helical Master)
 $v_c = 40$ m/min (Competitor's coated solid carbide endmill)
 $v_f = 186$ mm/min

Down-cut milling
Dry cutting

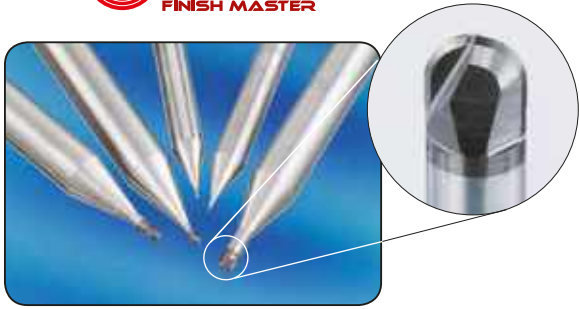
● Excellent Surface Roughness

"Helical Master" BNES 1080 $\phi 8,0$

Conventional straight flute CBN endmill, $\phi 8,0$

Work material: 15Cr3
Hardness: HRC 55–58
Cutting data: $v_c = 130$ m/min, $v_f = 310$ mm/min

Down-cut milling
Dry cutting



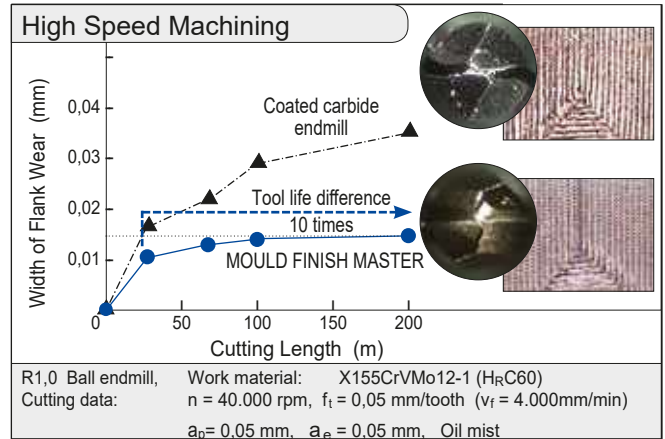
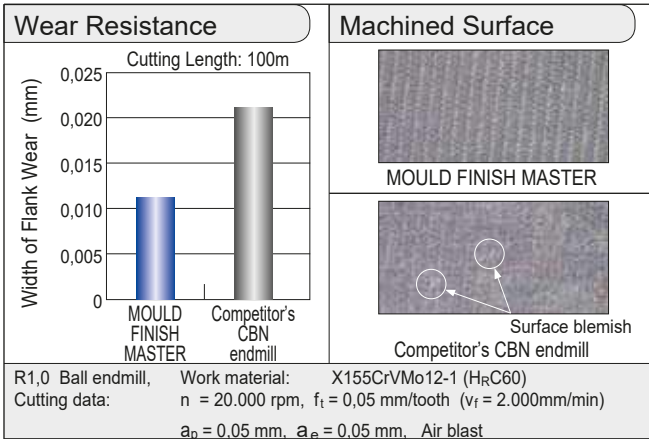
■ Characteristics / Application

- High precision machining of hardened steels < HRC 70 with long tool life
- Super tough grade SUMIBORON BN350 prevents chipping of the cutting edge
- R accuracy : ±0,005 mm

■ Endmills

<p>✳ Endmill Identification</p> <p>BNBP 2 R020-012 4</p> <p>MOULD FINISH MASTER</p> <p>Shank Diam.</p> <p>Neck length (LU)</p> <p>Number of teeth</p> <p>Radius of ball nose</p>	Cat. No.	Stock	Dimensions (mm)							
		BN350	RE	DC	LF	DN	DMM	APMX	LU	
4,0 mm (Shank Diam.)	BNBP 2 R020-012 4	●	0,2	0,4	50	0,37	4	0,3	1,2	
	BNBP 2 R030-015 4	●	0,3	0,6	50	0,57	4	0,4	1,5	
	BNBP 2 R050-025 4	●	0,5	1,0	50	0,97	4	0,6	2,5	
	BNBP 2 R075-040 4	●	0,75	1,5	50	1,47	4	0,9	4,0	
	BNBP 2 R100-055 4	●	1,0	2,0	50	1,97	4	1,4	5,5	
6,0 mm (Shank Diam.)	BNBP 2 R020-012 6	●	0,2	0,4	50	0,37	6	0,3	1,2	
	BNBP 2 R030-015 6	●	0,3	0,6	50	0,57	6	0,4	1,5	
	BNBP 2 R050-025 6	●	0,5	1,0	50	0,97	6	0,6	2,5	
	BNBP 2 R075-040 6	●	0,75	1,5	50	1,47	6	0,9	4,0	
	BNBP 2 R100-055 6	●	1,0	2,0	50	1,97	6	1,4	5,5	

■ Performance



Excellent surface finish compared with competitor's CBN and coated carbide endmills

■ Recommended Cutting Conditions

Spindle revolutions: N (rpm), Feed rate per tooth: f_t (mm/tooth), Depth of cut: a_p (mm), Wide of cut: a_e (mm)

Material Cutting data	Pre-hardened steel, Die steel (- HRC52)				Die steel (- HRC62)				High speed tool steel (- HRC70)			
	n (rpm)	f _t (mm/tooth)	d _{oc} (mm)	W _{oc} (mm)	n (rpm)	f _t (mm/tooth)	d _{oc} (mm)	W _{oc} (mm)	n (rpm)	f _t (mm/tooth)	d _{oc} (mm)	W _{oc} (mm)
R 0,2	20.000-50.000	0,02	0,03	0,03	20.000-50.000	0,02	0,01	0,02	20.000-50.000	0,015	0,01	0,02
R 0,3	20.000-50.000	0,02	0,03	0,03	20.000-50.000	0,02	0,01	0,02	20.000-50.000	0,015	0,01	0,02
R 0,5	20.000-50.000	0,03	0,05	0,05	20.000-50.000	0,03	0,03	0,04	20.000-50.000	0,02	0,02	0,03
R 0,75	20.000-50.000	0,04	0,08	0,1	20.000-50.000	0,04	0,05	0,05	20.000-50.000	0,03	0,02	0,05
R 1,0	20.000-50.000	0,05	0,1	0,1	17.000-50.000	0,05	0,05	0,05	17.000-50.000	0,03	0,03	0,05

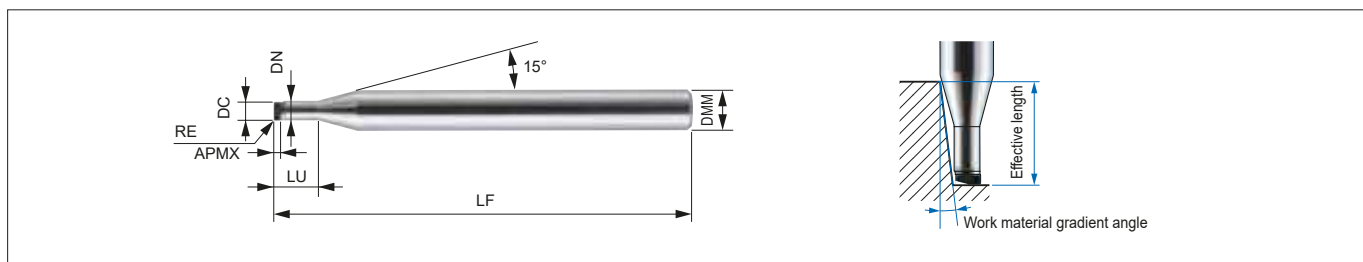
■ Important Notes

- (1) For stable machining, a more rigid machine is recommended.
- (2) Air blast or oil mist coolant is recommended.
- (3) Shorten overhang as much as possible.



SUMIDIA "MOULD Finish Master" NPDRS Type

SUMIDIA Binderless Radius Endmill NPDRS Type



NPDRS Type Body (for Standard Finishing)

Cat. No.	Stock	Dimensions (mm)							Real effective length with respect to work material gradient angle				
	NPD10	DC	RE	APMX	LU	LF	DN	DMM	0,5°	1°	1,5°	2°	3°
NPDRS 1020 R002-006	○	0,2	0,02	0,10	0,6	40	0,175	4	0,61	0,62	0,63	0,64	0,66
1020 R005-006	○	0,2	0,05	0,10	0,6	40	0,175	4	0,61	0,62	0,63	0,64	0,66
1030 R002-010	○	0,3	0,02	0,15	1,0	40	0,27	4	1,01	1,03	1,04	1,06	1,09
1030 R005-010	○	0,3	0,05	0,15	1,0	40	0,27	4	1,01	1,03	1,04	1,06	1,09
1050 R005-015	○	0,5	0,05	0,25	1,5	40	0,47	4	1,61	1,66	1,72	1,78	1,92
NPDRS 1050 R010-015	○	0,5	0,10	0,25	1,5	40	0,47	4	1,61	1,66	1,71	1,77	1,91
1100 R005-030	○	1,0	0,05	0,55	3,0	40	0,95	4	3,40	3,52	3,65	3,78	4,08
1100 R010-030	○	1,0	0,10	0,55	3,0	40	0,95	4	3,40	3,52	3,64	3,77	4,07
1100 R020-030	○	1,0	0,20	0,55	3,0	40	0,95	4	3,40	3,51	3,63	3,76	4,05
1200 R005-040	○	2,0	0,05	0,55	4,0	40	1,95	4	4,44	4,59	4,75	4,93	5,33
NPDRS 1200 R010-040	○	2,0	0,10	0,55	4,0	40	1,95	4	4,43	4,59	4,75	4,92	5,31
1200 R020-040	○	2,0	0,20	0,55	4,0	40	1,95	4	4,43	4,58	4,74	4,91	5,29

Identification Details

NPDR **S** **1** **020** **R002** - **006**
 Series Code For standard finishing No. of flutes Cutting diameter Corner radius Length below neck

Cutting Diameter and Nose Radius Combinations

DC	RE 0,02	RE 0,05	RE 0,1	RE 0,2
0,2	○	○		
0,3	○	○		
0,5		○	○	
1,0		○	○	○
2,0		○	○	○

Recommended Cutting Conditions

- Use a machine with high rigidity for stable cutting.
- Non-water soluble coolant recommended. Supply as a mist or external coolant. Take fire prevention precautions to avoid fire hazards caused by sparks igniting during machining or tool breakage.
- Shorten overhang as much as possible.
- Adjust cutting conditions as necessary as machine rigidity and other conditions may vary.
- Depth of cut shown in the table of conditions are maximum depths. Adjust the actual depth of cut to the desired machined surface finish.

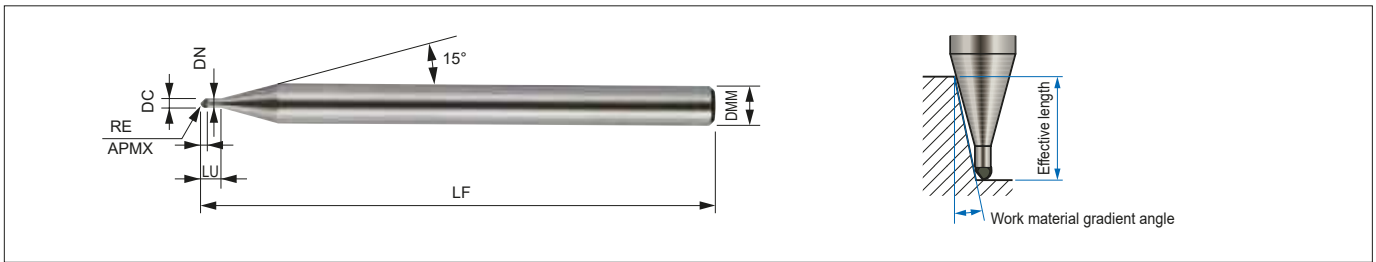
Work Material		Carbide				
RE (mm)	LU	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p (mm)	a _e (mm)	
0,2	0,10	40.000	100	0,001	0,001	
0,3	0,15	40.000	150	0,002	0,001	
0,5	0,25	40.000	200	0,003	0,001	
1,0	0,55	40.000	400	0,005	0,003	
2,0	0,55	40.000	600	0,010	0,005	



○ = Japan stock



SUMIDIA Binderless Ballnose Endmill NPDBS Type / NPDB Type



NPDBS Type Body (for Standard Finishing)

Cat. No.	Stock NPD10	Dimensions (mm)							Real effective length with respect to work material gradient angle				
		RE	DC	APMX	LF	LU	DN	DMM	0,5°	1°	1,5°	2°	3°
NPDBS 1010-004	○	0,1	0,2	0,1	0,4	40	0,18	4	0,44	0,45	0,46	0,47	0,49
1020-008	○	0,2	0,4	0,2	0,8	40	0,38	4	0,83	0,84	0,85	0,86	0,89
1030-010	○	0,3	0,6	0,3	1,0	40	0,58	4	1,05	1,08	1,10	1,13	1,20
1050-020	○	0,5	1,0	0,5	2,0	40	0,95	4	2,08	2,13	2,19	2,24	2,38
1100-030	○	1,0	2,0	1,0	3,0	40	1,95	4	3,13	3,20	3,27	3,35	3,53

NPDB Type Body (for Precision Finishing)

Cat. No.	Stock NPD10	Dimensions (mm)							Real effective length with respect to work material gradient angle				
		RE	DC	APMX	LF	LU	DN	DMM	0,5°	1°	1,5°	2°	3°
NPDB 1010-004	○	0,1	0,2	0,1	0,4	40	0,18	4	0,44	0,45	0,46	0,47	0,49
1020-008	○	0,2	0,4	0,2	0,8	40	0,38	4	0,83	0,84	0,85	0,86	0,89
1030-010	○	0,3	0,6	0,3	1,0	40	0,58	4	1,05	1,08	1,10	1,13	1,20
1050-020	○	0,5	1,0	0,5	2,0	40	0,95	4	2,08	2,13	2,19	2,24	2,38
1100-030	○	1,0	2,0	1,0	3,0	40	1,95	4	3,13	3,20	3,27	3,35	3,53

Identification Details

NPDB (S) 1 030 - 010

Series Code For standard finishing No. of flutes Ballnose radius Length below neck

Recommended Cutting Conditions

- Use a machine with high rigidity for stable cutting.
- Non-water soluble coolant recommended. Supply as a mist or external coolant.
Take fire prevention precautions to avoid fire hazards caused by sparks igniting during machining or tool breakage.
- Shorten overhang as much as possible.
- Adjust cutting conditions as necessary as machine rigidity and other conditions may vary.
- Depth of cut shown in the table of conditions are maximum depths. Adjust the actual depth of cut to the desired machined surface finish.

● Flat Surface Finishing

Work Material		Carbide			
RE (mm)	LU	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p (mm)	a _e (mm)
0,1	0,4	40.000	100	0,001	0,001
0,2	0,8	40.000	150	0,001	0,001
0,3	1,0	40.000	200	0,001	0,001
0,5	2,0	40.000	400	0,001	0,003
1,0	3,0	40.000	600	0,001	0,005

● Copy Finishing

Work Material		Carbide			
RE (mm)	LU	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p (mm)	a _e (mm)
0,1	0,4	40.000	100	0,001	0,001
0,2	0,8	40.000	150	0,002	0,001
0,3	1,0	40.000	200	0,003	0,001
0,5	2,0	40.000	400	0,005	0,003
1,0	3,0	40.000	600	0,010	0,005



SUMIDIA Drills

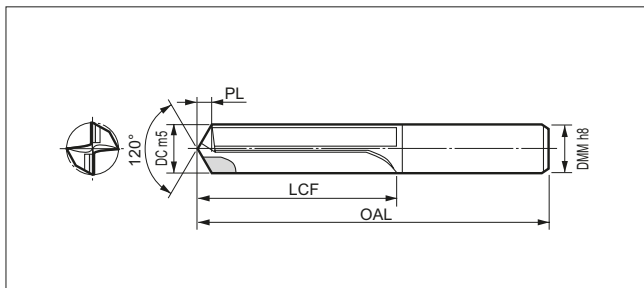
DAL/DDL/DML Type



From general to High Precision Drilling of Aluminum Alloys!

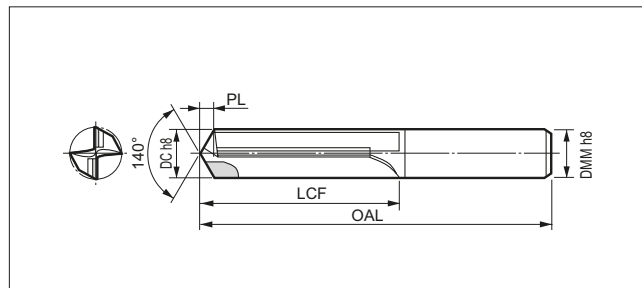
- High precision DAL type is able to produce holes of IT Class of 7 – 8.
- General DDL type is able to produce holes of IT class of 11 – 12, mainly for drilling of pre-tap holes.
- DML type is DDL type with a chamfer edge, incorporating 2 processes in one operation.

■ DAL Type



Cat. No.	DA2200	DC (DMM)	LCF	OAL	PL
DAL 0500H – 0600H		$\emptyset 5 \leq DC \leq \emptyset 6$	31,6	84,6	1,6
0601H – 0700H		$\emptyset 6 < DC \leq \emptyset 7$	36,9	91,9	1,9
0701H – 0800H		$\emptyset 7 < DC \leq \emptyset 8$	37,2	92,2	2,2
0801H – 0900H		$\emptyset 8 < DC \leq \emptyset 9$	42,5	102,5	2,5
0901H – 1000H		$\emptyset 9 < DC \leq \emptyset 10$	42,8	102,8	2,8
1001H – 1100H		$\emptyset 10 < DC \leq \emptyset 11$	53,1	113,1	3,1
1101H – 1200H		$\emptyset 11 < DC \leq \emptyset 12$	53,4	113,4	3,4

■ DDL Type



Cat. No.	DA2200	DC (DMM)	LCF	OAL	PL
DDL 050V – 060V		$\emptyset 5 \leq DC \leq \emptyset 6$	31,5	81,0	1,0
061V – 070V		$\emptyset 6 < DC \leq \emptyset 7$	36,2	91,2	1,2
071V – 080V		$\emptyset 7 < DC \leq \emptyset 8$	36,4	91,4	1,4
081V – 090V		$\emptyset 8 < DC \leq \emptyset 9$	41,6	101,6	1,6
091V – 100V		$\emptyset 9 < DC \leq \emptyset 10$	41,7	101,7	1,7
101V – 110V		$\emptyset 10 < DC \leq \emptyset 11$	51,9	111,9	1,9
111V – 120V		$\emptyset 11 < DC \leq \emptyset 12$	52,1	112,1	2,1

■ Recommended Conditions

DC (mm)	Cutting Speed (m/min)	Feed Rate (mm/rev)	Drilling Length L/D	Oil
<8	80–250	0,05–0,2	Below 3 x D	Water soluble
$\geq 8 \leq 12$		0,1–0,3		

■ Important Notes

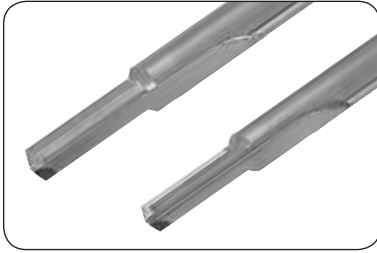
- Select a high rigidity machine and high precision tool holder.
- Enough coolant to drilled hole.

■ Application Examples (DAL Type)

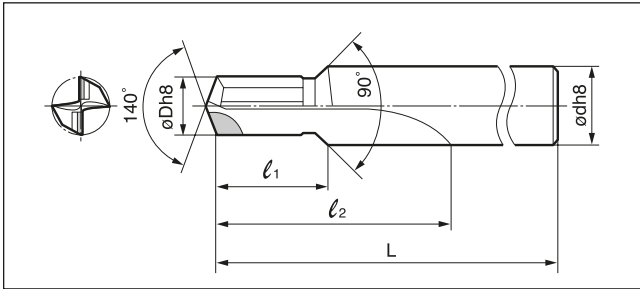
Work Shape	Work	Conditions	Results
	A390 High silicon Aluminum	$V_c=100\text{m/min}$ $f=0,1\text{mm/rev}$	<ul style="list-style-type: none"> • Holes by carbide drill was out of specifications after 2.000 holes/reg. • SumiDia drill could drill up to 30.000 holes/reg. • 15 times tool life that of carbide drills.
	A390 High silicon Aluminum (pre-cast hole of $\emptyset 10$)	$V_c=120\text{m/min}$ $f=0,12\text{mm/rev}$	<ul style="list-style-type: none"> • Average 40,000 holes/reg • Surface roughness $R_y = 1\mu\text{m}$
	ADC10 Aluminum Die Cast	$V_c=90\text{m/min}$ $f=0,08\text{mm/rev}$	<ul style="list-style-type: none"> • More than 50.000 holes and still running

■ Application Examples (DDL Type)

Work Shape	Work	Conditions	Results
	ADC12 Aluminum Die Cast M8 Pre-tap holes	$V_c=214\text{m/min}$ $f=0,14\text{mm/rev}$	<ul style="list-style-type: none"> • Regrind after 100.000 holes
	ADC12 Aluminum Die Cast	$V_c=200\text{m/min}$ $f=0,17\text{mm/rev}$	<ul style="list-style-type: none"> • Regrind after 74.000 holes (2.000m) (Preset tool change)
	AC2A Aluminum Casting	$V_c=234\text{m/min}$ $f=0,28\text{mm/rev}$	<ul style="list-style-type: none"> • Regrind after 80.000 holes (Preset tool change)



■ DML Type

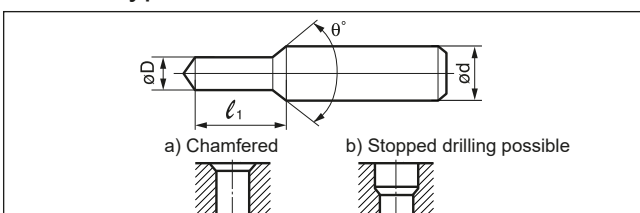


Applicable Tap Size	Cat. No.	Stock	ϕD	ϕd	L	l_1	l_2
		DA2200					
M6	DML 050V		5	8	90	18	36
M8	DML 068V		6,8	10	104	24	48
M10	DML 085V		8,5	12	122	30	60
M12	DML 103V		10,3	14	136	36	72

■ Application Examples (DML Type)

Work Shape	Work	Conditions	Results
	AC4C-T6 Aluminum Casting M6 Pre-tap holes	$V_c=100\text{m/min}$ $f=0,1\text{mm/rev}$ $m/c=6$ spindles	<ul style="list-style-type: none"> • Regrind after 150.000 holes • Tool life for carbide drill is 500 holes. • 30 times tool life that of carbide drills
	AC2C-T2 Aluminum Casting M8 Pre-tap holes	$V_c=210\text{m/min}$ $f=0,15\text{mm/rev}$	<ul style="list-style-type: none"> • 100.000 holes/reg (2.000m) and still running. • Drilling and chamfering in the same process
	AC4C-T6 Aluminum Casting M10 Pre-tap holes	$V_c=250\text{m/min}$ $f=0,2\text{mm/rev}$	<ul style="list-style-type: none"> • 80.000 holes/reg (1,840m) and still running. • Drilling and chamfering in the same process

■ DML Type Possible Profiles



- (1) Tolerance for dimension L is more than 0,2mm.
- (2) θ° is less than 180° .

