L-M

SUMITOMO
CARBIDE - CBN - DIAMOND

22|23

CBN/PCD TOOLS

CBN Inserts and Tools | PCD Inserts and Tools

SUMITOMO ELECTRIC GROUP

SUMIBORON SUMIDIA

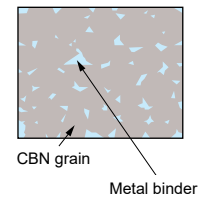
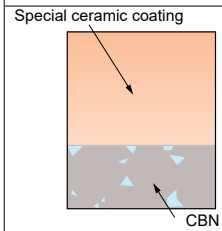
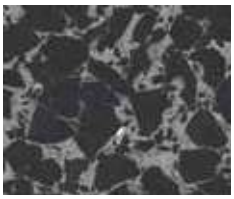
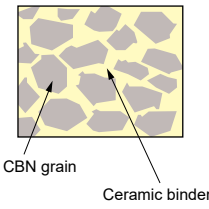
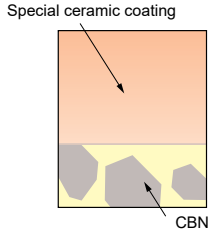
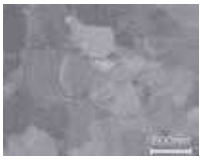
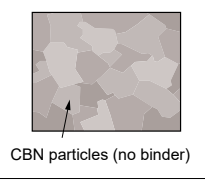
L1–L32

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.
The sintered CBN tool SUMIBORON is mainly used for the machining of ferrous metals due to its low chemical reactivity with iron. There are 4 different classifications of SUMIBORON as follows:

Classifications / Applications

Classifications	Structure	Diagram	Grade	Work Material
With a high CBN content, where each grain is fused together, this group can be used for the machining of high-hardness materials like cast iron, heat-resistant alloys and sintered alloys.			BN700	K (FC) Sintered Alloy S
			BN7000	
			BN7115 New	Sintered Alloy
			BN7500	Sintered Alloy
			BNS8125 New	K (FC/FCD) S
			BNS800	K (FC) S
			**BNC8115** New	K (FC/FCD) S H
The group where CBN grains are held together by a special ceramic binder with a strong binding force provides excellent wear resistance and toughness in the machining of hardened steel and cast iron.			BN1000	H
			BN2000	
			BN350	
			BNX10	
			BNX20	
			BNX25	
			BN500	K (FC/FCD)
SUMIBORON with special ceramic coating. The CBN and coating exhibit the hardness, toughness, thermal resistance and oxidation resistance that tool material requires for excellent cutting performance.			**BNC2115** New	H
			BNC2125 New	
			BNC2010	
			BNC2020	
			BNC300	
			BNC100	
			BNC160	
			BNC200	
			BNC500	K (FC)
Products containing no binder, with a structure of directly bonded nano-to sub-micron CBN particles which provides excellent hardness and thermal conductivity, making them highly efficient with long tool life when machining exotic alloys such as titanium alloys and cobalt-chrome alloys.			NCB100	K (FC) S Cemented Carbide Brittle Materials

Sintered Alloy Cemented Carbide Hard Brittle Material

Characteristics

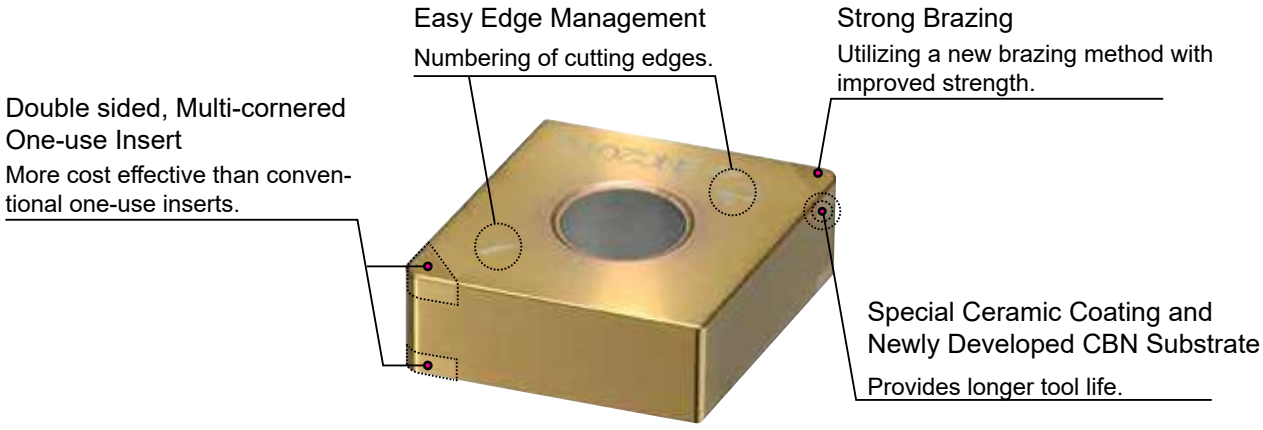
New Coated SUMIBORON Series achieving
- higher speed
- higher efficiency and
- higher precision

General Features

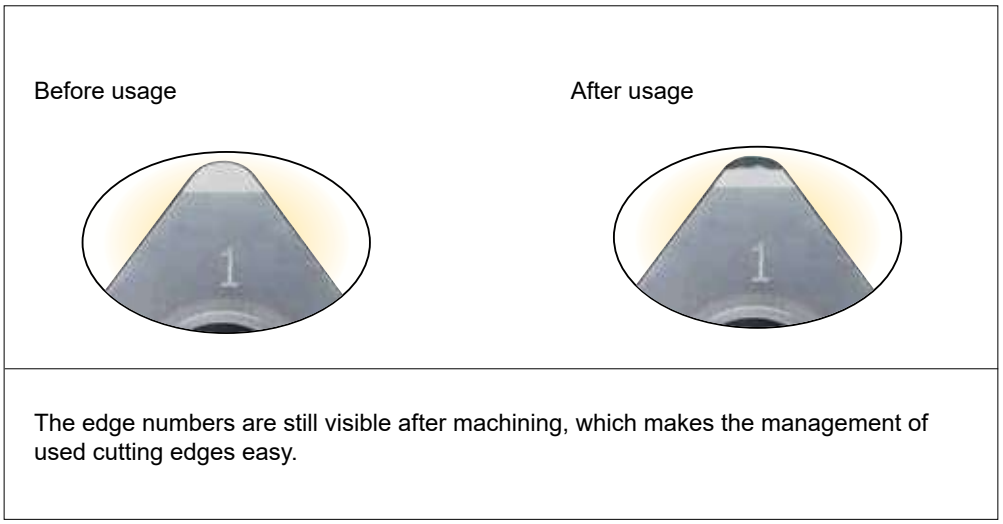
Using a high heat resistant and tough CBN substrate coupled with a special ceramic coating, this series caters to a wide variety of applications with improved precision and longer tool life as compared to conventional CBN.

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.

Features



Cutting Edge Management



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

Grade Guidance

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.

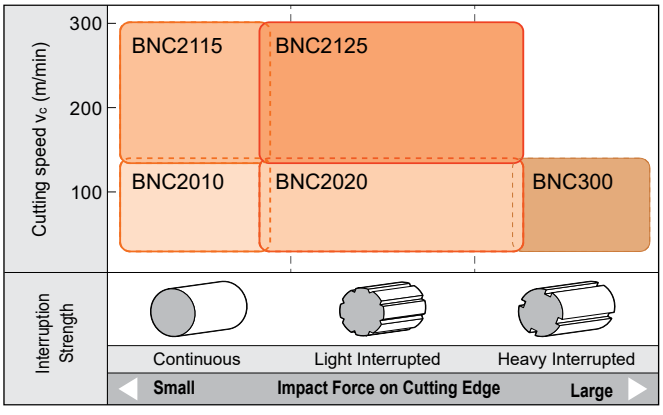
Recommended Grades

	Grade	Binder	CBN Content (%)	Grain Size (μm)	Hardness HV (GPa)	TRS (GPa)	Main Coating Components	Coating Thickness (μm)	Features
Coated	New BNC2115	TiN	60–65	3	31–33	1,3–1,4	TiAlSiN Super Multi-layered Coating	3	Maintains excellent surface roughness thanks to coating with high notch wear resistance and tough CBN substrate.
	New BNC2125	TiN	65–70	4	33–35	1,5–1,6	TiAlSiN Super Multi-layered Coating	3	Along with a tough CBN substrate, the coating combines wear resistance and toughness to achieve even more stable machining.
	BNC2010	TiCN	50–55	2	30–32	1,1–1,2	TiCN Multiple Layers	2	Improved wear resistance from coating and substrate, achieves excellent and consistent surface finish.
	BNC2020	TiN	70–75	5	34–36	1,4–1,5	TiCN Multiple Layers	2	Utilising a tough substrate along with a highly wear-resistant and adhesive coating layer, to achieve long tool life in general-purpose to high-efficiency machining.
	BNC300	TiN	60–65	1	33–35	1,5–1,6	TiAlN	1	Suitable for finishing work materials combining continuous and interrupted cutting.
	BNC100	TiN	40–45	1	29–32	1,0–1,1	TiAlN/TiCN	3	Suitable for high-speed finishing thanks to highly wear-resistant coating.
	BNC160	TiN	60–65	3	31–33	1,2–1,3	TiAlN/TiCN	3	Achieves stable, high-precision finishing of hardened steel.
	BNC200	TiN	65–70	4	33–35	1,4–1,5	TiAlN	3	Provides long tool life thanks to tough substrate and highly wear-resistant coating.
	New BNC8115	Al Alloy	85–90	8	39–42	0,95–1,15	TiAlN	2	Grade with 100% solid CBN structure, using PVD coating with excellent wear resistance to enable roughing operations.
Uncoated	BN1000	TiCN	40–45	1	27–31	0,9–1,0	–	–	Achieves ultimate wear and fracture resistance. Suitable for high-speed cutting.
	BN2000	TiN	50–55	2	31–34	1,1–1,2	–	–	General-purpose grade for hardened steel machining with a high degree of fracture and wear resistance.
	BNX20	TiN	55–60	3	31–33	1,0–1,1	–	–	Achieves excellent crater wear resistance. Suitable for high-efficiency cutting under high-temperature conditions.
	BN350	TiN	60–65	1	33–35	1,5–1,6	–	–	Achieves ultimate cutting edge strength. Suitable for heavy interrupted cutting.
	BNX10	TiCN	40–45	3	27–31	0,9–1,0	–	–	Excellent wear resistance. Suited to continuous high-speed cutting.
	BNX25				29–31	1,0–1,1	–	–	High efficiency cutting (continuous-interrupted). Excellent fracture resistance in interrupted cutting at high cutting speed.

Application Range

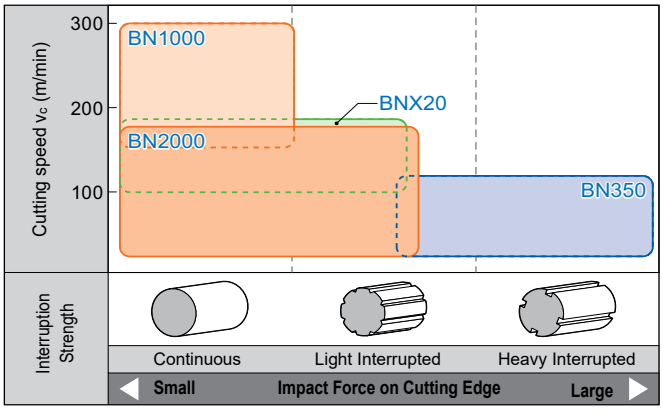
Coated SUMIBORON

● Induction Hardened Steel (C45, C55, etc.), Carburised Steel

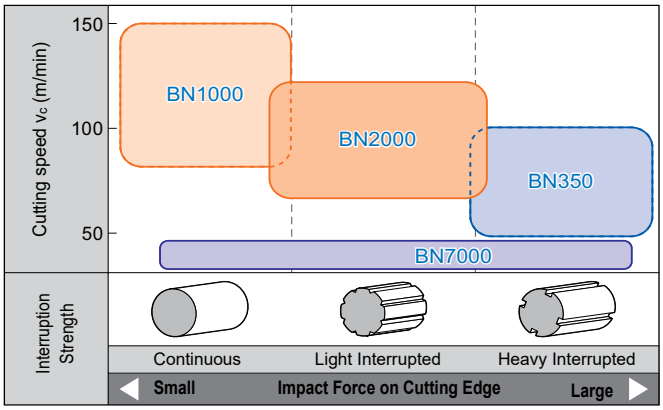


Uncoated SUMIBORON

● Induction Hardened Steel (C45, C55, etc.), Carburised Steel



● Die Steel (X155CrVMo12-1, X40CrVMo5-1, etc.), HSS



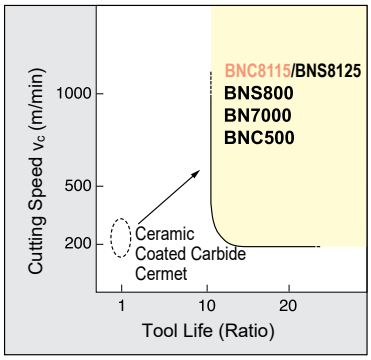
K Cast Iron Machining

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.

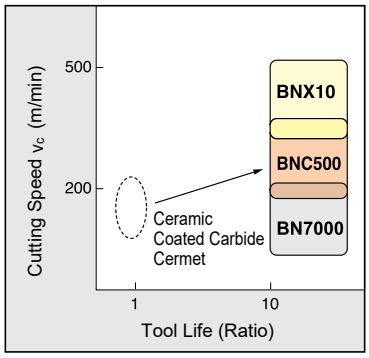
High Speed Machining

● Grey Cast Iron

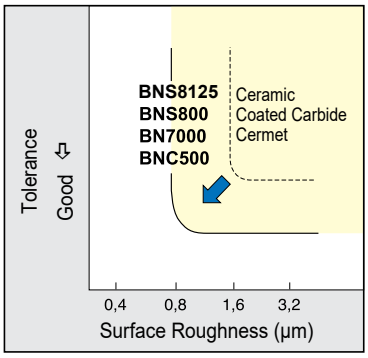


High Speed Machining

● Ductile Cast Iron



High Precision Machining

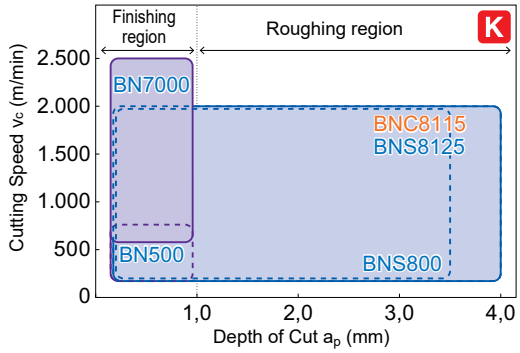


Recommended Grades

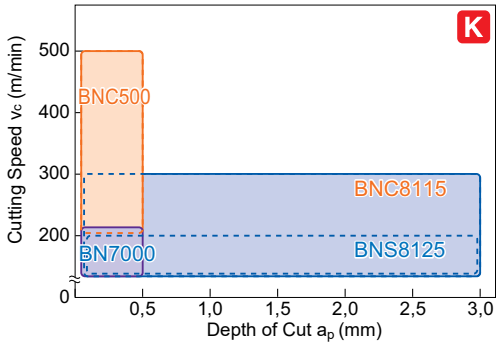
	Grade	Binder	CBN Content (%)	Grain Size (µm)	Hardness HV (GPa)	TRS (GPa)	Main Coating Components	Coating Thickness (µm)	Features
Uncoated	New BNS8125	Al Alloy	85–90	8	39–42	0,95–1,15	–	–	Grade with 100% solid CBN structure that exhibits excellent wear and fracture resistance.
Uncoated	BNS800	Al Alloy	85–90	8	39–42	0,9–1,1	–	–	Grade with solid CBN structure that has excellent thermal shock resistance.
Uncoated	BN7000	Co Compounded	90–95	2	41–44	1,8–1,9	–	–	Grade exhibiting wear and fracture resistance in cutting of cast iron and exotic alloys.
Uncoated	BN500	TiC	65–70	6	32–34	1,0–1,1	–	–	Grade optimised for cast iron cutting. Provides superior wear and fracture resistance.
Coated	New BNC8115	Al Alloy	85–90	8	39–42	0,95–1,15	TiAlN	2	Grade with 100% solid CBN structure, using PVD coating with excellent wear resistance that enables roughing operations.
Coated	BNC500	TiC	85–90	4	32–34	1,1–1,2	TiAlN	3	Suitable for machining of hard-to-cut cast iron, thanks to the highly wear-resistant substrate and coating.

Application Range

● Grey Cast Iron



● Ductile Cast Iron



● Special Cast Iron

Work Material	Hardness (HB)	Work Material Structure	Examples	Cutting Speed v_c (m/min) 100 200 300 350 400 500
Ni-resistant cast iron	150–200	Austenite	Piston ring	BNC500
High-Cr cast iron	250–350	Austenite	Pump part	BNS8125/BNS800
FCV (CGI)	400–580	Pearlite	Engine blocks Cylinder heads Brake discs	BNC500

Grade Guidance

Sintered Component Machining

Advantages

SUMIBORON has much smaller edge wear than cemented carbide or cermet. It also has better wear resistance and can form a shape edge easily. SUMIBORON is able to prevent burrs and chipping on the edges of the workpiece, achieving good machined precision and surface roughness.

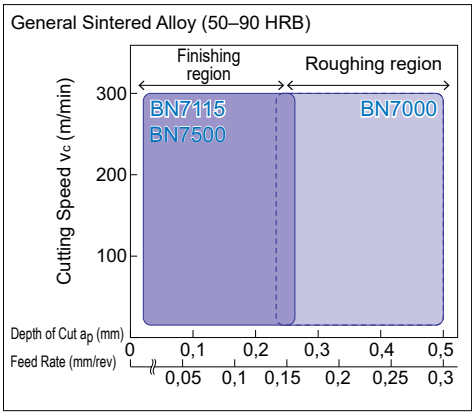
Recommended Grades

	Grade	Binder	CBN Content (%)	Grain Size (μm)	Hardness HV (GPa)	TRS* (GPa)	Main Coating Components	Coating Thickness (μm)	Features
Uncoated	BN7115 New	Co Compounded	90–95	1	41–44	2,2–2,3	–	–	Grade balancing ultimate cutting edge sharpness with fracture resistance, suitable for finishing of sintered alloy.
	BN7500	Co Compounded	90–95	1	41–44	2,0–2,1	–	–	Grade maintaining good cutting edge sharpness, suitable for finishing of sintered alloy.
	BN7000	Co Compounded	90–95	2	41–44	1,8–1,9	–	–	Grade exhibiting improved wear and fracture resistance in roughing of sintered materials.

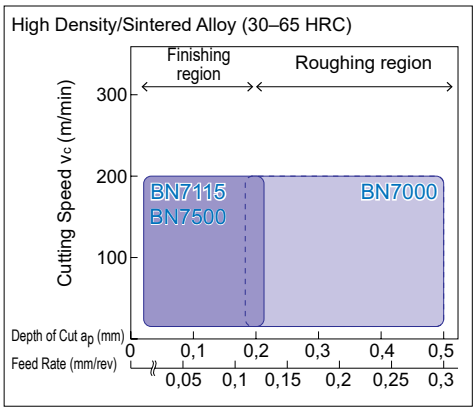
*Tranverse rupture strength measured with test piece equivalent to insert CBN layer.

Application Range

● General Sintered Alloy



● High Density/Sintered Alloy



S Titanium Alloy Cutting

Advantages

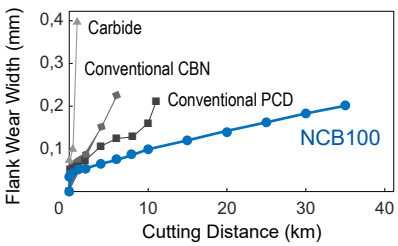
SUMIBORON enables high speed machining of titanium alloys that were previously difficult to machine with conventional tools, drastically improving machining efficiency.

Recommended Grades

Grade	Binder	CBN Content (%)	Grain Size (μm)	Hardness HV (GPa)	TRS* (GPa)	Main Coating Components	Coating Thickness (μm)	Features
NCB100	–	100	≤ 0,5	51–54	1,8–1,9	–	–	Ideal for high-efficiency finishing of titanium alloy.

*Tranverse rupture strength measured with test piece equivalent to insert CBN layer.

Cutting Performance



Work Material: Titanium Alloy (Ti-6Al-4V)
Insert: CNGA120408
Cutting Data: v_c = 150 m/min, f = 0,15 mm/rev, a_p = 0,5 mm
wet (high pressure coolant)

Recommended Cutting Conditions

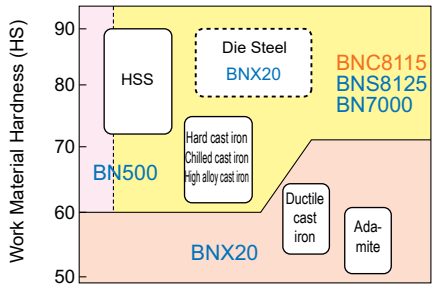
Work Material		Grade	Recommended Cutting Conditions		
Composition	Hardness (HRC)		Cutting Speed v_c (m/min) 50 100 150 200 250 300	Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
Ti-6Al-4V	30–35	NCB100		0,05–0,15–0,20	0,10–0,30–0,50
Ti-5Al-5V-5Mo-3Cr	32–38	NCB100		0,05–0,10–0,20	0,10–0,30–0,50
Ti-10V-2Fe-3Al	32–38	NCB100		0,05–0,10–0,20	0,10–0,30–0,50

Roll Machining

Advantages

SUMIBORON enables the machining of high-hardness rolls that were previously difficult to machine with conventional tools, drastically improving machining efficiency.

Recommended Grades



Finishing to Medium to Roughing

Rolled stand (example of rolled steel bar)

Recommended Cutting Conditions

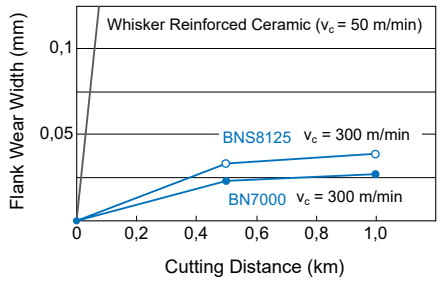
Work Material		Recommended Cutting Conditions		
Category	Hardness (HS)	Cutting Speed v_c (m/min) 20 40 60 80 100 120 140	Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
Adamite	≥ 40		0,1–0,5	0,2–3,0
Chilled cast iron	≥ 60		0,1–0,5	0,2–3,0
High-alloy cast iron	≥ 60		0,1–0,5	0,2–3,0
HSS	≥ 70		0,1–0,4	0,1–3,0

Hard Facing Alloy Machining

Advantages

SUMIBORON enables the machining of high-hardness facing alloys that were previously difficult to machine with conventional tools, drastically improving machining efficiency. The first recommended grade is BN7000, followed by BNS8125.

Cutting Performance



Work Material:	Colmomoy No. 6 (Ni-based self-fluxing alloy)
Insert:	SNGN090308
Cutting Data:	f = 0,1 mm/rev, a_p = 0,2 mm dry

BN7000 has a long tool life and minimal wear with high speed cutting.

Recommended Cutting Conditions

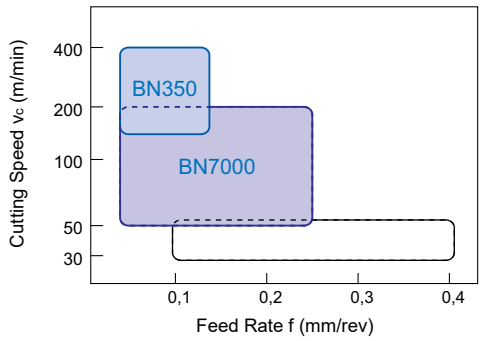
Work Material		Recommended Cutting Conditions		
Category	Material	Cutting Speed v_c (m/min) 50 100 200 300	Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
Ni-based self-fluxing alloy	Colmonoy No. 6		0,05–0,2	0,1–3,0
Co-based self-fluxing alloy	Stellite		0,05–0,2	0,1–1,0

Heat Resistant Alloy Machining

Advantages

SUMIBORON provides long tool life in the finishing of heat-resistant alloys.

Recommended Grades



SUMIBORON is best suited for finishing of heat-resistant steel.

Recommended Cutting Conditions

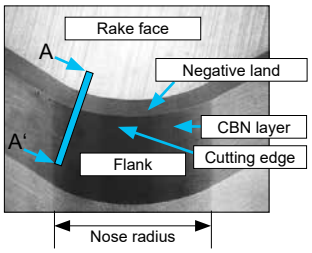
Work Material		Recommended Cutting Conditions		
Category	Material	Cutting Speed v_c (m/min) 50 100 150 200	Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
Ni-based heat-resistant alloy	Inconel 718		0,05–0,2	0,1–1,0
Co-based heat-resistant alloy	Stellite		0,05–0,2	0,1–1,0

Edge Specification of SUMIBORON Inserts

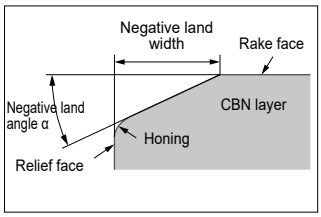
Sumiboron Inserts and Edge Preparation

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

Close-up of Cutting Edge



Section A - A'



SUMIBORON Insert Cutting Edge Specification

Series	Work Material	Grade	Negative / Positive	Standard				Low Cutting Force **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.	T01225	25°	0,12	No	–	–	–	–	–	**HT**	T01235	35°	0,12	No
			Pos.	T01235	35°	0,12	No						–	–	–	–	–
	Cast Iron / Sintered Alloy / 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
		BN7115	Neg./Pos.	T01215	15°	0,12	No	**LF**	(Sharp edge)	0°	0	No	**HS**	S00525	25°	0,05	Yes
							Yes	**LE**	(Sharp edge)	0°	0	Yes	**US**	S01225	25°	0,12	Yes
							–	**LS**	S00715	15°	0,05	–	**–**	–	–	–	–
		BN7500	Neg./Pos.	T01215	15°	0,12	No	**LF**	(Sharp edge)	0°	0	No	**HS**	S00525	25°	0,05	Yes
							Yes	**LE**	(Sharp edge)	0°	0	Yes					
							Yes	**LS**	S00715	15°	0,07	Yes					
		BNS8125	Neg.	T02020	20°	0,20	–	–	–	–	–	–	–	–	–	–	–
		BNS800	Neg.	T02020	20°	0,20	No	**LF**	(Sharp edge)	0°	0	No	–	–	–	–	–
Coated SUMIBORON	Hardened Steel	**BNC2115**	Neg./Pos.	S01225	25°	0,12	Yes	**LS**	S00515	15°	0,05	Yes	**HS**	S01730	30°	0,17	Yes
		BNC2125	Neg./Pos.	S01225	25°	0,12	Yes	**LS**	S00515	15°	0,05	Yes	**HS**	S02735	35°	0,27	Yes
		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
								ES	S00535	35°	0,05	Yes					
		BNC100	Neg./Pos.	S01225	25°	0,12	Yes	**LS**	S01715	15°	0,17	Yes	–	–	–	–	–
		BNC160	Neg./Pos.	S01225	25°	0,12	Yes	**LS**	S01020	20°	0,10	Yes	**HS**	S01730	30°	0,17	Yes
		BNC200	Neg./Pos.	S01225	25°	0,12	Yes	**LS**	S01015	15°	0,10	Yes	**HS**	S01735	35°	0,17	Yes
		BNC300	Neg./Pos.	S01225	25°	0,12	Yes	**LS**	S00515	15°	0,05	Yes	**HS**	S01735	35°	0,17	Yes
	Cast Iron	**BNC500**	Neg./Pos.	S01215	15°	0,12	Yes	–	–	–	–	–	**HS**	S01225	25°	0,12	Yes
	Cast Iron, Hardened Steel	**BNC8115**	Neg.	S02020	20°	0,20	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 insers with inscribed circle of less than Ø 4,76.

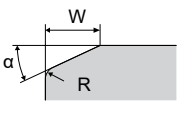
Cutting Edge Preparation of Inserts with Wiper / Chipbreakers

Type	Notation	Edge Specification Identification Code	α	W	Honing	Uncoated SUMIBORON			Coated SUMIBORON								
						BN2000	BNS8125	BNS800	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC500	BNC8115
Wiper	**WG**	S01215	15°	0,12	Yes	●			●	●	●	●		●	●		
	WH	S01215	15°	0,12	Yes	●			●	●	●	●		●	●		
	W	S01215	15°	0,12	Yes									●	●	●	
		S01715	15°	0,17	Yes								●				
		S02020	20°	0,20	Yes												●
		T02020	20°	0,20	No		●	●									
Wiper Sharp Edge	**LFW**	Sharp Edge	0°	0	No			●									
With Chipbreaker	**N-FV**	–	0°	0	Yes	●			●	●	●	●		●	●		
	N-LV	S00535	35°	0,05	Yes	●			●	●	●	●		●	●		
	N-SV	S01235	35°	0,12	Yes				●	●	●	●		●	●		

Cutting Edge Specification Identification Code

Notation of Edge Preparation				
No.	Standard Type			
L	Low cutting forces	+	F	Sharp edge
E	High efficiency		E	Honing
			T	Negative land
H	Strong edge type		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**

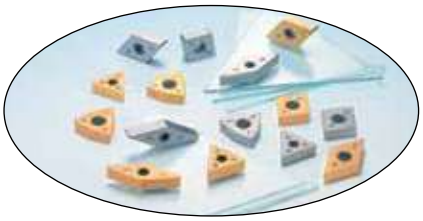
W: Negative land width **α**: Negative land angle

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

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

Insert Types and Cutting Edge Geometries

Multi Cornered One-Use Type Inserts

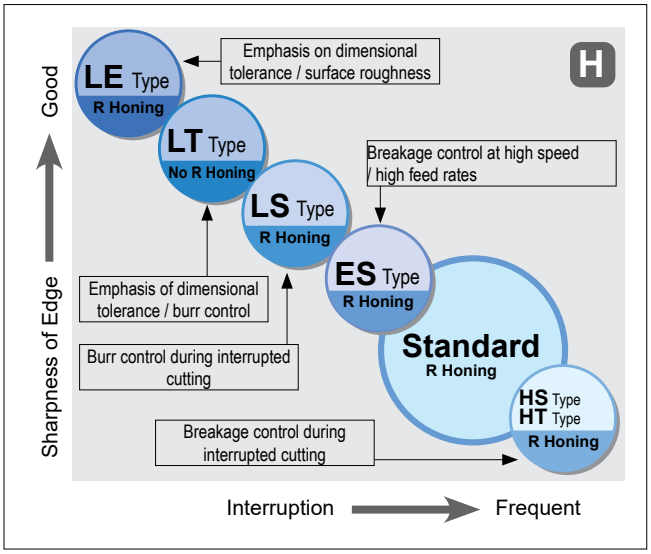


■ Characteristics

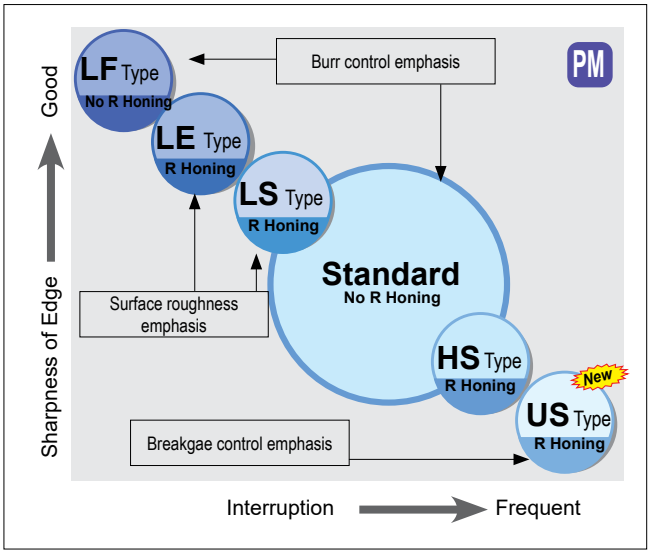
- One-use type inserts improve machining efficiency by using each cutting edge to its full potential following the numbering system on each cutting edge then throwing the insert away.
- Multi cornered inserts have a single piece of Sumiboron mounted on every useable corner. Single sided inserts use the 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

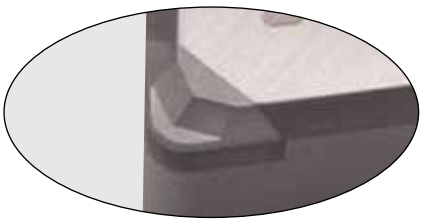


One-Use Wiper Insert

■ 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

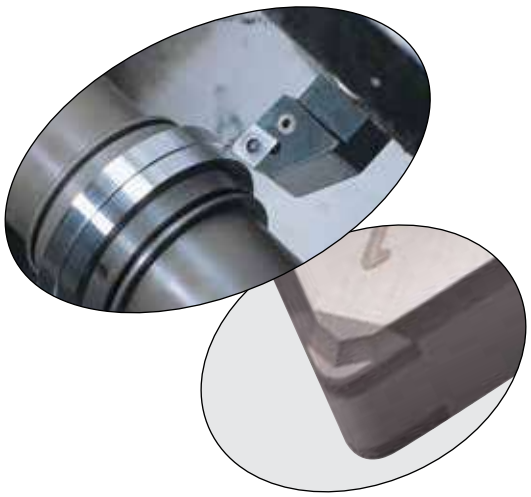


Break Master N-SV Type

■ 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 materals.
- Effective chip control solution protects component from swarf damage.

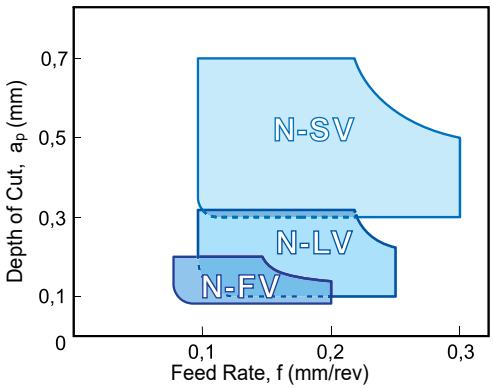
N-FV /N-LV /N-SV



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.

Application Range



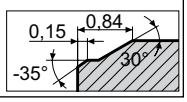
N-SV

N-LV

N-FV

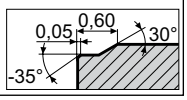
N-SV For Carburised Layer Removal

Ideal for carburised layer removal.



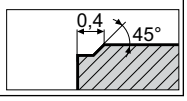
N-LV For Light Cutting

Excellent chip evacuation under conditions with depth of cut at ≤ 0,3 mm.



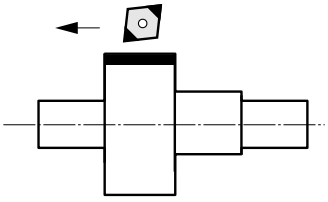
N-FV For Finishing

Excellent chip evacuation under finishing conditions with depth of cut at ≤ 0,2 mm.



Application Examples

External Carburised Layer Removal



No constant stopages or incorrect part dimension problem and the chips are small.

Double the tool life of competitor's CBN

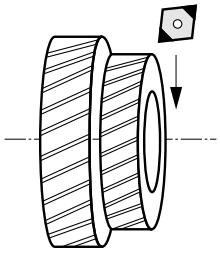
Break Master N-SV
Tool life = 200 pcs

BNC200 (no breaker)
Tool life = 200 pcs

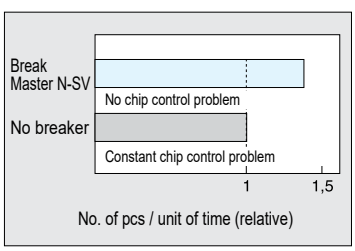
Comp. CBN (no breaker)
Tool life = 100 pcs

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 = 0,5mm, x 2 passes, wet

Carburised Face Layer Removal



Break Master N-SV type improves chip control with increased productivity until the pre-set tool life.

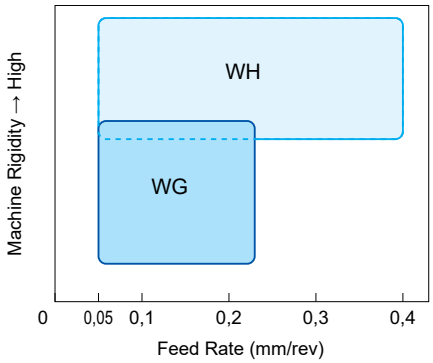


Work material: 42CrMo4 (HRC30-62)
Insert: CNGG 120408 N-SV NC4 (BNC200)
Conditions: v_c = 140 m/min, f = 0,15 mm/rev, a_p = 0,3 mm, wet

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

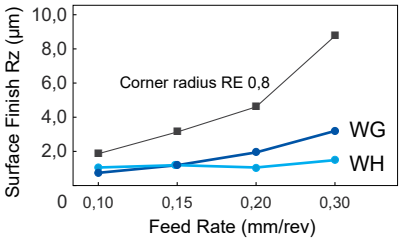
Application Range



WH type:
→ for high-rigidity workpieces and equipment

WG type:
→ for issues of undulation or chatter

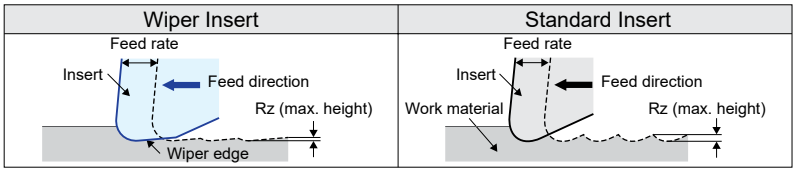
Finished Surface Roughness



The wiper insert offers good finished surface roughness and improved machining efficiency.

Work Material:	15CrMo5 (60 HRC)
Insert:	CNGA120408NC4
Cutting Data:	vc = 135 m/min, ap = 0,1 mm, dry

Wiper Insert Operation

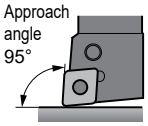


Tool-Setup WG / WH Wiper

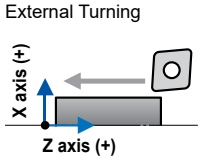
CNGA / CCGW / WNGA Type Wiper

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

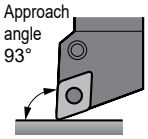


Nose Radius	Type	X-Direction	Z-Direction
RE 0,4	WG	-0,02	-0,02
	WH	-0,06	-0,06
RE 0,8/1,2	WG	-0,01	-0,01
	WH	-0,06	-0,06

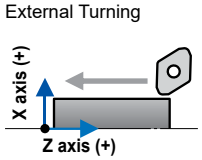
DNGA / DCGW Type Wiper

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



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 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.

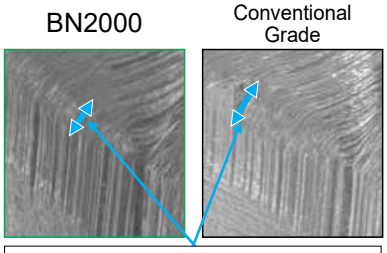
Available in single corner and multi-corner type inserts.

■ 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).

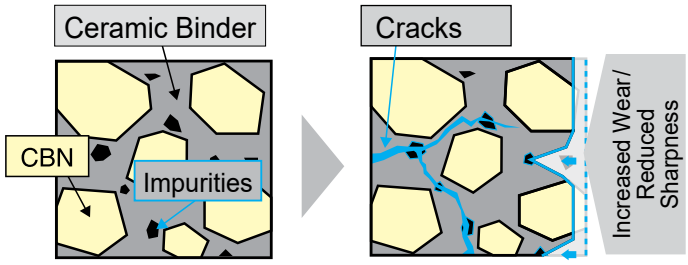
Sharpness Comparison



Compared to conventional grades, small cutting edge roundness

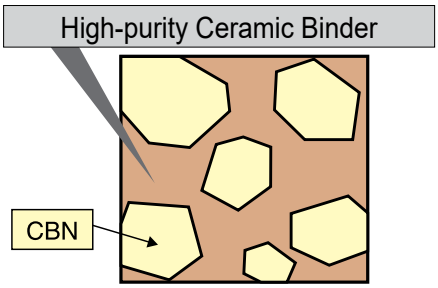
■ Newly Developed High-Purity Ceramic Binder

Conventional Grade



The impurities contained in the ceramic binder for conventional grades cause a weakening in the sintered body and a decrease in heat resistance, which becomes the cause of cracks (chipping) and wear.

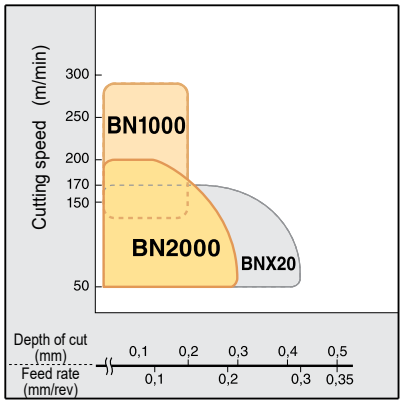
BN1000/BN2000



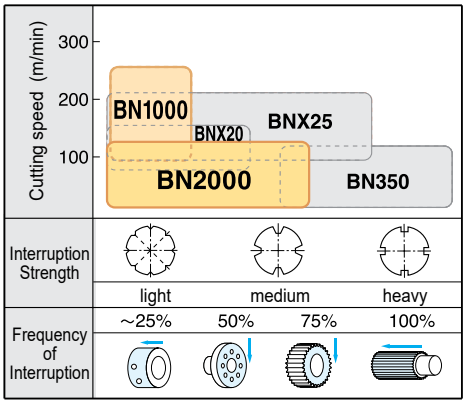
With the newly developed high-purity **ceramic binder**, the BN1000 / BN2000 achieve toughness and improved heat resistance by decreasing impurities to an extreme!

■ 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

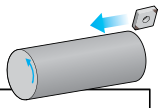
v_c (m/min)	f (mm/rev)	a_p (mm)
50 100 150 200 250 80 120	0,03–0,2	0,0–0,3

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

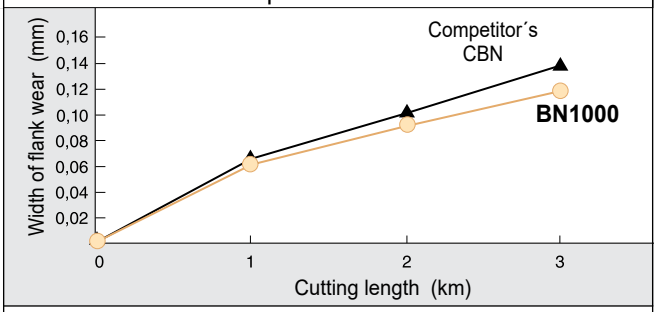
Uncoated SUMIBORON
BN1000 / BN2000

■ Cutting Performance

BN1000

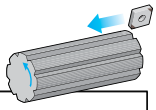


Wear Resistance Comparison

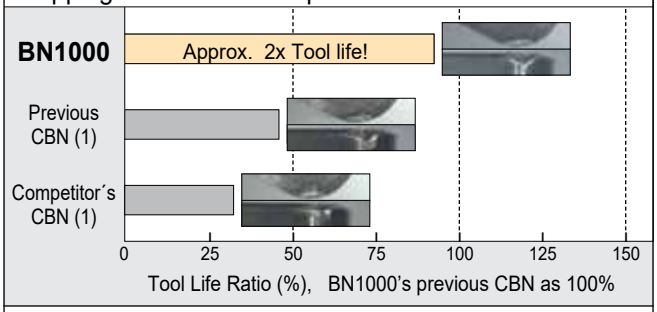


Work material: 100Cr6 (H_RC58-62), Round Bar
Insert: CNGA 120408 NU-2
Cutting data: v_c = 150 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, dry

BN1000

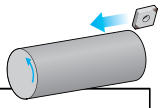


Chipping Resistance Comparison

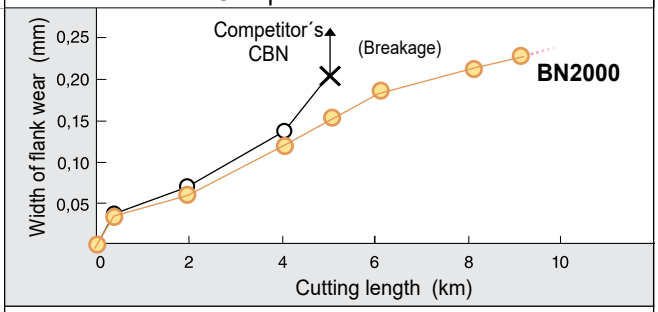


Work material: 15CrMo5 (H_RC58-62), 8 Grooves
Insert: CNGA 120408 NU-2
Cutting data: v_c = 150 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, dry

BN2000

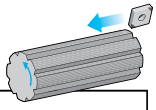


Wear Resistance Comparison

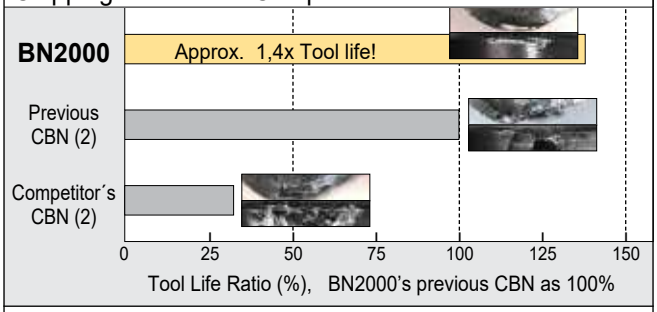


Work material: 15CrMo5 (H_RC58-62), Round Bar
Insert: CNGA 120408 NU-2
Cutting data: v_c = 100 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, dry

BN2000



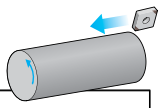
Chipping Resistance Comparison



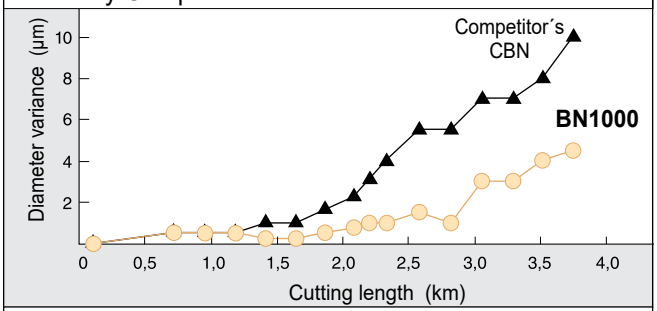
Work material: 15CrMo5 (H_RC58-62), 8 Grooves
Insert: CNGA 120408 NU-2
Cutting data: v_c = 150 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, dry

■ Machining Precision

BN1000

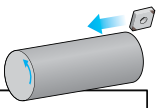


Accuracy Comparison

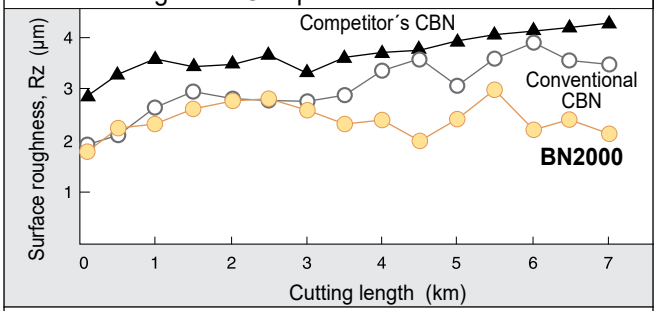


Work material: 15CrMo5 (H_RC58-62), Round Bar Ø 130
Insert: CNGA 120408 NU-2
Cutting data: v_c = 200 m/min, f = 0,1 mm/rev, a_p = 0,1 mm, wet

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

BNC2115/BNC2125/BNC2010/BNC2020

New

General Features

BNC2115/BNC2125 have been added to our coated SUMIBORON series and are our first recommendations for hardened steel machining, for even higher efficiency machining. It's the pinnacle of high accuracy and high efficiency cutting.
In combination with BNC2010/BNC2020, which emphasize stable tool life, they improve productivity in all kinds of hardened steel machining.

Features

BNC2115 New

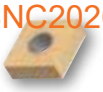
- The definitive grade in high-accurancy machining
  Realises long tool life with excellent surface roughness and stable machining.
- Further maintains excellent surface roughness
  Maintains excellent surface roughness thanks to a coating with high notch wear resistance and tough CBN substrate.

BNC2125 New

- First recommendation for hardened steel machining
  Superb wear and fracture resistance.
- Achieves long, stable tool life even in high-efficiency and interrupted machining
  Along with a tough CBN substrate, the coating combines wear resistance and toughness to realise stable machining.

BNC2010

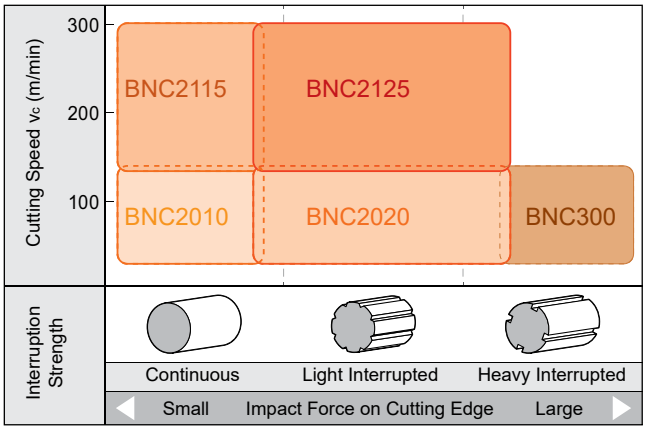
- Grade for high-precision machining with excellent surface roughness and finished surface accuracy
  Grade ideal for high-precision machining, with highly wear-resistant CBN substrate and coating.



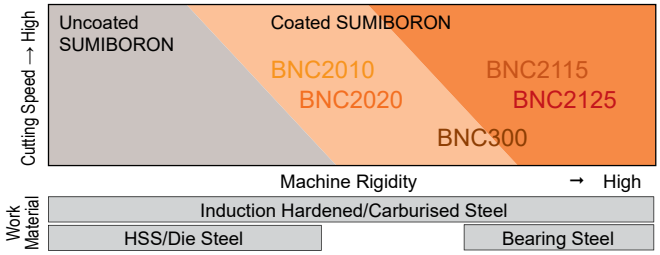
BNC2020

- General-purpose grade suitable for typical hardened steel machining applications
  Achieves further stability in machining of a wide range of hardened steel components.

Application Range



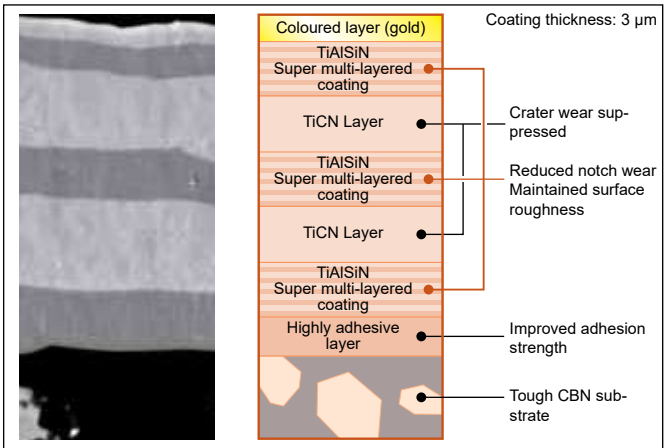
Differentiation



CBN Substrate und Coating Structure

BNC2115

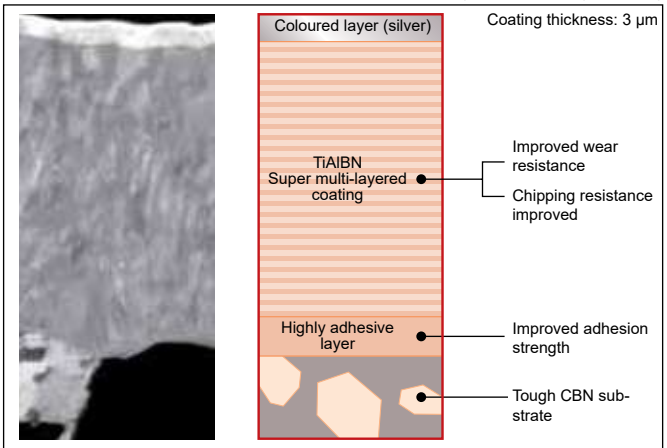
High-Precision Machining
(Medium- to high-speed)



Thick layer of laminated high-strength TiAlSiN super multi-layered coating and highly heat-resistant TiCN coating. Achieves excellent surface fnish quality with application to a tough substrate.

BNC2125

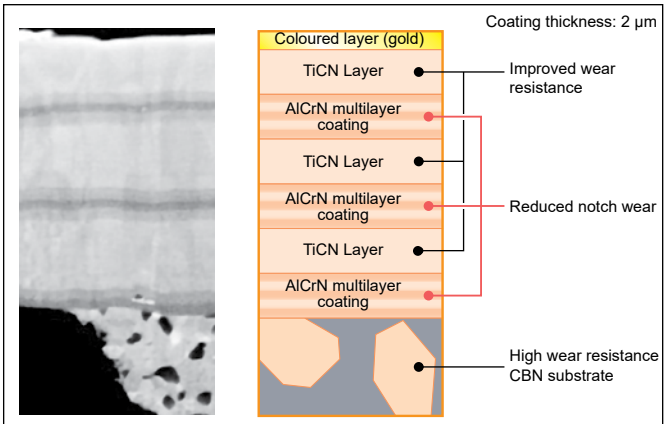
General Machining
(Medium- to high-speed)



Thick layer of super-multilayered ultra-fine TiAlBN coating with high strength and high hardness. High performance in a wide range of cutting through application to a tough substrate.

BNC2010

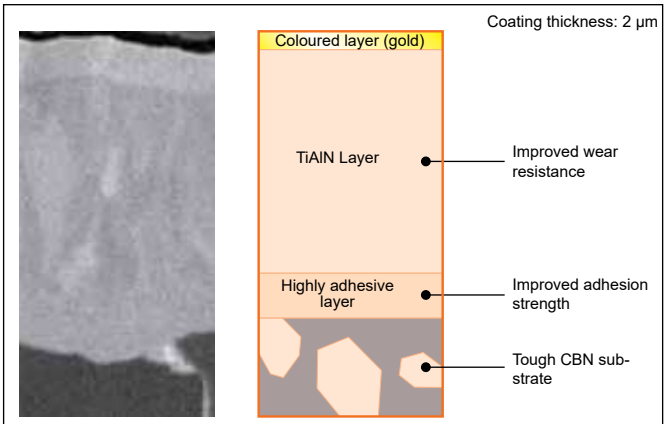
High-Precision Machining
(Low- to medium-speed)



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

BNC2020

General Purpose Machining
(Low to medium speed, unstable cutting)



Application of highly wear-resistant TiAlN coating to a tough substrate. Machining stability in low-rigidity environments and high-load cutting is dramatically improved.

Recommended Cutting Conditions

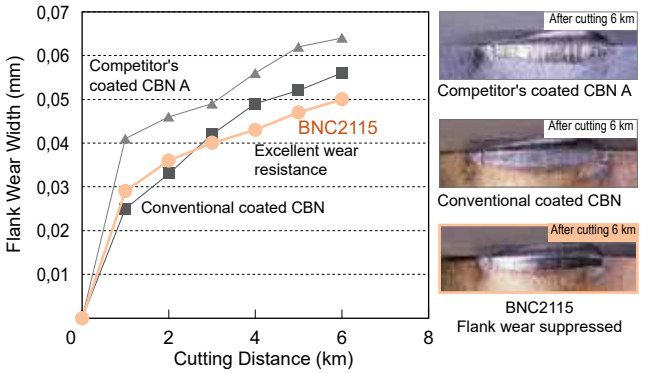
Grade	Cutting Speed v_c (m/min) Min.–**Optimum**–Max.	Feed Rate f (mm/rev) Min.–**Optimum**–Max.	Depth of Cut a_p (min) Min.–**Optimum**–Max.
BNC2115	110–**180**–300	0,03–**0,10**–0,20	0,03–**0,20**–0,35
BNC2125	110–**160**–300	0,05–**0,20**–0,40	0,05–**0,30**–0,50
BNC2010	50–**140**–180	0,03–**0,10**–0,20	0,03–**0,20**–0,35
BNC2020	50–**120**–180	0,03–**0,20**–0,40	0,05–**0,30**–0,50
BNC300	50–**100**–150	0,03–**0,10**–0,20	0,03–**0,20**–0,30

BNC2115/BNC2125/BNC2010/BNC2020

■ Cutting Performance

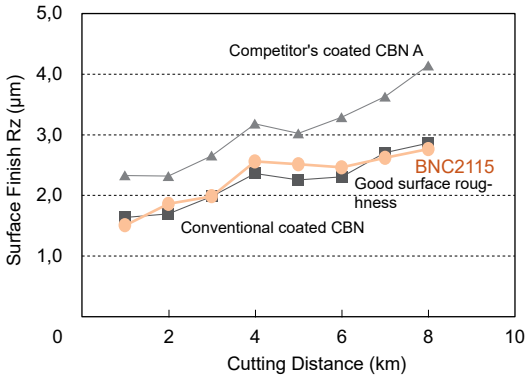
BNC2115

Continuous Cutting, Wear Resistance



Work Material:	16CrMo4 (58–62 HRC)
Insert:	DNGA150408NC4
Cutting Data:	v_c = 200 m/min, f = 0,1 mm/rev, a_p = 0,15 mm, wet

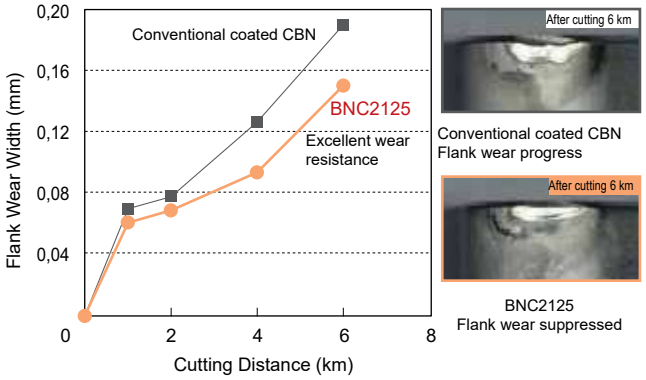
Continuous Cutting, Machined Surface Roughness



Work Material:	16CrMo4 (58–62 HRC)
Insert:	DNGA150408NC4
Cutting Data:	v_c = 200 m/min, f = 0,1 mm/rev, a_p = 0,15 mm, wet

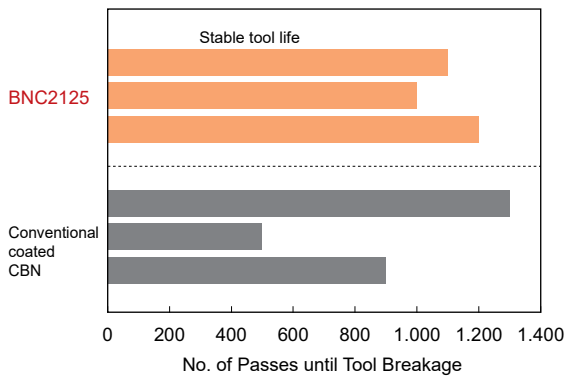
BNC2125

Continuous Cutting, Wear Resistance



Work Material:	100Cr6 (58–62 HRC)
Insert:	DNGA150408NC4
Cutting Data:	v_c = 150 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, wet

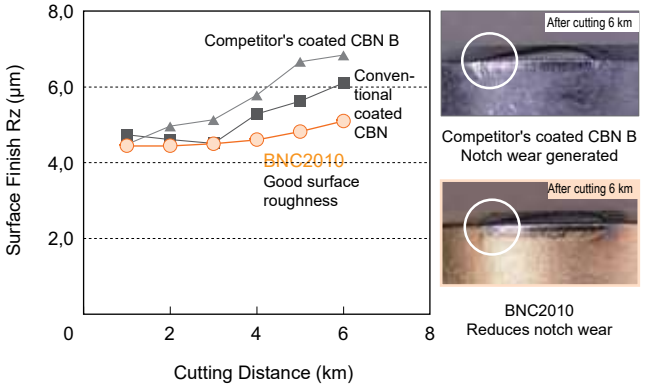
High-Load Cutting, Fracture Resistance



Work Material:	100Cr6 (58–62 HRC)
Insert:	DNGA150408NC4
Cutting Data:	v_c = 150 m/min, f = 0,15 mm/rev, a_p = 0,5 mm, 63 m/times, wet

BNC2010

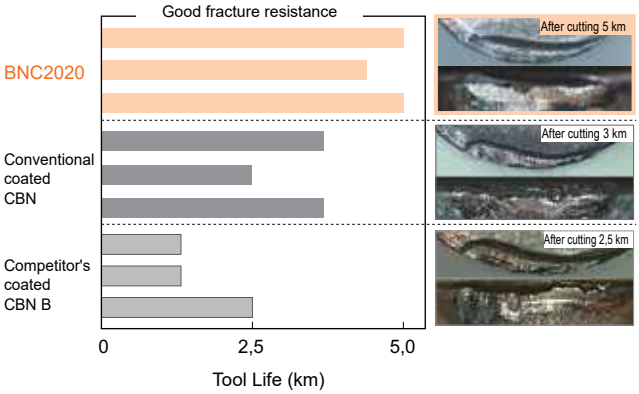
Continuous Cutting, Machined Surface Roughness



Work Material:	16CrMo4 (58–62 HRC)
Insert:	DNGA150408NC4
Cutting Data:	v_c = 120 m/min, f = 0,14 mm/rev, a_p = 0,15mm, wet

BNC2020

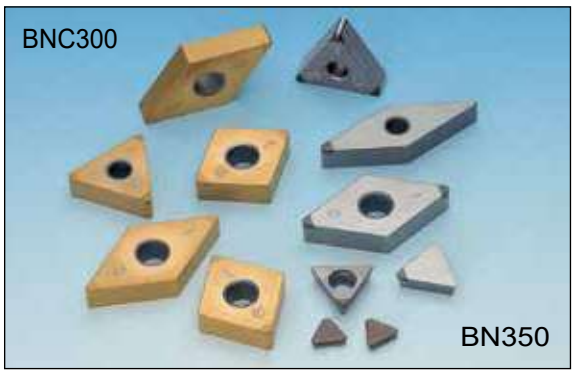
Interrupted Cutting, Fracture Resistance



Work Material:	16CrMo4 with 5 grooves (58–62 HRC)
Insert:	DNGA1204012NC4
Cutting Data:	v_c = 130 m/min, f = 0,1 mm/rev, a_p = 0,6 mm, dry

Coated SUMIBORON
BNC300 / BN350

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 achieve 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

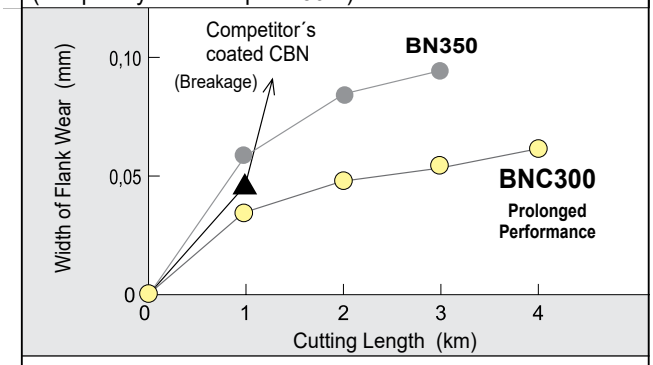
- Stable and long tool life in interrupted cutting
  Achieving stable and long tool life in heavy interrupted cutting, with superior fracture resistance.
- Superior dimensional precision
  Good adhesion strength, TiAlN based, high wear resistance coating. Achieving superior dimensional precision even 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.

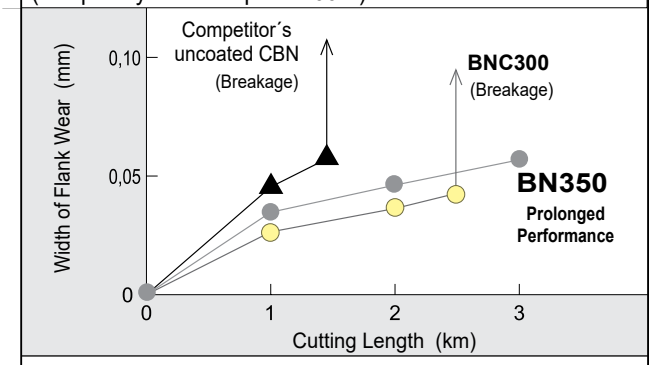
Performance

Continuous ~ Light Interrupted Machining
(Frequency of Interruption 50%)



Work material: 15CrMo5 (H_RC58-62)
Insert type: CNGA 120408 NC-4
Cutting data: v_c = 120 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, dry

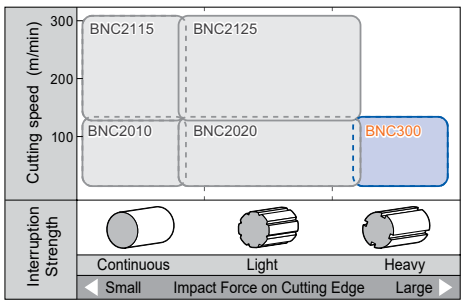
Heavy Interrupted Machining
(Frequency of Interruption 100%)



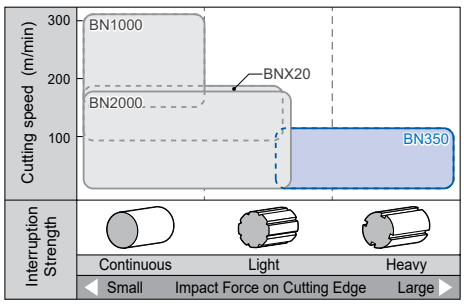
Work material: 15CrMo5 (H_RC58-62)
Insert type: CNGA 120408 NU-2
Cutting data: v_c = 100 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, dry

Recommended Application Range

Coated SUMIBORON



Uncoated SUMIBORON



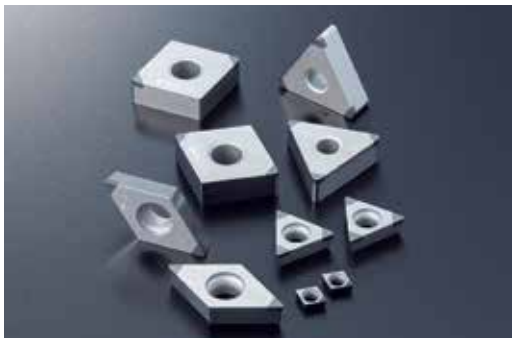
Recommended Cutting Conditions (BNC300, BN350)

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

Uncoated SUMIBORON
BN7000 K PM / BN7115 PM

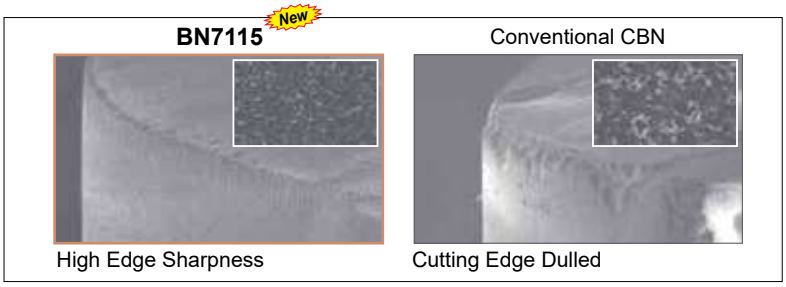
New



General Features

Good wear resistance through high CBN content also delivers superior fracture resistance by increasing the binding strength between CBN particles.
BN7115 provides stable performance for high-speed finishing work and is ideal for finishing of sintered alloys.

New cutting edge treatment with an emphasis on fracture resistance: “US” type chipbreaker now available.



Removal of binder → comparison of CBN particles ‘ binding strength

Features

BN7000

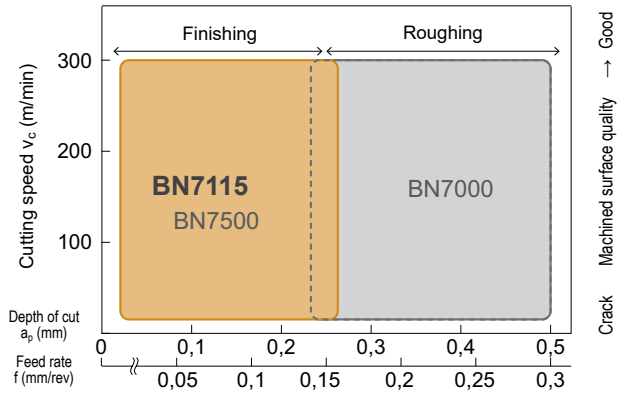
- Achieves high-efficiency machining of sintered alloys of various shapes with a standard and two types of cutting edge variations. Also exhibits high performance for difficult-to-cut materials such as rolls, high speed steel and heat resistive alloys. Exhibits good thermal resistance in high-speed machining of cast iron.

BN7115 New

- With improved CBN particle/binder boundary strength due to the special binder and improved binding strength between CBN particles thanks to our proprietary sintering process, the edge sharpness in sintered alloy machining is excellent and burrs and tearing are suppressed.

Application Range

● Sintered Alloy (50–95 HRB/90–200 HV)



Recommended Cutting Conditions

● Cast Iron K

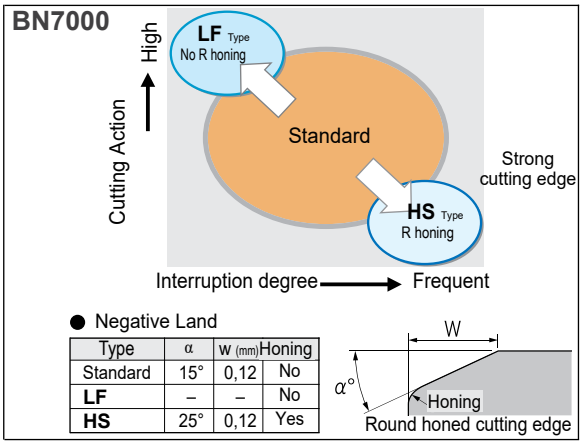
Work material	Grade	Cutting conditions (min.–optimum–max.)		
		Cutting speed Vc (m/min)	Feed rate f (mm/rev)	Depth of cut ap (mm)
Cast Iron	**BN7000**	100–**1.000**–2.500	0,05–**0,30**–0,60	0,05–**0,50**–1,00

● Sintered Alloy Sintered Alloy

Work material	Grade	Cutting conditions (min.–optimum–max.)		
		Cutting speed Vc (m/min)	Feed rate f (mm/rev)	Depth of cut ap (mm)
General sintered alloy	**BN7115**	10–**150**–300	0,01–**0,08**–0,15	0,05–**0,13**–0,25
	BN7000	10–**150**–300	0,01–**0,15**–0,30	0,05–**0,25**–0,50
High-density sintered alloy	**BN7115**	10–**100**–200	0,01–**0,06**–0,12	0,05–**0,10**–0,20
	BN7000	10–**100**–200	0,01–**0,15**–0,30	0,05–**0,25**–0,50

Recommended Edge Treatment

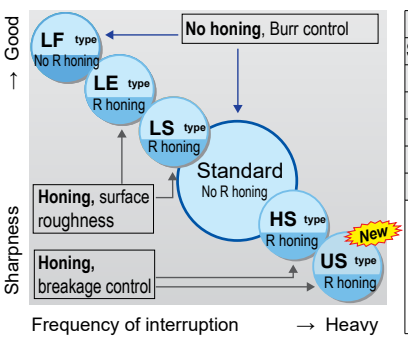
BN7000



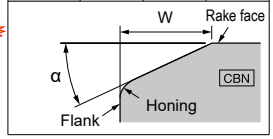
● Negative Land

Type	α	W (mm)	Honing
Standard	15°	0,12	No
LF	–	–	No
HS	25°	0,12	Yes

BN7115



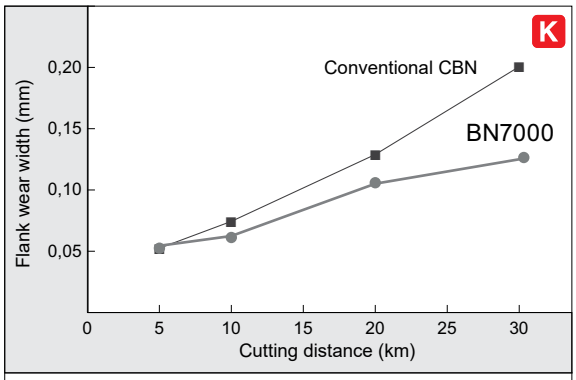
Type	α°	W (mm)	Honing
Standard	15°	0,12	no
LF	Standard edge		no
LE	Standard edge		yes
LS	15°	0,07	yes
HS	25°	0,05	yes
US	25°	0,12	yes



New **US** type emphasises fracture resistance, ideal for heavy interrupted cutting.

■ Cutting Performance (Cast Iron)

● BN7000 Continuous Cutting (Flank Wear)



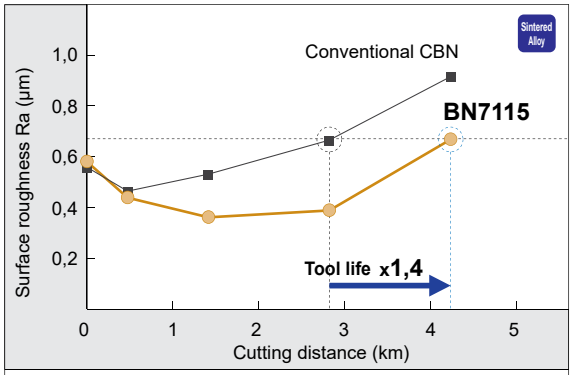
Conventional CBN

BN7000

Work material: FC3000 (Pearlite)
Insert: CNGA 120408 NU2
Cutting conditions: v_c = 800 m/min, f = 0,12 mm/rev, a_p = 0,3 mm, wet

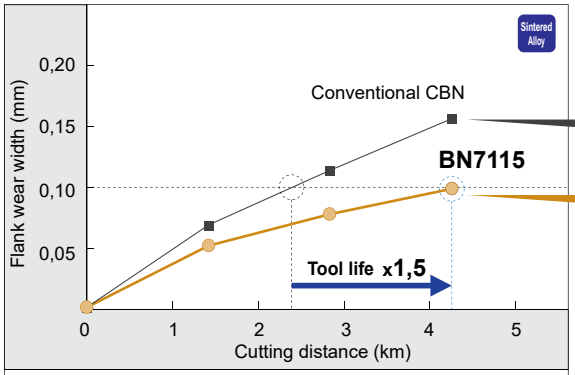
■ Cutting Performance (Sintered Alloy)

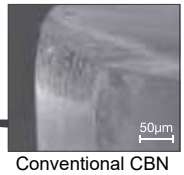
● **BN7115** Continuous Cutting (Surface Roughness)



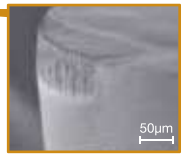
Work material: Sinterred ferrous alloy F-08C2 equivalent (150 HV)
Insert: CNGA 120408 NU2
Cutting conditions: v_c = 200 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, wet

● **BN7115** Continuous Cutting (Wear Resistance)





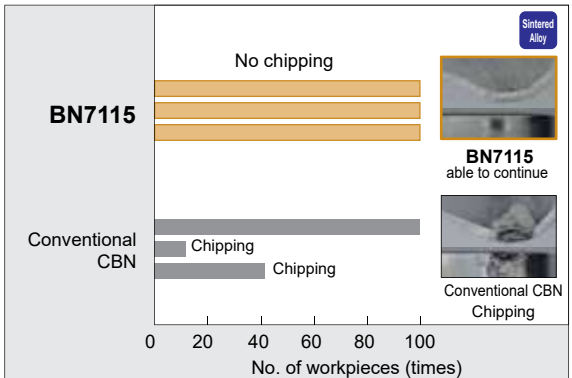
Conventional CBN



BN7115
Maintains cutting edge line

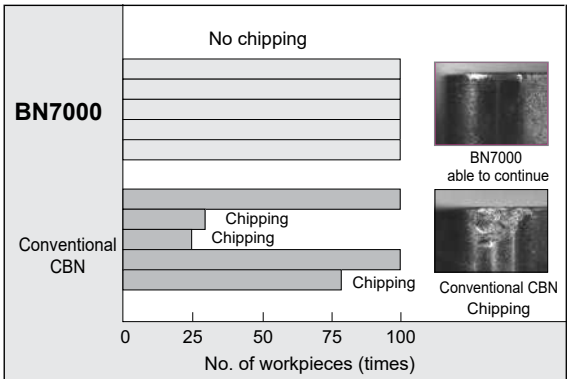
Work material: Sinterred ferrous alloy F-08C2 equivalent (150 HV)
Insert: CNGA 120408 NU2
Cutting conditions: v_c = 200 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, wet

● **BN7115** Interrupted Cutting (Fracture Resistance)



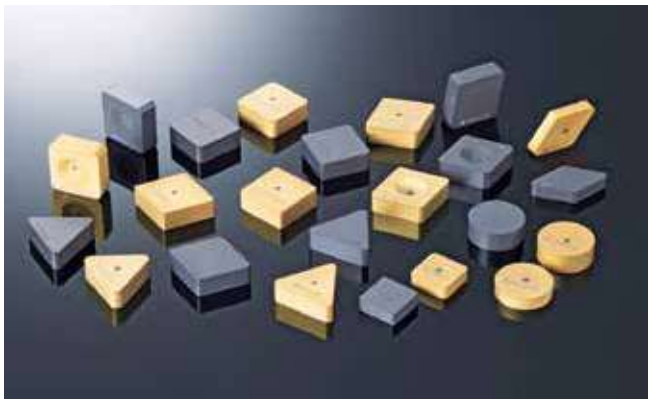
Work material: Sinterred ferrous alloy FLA-07C2M equivalent (500 HV)
Insert: CNGA 120408 NU2
Cutting conditions: v_c = 175 m/min, f = 0,09 mm/rev, a_p = 0,15 mm, dry

● BN7000 Interrupted Cutting (Fracture Resistance)



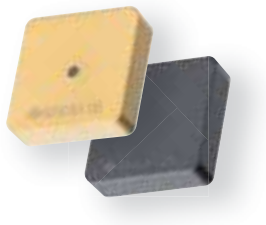
Work material: Sintered ferrous alloy, SMF4040 equivalent (HRB70, Interrupted Machining)
Insert type: CNGA 120408
Cutting data: v_c = 250 m/min, f = 0,1 mm/rev, a_p = 0,3 mm, wet

BNC8115/BNS8125 K H New



General Features

Enables a wide range of machining from roughing to finishing of cast iron, exotic alloy cast iron and hardened steel.
100% solid CBN structure enables depth-of-cut of 0,5 mm and above.



Features

BNC8115 New

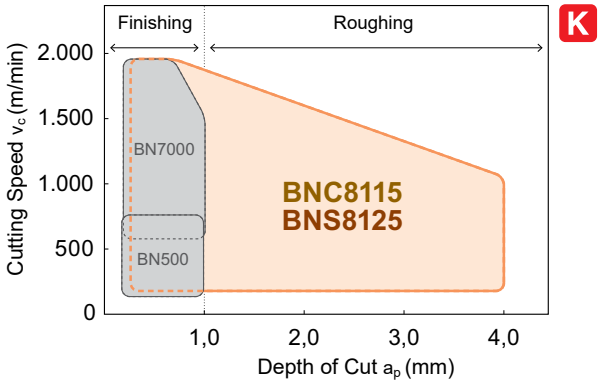
- PVD coating with excellent wear resistance suppresses flank wear when machining difficult-to-cut cast iron and hardened steel. Ideal for roughing and depth-of-cut of 0,5 to 3,0 mm. Can also be used for roughing and finishing of grey cast iron. Gold-colored coating improves visibility of used corners.

BNS8125 New

- Optimising the particle size distribution of the CBN particles has resulted in improved chipping resistance and longer life while machining wear resistance during grey cast iron machining.

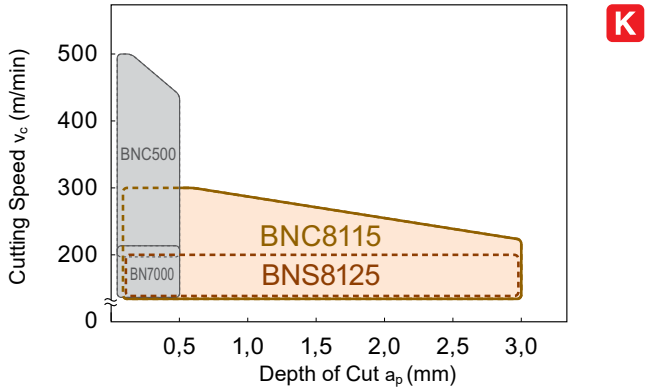
Application Range

Grey Cast Iron

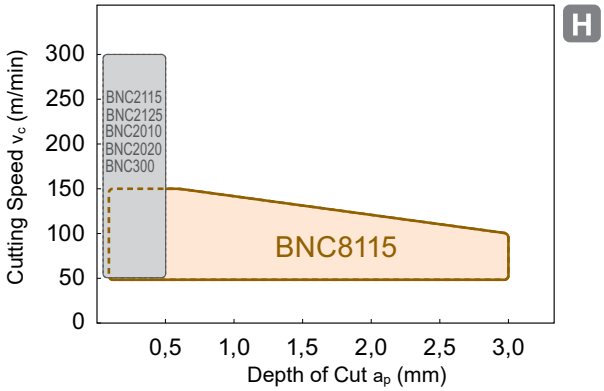


Wet machining is recommendet for grey cast iron. In case of dry machining, our 1st recommendation are BNC8115/ BNS8125 for both roughing and finishing.

Ductile Cast Iron



Hardened Steel



Recommended Cutting Conditions

Cast Iron (Turning) K

Work Material	Grade	Cutting Conditions Min.–**Optimum**–Max.		
		Cutting Speed v_c (m/min)	Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
Grey Cast Iron	BNC8115	200–**1.000**–2.000	0,10–**0,50**–1,00	≤ 4,0
	BNS8125	200–**1.000**–2.000	0,10–**0,50**–1,00	≤ 4,0
Ductile Cast Iron	BNC8115	80–**160**–300	0,10–**0,30**–0,50	≤ 3,0
	BNS8125	80–**120**–200	0,10–**0,30**–0,50	≤ 3,0

Hardened Steel (Turning) H

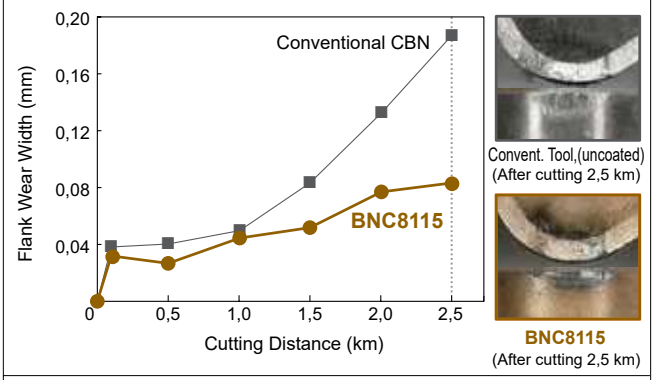
Work Material	Grade	Cutting Conditions Min.–**Optimum**–Max.		
		Cutting Speed v_c (m/min)	Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
Hardened Steel	BNC8115	50–**100**–150	0,10–**0,25**–0,40	≤ 3,0

Cast Iron (Milling) K

Work Material	Grade	Cutting Conditions Min.–**Optimum**–Max.		
		Cutting Speed (m/min)	Feed Rate (mm/rev)	Depth of Cut (mm)
Grey Cast Iron	BNC8115	800–**1.400**–2.000	0,10–**0,50**–1,00	≤ 4,0
	BNS8125	800–**1.400**–2.000	0,10–**0,50**–1,00	≤ 4,0

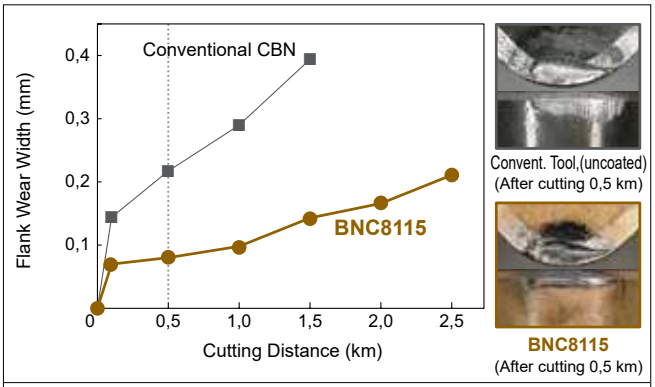
■ BNC8115 Cutting Performance

● Wear Resistance (Ductile Cast Iron Machining) K



Work Material: GGG-40.3, (Round Bar)
Insert: SNGN090308
Cutting Conditions: v_c = 300 m/min, f = 0,2 mm/rev, a_p = 0,2 mm, wet

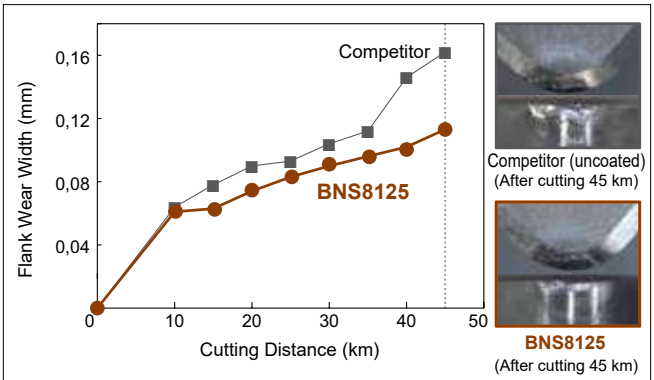
● Wear Resistance (Hardened Steel Machining) H



Work Material: SUJ2 58-62 HRC, (Round Bar)
Insert: SNGN090308
Cutting Conditions: v_c = 150 m/min, f = 0,2 mm/rev, a_p = 0,3 mm, wet

■ BNS8125 Cutting Performance

● Wear Resistance (Grey Cast Iron Machining) K



Work Material: GGG-30 (Round Bar)
Insert: SNGN090308
Cutting Conditions: v_c = 800 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, wet

● Fracture Resistance (Ductile Cast Iron Machining) K

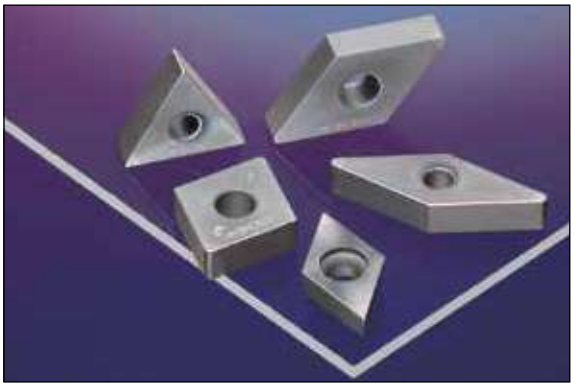
Work Material: GGG-40.3, (Round Bar with 2 V-grooves)
Insert: SNGN120408
Cutting Conditions: v_c = 200 m/min, f = 0,2 mm/rev, a_p = 0,5 mm, wet

■ Choosing between BNC8115 and BNS8125 (Cast Iron/Hardened Steel)

Work Material		Coated SUMIBORON BNC8115 Turning	Coated SUMIBORON BNC8115 Milling	SUMIBORON BNS8125 Turning	SUMIBORON BNS8125 Milling	SUMIBORON BN7000 Turning	SUMIBORON BN7000 Milling	Coated SUMIBORON BNC500 Turning	Coated SUMIBORON BNC2125 Turning
K	Grey Cast Iron	○ Best		○ Best Economical		○ Depth of cut ≤ 1,0 mm High-speed-finishing		× Not available	× Not available
K	Ductile Cast Iron	○ Depth of cut ≥ 0,5 mm		○ Interrupted machining		○ Depth of cut ≤ 0,5 mm Low-speed-machining		○ Depth of cut ≤ 0,5 mm	× Not available
H	Hardened Steel	○ Depth of cut ≥ 0,5 mm		× Not available		× Not available		× Not available	○ Depth of cut ≤ 0,5 mm High-speed machining

○ Recommendation × Not available

Coated CBN grade for ductile cast iron machining

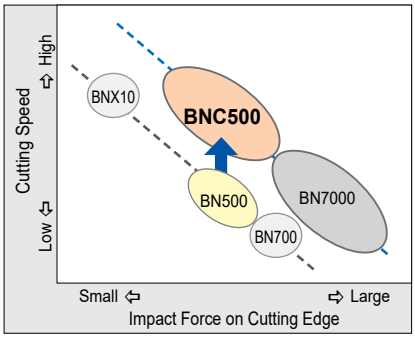


General Features

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 centrifugally cast iron.

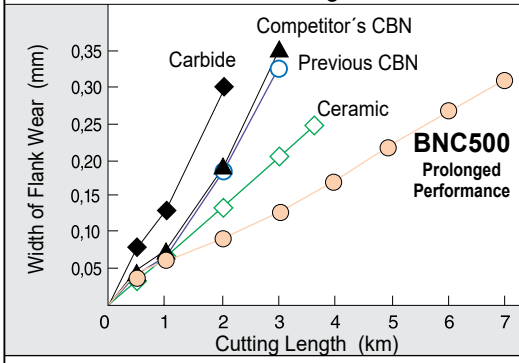
Characteristics

- 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.



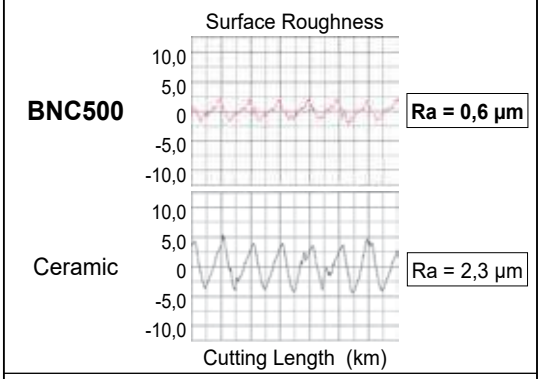
Cutting Performance

Cast Iron Continuous Cutting



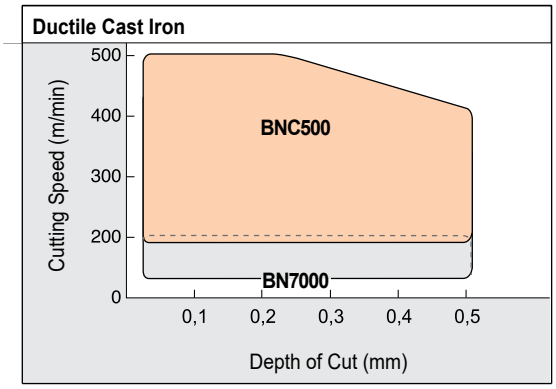
Work material: GGG70, Round Bar
Insert type: CNGA 120408 NC-4
Cutting data: v_c = 400 m/min, f = 0,2 mm/rev, a_p = 0,2 mm
Wet

Machined Surface Quality

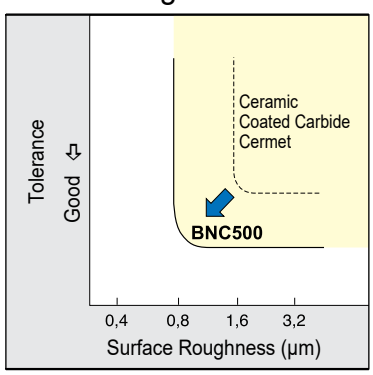


Work material: GGG70
Cutting data: v_c = 400 m/min, f = 0,2 mm/rev, a_p = 0,2 mm
Wet

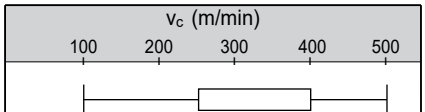
Application Range



High Precision Machining



Recommended Cutting Conditions



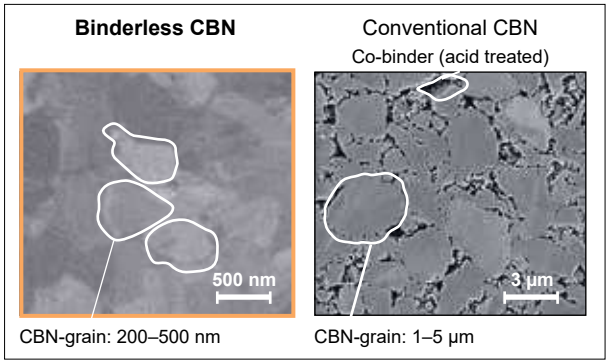
f (mm/rev)	a_p (mm)
0,1–0,4	0,03–0,5

* Coolant ... Wet

Feattures

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

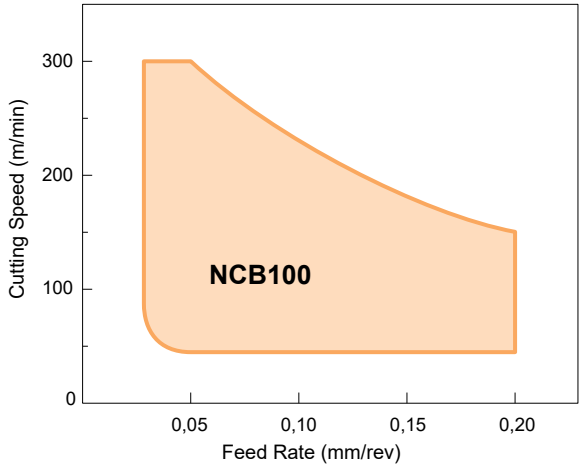
SUMIBORON Binderless CBN

Advantages

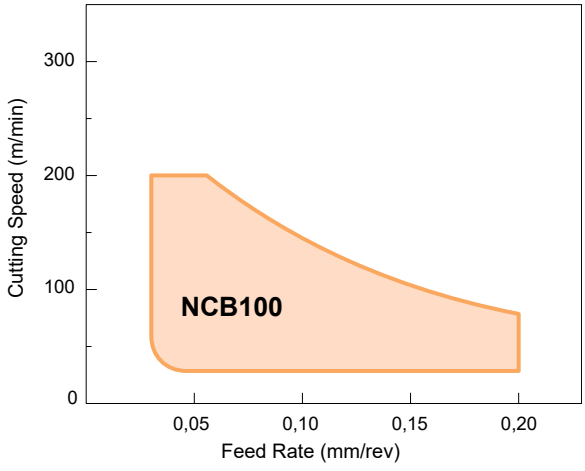
– Higher efficient machining and longer tool life have been realized by the effects of higher hardness and thermal conductivity than conventional CBN grades.
– Achieves high precise machining and better surface integrity because of less adhesion by not containing any binder materials.
– Ideal tool material 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)



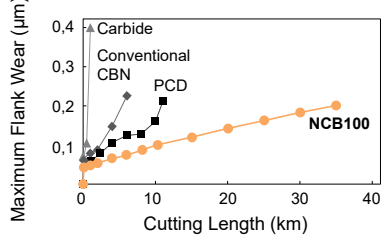
Turning of Cobalt-Chromium Alloy (Co-Cr)



SUMIBORON Binderless
NCB100

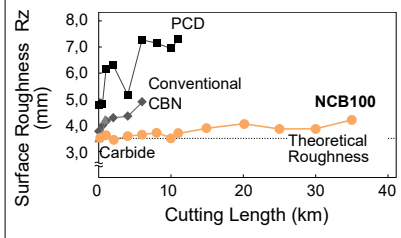
Turning of Titanium Alloy (Ti-6Al-4V)

Wear Resistance

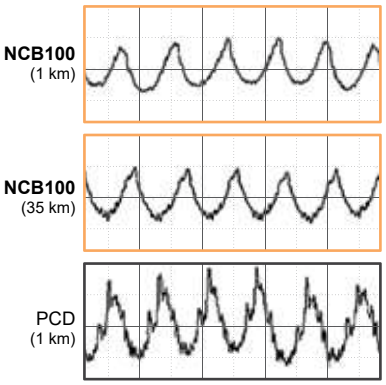


Work Material: Ti-6Al-4V
Insert: CNGA 120408 NU
Cutting Conditions: v_c = 150 m/min, f = 0,15 mm/rev, a_p = 0,5 mm, wet

Surface Roughness

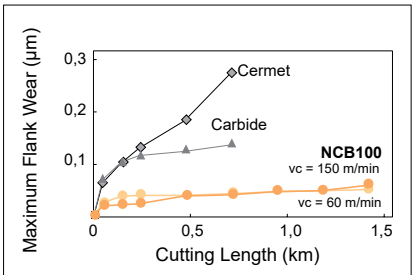


Work Material: Ti-6Al-4V
Insert: CNGA 120408 NU
Cutting Conditions: v_c = 150 m/min, f = 0,15 mm/rev, a_p = 0,5 mm, wet



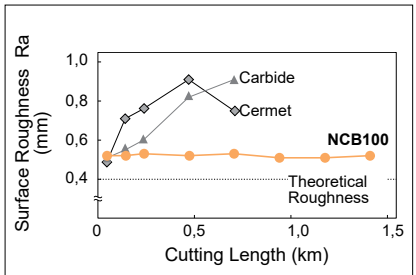
Turning of Cobalt-Chromium Alloy (Co-Cr)

Wear Resistance

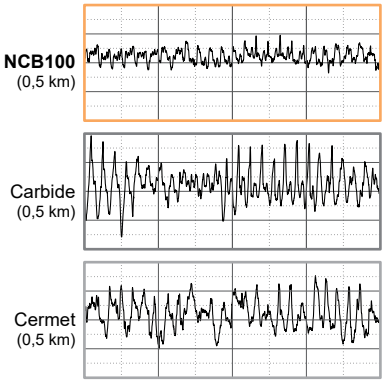


Work Material: Co-Cr
Insert: VNGA 160408 NU
Cutting Conditions: v_c = 60, 150 m/min, f = 0,1 mm/rev, a_p = 0,4 mm, wet

Surface Roughness



Work Material: Co-Cr
Insert: VNGA 160408 NU
Cutting Conditions: v_c = 60, 150 m/min, f = 0,1 mm/rev, a_p = 0,4 mm, wet



■ Recommended Cutting Conditions

Titanium Alloys

Min. - **Optimum** - Max.

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

Cobalt-Chromium Alloys

Min. - **Optimum** - Max.

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

Carbides

Min. - **Optimum** - Max.

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

SUMIDIA BINDERLESS NPD10 is recommended for: > 85 HRA

Other Work Materials

Min. - **Optimum** - Max.

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

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 sence 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/mm^2 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

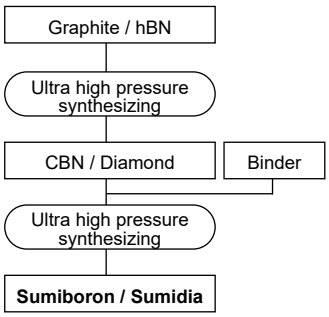
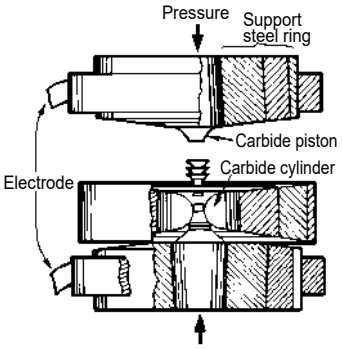
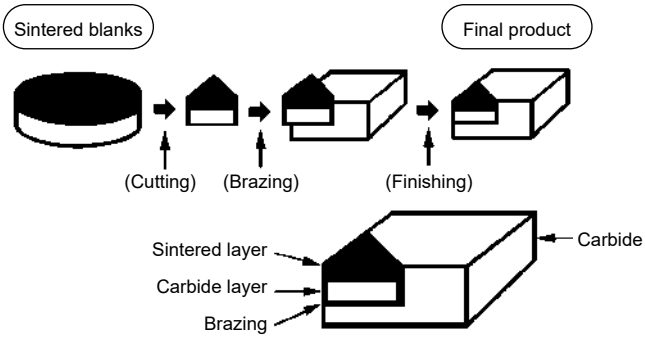


Fig. 2





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.

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.	• High silicon aluminum alloy cutting • Rough, interrupted and finishing of Al-alloy • Wood or wooden board cutting • Non-ferrous metal finishing (aluminium, copper alloy)	< 0,5	50 60	≈ 2,60
SUMIDIA	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.	• Non-ferrous metal finishing (aluminium, copper alloy) • Green or semi-sintered carbide & ceramic roughing • FRP, hard rubber & carbon cutting • Wooden or Inorganic Material Board Cutting	5	50 ~ 60	≈ 1,95
SUMIDIA	**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.	• Machining of high-silicon • Machining of aluminium composite (MMC) • Green or semi-sintered carbide & ceramic roughing • Machining of sintered ceramics/stone/rock	< 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.	• Surface finishing of carbide • Machining brittle materials (ceramics)	< 0,05	120 ~ 130	≈ 3,15

Application Range

Aluminium

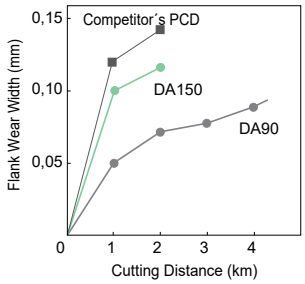
Machinability	Work Material	Turning: Roughing	Turning: Finishing	Milling	Example Part
Good ↕ Difficult	Sintered aluminium	DA1000	DA1000	DA1000	Cylinder liner
	Die cast aluminium (ADC12)	DA1000	DA1000	DA1000	Transmission case, oil pan cylinder block, aluminium wheel
	Low silicon (AC2B-T6, AC4C-T6)	DA1000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

Non-Aluminium

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

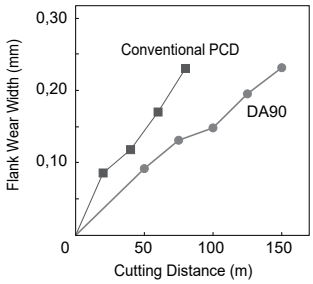
Cutting Performance

Continuous Cutting



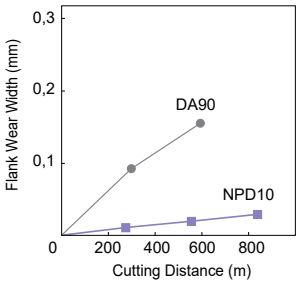
Work Material: MMC (Al-20% SIC)
Insert: CNMX 120408, Holder: PCLN2525
Cutting Cond.: v_c = 350 m/min, f = 0,2 mm/rev, a_p = 0,18 mm, wet

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	10 ~ 30	100 ~ 600
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

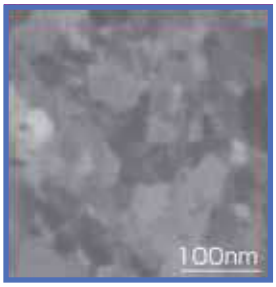
Nano-Polycristalline Diamond

General Features

Nano-polycristalline diamond is a type of polycristalline 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-polycristalline diamond.

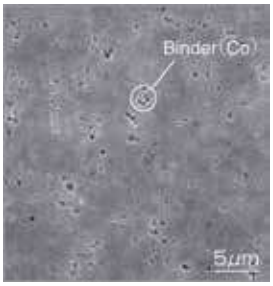
Micro-Structure Comparison

Nano-Polycristalline Diamond
SEM Structure



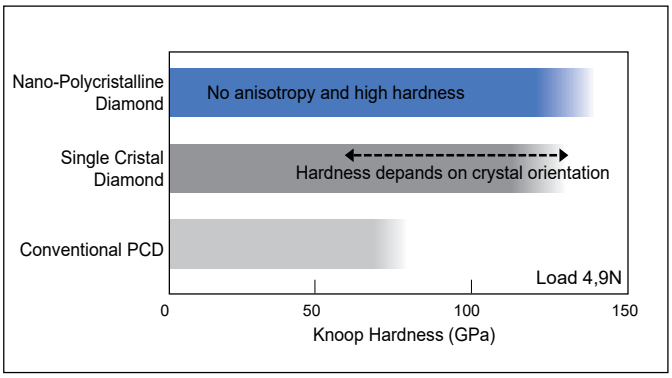
Diamond particle average grain diameter
(30 - 50 nm)

Conventional PCD
SEM Structure



Diamond particle average grain diameter
(1 - 10 μm)

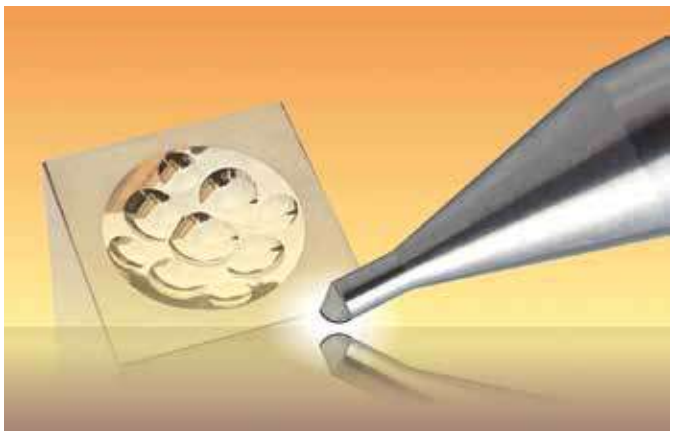
Hardness



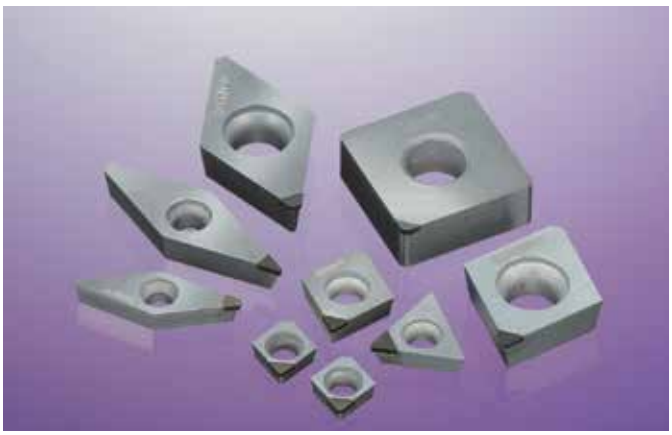
SUMIDIA Binderless

Application Examples

- Ballnose Endmill / Radius Endmill (Carbide Machining)



- Indexable Inserts (Carbide Machining)



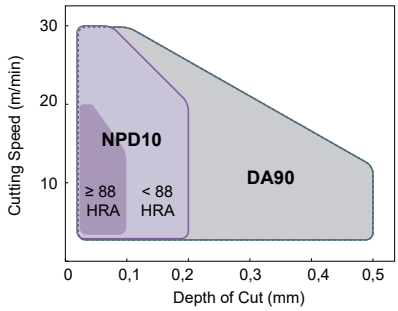
General Features

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 $a_p \le 0,2$ mm, $f \le 0,1$mm/rev	○	$a_p \ge 0,2$ mm can also be used
Sintered Surface Machining of Cemented Carbide	×	Impossible	◎	Best
Machined Surface Quality	◎	Best	△	The first recommendation is NPD10

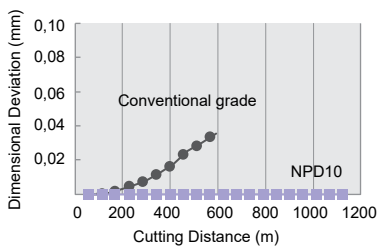
Recommended Cutting Conditions (Carbide Machining)

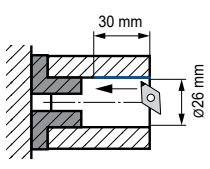
Work Material				Grade	Cutting Conditions		
Class		Hardness (HRA)	SEI Grades		Cutting Speed v_c (m/min)	Feed Rate f (mm/rev)	Depth of Cut a_p (mm/rev)
VM, VC	40	≥ 88	G5, D2	NPD10	5–**15**–20	0,03–**0,05**–0,07	0,03–**0,05**–0,07
VM, VC	70, 60, 50	83 – <88	G7, G6	NPD10	5–**20**–30	0,03–**0,10**–0,20	0,03–**0,10**–0,20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

Boring of Carbide VM30 (91HRA)



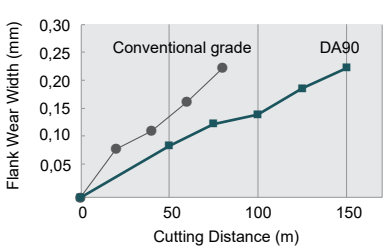


NPD10 has no dimension variation even with cutting distance of 1.100 m.

Work Material: Carbide VM30 (91HRA)
Insert: DCMW 11T304 RH
Cutting Conditions: v_c = 20 m/min, f = 0,05 mm/rev, a_p = 0,05 mm, dry

Wear Resistance of DA90

External Machining of Cemented Carbide VC50 (87HRA)



Work Material: Carbide VC50 (87HRA)
Insert: DCMW 070204 NF
Cutting Conditions: v_c = 20 m/min, f = 0,1 mm/rev, a_p = 0,2 mm, wet

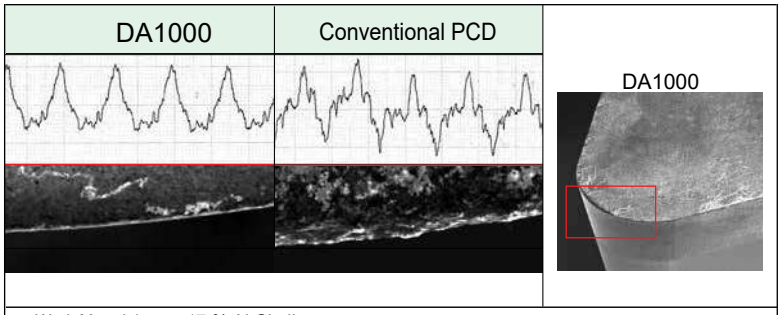
General Features

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.

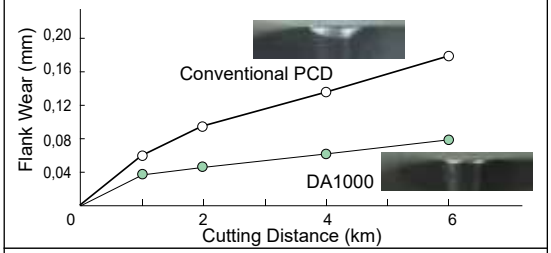
Furthermore, the NF type inserts makes it even more cost effective.

Cutting Performance



Work Material: 17 % Al-Si alloy
Insert: TPGW 160308
Cutting conditions: v_c= 1.000 m/min, f = 0,15 mm/rev, a_p = 0,2 mm, wet

Wear Resistance in Turning Application



Work Material: 17 % Si-Al alloy
Insert: TPGN 160304
Cutting Conditions: v_c=800 m/min, f = 0,12 mm/rev, a_p=0,5 mm, wet

NF Type Inserts

General Features

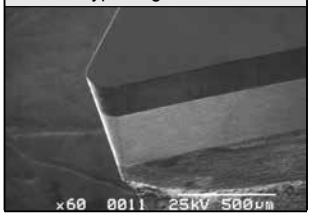
- **Total Cost Effectiveness with High Performance and Lower Price**
  - Optimum design utilizing improved mass production techniques provides a relatively lower cost.
  - Regrindable type results in huge total cost reduction.

- **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.

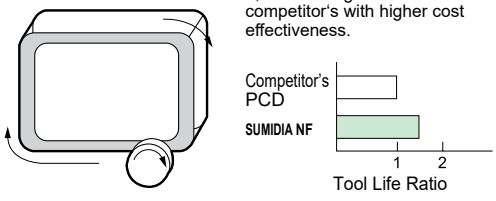
● NF-Type Edge



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

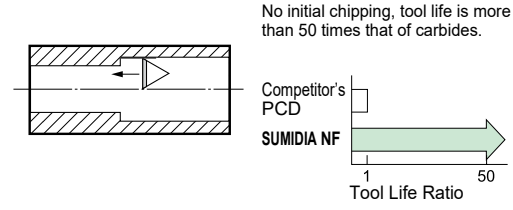
Application Examples

Milling of Aluminum Oil Pump Cover



Work Material: ADC12 (Al-12% Si alloy)
Insert: TEEN32R NF
Cutting conditions: v_c = 3.000 m/min, f_t = 0,06 mm/rev, a_p = 0,2 mm

Boring of Aluminum Valve Bore



Work Material: ADC12 (Al-12% Si alloy)
Insert: TPGN 110304 NF
Cutting conditions: v_c = 530 m/min, f = 0,05 mm/rev, a_p = 0,2 mm

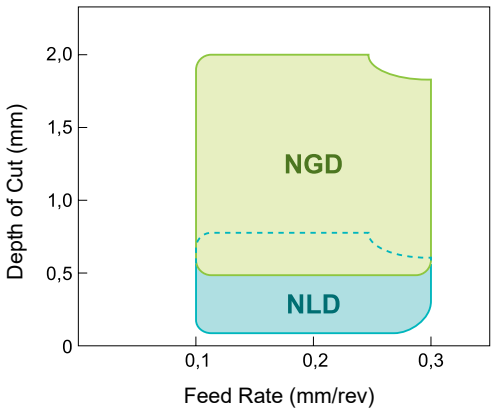
SUMIDIA Inserts
Break Master N-LD / -GD Type

Characteristics

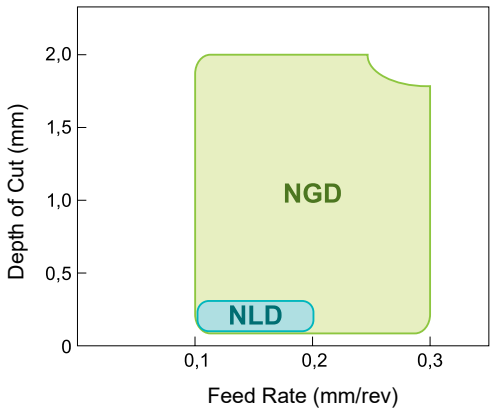
- Provides excellent chip control in semi finishing and finishing of aluminium alloy.
- Solves chip control problems and dramatically improves work efficiency.
- Achieves stable tool life by employing high toughness grade DA1000.

Applications Range

Wrought Aluminium Alloy (A6061)



Casted Aluminium Alloy (ADC12)



NLD Type Chipbreaker

Achieves excellent chip control for finishing.

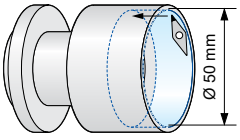
NGD Type Chipbreaker

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.



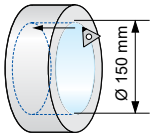
Breakmaster **NLD** type

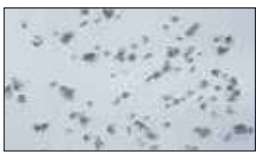
Without chip breaker

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.

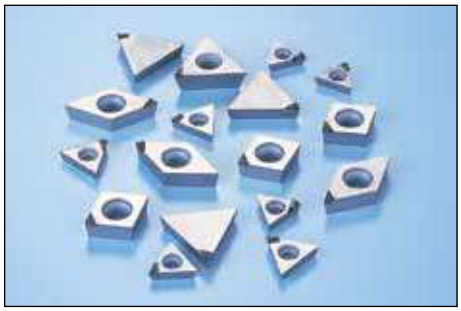




Breakmaster **NGD** type

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



General Features

Economy One-Use Insert

- Similar to SumiBoron One-Use type inserts

With Built-in Chipbreaker for Effective Chip Removal

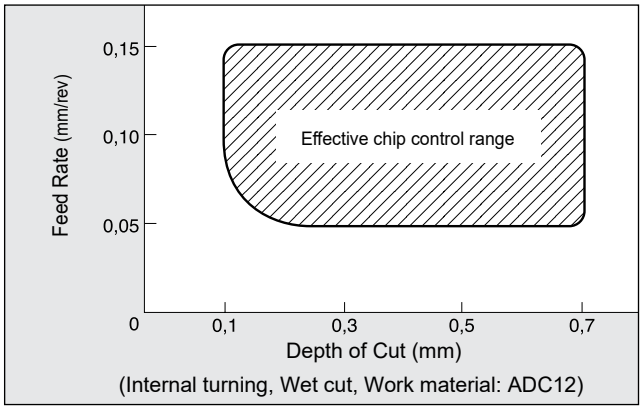
- Solving chip control problems and improving efficiency with DM-type chipbreaker.

Extensive Insert Range for External and Facing Operation

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

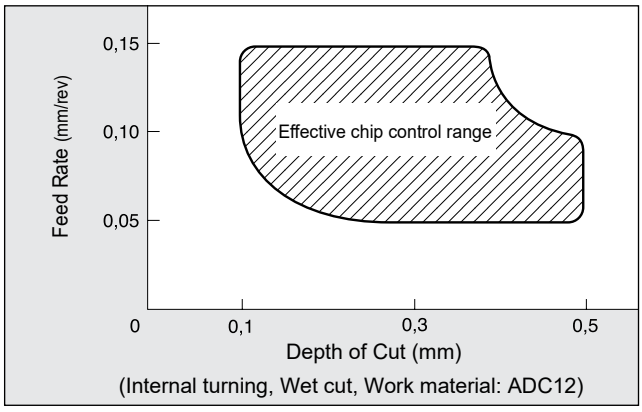
Application Range

Triangular Type Insert (Boring)



(Internal turning, Wet cut, Work material: ADC12)

CCMT/DCMT Type (External Turning & Facing)

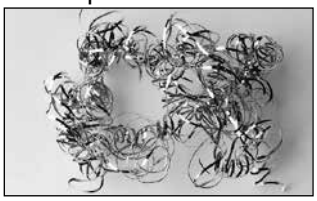


(Internal turning, Wet cut, Work material: ADC12)

Chip Control

Break Master

No Chipbreaker



Application

Machining Details	Cutting Conditions	Results
Work Material: AC2A-T6 Operation: Internal Boring	v_c = 300 m/min f = 0,06 mm/rev a_p = 0,35 mm Wet cut	Surface finish of the bore hole was less than Ra = 1 µm. 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

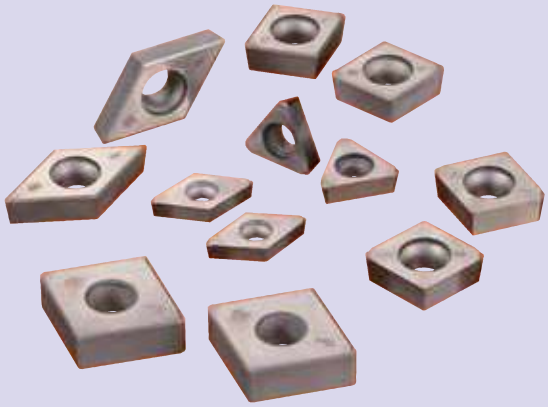
External Turning & Facing		Boring	
	CCMT 0602_ _ L/R-DM NU		TPMT 0802_ _ L/R-DM NU
	CCMT 09T3_ _ L/R-DM NU		TPMT 0902_ _ L/R-DM NU
	DCMT 0702_ _ L/R-DM NU		TPMR 1103_ _ L/R-DM NU(*)
	DCMT 11T3_ _ L/R-DM NU		TPMR 1603_ _ L/R-DM NU(*)

(*) Stock in Japan
Delivery on request

SUMIBORON / SUMIDIA
Indexable Inserts & Tools

M1–M80

M



C D R S T V W Z

Sumiboron / SumiDia Inserts/Tools

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

⑤ No. of Cutting Edges: Chart 5

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
US	Strong cutting edge
N-FV N-LV N-SV	Chipbreaker Type

Chart 3

Symbol	One-Use Type	Grade
NC	Coated SUMIBORON	BNC2115, BNC2125 BNC2010, BNC2020 BNC100, BNC160 BNC200, BNC300 BNC500
NU	Uncoated CBN	BNX10, BNX20 BN1000, BN2000 BN350, BN7000, BN7115,7500
	SUMIBORON binderless	NCB100
NS	Uncoated CBN	BNX25

Chart 4

Symbol	Wiper Insert
WG	Finishing 0,05 ≤ f ≤ 0,20
WH	High feed cutting 0,20 ≤ f < 0,40
W	Surface Roughness Standard: R_z 1,6–3,2µm

f : Feed Rate (mm/rev)

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	

Regrindable Type

CNMA 120408 RH

① Insert ISO Code: ISO ⇨ C2/C3

② Additional Information: Chart 1

Chart 1

Symbol	Description
RH	Honing specification (treated cutting edge)

One-Use Type

CNMA 120408 N-LD NF

① Insert ISO Code: ISO ⇨ C2/C3

② Additional Information: Chart 2

③ Type: Chart 3

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

80° Diamond Type | 7° Relief With Insert Hole

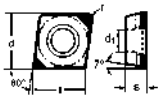
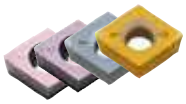
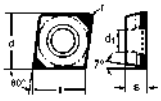
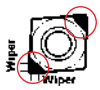
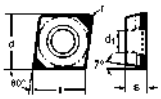
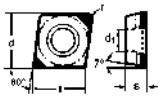
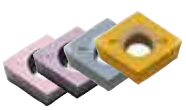
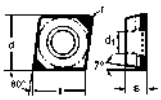
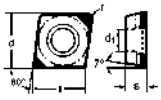
Coated

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 Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	KH BNC500	BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	K PM KH BN7000	BN7115	S BNS8125	Binderless CBN NCB100	N Uncoated PCD DA90	DA150	DA1000	Binderless Sumidia NPD10
Break Master - FV, LV  CBN with chipbreaker	 with 2 CBN cutting edges	**CCGT 060204 N-FV NC2**	0,4	❍	❍	●	●		●	❍																		
		CCGT 09T304 N-FV NC2	0,4	●	●	●	●		●	●																		
		CCGT 09T308 N-FV NC2	0,8	●	●	●	●		●	●																		
		CCGT 09T304 N-LV NC2	0,4	●	●	●	●		❍	●																		
		CCGT 09T308 N-LV NC2	0,8	●	●	●	●		●	●																		
 Standard - Normal cut geometry	 with 2 CBN cutting edges	**CCGW 060202 NC2**	0,2	●	●	●	●	●	●	●		❍																
		CCGW 060204 NC2	0,4	●	●	●	●	●	●	●	●	●																
		CCGW 060208 NC2	0,8	●	●		●			●	●	❍																
		CCGW 09T302 NC2	0,2	●	●	❍	●			●		❍																
		CCGW 09T304 NC2	0,4	●	●	●	●	●	●	●	●	●																
		CCGW 09T308 NC2	0,8	●	●	●	●	●	●	●	●	●																
	 (Wiper Type)	**CCGW 09T304 NC-W2**	0,4		●			●	●	●																	
		CCGW 09T308 NC-W2	0,8		●			●	●	●																	
		CCGW 09T304 NC-WG2	0,4	●	●	●	●		●	●																		
		CCGW 09T308 NC-WG2	0,8	●	●	●	●		●	●																		
		CCGW 09T304 NC-WH2	0,4	●	●	●	●		●	●																		
		CCGW 09T308 NC-WH2	0,8	●	●	●	●		●	●																		
 **LE** - Type Low cutting force	 with 2 CBN cutting edges	**CCGW 060202 LE-NC2**	0,2			●																						
		CCGW 060204 LE-NC2	0,4			●																						
		CCGW 09T302 LE-NC2	0,2			●																						
		CCGW 09T304 LE-NC2	0,4			●																						
		CCGW 09T308 LE-NC2	0,8			●																						
 **LT** - Type Sharp cutting edge	 with 2 CBN cutting edges	**CCGW 060202 LT-NC2**	0,2				●																					
		CCGW 060204 LT-NC2	0,4				●																					
		CCGW 09T302 LT-NC2	0,2				❍																					
		CCGW 09T304 LT-NC2	0,4				●																					
		CCGW 09T308 LT-NC2	0,8				●																					
 **LS** - Type Low cutting force	 with 2 CBN cutting edges	**CCGW 060202 LS-NC2**	0,2	●	●			●	●																			
		CCGW 060204 LS-NC2	0,4	●	●			●	●																			
		CCGW 060208 LS-NC2	0,8	❍	❍				●																			
		CCGW 09T302 LS-NC2	0,2	❍	❍				❍																			
		CCGW 09T304 LS-NC2	0,4	●	●			●	●	●	●																	
		CCGW 09T308 LS-NC2	0,8	❍	●			●	●	●	●																	
 **HS** - Type Strong cutting edge	 with 2 CBN cutting edges	**CCGW 060208 HS-NC2**	0,8								●																	
		CCGW 09T304 HS-NC2	0,4		●		●			●	●																	
		CCGW 09T308 HS-NC2	0,8		●		●			●	●																	

● = Euro stock
❍ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

80° Diamond Type | 7° Relief With Insert Hole

Uncoated

CCEW / CCGW

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
03X1--		3,5	1,4	1,9
04X1--		4,3	1,8	2,3
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

● SumiBoron (CBN, One-Use Type)

● G-Class SumiBoron (CBN, Regrindable Type)

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

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
			H Coated CBN								K KH		H Uncoated CBN							K PM		KH	S Binderless CBN	N Uncoated PCD			N Binderless Sumidia
LF - Type Low cutting force	**CCEW 03X102 LF-NU**	0,2																		❍	❍						
LT - Type Sharp cutting edge	**CCEW 03X102 LT-NU**	0,2														●											
	CCEW 03X104 LT-NU	0,4														❍											
	CCEW 04X102 LT-NU	0,2														❍											
	CCEW 04X104 LT-NU	0,4														❍											
	CCGW 09T304	0,4																▲									
	CCGW 09T308	0,8														●											
	CCGW 060204 NS	0,4															●										
	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											●		▲	●											
LT - Type Sharp cutting edge	**CCGW 060202 LT-NU**	0,2												❍													
	CCGW 060204 LT-NU	0,4												❍													
	CCGW 060208 LT-NU	0,8												❍													
	CCGW 09T302 LT-NU	0,2												❍													
	CCGW 09T304 LT-NU	0,4												❍													
	CCGW 09T308 LT-NU	0,8												❍													
HS - Type Strong cutting edge	**CCGW 060202 HS-NU**	0,2												❍													
	CCGW 060204 HS-NU	0,4												❍													
	CCGW 09T302 HS-NU	0,2												❍													
	CCGW 09T304 HS-NU	0,4												❍													
	CCGW 09T308 HS-NU	0,8												❍													

● = Euro stock
❍ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

80° Diamond Type | 7° Relief With Insert Hole

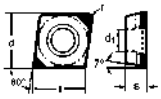
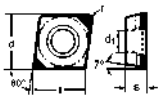
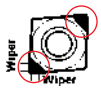
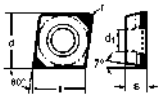
Dimensions (mm)				
CC_ _	L	IC	S	D_1
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4

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

Uncoated

CCGT / CCGW ●●●●●●

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

Shape		ISO Cat. No.	RE	H Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	K KH BNC500	BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	K PM KH BN7000	BN7115	S BNS8125	S Binderless CBN NCB100	N Uncoated PCD DA90	DA150	DA1000	Binderless Sumidia NPD10
Break Master - FV, LV  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											●														
		CCGT 09T304 N-LV NU2	0,4											●														
	 with 2 CBN cutting edges	**CCGW 060204 NU2**	0,4																		❍	●						
		CCGW 09T304 NU2	0,4											●	●	▲	●		▲	●	❍	●						
		CCGW 09T308 NU2	0,8											●	●	▲	●		▲	●	❍	●						
	 (Wiper Type)	**CCGW 09T304 NU-WG2**	0,4												●													
		CCGW 09T308 NU-WG2	0,8												●													
		CCGW 09T304 NU-WH2	0,4												●													
		CCGW 09T308 NU-WH2	0,8												●													
 **HS** - Type Strong cutting edge	 with 2 CBN cutting edges	**CCGW 09T308 HS-NU2**	0,8																			●						

● = Euro stock
❍ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

80° Diamond Type — 11° Relief, With Insert Hole

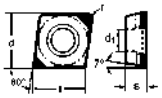
Dimensions (mm)				
CP--	L	IC	S	D_1
0602--	6,45	6,35	2,38	2,8
0802--		7,94	2,38	3,4
0903--		9,525	3,18	4,4

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

Coated

CPGW ●●●●●●

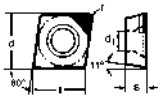
● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	 with 2 CBN cutting edges	**CPGW 080202 NC2**	0,2			○	○																					
		CPGW 080204 NC2	0,4			○	○																					
		CPGW 090302 NC2	0,2			○	○																					
		CPGW 090304 NC2	0,4			○	○																					

Uncoated

CPMW ●●●●●●

● M-Class SumiDia (PCD, NF Type)

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
		**CPMW 060208 NF**	0,8																								●	

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

80° Diamond Type | 7° Relief With Insert Hole

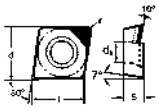
Dimensions (mm)				
CC_ _	L	IC	S	D_1
0602--	6,45	6,35	2,38	2,8
09T3--	9,7	9,525	3,97	4,4
03X1--		3,5	1,4	1,9
04X1--		4,3	1,8	2,3

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

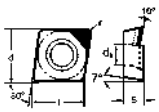
Uncoated

CCMT / CCMW ●●●●●●

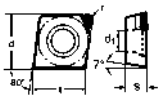
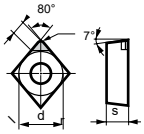
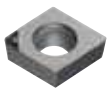
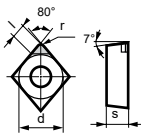
● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	**CCMT 060202**	0,2																							●		
	CCMT 060204	0,4																							●		
	**CCMT 09T302**	0,2																							●		
	CCMT 09T304	0,4																							○		

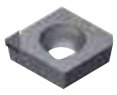
● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	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 09T304 NF	0,4																								●	
	CCMT 09T308 NF	0,8																								●	

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

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
Break Master - DM 	**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 09T304 R-DM NU	0,4																							●		
Break Master - LD 	**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																								○	
Break Master - GD 	**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																								○	

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	**CCMW 03X102 NF**	0,2																						○			
	CCMW 03X104 NF	0,4																						○			
	CCMW 04X102 NF	0,2																						○			
	CCMW 04X104 NF	0,4																						○			
	CCMW 060202 NF	0,2																						○			
	CCMW 060204 NF	0,4																						○			
	CCMW 09T302 NF	0,2																						○			
	CCMW 09T304 NF	0,4																						○			
	CCMW 09T308 NF	0,8																						○			

● M-Class SumiDia (PCD, Binderless)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	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																									○

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

80° Diamond Type | 0° Relief / With Insert Hole

Coated

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 ●●●●●●

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

Shape		ISO Cat. No.	RE	H Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	K K H Coated CBN BNC500	BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	K PM K H Uncoated CBN BN7000	BN7115	BNS8125	S Binderless CBN NCB100	N Uncoated PCD DA90	DA150	DA1000	Binderless Sumidia NPD10
Standard - Normal cut geometry	with 2 CBN cutting edges	CNGA 120404 NC2	0,4		○		○																					
		CNGA 120408 NC2	0,8		○	○	○																					
		CNGA 120412 NC2	1,2		○	○	○																					
		CNGA 120416 NC2	1,6			○	○		○	○	○																	
		CNGA 120420 NC2	2,0			○	○		○	○	○																	
		CNGA 120424 NC2	2,4			○	○		○	○	○																	
	with 4 CBN cutting edges	CNGA 120402 NC4	0,2	○	○	○	○																					
		CNGA 120404 NC4	0,4	●	●	●	●	●	●	●	●	○																
		CNGA 120408 NC4	0,8	●	●	○	●	●	●	●	●	○																
		CNGA 120412 NC4	1,2	●	●	●	●	●	●	●	●	○																
		CNGA 120416 NC4	1,6	○	○	○	○		○	○	○																	
		CNGA 120420 NC4	2,0	○	○		○		○	○																		
		CNGA 120424 NC4	2,4	○	○	○	○			○	○																	
	(Wiper Type)	CNGA 120404 NC-W4	0,4	●	●			●	●	●																		
		CNGA 120408 NC-W4	0,8	●	●			●	●	●		●																
		CNGA 120404 NC-WG4	0,4	●	●	●	●		●	●																		
		CNGA 120408 NC-WG4	0,8	●	●	●	●		●	●																		
		CNGA 120412 NC-WG4	1,2	●	●	●	●		●	●																		
		CNGA 120404 NC-WH4	0,4	●	●	●	●		●	●																		
		CNGA 120408 NC-WH4	0,8	●	●	●	●		●	●																		
		CNGA 120412 NC-WH4	1,2	●	●	●	●		●	●																		
LE - Type Low cutting force	with 2 CBN cutting edges	CNGA 120404 LE-NC2	0,4			●																						
		CNGA 120408 LE-NC2	0,8			●																						
		CNGA 120412 LE-NC2	1,2			●																						
LT - Type Sharp cutting edge	with 2 CBN cutting edges	CNGA 120402 LT-NC2	0,2				○																					
		CNGA 120404 LT-NC2	0,4				●																					
		CNGA 120408 LT-NC2	0,8				●																					
		CNGA 120412 LT-NC2	1,2				●																					
LS - Type Low cutting force	with 2 CBN cutting edges	CNGA 120402 LS-NC2	0,2		○																							
		CNGA 120404 LS-NC2	0,4			●	●	●	●	●	●																	
		CNGA 120408 LS-NC2	0,8			●	●	●	●	●	●																	
		CNGA 120412 LS-NC2	1,2			●	●	●	●		○																	
	with 4 CBN cutting edges	CNGA 120404 LS-NC4	0,4						○																			
		CNGA 120408 LS-NC4	0,8						○																			
		CNGA 120412 LS-NC4	1,2							○																		
ES - Type Crater wear stability	with 4 CBN cutting edges	CNGA 120404 ES-NC4	0,4				●																					
		CNGA 120408 ES-NC4	0,8				●																					
		CNGA 120412 ES-NC4	1,2				●																					

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

80° Diamond Type | 0° Relief / With Insert Hole

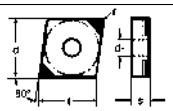
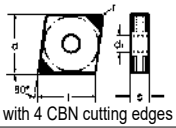
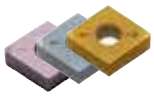
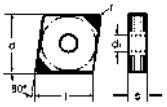
Coated

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 / CNGG

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

Shape		ISO Cat. No.	RE	H Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	K KH BNC500	BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	K PM BN7000	BN7115	KH BNS8125	S Binderless CBN NCB100	N Uncoated PCD DA90	DA150	DA1000	Binderless Sumidia NPD10
 HS - Type Strong cutting edge	 with 2 CBN cutting edges	**CNGA 120404 HS-NC2**	0,4		●	●	●		●		●																	
		CNGA 120408 HS-NC2	0,8		●	●	●		●	●	●																	
		CNGA 120412 HS-NC2	1,2		●		●		●	●	●																	
	 with 4 CBN cutting edges	**CNGA 120404 HS-NC4**	0,4	❍	❍		❍				❍	❍																
		CNGA 120408 HS-NC4	0,8	❍	❍		❍				❍	❍																
		CNGA 120412 HS-NC4	1,2	❍	❍		❍			❍	❍	❍																
Break Master - FV, LV, SV  CBN with chipbreaker		**CNGG 120404 N-FV NC4**	0,4	●	●	●	●			●																		
		CNGG 120408 N-FV NC4	0,8	●	●	●	●			●																		
		CNGG 120412 N-FV NC4	1,2	●	●	●	●			●																		
	 with 4 CBN cutting edges	**CNGG 120404 N-LV NC4**	0,4	●	●	●	●		●	●																		
		CNGG 120408 N-LV NC4	0,8	●	●	●	●		●	●																		
		CNGG 120412 N-LV NC4	1,2	●	●	●	●		●	●																		
		CNGG 120408 N-SV NC4	0,8	●	●		●		❍	●																		
		CNGG 120412 N-SV NC4	1,2	●	●		●			●																		

● ≡ Euro stock
❍ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

80° Diamond Type | 0° Relief / With Insert Hole

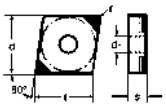
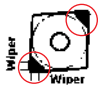
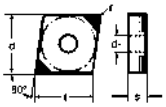
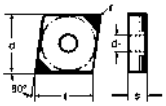
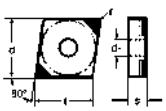
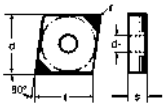
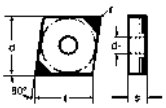
Uncoated

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 ○○○○○○

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

Shape		ISO Cat. No.	RE	H Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	K H BNC500	BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	K PM BN7000	BN7115	S BNS8125	N Uncoated PCD NCB100	DA90	DA150	DA1000	NPD10
	 with 2 CBN cutting edges	**CNGA 120404 NS2** **CNGA 120408 NS2** **CNGA 120412 NS2**	0,4 0,8 1,2															● ● ●										
		CNGA 120404 NU2 **CNGA 120408 NU2** **CNGA 120412 NU2**	0,4 0,8 1,2											○ ● ●	● ● ●	 ▲ ▲	● ● ●	 	▲ ▲ ▲	● ● ●	○ ● ○	○ ● ○					
	 (Wiper Type)	**CNGA 120404 NU-W2** **CNGA 120408 NU-W2**	0,4 0,8											● ●	● ●													
		CNGA 120404 NU-WG2 **CNGA 120408 NU-WG2** **CNGA 120412 NU-WG2**	0,4 0,8 1,2												● ● ○													
		CNGA 120404 NU-WH2 **CNGA 120408 NU-WH2**	0,4 0,8												● ●													
 **LF** - Type Sharp cutting edge	 with 2 CBN cutting edges	**CNGA 120404 LF-NU2** **CNGA 120408 LF-NU2**	0,4 0,8																		○ ○	○ ○						
 **LE** - Type Low cutting force	 with 2 CBN cutting edges	**CNGA 120404 LE-NU2** **CNGA 120408 LE-NU2**	0,4 0,8																			○ ○						
 **LT** - Type Sharp cutting edge	 with 2 CBN cutting edges	**CNGA 120404 LT-NU2** **CNGA 120408 LT-NU2** **CNGA 120412 LT-NU2**	0,4 0,8 1,2												○ ○ ○													
 **LS** - Type Low cutting force	 with 2 CBN cutting edges	**CNGA 120404 LS-NU2**	0,4																			○						
 **HT** - Type Strong cutting edge	 with 2 CBN cutting edges	**CNGA 120408 HT-NU2** **CNGA 120412 HT-NU2**	0,8 1,2																○ ○									

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

80° Diamond Type | 0° Relief / With Insert Hole

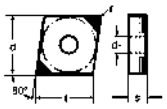
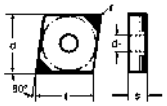
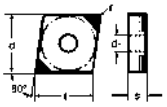
Uncoated

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 Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	KH BNC500	BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	K PM KH BN7000	BN7115	BNS8125	S Binderless CBN NCB100	N Uncoated PCD DA90	DA150	DA1000	Binderless Sumidia NPD10
 **HS** - Type Strong cutting edge	 with 2 CBN cutting edges	**CNGA 120404 HS-NU2**	0,4												○						○	○							
		CNGA 120408 HS-NU2	0,8												○						○								
		CNGA 120412 HS-NU2	1,2												○						○								
 **US** - Type Strong cutting edge	 with 2 CBN cutting edges	**CNGA 120404 US-NU2**	0,4																			○							
Break Master - LV  CBN with chipbreaker	 with 2 CBN cutting edges	**CNGM 120404 N-LV NU2**	0,4												●														
		CNGM 120412 N-LV NU2	1,2												●														

● G-Class SumiBoron (CBN, Binderless)

		**CNGA 120404 NU**	0,4																				○						
		CNGA 120408 NU	0,8																				○						
		CNGA 120412 NU	1,2																				○						

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

80° Diamond Type | 0° Relief | —

Coated / 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	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	CNGN 090308	0,8										●										●					
	CNGN 090312	1,2										●										●					
	CNGN 120408	0,8										●										●					
	CNGN 120412	1,2										●										●					
	CNGN 120416	1,6										●										●					

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

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	CNGX 120412	1,2										●										●					
	CNGX 120416	1,6										●										●					

CNMA / CNMX

● M-Class SumiBoron (CBN, Regrindable Type)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	CNMA 120404	0,4														●		▲									
	CNMA 120408	0,8														●		▲		○							
	CNMA 120412	1,2														●											

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

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	CNMA 120404 NS	0,4															●										
	CNMA 120408 NS	0,8															●										
	CNMA 120412 NS	1,2															●										
	CNMA 120404 NU	0,4											●	●	▲	●		▲	●	●							
	CNMA 120408 NU	0,8											●	●	▲	●		▲	●	●							
	CNMA 120412 NU	1,2											●		▲	●		▲	●	●							
(Wiper Type)	**CNMA 120408 NU-W**	0,8													▲	●											

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	CNMX 120402 NF	0,2																								●	
	CNMX 120404 NF	0,4																								●	
	CNMX 120408 NF	0,8																								●	
	CNMX 120412 NF	1,2																								●	

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON 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	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
				H Coated CBN								K KH		H Uncoated CBN							K PM		KH	S Binderless CBN	N Uncoated PCD			Binderless Sumidia
Break Master - FV, LV	with 2 CBN cutting edges	**DCGT 070204 N-FV NC2**	0,4	●	●	●	●		●	●																		
		DCGT 11T304 N-FV NC2	0,4	❍	❍	●	●		●	❍																		
		DCGT 11T308 N-FV NC2	0,8	●	●	●	●		●	●																		
CBN with chipbreaker	with 2 CBN cutting edges	**DCGT 11T304 N-LV NC2**	0,4	●	●	●	●		●	●																		
		DCGT 11T308 N-LV NC2	0,8	●	●	●	●		●	●																		
Standard - Normal cut geometry	with 2 CBN cutting edges	**DCGW 070202 NC2**	0,2	●	●	●	●	●	●	●	●																	
		DCGW 070204 NC2	0,4	●	●	●	●	●	●	●	●																	
		DCGW 070208 NC2	0,8	❍	❍	❍	●			●	●																	
		DCGW 11T302 NC2	0,2	●	●	●	●	●	●	●	●	❍																
		DCGW 11T304 NC2	0,4	●	●	●	●	●	●	●	●	●																
		DCGW 11T308 NC2	0,8	❍	●	●	●	●	●	●	●	●																
	(Wiper Type)	**DCGW 11T304 NC-WG2**	0,4	●	●	●	●		●	●																		
		DCGW 11T308 NC-WG2	0,8	●	●	●	●		●	●																		
		DCGW 11T304 NC-WH2	0,4	●	●	●	●		●	●																		
		DCGW 11T308 NC-WH2	0,8	●	●	●	●		●	●																		
LE - Type Low cutting force	with 2 CBN cutting edges	**DCGW 11T302 LE-NC2**	0,2			❍																						
		DCGW 11T304 LE-NC2	0,4			●																						
		DCGW 11T308 LE-NC2	0,8			●																						
LT - Type Sharp cutting edge	with 2 CBN cutting edges	**DCGW 070202 LT-NC2**	0,2				●																					
		DCGW 070204 LT-NC2	0,4				●																					
		DCGW 11T302 LT-NC2	0,2				●																					
		DCGW 11T304 LT-NC2	0,4				●																					
		DCGW 11T308 LT-NC2	0,8				●																					
LS - Type Low cutting force	with 2 CBN cutting edges	**DCGW 070202 LS-NC2**	0,2	●	●			●	●	●																		
		DCGW 070204 LS-NC2	0,4	●	●			●	●	●																		
		DCGW 070208 LS-NC2	0,8	❍	❍																							
		DCGW 11T302 LS-NC2	0,2	❍	❍				●	❍																		
		DCGW 11T304 LS-NC2	0,4	●	●			●	●	●	●																	
		DCGW 11T308 LS-NC2	0,8	●	●			●	●	●	●																	
HS - Type Strong cutting edge	with 2 CBN cutting edges	**DCGW 11T304 HS-NC2**	0,4		●		●			●	●																	
		DCGW 11T308 HS-NC2	0,8		●		●			●	●																	

● = Euro stock
❍ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

55° Diamond Type | 7° Relief With Insert Hole

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

Uncoated

DCGT / DCGW ●●●●●●

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
				H Coated CBN								K KH		H Uncoated CBN							K PM		KH	S Binderless CBN	N Uncoated PCD			Binderless Sumidia
Break Master - FV, LV	with 2 CBN cutting edges	DCGT 070204 N-FV NU2	0,4											●														
CBN with chipbreaker		DCGT 11T304 N-FV NU2	0,4											●														
		DCGT 11T308 N-FV NU2	0,8											○														
		DCGT 11T304 N-LV NU2	0,4											●														
		DCGT 11T308 N-LV NU2	0,8											●														
	with 2 CBN cutting edges	DCGW 070202 NU2	0,2												●													
		DCGW 070204 NU2	0,4											●	●	▲	●		▲	●		○						
		DCGW 070208 NU2	0,8												●		●					●						
		DCGW 11T302 NU2	0,2												●						○	●						
		DCGW 11T304 NU2	0,4											●	●	▲	●		▲	●	●	○						
		DCGW 11T308 NU2	0,8											●	●	▲	●		▲	●	●	●						
	(Wiper Type)	DCGW 11T304 NU-WG2	0,4												●													
		DCGW 11T308 NU-WG2	0,8												●													
		DCGW 11T304 NU-WH2	0,4												●													
LF - Type Sharp cutting edge	with 2 CBN cutting edges	DCGW 11T302 LF-NU2	0,2																		○	○						
		DCGW 11T304 LF-NU2	0,4																			●						
		DCGW 11T308 LF-NU2	0,8																		○	●						
LE - Type Low cutting force	with 2 CBN cutting edges	DCGW 11T302 LE-NU2	0,2																			○						
		DCGW 11T304 LE-NU2	0,4																			○						
		DCGW 11T308 LE-NU2	0,8																			○						
LS - Type Low cutting force	with 2 CBN cutting edges	DCGW 11T302 LS-NU2	0,2																			○						
		DCGW 11T304 LS-NU2	0,4																			○						
		DCGW 11T308 LS-NU2	0,8																			○						
HS - Type Strong cutting edge	with 2 CBN cutting edges	DCGW 070208 HS-NU2	0,8																			●						
		DCGW 11T304 HS-NU2	0,4																			●						
		DCGW 11T308 HS-NU2	0,8																			●						

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

55° Diamond Type | 7° Relief / With Insert Hole

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

Uncoated

DCGT / DCGW ●●●●●●

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
		DCGW 11T304 NS	0,4															●										
		DCGW 11T308 NS	0,8															●										
		DCGW 070202 NU	0,2											●	●	▲	●		▲	●	●							
		DCGW 070204 NU	0,4											●	●	▲	●		▲		●			❍				
		DCGW 070208 NU	0,8												●	▲	●				●							
		DCGW 11T301 NU	0,1																					●				
		DCGW 11T302 NU	0,2											●	●	▲	●		▲	●	●			●				
		DCGW 11T304 NU	0,4											●	●	▲	●		▲	●	●			❍				
		DCGW 11T308 NU	0,8											●	●	▲	●		▲	●	●			❍				
		DCGW 11T312 NU	1,2												❍													
		DCGW 11T302 LF-NU	0,2																		❍							
LF - Type Low cutting force																												
		DCGW 070202 LT-NU	0,2													❍												
		DCGW 070204 LT-NU	0,4													❍												
		DCGW 070208 LT-NU	0,8													❍												
		DCGW 11T302 LT-NU	0,2													❍												
		DCGW 11T304 LT-NU	0,4													❍												
		DCGW 11T308 LT-NU	0,8													❍												
		DCGW 11T312 LT-NU	1,2													❍												
LT - Type Sharp cutting edge																												
		DCGW 070202 HS-NU	0,2													❍												
		DCGW 070204 HS-NU	0,4													❍												
		DCGW 11T302 HS-NU	0,2													❍												
		DCGW 11T304 HS-NU	0,4													❍												
		DCGW 11T308 HS-NU	0,8													❍												
HS - Type Strong cutting edge																												

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9

55° Diamond Type | 7° Relief With Insert Hole

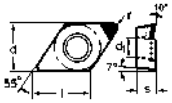
Uncoated

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

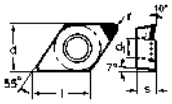
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
Carbide/Hard Brittle Material

DCMT / DCMW

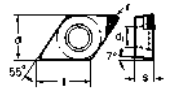
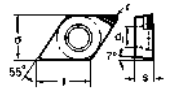
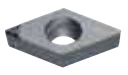
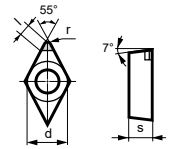
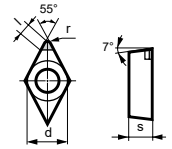
● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	**DCMT 070201**	0,1																							○		
	**DCMT 070202**	0,2																							●		
	DCMT 070204	0,4																							●		
	DCMT 11T302	0,2																							●		
	DCMT 11T304	0,4																							●		
	DCMT 11T308	0,8																							●		

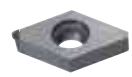
● M-Class SumiDia (PCD, NF Type)

	**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 - DM 		**DCMT 070202 L-DM NU**	0,2																						○		
		DCMT 070204 L-DM NU	0,4																						○		
		DCMT 11T304 L-DM NU	0,4																						●		
Break Master - DM 		**DCMT 070202 R-DM NU**	0,2																						○		
		DCMT 070204 R-DM NU	0,4																						●		
		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																							○	
		DCMT 11T302 N-LD NF	0,2																							○	
		DCMT 11T304 N-LD NF	0,4																							○	
		DCMT 11T308 N-LD NF	0,8																							○	
Break Master - GD 		**DCMT 070202 N-GD NF**	0,2																							○	
		DCMT 070204 N-GD NF	0,4																							○	
		DCMT 11T302 N-GD NF	0,2																							○	
		DCMT 11T304 N-GD NF	0,4																							○	
		DCMT 11T308 N-GD NF	0,8																							○	

● M-Class SumiDia (PCD, NF Type)

		**DCMW 070202 NF**	0,2																					○			
		DCMW 070204 NF	0,4																					○			
		DCMW 11T302 NF	0,2																					○			
		DCMW 11T304 NF	0,4																					○			
		DCMW 11T308 NF	0,8																					○			

● M-Class SumiDia (PCD, Binderless)

		**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

☞ L8, L9 Edge Specification of SUMIBORON Inserts

55° Diamond Type | 0° Relief, With Insert Hole

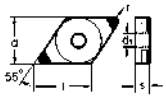
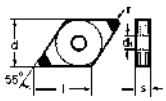
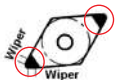
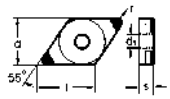
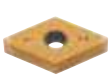
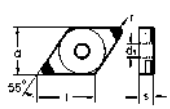
Coated

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	H Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	KH BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	KPMKH BNX25	BN300	BN350	BN7000	BN7115	S BNS8125	N Binderless CBN NCB100	Uncoated PCD DA90	DA150	DA1000	Binderless Sumidia NPD10
 Standard - Normal cut geometry	 with 2 CBN cutting edges	**DNGA 110404 NC2**	0,4	●	●	○	●			●																	
		DNGA 110408 NC2	0,8	●	●	○	●			●																	
		DNGA 110412 NC2	1,2	○	○	○	○																				
		DNGA 150404 NC2	0,4		○	○	○																				
		DNGA 150408 NC2	0,8		○	○	○			○																	
		DNGA 150412 NC2	1,2		○																						
		DNGA 150416 NC2	1,6			○	○			○	○																
		DNGA 150420 NC2	2,0			○	○		○	○	○																
		DNGA 150424 NC2	2,4			○	○		○	○	○																
	 with 4 CBN cutting edges	**DNGA 150402 NC4**	0,2	○	○	○	○																				
		DNGA 150404 NC4	0,4	○	○	○	○		○	○																	
		DNGA 150408 NC4	0,8	○	○	○			○	○	○	○															
		DNGA 150412 NC4	1,2	○	○	○	○			○	○																
		DNGA 150416 NC4	1,6	○	○	○	○			○	○																
		DNGA 150420 NC4	2,0	○	○	○	○		○	○	○																
		DNGA 150424 NC4	2,4	○	○	○	○		○	○	○																
		DNGA 150604 NC4	0,4		●	●	●	●	●	●	●	●															
		DNGA 150608 NC4	0,8		●	●	●	●	●	●	●	●															
		DNGA 150612 NC4	1,3		●	●	●	●	●	●	●	●															
	 (Wiper Type)	**DNGA 150404 NC-WG4**	0,4	○	○		○		○	○																	
		DNGA 150408 NC-WG4	0,8	○	○	○	○		○	○																	
		DNGA 150604 NC-WG4	0,4		●	●	●		●	●																	
		DNGA 150608 NC-WG4	0,8		●	●	●		●	●																	
		DNGA 150612 NC-WG4	1,2			●	●		●																		
		DNGA 150404 NC-WH4	0,4	○	○				○	○																	
		DNGA 150408 NC-WH4	0,8	○	○				○	○																	
		DNGA 150604 NC-WH4	0,4		●	●	●			●																	
		DNGA 150608 NC-WH4	0,8		●	●	●		●	●																	
		DNGA 150612 NC-WH4	1,2		●	●	●			●																	
 **LE** - Type Low cutting force	 with 2 CBN cutting edges	**DNGA 150404 LE-NC2**	0,4			○																					
		DNGA 150408 LE-NC2	0,8			○																					
		DNGA 150412 LE-NC2	1,2			○																					
		DNGA 150604 LE-NC2	0,4			●																					
		DNGA 150608 LE-NC2	0,8			●																					
		DNGA 150612 LE-NC2	1,2			●																					
 **LT** - Type Sharp cutting edge	 with 2 CBN cutting edges	**DNGA 150402 LT-NC2**	0,2				○																				
		DNGA 150404 LT-NC2	0,4				○																				
		DNGA 150408 LT-NC2	0,8				○																				
		DNGA 150412 LT-NC2	1,2				○																				
		DNGA 150604 LT-NC2	0,4				●																				
		DNGA 150608 LT-NC2	0,8				●																				
		DNGA 150612 LT-NC2	1,2				●																				

● = Euro stock
○ = Stock item in Japan

To be replaced y new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

55° Diamond Type | 0° Relief / With Insert Hole

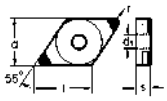
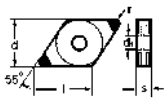
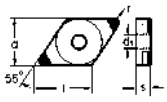
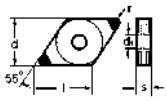
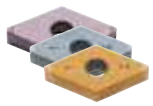
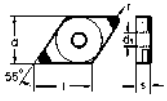
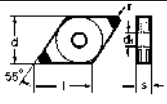
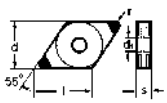
Coated

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	H Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	KH CBN BNC500	BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	K PM BN7000	BN7115	KH BNS8125	S Binderless CBN NCB100	N Uncoated PCD DA90	DA150	DA1000	Binderless Sumidia NPD10
 **LS** - Type Low cutting force	 with 2 CBN cutting edges	**DNGA 150402 LS-NC2**	0,2		❍																							
		DNGA 150404 LS-NC2	0,4	❍	❍						❍																	
		DNGA 150408 LS-NC2	0,8	❍	❍						❍																	
		DNGA 150412 LS-NC2	1,2	❍	❍						❍																	
		DNGA 150604 LS-NC2	0,4		●			●	●																			
		DNGA 150608 LS-NC2	0,8		●			●	●	●	●																	
		DNGA 150612 LS-NC2	1,2		●			●	●	●	●																	
	 with 4 CBN cutting edges	**DNGA 150408 LS-NC4**	0,8						❍																			
 **ES** - Type Crater wear stability	 with 2 CBN cutting edges	**DNGA 150604 ES-NC2**	0,4				●																					
		DNGA 150608 ES-NC2	0,8				●																					
		DNGA 150612 ES-NC2	1,2				●																					
	 with 4 CBN cutting edges	**DNGA 150404 ES-NC4**	0,4				❍																					
		DNGA 150408 ES-NC4	0,8				❍																					
		DNGA 150412 ES-NC4	1,2				❍																					
 **HS** - Type Strong cutting edge	 with 2 CBN cutting edges	**DNGA 150604 HS-NC2**	0,4		●	●	●		●		●																	
		DNGA 150608 HS-NC2	0,8		●	●	●		●	●	●																	
		DNGA 150612 HS-NC2	1,2		●	●	●		●	●	●																	
	 with 4 CBN cutting edges	**DNGA 150404 HS-NC4**	0,4	❍	❍				❍		❍																	
		DNGA 150408 HS-NC4	0,8	❍	❍	❍	❍		❍	❍	❍	❍																
		DNGA 150412 HS-NC4	1,2	❍	❍						❍																	
Break Master - FV, LV, SV  CBN with chipbreaker	 with 4 CBN cutting edges	**DNGG 150404 N-FV NC4**	0,4	❍	❍	❍	❍		❍	❍																	
		DNGG 150408 N-FV NC4	0,8	❍	❍		❍		❍	❍																	
		DNGG 150412 N-FV NC4	1,2	❍	❍	❍	❍		❍	❍																	
		DNGG 150604 N-FV NC4	0,4		●	●	●			●																	
		DNGG 150608 N-FV NC4	0,8		●	●	●		●	●																	
		DNGG 150612 N-FV NC4	1,2			●	●																					
		DNGG 150404 N-LV NC4	0,4	❍	❍	❍	❍		❍	❍																	
		DNGG 150408 N-LV NC4	0,8	❍	❍	❍	❍		❍	❍																	
		DNGG 150412 N-LV NC4	1,2	❍	❍	❍	❍		❍	❍																	
		DNGG 150604 N-LV NC4	0,4		●	●	●		●	●																	
		DNGG 150608 N-LV NC4	0,8		●	●	●		●	●																	
		DNGG 150612 N-LV NC4	1,2		●	●	●		●	●																	
		DNGG 150408 N-SV NC4	0,8	❍	❍	❍	❍			❍																	
		DNGG 150412 N-SV NC4	1,2	❍	❍	❍	❍			❍																	
		DNGG 150608 N-SV NC4	0,8		●		●			●																	
		DNGG 150612 N-SV NC4	1,2		●	●	●			●																	

● = Euro stock
❍ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

55° Diamond Type | 0° Relief / With Insert Hole

Uncoated

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 / DNGM

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	with 2 CBN cutting edges	DNGA 150404 NU2	0,4												❍					❍		❍						
		DNGA 150408 NU2	0,8												❍		❍			❍	❍	❍						
		DNGA 150412 NU2	1,2												❍						❍							
		DNGA 150604 NU2	0,4												●		●		▲	●								
		DNGA 150608 NU2	0,8											●	●	▲	●		▲	●								
		DNGA 150612 NU2	1,2													▲												
	(Wiper Type)	DNGA 150404 NU-WG2	0,4												❍													
		DNGA 150404 NU-WH2	0,4												❍													
		DNGA 150408 NU-WH2	0,8												❍													
LF - Type Low cutting force	with 2 CBN cutting edges	DNGA 150408 LF-NU2	0,8																		❍							
LT - Type Sharp cutting edge	with 2 CBN cutting edges	DNGA 150404 LT-NU2	0,4												❍													
		DNGA 150408 LT-NU2	0,8												❍													
		DNGA 150412 LT-NU2	1,2												❍													
HS - Type Strong cutting edge	with 2 CBN cutting edges	DNGA 150404 HS-NU2	0,4												❍						❍							
		DNGA 150408 HS-NU2	0,8												❍													
		DNGA 150412 HS-NU2	1,2												❍													
Break Master - LV CBN with chipbreaker	with 2 CBN cutting edges	DNGM 150404 N-LV NU2	0,4												❍													
		DNGM 150408 N-LV NU2	0,8												❍													
		DNGM 150412 N-LV NU2	1,2												❍													
		DNGM 150608 N-LV NU2	0,8												●													

● G-Class SumiBoron (CBN, Binderless)

		DNGA 150404 NU	0,4																					❍				
		DNGA 150408 NU	0,8																					❍				
		DNGA 150412 NU	1,2																					❍				

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

55° Diamond Type | 0° Relief

Coated / Uncoated

Dimensions (mm)				
DN_ _	L	IC	S	D_1
1103--		9,525	3,18	-
1506--	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

DNGN

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	DNGN 110308	0,8										●										●					
	DNGN 110312	1,2										●										●					

DNMA

● M-Class SumiBoron (CBN, Regrindable Type)

		RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	DNMA 150404	0,4														❍											
	DNMA 150604	0,4														●		▲									
	DNMA 150608	0,8														●		▲									
	DNMA 150612	1,2														●		▲									

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

	DNMA 150408 NS	0,8															❍										
	DNMA 150604 NS	0,4															●										
	CNMA 150608 NS	0,8															●										
	DNMA 150401 NU	0,1												❍													
	DNMA 150402 NU	0,2												❍													
	DNMA 150404 NU	0,4												❍	▲	❍											
	DNMA 150408 NU	0,8												❍	▲	❍											
	DNMA 150412 NU	1,2																		❍							
	DNMA 150604 NU	0,4												●		●		▲		●							
	DNMA 150608 NU	0,8												●	▲	●		▲	●	●							
	DNMA 150612 NU	1,2													●	●											

● M-Class SumiDia (PCD, NF Type)

	DNMA 150408 NF	0,8																						❍			
	DNMA 150412 NF	1,2																						❍			

● M-Class SumiBoron (CBN, Binderless)

	DNMA 150408 RH	0,8																									❍
	DNMA 150412 RH	1,2																									❍

● = Euro stock
❍ = Stock item in Japan

▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

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 (CBN, Full Top Type)

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	Solid CBN	**RNGN 090300**	–										●										●					
		RNGN 120300	–										●										●					
		RNGN 120400	–										●										●					

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	Solid CBN	**RNGN 090300 B**	–							●	●																	
		RNGN 120400 B	–																		○							

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

SUMIBORON / SUMIDIA
Indexable Inserts

Square Type | 7°/ 0° Relief / With Insert Hole

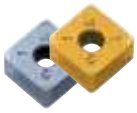
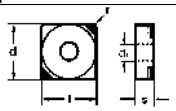
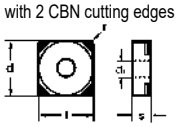
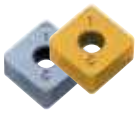
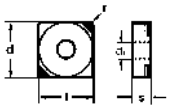
Coated / Uncoated

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

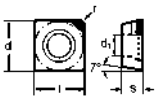
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
Carbide/Hard Brittle Material

SCGW / SNGA ●●●●●●

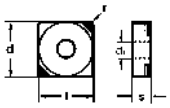
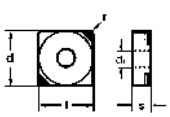
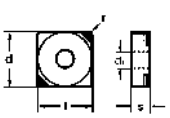
● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
				H K KH										H							K PM KH		S	N				
				Coated										Uncoated										Binderless CBN	Uncoated PCD			Binderless Sumidia
				CBN																								
 Standard - Normal cut geometry	 with 2 CBN cutting edges	**SNGA 120408 NC2**	0,8									❍																
	 with 4 CBN cutting edges	**SNGA 120404 NC4**	0,4	❍	❍																							
		SNGA 120408 NC4	0,8	❍	●		●			●	●																	
		SNGA 120412 NC4	1,2	●	●		❍			●	●																	
 **HS** - Type Strong cutting edge	 with 2 CBN cutting edges	**SNGA 120408 HS-NC2**	0,8		●						●																	
		SNGA 120412 HS-NC2	1,2		●					●	●																	

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

		**SCGW 09T304 NU**	0,4													●					●						
		SCGW 09T308 NU	0,8													●					●						

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

	 with 2 CBN cutting edges	**SNGA 120404 NU2**	0,4											❍							❍						
		SNGA 120408 NU2	0,8											❍		❍					❍						
		SNGA 120412 NU2	1,2											❍							❍						
 **LT** - Type Sharp cutting edge	 with 2 CBN cutting edges	**SNGA 120404 LT-NU2**	0,4											❍													
		SNGA 120408 LT-NU2	0,8											❍													
		SNGA 120412 LT-NU2	1,2											❍													
 **HS** - Type Strong cutting edge	 with 2 CBN cutting edges	**SNGA 120404 HS-NU2**	0,4											❍													
		SNGA 120408 HS-NU2	0,8											❍													
		SNGA 120412 HS-NU2	1,2											❍													

● = Euro stock
❍ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

Square Type — 0° Relief / Without Insert Hole

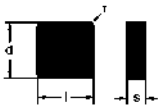
Coated / Uncoated

Dimensions (mm)				
SN_ _	L	IC	S	D_1
0903--	9,525	9,525	3,18	–
1204--	12,7	12,7	4,76	–

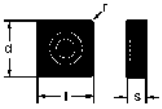
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
Carbide/Hard Brittle Material

SNGN / SNGX ●●●●●●

● G-Class SumiBoron (Solid CBN Type)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
 	**SNGN 090308**	0,8										●										●					
	SNGN 090312	1,2										●										●					
	SNGN 120308	0,8										●										●					
	SNGN 120312	1,2										●										●					
	SNGN 120408	0,8										●										●					
	SNGN 120412	1,2										●										●					
	SNGN 120416	1,6										●										●					
	SNGN 120420	2,0										●										●					

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

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
 	**SNGX 120412**	1,2										●										●					
	SNGX 120416	1,6										●										●					

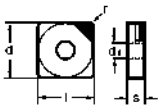
Square Type — 0° Relief / With Insert Hole

Uncoated

SN_ _	L	IC	S	D_1
0903--	9,525	9,525	3,18	–
1204--	12,7	12,7	4,76	–

SNMA ●●●●●●

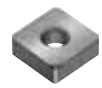
● M-Class SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
 	**SNMA 120408 NS**	0,8															●										
	SNMA 120412 NS	1,2															●										
	SNMA 120408 NU	0,8													○		▲			●							
	SNMA 120412 NU	1,2												●	●		▲	●		●							

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	**SNMA 120408 NF**	0,8																						○			
	SNMA 120412 NF	1,2																						○			

● M-Class SumiDIA (PCD, Binderless)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	**SNMA 120408 RH**	0,8																									○
	SNMA 120412 RH	1,2																									○

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

60° Triangle Type | 5° Relief

Coated / Uncoated

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	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
		TBGN 060102 B	0,2							●					●		●										○	
		TBGN 060104 B	0,4							●					●	▲	●		▲		○							

● G-Class SumiDIA (PCD, NF Type)

		TBGN 060102 NF	0,2																							○		
		TBGN 060104 NF	0,4																							●		

● G-Class SumiDIA (PCD, NF Type)

		TBGW 060102 NF	0,2																							●		
		TBGW 060104 NF	0,4																							●		

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON 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+Multi-Corner)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	TCGW 090204 NC	0,4		●		●			●																		
	TCGW 090208 NC	0,8		●		●			●																		
	TCGW 110202 NC	0,2		●		●			●																		
	TCGW 110204 NC	0,4		●		●			●		●																
	TCGW 110208 NC	0,8	●	●		●			●																		
	TCGW 16T304 NC3	0,4		●		●			●																		
with 3 CBN cutting edges	**TCGW 16T308 NC3**	0,8		●		●			●																		
	TCGW 090204 NU	0,4																		●							
	TCGW 090208 NU	0,8																		●							
	TCGW 110202 NU	0,2													▲	●				●							
	TCGW 110204 NU	0,4											●	●	▲	●				●							
	TCGW 110208 NU	0,8													▲					●							
	TCGW 16T304 NU	0,4													▲	●				●							
	TCGW 16T308 NU	0,8														●				●							

TCMT ●●●●●●

● M-Class SumiDia (PCD, NF Type)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	TCMT 090202 NF	0,2																								○	
	TCMT 090204 NF	0,4																								●	
	TCMT 110201 NF	0,1																								●	
	TCMT 110202 NF	0,2																								●	
	TCMT 110204 NF	0,4																								●	

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

60° Triangle Type | 0° Relief With Insert Hole

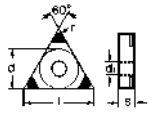
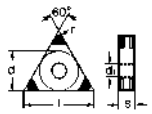
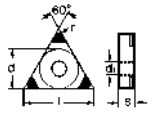
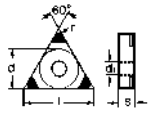
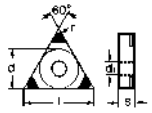
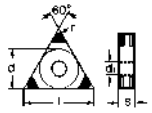
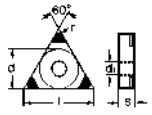
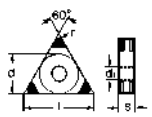
Coated

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 ●●●●●●

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

Shape		ISO Cat. No.	RE	H Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	KH CBN BNC500	BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	K PM KH CBN BN7000	BN7115	BNS8125	S Binderless CBN NCB100	N Uncoated PCD DA90	DA150	DA1000	Binderless Sumidia NPD10
 Standard - Normal cut geometry	 with 3 CBN cutting edges	TNGA 160404 NC3	0,4		○																							
		TNGA 160408 NC3	0,8		○																							
		TNGA 160412 NC3	1,2		○																							
		TNGA 160416 NC3	1,6			○	○		○	○	○																	
		TNGA 160420 NC3	2,0			○	○		○	○	○																	
		TNGA 160424 NC3	2,4			○	○		○	○	○																	
	 with 6 CBN cutting edges	TNGA 160402 NC6	0,2	○	○	○	○																					
		TNGA 160404 NC6	0,4	●	●	●	●	○	●	●	●																	
		TNGA 160408 NC6	0,8	●	●	●	●	●	●	●	●	○																
		TNGA 160412 NC6	1,2	●	●	●	●		●	●	●	○																
		TNGA 160416 NC6	1,6	○	○	○	○		○	○	○																	
		TNGA 160420 NC6	2,0	○	○	○	○		○	○	○																	
		TNGA 160424 NC6	2,4	○	○	○	○		○	○	○																	
 LE - Type Low cutting force	 with 3 CBN cutting edges	TNGA 160404 LE-NC3	0,4			●																						
		TNGA 160408 LE-NC3	0,8			●																						
		TNGA 160412 LE-NC3	1,2			○																						
 LT - Type Sharp cutting edge	 with 3 CBN cutting edges	TNGA 160402 LT-NC3	0,2				○																					
		TNGA 160404 LT-NC3	0,4				○																					
		TNGA 160408 LT-NC3	0,8				○																					
		TNGA 160412 LT-NC3	1,2				○																					
 LS - Type Low cutting force	 with 3 CBN cutting edges	TNGA 160402 LS-NC3	0,2		○																							
		TNGA 160404 LS-NC3	0,4	●	●			●		●	●																	
		TNGA 160408 LS-NC3	0,8	●	●			●	●		●																	
		TNGA 160412 LS-NC3	1,2	○	○				●		○																	
 ES - Type Crater wear stability	 with 6 CBN cutting edges	TNGA 160404 ES-NC6	0,4			●																						
		TNGA 160408 ES-NC6	0,8			●																						
		TNGA 160412 ES-NC6	1,2			○																						
 HS - Type Strong cutting edge	 with 3 CBN cutting edges	TNGA 160404 HS-NC3	0,4		●	●	●				●																	
		TNGA 160408 HS-NC3	0,8		●	●	●				●																	
		TNGA 160412 HS-NC3	1,2		●	●	●				●																	
	 with 6 CBN cutting edges	TNGA 160404 HS-NC6	0,4	○	○																							
		TNGA 160408 HS-NC6	0,8	○	○		○					○																
		TNGA 160412 HS-NC6	1,2	○	○		○				○	○																

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

60° Triangle Type | 0° Relief With Insert Hole

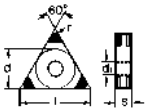
Coated

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

TNGG ●●●●●●

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

Shape		ISO Cat. No.	RE	H K KH Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	K PM KH BN7000	BN7115	BNS8125	S Binderless CBN NCB100	N Uncoated PCD DA90	DA150	DA1000	Binderless Sumidia NPD10
Break Master - FV, LV, SV																												
 CBN with chipbreaker	 with 6 CBN cutting edges	**TNGG 160404 N-FV NC6**	0,4	❍	❍	●	●		●																			
		TNGG 160408 N-FV NC6	0,8	❍	❍		●																					
		TNGG 160412 N-FV NC6	1,2	❍	❍	●	●																					
		TNGG 160404 N-LV NC6	0,4	❍	❍		●			❍																		
		TNGG 160408 N-LV NC6	0,8	●	●	●	●		●	●																		
		TNGG 160412 N-LV NC6	1,2	●	●	●	●			●																		
		TNGG 160408 N-SV NC6	0,8	●	●		●			●																		
		TNGG 160412 N-SV NC6	1,2	❍	❍		❍																					

● = Euro stock
❍ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

60° Triangle Type | 0° Relief

Coated / Uncoated

Dimensions (mm)				
TN__	L	IC	S	D_1
1103--		6,35	3,18	-
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	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	with 3 CBN cutting edges	**TNGA 160404 NU3**	0,4												○		○					○						
		TNGA 160408 NU3	0,8												○		○			○	○	○						
		TNGA 160412 NU3	1,2														○				○	○						
	with 3 CBN cutting edges	**TNGA 160404 T NU3**	0,4												○													
		TNGA 160408 T NU3	0,8												○													
LF / LE - Type Sharp cutting edge	with 3 CBN cutting edges	**TNGA 160404 LF-NU3**	0,4																		○	○						
		TNGA 160408 LF-NU3	0,8																		○	○						
	with 3 CBN cutting edges	**TNGA 160404 LE NU3**	0,4																			○						
		TNGA 160408 LE NU3	0,8																			○						
LS - Type Low cutting force	with 3 CBN cutting edges	**TNGA 160404 LS NU3**	0,4																			○						
HT, HS, US - Type Strong cutting edge	with 3 CBN cutting edges	**TNGA 160408 HT NU3**	0,8																	○								
		TNGA 160404 HS NU3	0,4																			○						
		TNGA 160408 HS NU3	0,8																		○	○						
		TNGA 160416 HS NU3	1,6																			●						
		TNGA 160404 US NU3	0,4																			○						
Break Master - LV CBN with chipbreaker	with 3 CBN cutting edges	**TNGM 160404 N-LV NU3**	0,4												○													

TNGN

● G-Class SumiBoron (Solid CBN Type, without Hole)

Shape	ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	TNGN 110308	0,8										●										●					
	TNGN 110312	1,2										●										●					
	TNGN 160408	0,8										●										●					
	TNGN 160412	1,2										●										●					
	TNGN 160416	1,6										●										●					
	TNGN 160420	2,0										●										●					

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

60° Triangle Type | 0° Relief | With Insert Hole

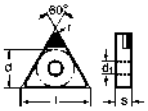
Uncoated

Dimensions (mm)				
TN__	L	IC	S	D_1
1604--	16,5	9,525	4,76	3,81

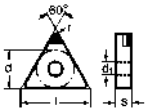
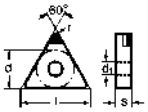
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
Carbide/Hard Brittle Material

TNMA

● M-Class SumiBoron (CBN, Regrindable Type)

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
		**TNMA 160404** **TNMA 160408**	0,4 0,8														● ▲		▲ ▲									

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

		**TNMA 160401 NU** **TNMA 160402 NU** **TNMA 160404 NU** **TNMA 160408 NU** **TNMA 160412 NU**	0,1 0,2 0,4 0,8 1,2											○ ○ ● ● ○	 ▲ ▲ ▲	 ● ● ●			 ▲ 	 ● 		 ○						
		**TNMA 160408 NS**	0,8															○										

TNMX

● M-Class SumiDia (PCD, NF Type)

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
		**TNMX 160404 NF** **TNMX 160408 NF**	0,4 0,8																								○ ○	

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

60° Triangle Type | 11° Relief | Without Insert Hole

Uncoated

Dimensions (mm)				
TP__	L	IC	S	D_1
1103--	11,0	6,35	3,18	
1603--	16,5	9,525	3,18	

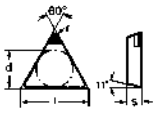
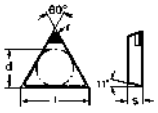
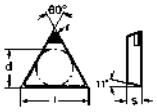
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
Carbide/Hard Brittle Material

TPGN ○○○○○○

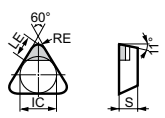
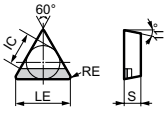
● G-Class SumiBoron (CBN, Regrindable Type)

		RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
		**TPGN 110304**	0,4											○													
		TPGN 160304	0,4													○											
		TPGN 160308	0,8													○											

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

		**TPGN 110302 NU**	0,2											○													
		TPGN 110304 NU	0,4											○		●			○								
		TPGN 110308 NU	0,8											○		●											
		TPGN 160302 NU	0,2											○													
		TPGN 160304 NU	0,4													●					○						
		TPGN 160308 NU	0,8											○		●					○						
		**TPGN 110302 LT NU**	0,2											○													
		TPGN 110304 LT NU	0,4											○													
		TPGN 110308 LT NU	0,8											○													
		TPGN 160304 LT NU	0,4											○													
		TPGN 160308 LT NU	0,8											○													
		**TPGN 110304 HS NU**	0,4											○													
		TPGN 110308 HS NU	0,8											○													
		TPGN 160304 HS NU	0,4											○													
		TPGN 160308 HS NU	0,8											○													

● G-Class SumiDia (PCD, NF Type)

		**TPGN 110302 NF**	0,2																						○		
		TPGN 110304 NF	0,4																						●		
		TPGN 110308 NF	0,8																						●		
		TPGN 160302 NF	0,2																						●		
		TPGN 160304 NF	0,4																						●		
		TPGN 160308 NF	0,8																						●		
	 P: Full-length cutting edge type	**TPGN 110304 P NF**	0,4																						○		
		TPGN 160304 P NF	0,4																						○		

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON 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
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

TPGT / TPGW ●●●●●●

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
Break Master - FV CBN with chipbreaker	with 3 CBN cutting edges	**TPGT 110304 N-FV NC3**	0,4	●	●	○	●			●																		
		TPGT 110308 N-FV NC3	0,8	○	○	○	●		●	○																		

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

Standard - Normal cut geometry		**TPGW 080202 NC**	0,2		●		●			●																		
		TPGW 080204 NC	0,4		●		●			●																		
		TPGW 110304 NC	0,4		●		●			●																		
		TPGW 110308 NC	0,8		●		●			●																		

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

Standard Type	with 3 CBN cutting edges	**TPGW 080202 NC3**	0,2	○	○	●	●																					
		TPGW 080204 NC3	0,4	○	○	●	●																					
		TPGW 090202 NC3	0,2	○	○	○	○																					
		TPGW 090204 NC3	0,4	○	○	○	○																					
		TPGW 110302 NC3	0,2	○	○																							
		TPGW 110304 NC3	0,4	○	○					○		○																
		TPGW 110308 NC3	0,8	○	○					○		○																
		TPGW 160404 NC3	0,4	○	○							○																
		TPGW 160408 NC3	0,8	○	○							○																
LE - Type Low cutting force	with 3 CBN cutting edges	**TPGW 110302 LE-NC3**	0,2			○																						
		TPGW 110304 LE-NC3	0,4			○																						
		TPGW 110308 LE-NC3	0,8			○																						
LT - Type Sharp cutting edge	with 3 CBN cutting edges	**TPGW 110302 LT-NC3**	0,2				○																					
		TPGW 110304 LT-NC3	0,4				○																					
		TPGW 110308 LT-NC3	0,8				○																					
LS - Type Low cutting force	with 3 CBN cutting edges	**TPGW 110302 LS-NC3**	0,2	○	○						○																	
		TPGW 110304 LS-NC3	0,4	○	○						○																	
		TPGW 110308 LS-NC3	0,8	○	○			○	○		○																	
HS - Type Sharp cutting edge	with 3 CBN cutting edges	**TPGW 160404 HS-NC3**	0,4		○					○																		
		TPGW 160408 HS-NC3	0,8		○																							

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 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

TPGT / TPGW

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

● G-Class SumiBoron (CBN, Regrindable Type)

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
				H Coated CBN								K H		H Uncoated CBN							K PM		K H	S Binderless CBN	N Uncoated PCD			N Binderless Sumidia
Break Master - FV		**TPGT 110304 N-FV NU3**	0,4												●													
CBN with chipbreaker	with 3 CBN cutting edges																											
		TPGW 110304	0,4														●											
		TPGW 110308	0,8														●											
		TPGW 080202 NU	0,2											○	●		●											
		TPGW 080204 NU	0,4											●	●	▲	●				○							
		TPGW 090204 NU	0,4												○													
		TPGW 110202 NU	0,2												○													
		TPGW 110204 NU	0,4												○	▲					○							
		TPGW 110302 NU	0,2												○													
		TPGW 110304 NU	0,4												●	▲	●		▲	●								
		TPGW 110308 NU	0,8												●	▲	●		▲	●	○							
		TPGW 160404 NU	0,4														○					●						
		TPGW 110308 LF NU	0,8																		○							
		TPGW 080202 LT NU	0,2												○													
		TPGW 080204 LT NU	0,4												○													
		TPGW 090202 LT NU	0,2												○													
		TPGW 090204 LT NU	0,4												○													
		TPGW 110202 LT NU	0,2												○													
		TPGW 110204 LT NU	0,4												○													
		TPGW 110302 LT NU	0,2												○													
		TPGW 110304 LT NU	0,4												○													
		TPGW 110308 LT NU	0,8												○													

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 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

TPGT / TPGW ●●●●●●

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
		TPGW 080202 HS NU	0,2												○													
		TPGW 080204 HS NU	0,4												○													
		TPGW 080208 HS NU	0,8												○													
		TPGW 110204 HS NU	0,4												○													
		TPGW 110302 HS NU	0,2												○													
		TPGW 110304 HS NU	0,4												○													
		TPGW 110308 HS NU	0,8												○													

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

	with 3 CBN cutting edges	**TPGW 110204 NU3**	0,4																		○							
		TPGW 110208 NU3	0,8																		○							
		TPGW 110304 NU3	0,4																			○						
		TPGW 110308 NU3	0,8																		○	○						
	with 3 CBN cutting edges	**TPGW 110302 LF NU3**	0,2																		○	○						
		TPGW 110304 LF NU3	0,4																		○	○						
		TPGW 110308 LF NU3	0,8																			○						
	with 3 CBN cutting edges	**TPGW 110304 LE NU3**	0,4																			○						

● G-Class SumiDia (PCD, NF Type)

		TPGW 080202 NF	0,2																							●		
		TPGW 080204 NF	0,4																							●		
		TPGW 090204 NF	0,4																							○		
		TPGW 110202 NF	0,2																							○		
		TPGW 110208 NF	0,8																							●		
		TPGW 110302 NF	0,2																							●		
		TPGW 110304 NF	0,4																							●		
		TPGW 110308 NF	0,8																							●		
		TPGW 160304 NF	0,4																							○		
		TPGW 160402 NF	0,2																							●		
		TPGW 160404 NF	0,4																							●		
		TPGW 160408 NF	0,8																							●		

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 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	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
Break Master - DM		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, NF Type)

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

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

35° Diamond Type | 5° Relief With Insert Hole

Coated / Uncoated

Dimensions (mm)				
VB_ _	L	IC	S	D_1
1102--	11,0	6,35	2,38	2,8
1103--			3,18	
1604--	16,6	9,525	4,76	4,4

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

VBGW ●●●●●●

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
		VBGW 110202 NC	0,2	●		●				●																		
		VBGW 110204 NC	0,4	●		●				●																		
Standard - Normal cut geometry		**VBGW 110208 NC**	0,8	●		●				●																		
		VBGW 110202 NU	0,2														●											
		VBGW 110204 NU	0,4												●		●											
		VBGW 110208 NU	0,8														●											
		VBGW 110302 NU	0,2												○													
		VBGW 110304 NU	0,4											○	○						○			○				
		VBGW 110308 NU	0,8												○						○			○				
		VBGW 160402 NU	0,2												○		●											
		VBGW 160404 NU	0,4											●	●	▲	●		▲	●	●			○				
		VBGW 160408 NU	0,8											●	●		●		▲	●	●			○				
		VBGW 110302 LT NU	0,2												○													
		VBGW 110304 LT NU	0,4												○													
		VBGW 110308 LT NU	0,8												○													
		VBGW 160402 LT NU	0,2												○													
		VBGW 160404 LT NU	0,4												○													
LT - Type Sharp cutting edge		**VBGW 160408 LT NU**	0,8												○													
		VBGW 110302 HS NU	0,2												○													
		VBGW 110304 HS NU	0,4												○													
		VBGW 110308 HS NU	0,8												○													
		VBGW 160404 HS NU	0,4												○													
HS - Type Strong cutting edge		**VBGW 160408 HS NU**	0,8												○													

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

SUMIBORON / SUMIDIA
Indexable Inserts

35° Diamond Type | 5° Relief / With Insert Hole

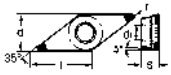
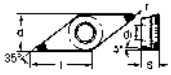
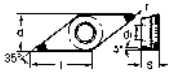
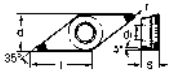
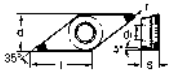
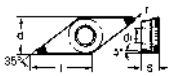
Coated / Uncoated

Dimensions (mm)				
VB_ _	L	IC	S	D_1
1102--	11,0	6,35	2,38	2,8
1103--			3,18	
1604--	16,6	9,525	4,76	4,4

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

VBGW ●●●●●●

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

Shape		ISO Cat. No.	RE	H Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	KH BNC500	BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	K PM KH BN7000	BN7115	S BNS8125	N Binderless CBN NCB100	Uncoated PCD DA90	DA150	DA1000	Binderless Sumidia NPD10
	 with 2 CBN cutting edges	**VBGW 110304 NU2**	0,4																			❍						
		VBGW 160404 NU2	0,4											●	●	▲	●					●						
		VBGW 160408 NU2	0,8											●	●	▲	●				❍	❍						
 Standard - Normal cut geometry	 with 2 CBN cutting edges	**VBGW 110302 NC2**	0,2	❍	❍																							
		VBGW 110304 NC2	0,4	❍	❍	❍	❍																					
		VBGW 110308 NC2	0,8	❍	❍	❍	❍																					
		VBGW 160402 NC2	0,2	❍	❍	❍	❍																					
		VBGW 160404 NC2	0,4	●	●	●	●	●	●	●	●	●																
		VBGW 160408 NC2	0,8	❍	●	●	●	●	●	●	●	●																
		VBGW 160412 NC2	1,2				●																					
 **LE** - Type Low cutting force	 with 2 CBN cutting edges	**VBGW 160408 LE NU2**	0,8																			●						
		VBGW 160402 LE-NC2	0,2			●																						
		VBGW 160404 LE-NC2	0,4			●																						
		VBGW 160408 LE-NC2	0,8			●																						
 **LT** - Type Sharp cutting edge	 with 2 CBN cutting edges	**VBGW 110302 LT-NC2**	0,2				❍																					
		VBGW 110304 LT-NC2	0,4				●																					
		VBGW 160402 LT-NC2	0,2				❍																					
		VBGW 160404 LT-NC2	0,4				●																					
		VBGW 160408 LT-NC2	0,8				●																					
 **LS** - Type Low cutting force	 with 2 CBN cutting edges	**VBGW 110302 LS-NC2**	0,2	❍	❍																							
		VBGW 110304 LS-NC2	0,4	❍	❍																							
		VBGW 110308 LS-NC2	0,8	❍	❍																							
		VBGW 160402 LS-NC2	0,2	❍	❍																							
		VBGW 160404 LS-NC2	0,4	●	●			●	●	●																		
		VBGW 160408 LS-NC2	0,8	❍	●			●	●	●																		
 **HS** - Type Strong cutting edge	 with 2 CBN cutting edges	**VBGW 160404 HS-NC2**	0,4		●		●			●	●																
		VBGW 160408 HS-NC2	0,8		●		●			●	●																	

● = Euro stock
❍ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

35° Diamond Type | 7° Relief With Insert Hole

Coated / Uncoated

Dimensions (mm)				
VC--	L	IC	S	D_1
0802--	8,3	4,76	2,38	2,3
1103--	11,0	6,35	3,18	2,8
1604--	16,6	9,525	4,76	4,4

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

VCGW ●●●●●●

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
		VCGW 080202 NU	0,2												○													
		VCGW 080204 NU	0,4												○													
		VCGW 110301 NU	0,1																					●				
		VCGW 110302 NU	0,2											○	○									●				
		VCGW 110304 NU	0,4												○													
		VCGW 160404 NU	0,4																					○				
		VCGW 160408 NU	0,8																					○				
		VCGW 080202 LT NU	0,2												○													
		VCGW 080204 LT NU	0,4												○													
		VCGW 080208 LT NU	0,8												○													

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

Standard - Normal cut geometry	with 2 CBN cutting edges	**VCGW 080202 NC2**	0,2			○	○																					
		VCGW 080204 NC2	0,4			○	○																					
		VCGW 160404 NC2	0,4	○	○				○																			
		VCGW 160408 NC2	0,8	○	○		○																					
LS - Type Low cutting force	with 2 CBN cutting edges	**VCGW 160404 LS NC2**	0,4	○	○																							
		VCGW 160408 LS NC2	0,8	○	○					○																		
HS - Type Strong cutting edge	with 2 CBN cutting edges	**VCGW 160404 HS NC2**	0,4		○																							
		VCGW 160408 HS NC2	0,8		○		○			○																		

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

35° Diamond Type | 7° Relief With Insert Hole

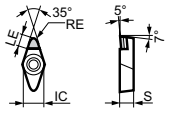
Uncoated

Dimensions (mm)				
VC--	L	IC	S	D_1
0802--	8,3	4,76	2,38	2,3
1103--	11,0	6,35	3,18	2,8
1604--	16,6	9,525	4,76	4,4
2205--		12,7	5,56	5,5

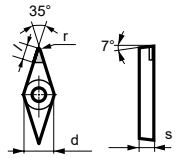
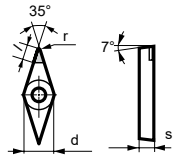
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
Carbide/Hard Brittle Material

VCMT / VCGW

● M-Class (Regrindable Type)

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
		**VCMT 220530**	3,0																								○	
		VCMW 160404	0,4														○											

● M-Class SumiDia (PCD, NF Type)

		**VCMT 110301 NF**	0,1																								●	
		VCMT 110302 NF	0,2																								●	
		VCMT 110304 NF	0,4																								●	
		VCMT 160404 NF	0,4																								●	
		VCMT 160408 NF	0,8																								●	
		VCMT 160412 NF	1,2																								●	
		**VCMT 110302 N-LD NF**	0,2																								○	
		VCMT 110304 N-LD NF	0,4																								○	
		VCMT 160404 N-LD NF	0,4																								○	
		VCMT 160408 N-LD NF	0,8																								○	
		VCMT 160412 N-LD NF	1,2																								○	
		**VCMT 110302 N-GD NF**	0,2																								○	
		VCMT 110304 N-GD NF	0,4																								○	
		VCMT 160404 N-GD NF	0,4																								○	
		VCMT 160408 N-GD NF	0,8																								○	
		VCMT 160412 N-GD NF	1,2																								○	

● M-Class SumiDia (PCD, NF Type)

		**VCMW 080202 NF**	0,2																						○			
		VCMW 080204 NF	0,4																						○			
		VCMW 110302 NF	0,2																						○			
		VCMW 110304 NF	0,4																						○			
		VCMW 160402 NF	0,2																						○			
		VCMW 160404 NF	0,4																						○			
		VCMW 160408 NF	0,8																						○			
		VCMW 160412 NF	1,2																						○			

● M-Class SumiDia (PCD, Binderless)

		**VCMW 080201 RH**	0,1																									○
		VCMW 080202 RH	0,2																									○
		VCMW 080204 RH	0,4																									○
		VCMW 110302 RH	0,2																									○
		VCMW 110304 RH	0,4																									○
		VCMW 160402 RH	0,2																									○
		VCMW 160404 RH	0,4																									○
		VCMW 160408 RH	0,8																									○
		VCMW 160412 RH	1,2																									○

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON 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

VNGA ●●●●●●

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	with 2 CBN cutting edges	**VNGA 160404 NU2**	0,4											❍	●		❍			❍	❍	●		❍				
		VNGA 160408 NU2	0,8											●	●		●				❍	●						
	with 2 CBN cutting edges	**VNGA 160404 LT NU2**	0,4												❍													
		VNGA 160408 LT NU2	0,8												❍													
	with 2 CBN cutting edges	**VNGA 160404 HS NU2**	0,4												❍													
		VNGA 160408 HS NU2	0,8												❍													

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

		VNGA 160404 NU	0,4																					❍				
		VNGA 160408 NU	0,8																					❍				

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

35° Diamond Type | 0° Relief / With Insert Hole

Coated

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

VNGA / VNGG

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
				H / K H										H							K PM	K H	S	N				
				Coated										Uncoated										Binderless CBN	Uncoated			Binderless Sumidia
				CBN																				PCD				
	with 2 CBN cutting edges	**VNGA 160404 NC2** **VNGA 160408 NC2** **VNGA 160412 NC2**	0,4 0,8 1,2		○ ○ ○	○ ○	● ●			○ ○																	
	 with 4 CBN cutting edges	**VNGA 160402 NC4** **VNGA 160404 NC4** **VNGA 160408 NC4** **VNGA 160412 NC4**	0,2 0,4 0,8 1,2	○ ○ ● ○	○ ○ ● ○	○ ○ ○	○ ● ●	○	○ ○	○ ○ ○	○ ○	○															
 **LT** - Type Sharp cutting edge	 with 2 CBN cutting edges	**VNGA 160402 LT-NC2** **VNGA 160404 LT-NC2** **VNGA 160408 LT-NC2** **VNGA 160412 LT-NC2**	0,2 0,4 0,8 1,2				○ ● ● ○																			
 **LS** - Type Low cutting force	 with 2 CBN cutting edges	**VNGA 160402 LS-NC2** **VNGA 160404 LS-NC2** **VNGA 160408 LS-NC2** **VNGA 160412 LS-NC2**	0,2 0,4 0,8 1,2	○ ○ ○	○ ○ ○																					
	 with 4 CBN cutting edges	**VNGA 160404 LS-NC4** **VNGA 160408 LS-NC4** **VNGA 160412 LS-NC4**	0,4 0,8 1,2					○ ○		○ ○																	
 **HS** - Type Strong cutting edge	 with 4 CBN cutting edges	**VNGA 160404 HS-NC4** **VNGA 160408 HS-NC4** **VNGA 160412 HS-NC4**	0,4 0,8 1,2	○ ○ ○	○ ○ ○		○			○ ○	○															
 **ES** - Type Crater wear stability	 with 4 CBN cutting edges	**VNGA 160404 ES-NC4** **VNGA 160408 ES-NC4** **VNGA 160412 ES-NC4**	0,4 0,8 1,2				● ● ○																			
Break Master - FV, - LV  CBN with chipbreaker	 with 4 CBN cutting edges	**VNGG 160404 N-FV NC4** **VNGG 160408 N-FV NC4**	0,4 0,8	● ●		○ ●	● ●		● ●	● ●																
		VNGG 160404 N-LV NC4 **VNGG 160408 N-LV NC4**	0,4 0,8	● ●		● ●	● ●	○		● ●																

● = Euro stock
○ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON 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 ●●●●●●

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
Break Master - LV		**VNGM 160404 N-LV NU2**	0,4												●													
		VNGM 160408 N-LV NU2	0,8												●													
CBN with chipbreaker	with 2 CBN cutting edges																											

● M-Class SumiBoron (CBN, Regrindable Type)

		VNMA 160404	0,4														●		▲										
		VNMA 160408	0,8												○		○		▲										

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

		VNMA 160401 NU	0,1												○														
		VNMA 160402 NU	0,2												○														
		VNMA 160404 NU	0,4												●	▲	●		▲	●									
		VNMA 160408 NU	0,8												●	▲	●		▲	●									
		VNMA 160412 NU	1,2												○														
		VNMA 160408 NS	0,8															○											

● M-Class SumiDia (PCD, NF Type)

		VNMA 160408 NF	0,8																						○				
		VNMA 160412 NF	1,2																						○				

● M-Class SumiDia (PCD, Binderless)

		VNMA 160408 RH	0,8																										○
		VNMA 160412 RH	1,2																										○

VNMX ●●●●●●

● 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
		VNMX 160402 NF	0,2																						○	
		VNMX 160404 NF	0,4																						●	
		VNMX 160408 NF	0,8																						●	
		VNMX 160412	1,2																						○	

● = Euro stock
○ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

80° Trigon Type | 0° Relief With Insert Hole

Coated / Uncoated

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 ○○○○○○

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
		WNMA 080408 NU	0,8												❍													

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

Shape		ISO Cat. No.	RE	BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10
	with 6 CBN cutting edges	**WNGA 080404 NC6**	0,4	●	●	❍	●			●																		
		WNGA 080408 NC6	0,8	●	●		●			●																		
		WNGA 080412 NC6	1,2	●	●	❍	●			●																		
LT - Type Sharp cutting edge	with 3 CBN cutting edges	**WNGA 080408 LT-NC3**	0,8				❍																					
LS - Type Low cutting force	with 3 CBN cutting edges	**WNGA 080408 LS NC3**	0,8	❍	❍																							
	with 6 CBN cutting edges	**WNGA 080408 LS NC6**	0,8						❍																			
HS - Type Strong cutting edge	with 6 CBN cutting edges	**WNGA 080408 HS NC6**	0,8	❍	❍					❍																		
	(Wiper Type)	**WNGA 080408 NC-WG6**	0,8	❍	❍	●	●		❍	❍																		
		WNGA 080408 NC-WH6	0,8	❍	❍	●	●		❍	❍																		

● = Euro stock
❍ = Stock item in Japan

☞ L8, L9 Edge Specification of SUMIBORON Inserts

80° Special Type | 7° Relief / With Insert Hole

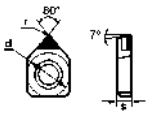
Coated / Uncoated

Dimensions (mm)				
WN_ _	L	IC	S	D_1
0401--	-	4,76	1,69	2,3

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

ZNEX ●●●●●●

● SumiBoron (CBN, One-Use Type)

Shape	ISO Cat. No.	RE	H Coated CBN BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	KH BNC500	BNC8115	H Uncoated CBN BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	K PM BN7000	BN7115	KH BNS8125	S Binderless CBN NCB100	N Uncoated PCD DA90	DA150	DA1000	Binderless Sumidia NPD10
 	**ZNEX 040102 NC**	0,2				●	●	●	●																		
	ZNEX 040104 NC	0,4				●	●	●	●																		
	ZNEX 040102 LE-NC	0,2			❍																						
	ZNEX 040104 LE-NC	0,4			❍																						
	ZNEX 040102 LT-NC	0,2				❍																					
	ZNEX 040104 LT-NC	0,4				❍																					
	ZNEX 040102 NU	0,2											●	●	▲	●											
	ZNEX 040104 NU	0,4											●	●	▲	●				❍							

● = Euro stock
❍ = Stock item in Japan
▲ = To be replaced by new item

☞ L8, L9 Edge Specification of SUMIBORON Inserts

SUMIDIA Binderless PCD - Insert Grade NPD10

Negative Inserts

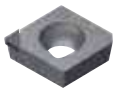
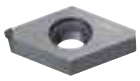
Application: Hard brittle material

	Shape	ISO Cat. No.	Dimensions (mm) Inscribed Circle (IC)	Thick-ness	Hole Size	Nose Radius	Cutting Edge Length	NPD10
55° Diamond Type		**DNMA 150408 RH**	12,70	4,76	5,16	0,8	1,8	❍
		150412 RH				1,2	1,8	❍
Square Type		**SNMA 120408 RH**	12,70	4,76	5,16	0,8	1,7	❍
		120412 RH				1,2	1,7	❍
35° Diamond Type		**VNMA 160408 RH**	9,525	4,76	3,81	0,8	1,8	❍
		160412 RH				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) Inscribed Circle (IC)	Thick-ness	Hole Size	Nose Radius	Cutting Edge Length	NPD10
80° Diamond Type	7°		**CCMW 03X102 RH**	3,50	1,40	1,9	0,2	1,3	❍
			03X104 RH				0,4	1,3	❍
			CCMW 04X102 RH	4,30	1,80	2,3	0,2	1,7	❍
			04X104 RH				0,4	1,7	❍
			**CCMW 060202 RH**	6,35	2,38	2,8	0,2	1,7	❍
			060204 RH				0,4	1,7	❍
			CCMW 09T302 RH	9,525	3,97	4,4	0,2	1,7	❍
			09T304 RH				0,4	1,7	❍
			09T308 RH				0,8	1,6	❍
55° Diamond Type	7°		**DCMW 070202 RH**	6,35	2,38	2,8	0,2	2,1	❍
			070204 RH				0,4	2,0	❍
			DCMW 11T302 RH	9,525	3,97	4,4	0,2	2,1	❍
			11T304 RH				0,4	1,9	❍
			11T308 RH				0,8	1,6	❍
Triangular Type	11°		**TPMW 080202 RH**	4,76	2,38	2,3	0,2	1,2	❍
			080204 RH				0,4	1,0	❍
			TPMW 110302 RH	6,35	3,18	3,4	0,2	1,5	❍
			110304 RH				0,4	1,3	❍
			110308 RH				0,8	1,0	❍
			TPMW 160402 RH	9,525	4,76	4,4	0,2	2,2	❍
			160404 RH				0,4	2,0	❍
			160408 RH				0,8	1,6	❍
35° Diamond Type	7°		**VCMW 080201 RH**	4,76	2,38	2,3	0,1	2,2	❍
			080202 RH				0,2	1,9	❍
			080204 RH				0,4	1,5	❍
			VCMW 110302 RH	6,35	3,18	2,8	0,2	2,1	❍
			110304 RH				0,4	1,7	❍
			VCMW 160402 RH	9,525	4,76	4,4	0,2	2,1	❍
			160404 RH				0,4	1,7	❍
			160408 RH				0,8	1,8	❍
			160412 RH				1,2	1,5	❍

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

Precision Tools

BSME → M48-50

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 ø 2,5 mm.

SEXC → M48-51

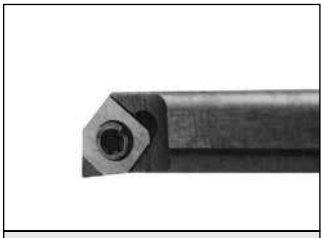
CBN boring tool for small diameter boring

- 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 ø 4,0 mm.

BNBB → M52

Small hole boring tools

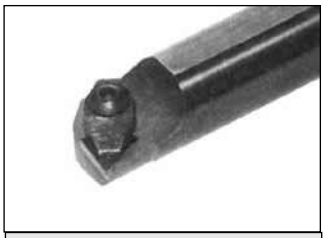
- CBN cutting edge is brazed on to a solid carbide shank.
- Small hole boring for hardened steels.
- Min. boring dia. is ø 3,5 mm.



BNZ → M53

Small hole boring bars

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



BNB → M53

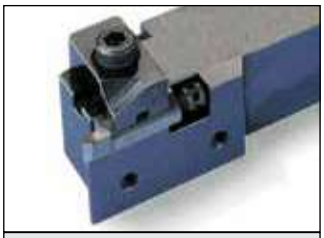
Small hole boring bars

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

GWB / PSC → M54-55

CBN Grooving System for Hardened Steels

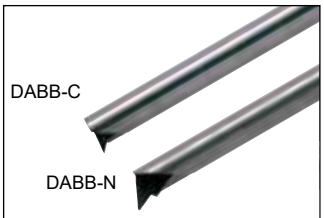
- Tangential Inserts – Double clamp holder
- Groove Widths from 1,5 – 6,0mm
- New CBN grade for interrupted grooving
- ISO-PSC polygon modular grooving system



BNGG → M56

Threading holders

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



DABB → M57

Small hole boring tools

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

ANX
→ M58-69

High speed cutter for Non-ferrous Metal

- Achieves feeds of over vf = 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 Ø 32-160 mm

RF
→ M70

High speed face mill for Aluminium

- Finishing and roughing aluminium alloys and non-ferrous materials
- High precision and highspeed machining vc = 5000 m/min
- Alumimum alloy body Run-out less than 10 µm
- Easy assembling

SRF
→ M71

High speed face mill for Aluminium

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

FMU
→ M72-73

"BN Finish Mill" for finishing grey cast iron

- High speed machining vc = 1500 m/min
- Excellent surface roughness Rz = 3,2
- Run-out less than 10 µm
- Easy assembling

BNES
→ M74

"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
→ M75

"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 : ±0,005 mm

NPDRS / NPDB(S)
→ M76-77

"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
→ M78-79

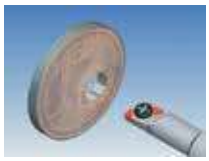
High precision SUMIDIA Drills

- 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

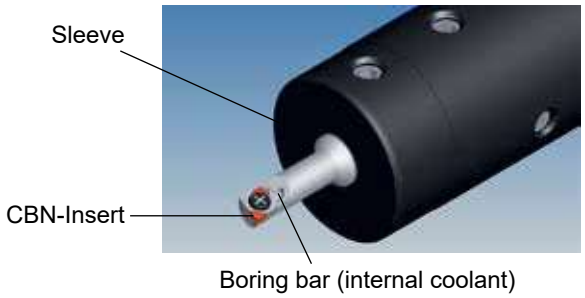
BSME/SEXC Series

Features

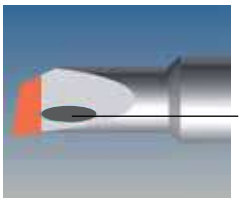
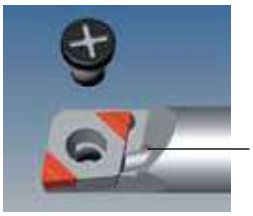
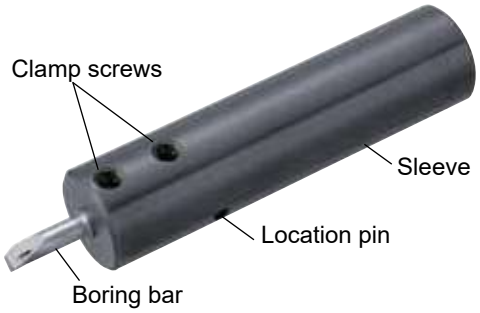
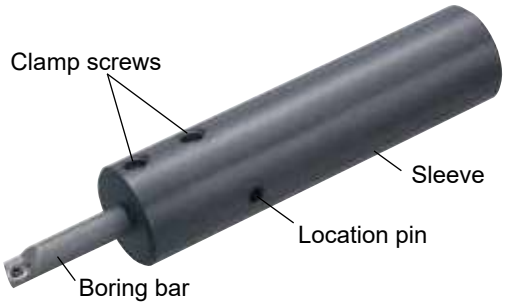
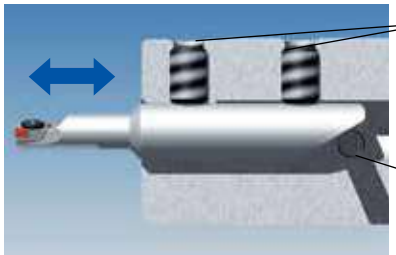
- New ultra small boring bar with CBN cutting edge
- Internal coolant
- Easy setting and handling
- High accuracy
- Carbide body for high rigidity
- One sleeve for different diameters



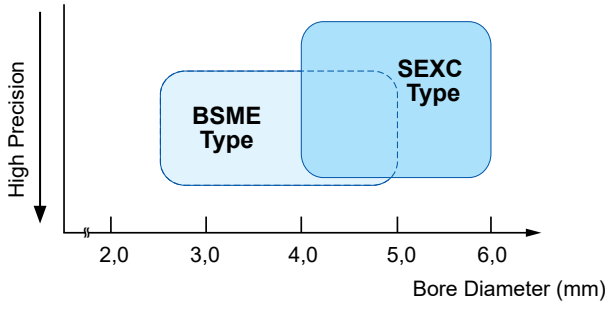
Basic System



2 Types of CBN Small Hole Boring Bar System

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

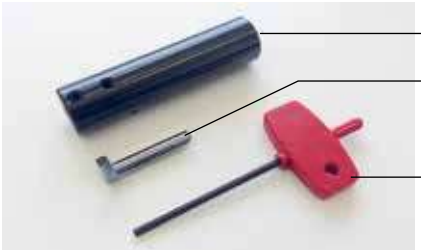
Application Range



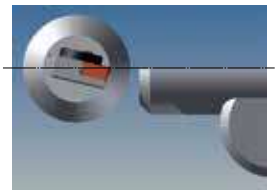
Recommended Cutting Conditions

Spindle Speed (*n*)	>2000 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



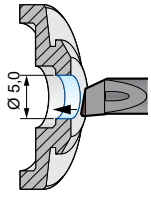
Mounting Instruction

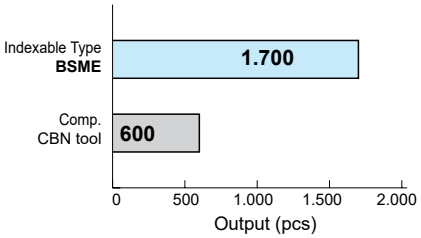
1. Insert alignment tool into the sleeve until you connect with the pin inside. Gently lock the screws to hold.	
2. Locate the sleeve into your tool-holding system. Gently lock the screws to hold.	 
3. Clock the flat of the alignment tool into a straight position. 	After adjustment, equipped boring bar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

Application Example

BSME Hardened Alloy Steel Valve Component

The BSME type provides stable machining.
Tool life is over 2 times longer than competitor´s CBN tool.

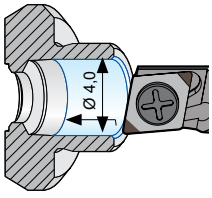


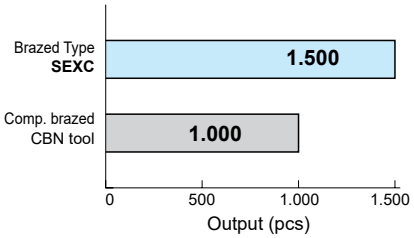


Work Material:	Hardened alloy steel valve component (automotive component)
Tool:	BSME R50020D2S6
Grade:	BN2000
Cutting Conditions:	v_c = 135 m/min f = 0,02 mm/rev a_p = 0,10 mm Dry

SEXC Bearing Steel Small Automotive Component

The SEXC type provides drastically reduced tool costs.
Tool life is 1,5 times longer than competitor´s brazed CBN tool.





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

BSME Series

BSME-Type with Internal Coolant

BSME
General, Facing

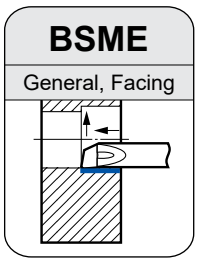


Fig. 1

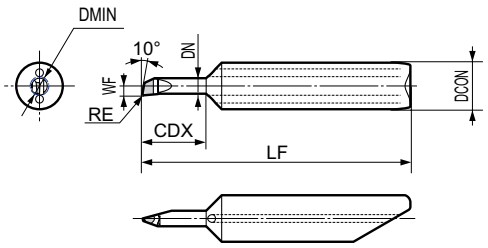
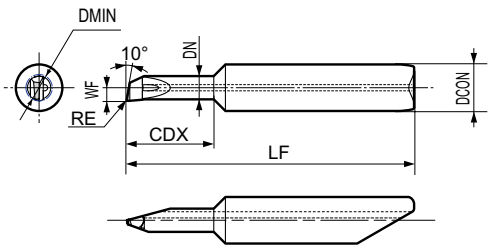


Fig. 2

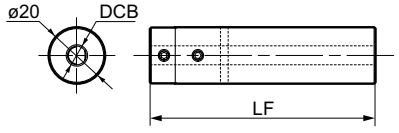


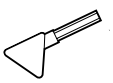
Sharp edge (no honing)

■ 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			2	
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				

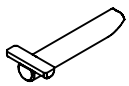
■ Adapter Sleeve and Parts





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

■ Alignment Tool



Description	Stock
AFBSM60	●

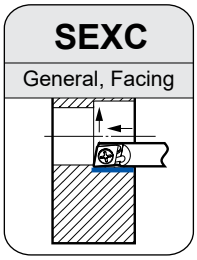
■ Identification Details

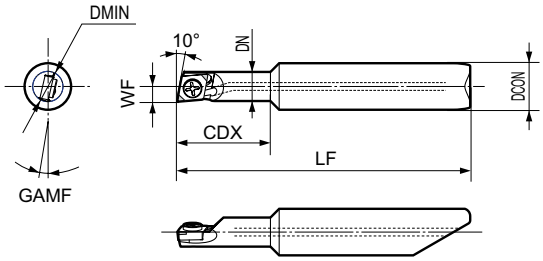
B S M	E	R/L	3 5 0	2 0	D 3	S 6
Sumitomo CBN Product Special Mini	Solid Carbide Bar with Inner Coolant	R: Right Hand L: Left Hand	Minimum Bore Diameter (ø 3,5 mm)	Nose Radius of Edge (ø 0,20 mm)	L/D - Ratio of Working Length	Shank Diameter

● = Euro stock
❑ = Delivery on request

Recommended Tightening Torque (N·m)

SEXC-Type with Internal Coolant

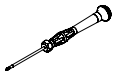




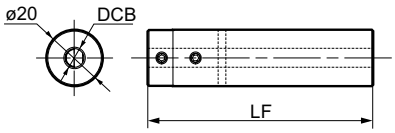
Boring Bar

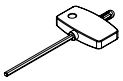
Description	Stock		Dimensions (mm)							Applicable Sleeve	Insert Screw	N·m	Wrench
	R	L	DMIN	DN	WF	CDX	LF	DCON	GAMF				
E06D2 SEXC R/L 03-04P	●	●	4,0	3,75	1,95	8	33,75	6,0	13°	HBSM6020	MIB1,6–2,0	0,2	SDBSM
E06D3 SEXC R/L 03-04P	●	●				12	37,75						
E06D2 SEXC R/L 03-05P	●	●	5,0	4,75	2,45	10	35,25		12°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

Spare Parts

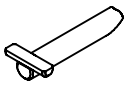
Adapter Sleeve and Parts



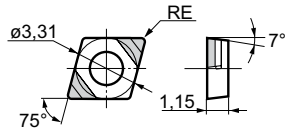
Description	Stock	Dimensions (mm)		Sleeve Screw	Wrench
		DCB	LF		
HBSM6020	●	6,0	80	BT0506	TH025

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

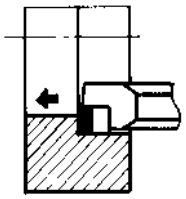
E 06 D2 S E X C R/L 03 - 04 P

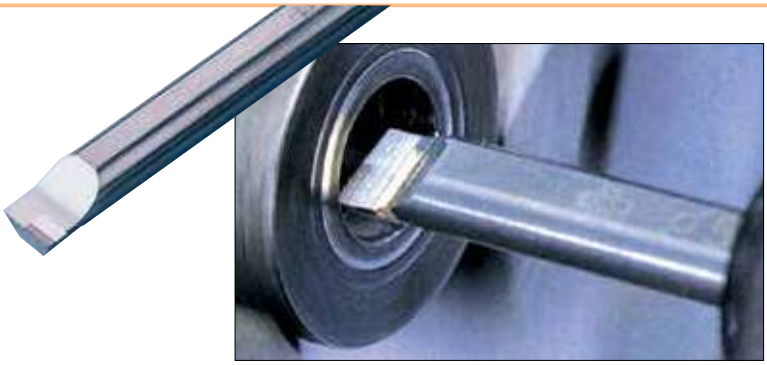
- **E** — Carbide Bar with Coolant Hole
- **06** — Shank Diameter (ø 6 mm)
- **D2** — L/D Ratio of Working Length
- **S** — Insert Clamp System S = Screw Type
- **E** — Insert Shape E = Diamond 75°
- **X** — Approch Angle of Main Cutting Edge
- **C** — Insert Relief Angle C = 7°
- **R/L** — R: Right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

BNBB Type

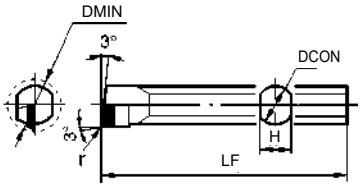
For Hardened Steel

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

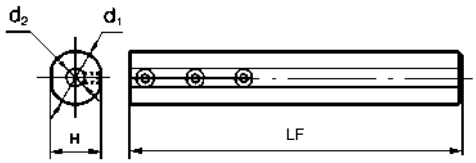




■ „Sumiboron“ Brazed Boring Tools for Small Hole Boring

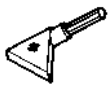
	Cat. No.	Stock	Dimensions (mm)					Applicable holder	Grade of brazed cutting edge
			DMIN	DCON	LF	H	RE		
BNBB (Carbide shank) 	BNBB 03 R	▲	3,5	3	60	2,4	0,2	HBB 316	SUMIBORON (CBN) BN250
	BNBB 04 R	▲	4,5	4	60	3,4	0,2	HBB 416	
	BNBB 05 R	▲	5,5	5	80	4,4	0,2	HBB 516	
	BNBB 06 R	▲	6,5	6	80	5,4	0,2	HBB 616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

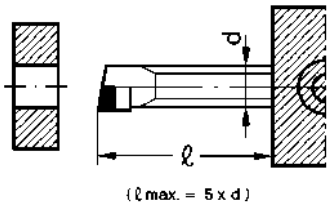
■ Spare Parts

Screw	Wrench
	
BT 0404	TH 020

■ Recommended Cutting Conditions

Work Material	SUMIBORON BN250		Notes
Hardened steels ($H_RC45–68$)	Cutting speed (v_c)	30–150 m/min	Low speed may cause chattering in cutting process and chipping occurence 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

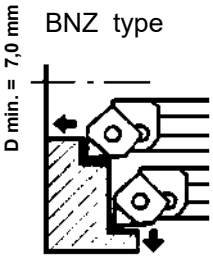


- Adjust overhang to achieve absolute minimum.
- For use of a small diameter brazed boring tool, select high speed and small feed rate, as much as possible.

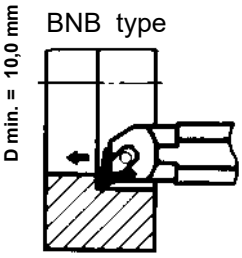
● = Euro stock
❍ = Japan stock
▲ = To be replaced by new item
❑ = Delivery on request
Recommended Tightening Torque (N·m)

SUMIBORON Small Hole Boring Bars
BNZ / BNB Type

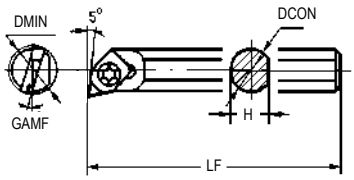
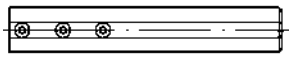
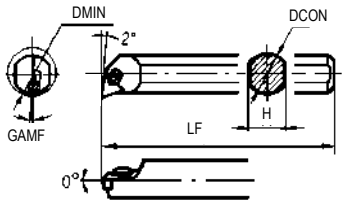
BNZ type



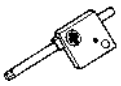
BNB type



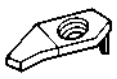
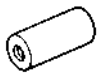
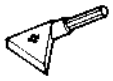
Boring Bars for Small Hole Boring

	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 0401○○	 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 0601○○	 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** (N·m)	

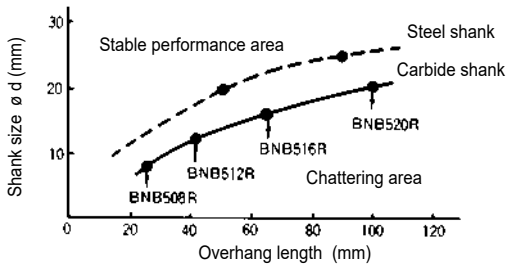
Spare Parts for BNB

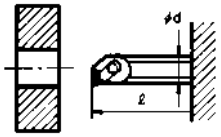
Holder	Clamp	Clamp bold	Nut	Wrench
				
BNB 508 R/L	BNBC	BH 0306	BNBW-2	TH 020
BNB 512 R/L	BNBC	FBUP-3-A0-9	BNBW-4	TH 020
BNB 516 R/L	BNBC	BH 0310	BNBW-4	TH 020
BNB 520 R/L	BNBC	BH 0310	BNBW-7	TH 020

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 (H_RC 60)
Cutting conditions: v_c = 100 m/min
f = 0,1 mm/rev
a_p = 0,2 mm

GWB / PSC Type

CBN Grooving System for Hardened Steels

GWB Type

ISO-PSC Polygon Modular

CGA Inserts

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.

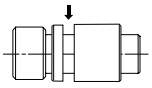
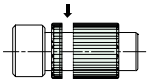
Coated CBN grade BNC30G

Tough new coated CBN grade for interrupted hard grooving

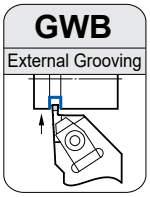
Wide insert range 1,5–6,0 mm

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

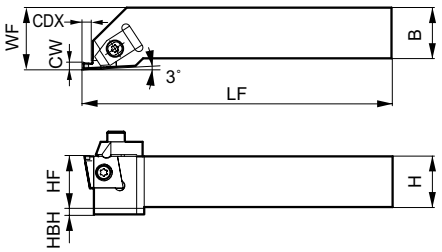
Grades

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

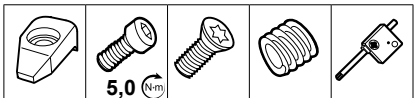
Grooving Tool Holder GWB Type



External



Spare Parts



Holders

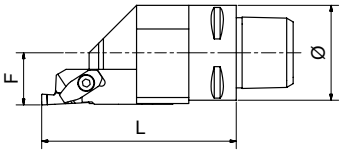
Cat. No.	Stock		Dimensions (mm)								Appl. Insert No.	Clamp finger	Clamp screw	Insert screw	Spring	Wrench
	R	L	H	B	LF	WF	HF	HBH	CW (*)	CDX						
GWB R/L 2020-45	❑	❑	20	20	151 (150)	25	20	5	1,5≤cw≤4,5	3,5 – 5,0	❶	TF 72 (Right handed) TF 73 (Left handed)	BX 0520T	BFTX 0511N	GSP 06	TRX 20
GWB R/L 2525-45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

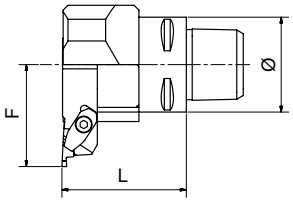
Right handed tool holders are applicable with right handed inserts.

Remark: Inserts are not included.

● = Euro stock
❑ = Delivery on request
▲ = To be replaced by new item
Recommended Tightening Torque (N·m)

ISO-PSC Polygon Modular CGA Grooving System





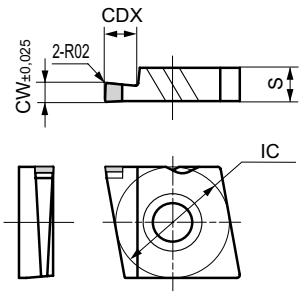
Holders

Cat. No.	R	L	Ø (mm)	F (mm)	L (mm)	Cap Screw (7,5 N·m)	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	Insert Screw (5,0 N·m)	Wrench	Spring	Clamp Finger	Cap Screw (3,0 N·m)	Wrench
GWBCM R/L 45	●	●	1,5–2,0	3,5	CGA1504□□0	BFTX0511N	TRX20	SCP4A			LH030
			2,5–3,0	4,0							
GWBCM R/L 60	●	●	3,5–6,0	5,0	CGA1506□□0						

CGA Inserts



Cat. No.	Stock BN250 R	Stock BN250 L	Stock BNC30G R	Stock BNC30G L	Stock BN2000 R	Stock BN2000 L	Dimensions (mm) CW	CDX	IC	S	Insert No.	Applicable Holder
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	4,0				
R/L 1504 300	▲	▲	●	●			3,0					
R/L 1504 350	▲	▲	●	●			3,5	5,0				
R/L 1504 400	▲	▲	●	❑			4,0					
R/L 1504 450	▲	▲	❑	●			4,5					
CGA R/L 1506 500	▲	▲	●	●		❍	5,0			6,35		GWB R/L 2525-60 GWBCM R/L-60
R/L 1506 550	▲	▲	●	●			5,5					
R/L 1506 600	▲	▲	●	❑			6,0					

Special widths available on request

Recommended Cutting Conditions

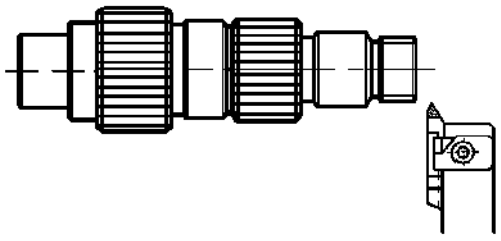
Material	Hardened steel
Cutting speed (m/min)	60 80 120 150
Feed rate (mm/rev)	0,03 0,04 0,08 0,1
Grade	BN250, BNC30G

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

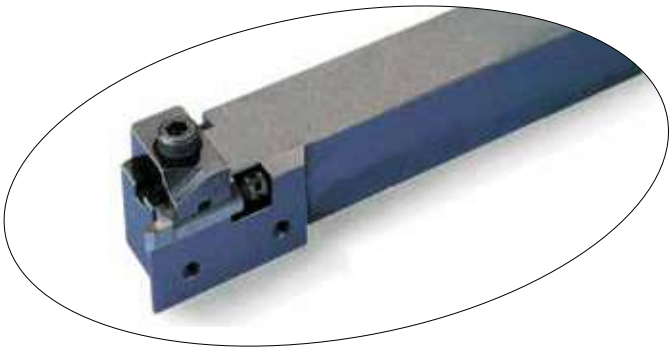
Remarks:
To avoid thermal cracking of the cutting edge when interrupted cutting please ensure workpiece remains dry.

BNGG Type

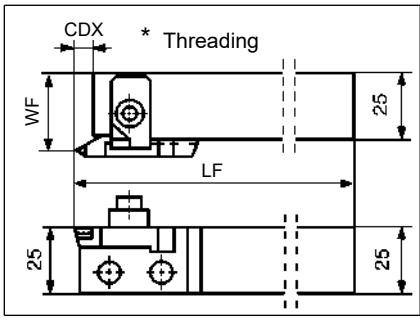
For Hardened Steel



BNGG_TT

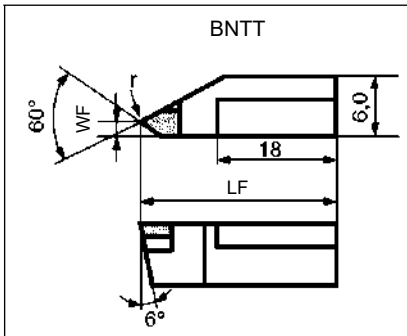


„Sumiboron“ Holders



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

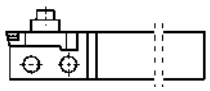
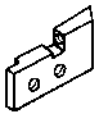
Inserts



Cat. No.	Stock				Dimensions (mm)				Applicable Holder
	BN250		BNX20						
	R	L	R	L	Pitch	RE	LF	S	
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 (for clamp) BX 0414 (for support)	LH 050 LH 030	ø1,8x45

Recommended Cutting Conditions

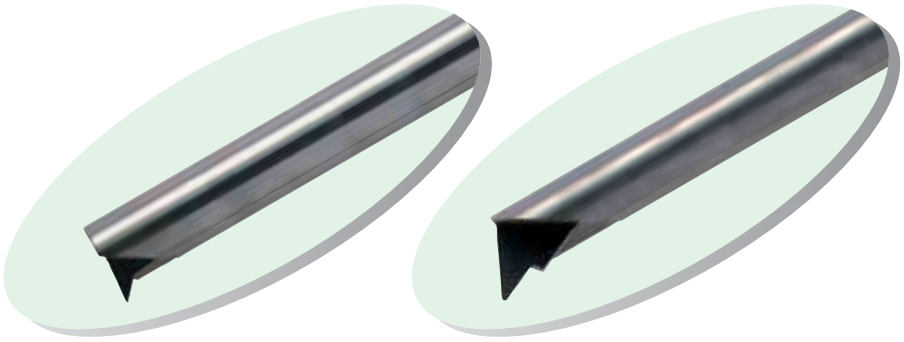
Threading

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

● = Euro stock
❑ = Delivery on request

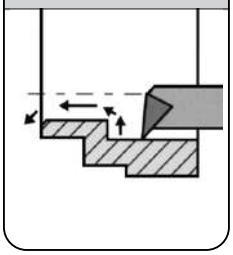
▲ = To be replaced by new item

SUMIDIA Small Hole Boring Bars
DABB Type

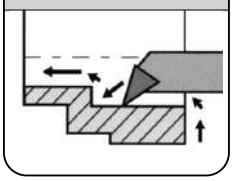


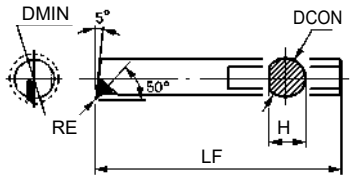
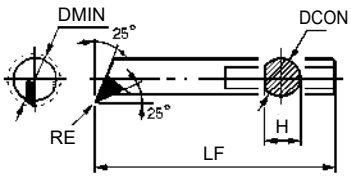
„Sumidia“ Brazed Boring Tools for Small Hole Boring

DABB-CR



DABB-NR

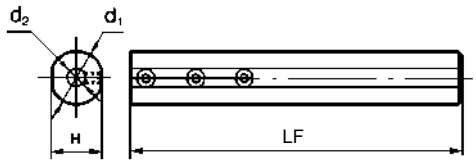


DABB (Solid carbide shank)	Cat. No.	Stock	Dimensions (mm)					Applicable Holder
		DA2200	DMIN	DCON	LF	H	RE	
For small boring 	DABB 025 CR	▲	3,0	2,5	60	2,2	0,1	HBB 2516
	DABB 035 CR	▲	4,0	3,5	60	3,2	0,1	HBB 3516
	DABB 045 CR	▲	5,0	4,5	80	4,1	0,1	HBB 4516
	DABB 060 CR	▲	7,0	6,0	80	5,2	0,1	HBB 616
For profiling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

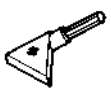
Spindle revolution	Feed rate	Depth of cut	Coolant
> 2000 rpm	0,03 – 0,1 mm/rev	0,03 – 0,2 mm	Wet

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

Expansion

Features

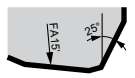
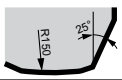
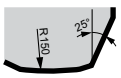
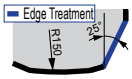
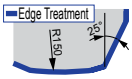
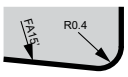
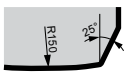
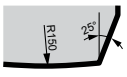
- **Drastically Reduced Runout Adjustment Time**
  Simple screw-fastening structure enables fine adjustments to be made easily.
- **Blade Through Coolant**
  Secures a supply of coolant to the cutting edge and breaks chips thoroughly.
- **Lightweight Aluminum Alloy Body**
  Utilizing aluminum alloy to 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									
			Ø 25	Ø 30	Ø 32	Ø 40	Ø 50	Ø 63	Ø 80	Ø 100	Ø 125	Ø 160
Shell	ANXA 16000RS	Aluminum Alloy	→ G78						6, 10, 14	8, 12, 18	10, 14, 22	12, 20, 28
	ANXA 16000R (Inch)	Aluminum Alloy							6, 10, 14	8, 12, 18	10, 14, 22	12, 20, 28
	ANXS 16000RS	Steel	→ G80			4, 6	4, 6, 9	6, 8, 12	6, 10, 14	8, 12, 18	10, 14, 22	
	ANXS 16000R (Inch)	Steel						6, 8, 12	6, 10, 14	8, 12, 18	10, 14, 22	
Shank	ANXS 16000E	Steel	2	3, 4	3, 4	4, 6	4, 6, 9	→ H84				
Modular	ANXS 16000M	Steel	2	3, 4	3, 4	4, 6		→ H86				

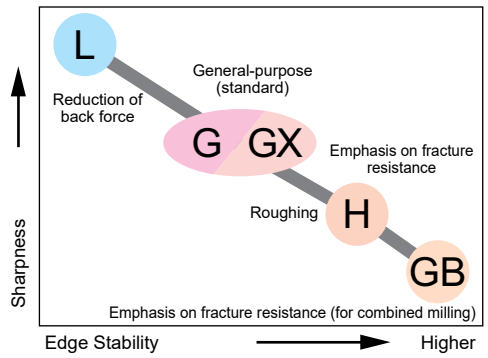
Inch Inch Bore

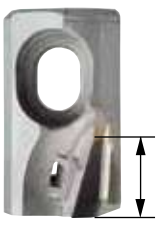
Blade Selection Guide

Work Material	N								
Applications	Finishing / Light Cutting	General Purpose	Roughing		Combined Milling *1	Corner Radius Milling	Corner Radius Milling	Finishing	Burr-free / Mirror Finishing
Features	Low Cutting Force	Standard	Long Edge	High Strength	High Strength	Corner Radius 0,4	Corner Radius 0,8	Wiper	Wiper
Type	L	G	GX	H	GB	-	-	W	WS
Cutting Edge Shape									
Edge Length(*2)	6,0 mm	6,0 mm	9,0 mm	6,0 mm	6,0 mm	6,0 mm	6,0 mm	2,0 mm	—

*1 Machining of components combining aluminum alloy and cast iron

Edge Selection Guide

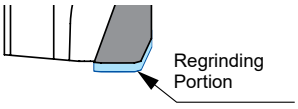


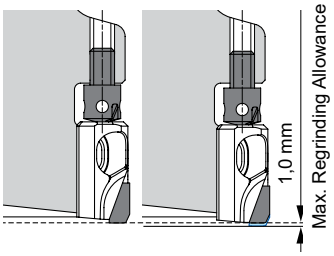


*2 Edge length
GX type = 9,0 mm

- **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.

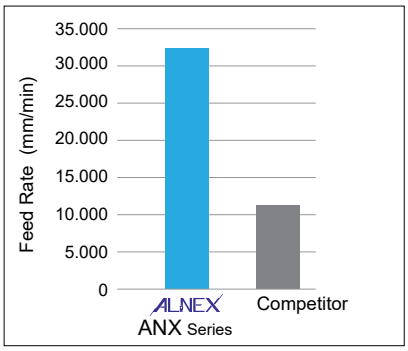
Performances

High-Speed / High-Efficiency Cutting

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

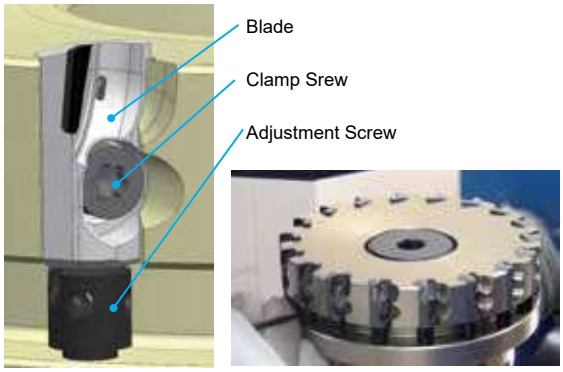
Comparison: Cutter Diameter Ø 100 mm

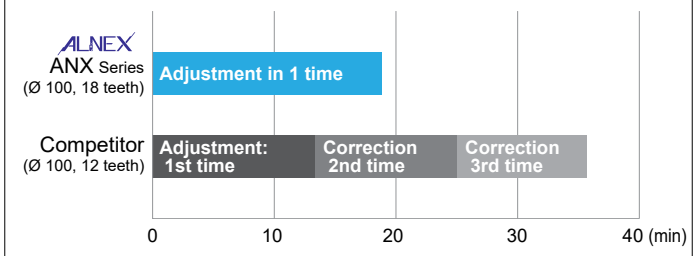
	Spindle Speed min^{-1}	Number of Teeth	Feed Rate v_f (mm/min)
ANX Series	18.000	18	32.400
Competitor	9.500	12	11.400



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

ALNEX ANX Series

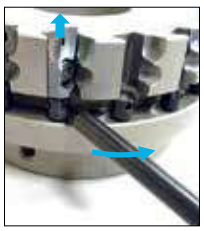
Competitor

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

Adjustment of the Blades, Runout Alignment

① 

② 

③ 

④ 

①	②	③	④
Insert the blade into its seat.	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)	Using the provided wrench for the height adjustment screw, set the height to your predetermined value.	Fully tighten the clamp bolt. (recommended torque is 2 N·m)

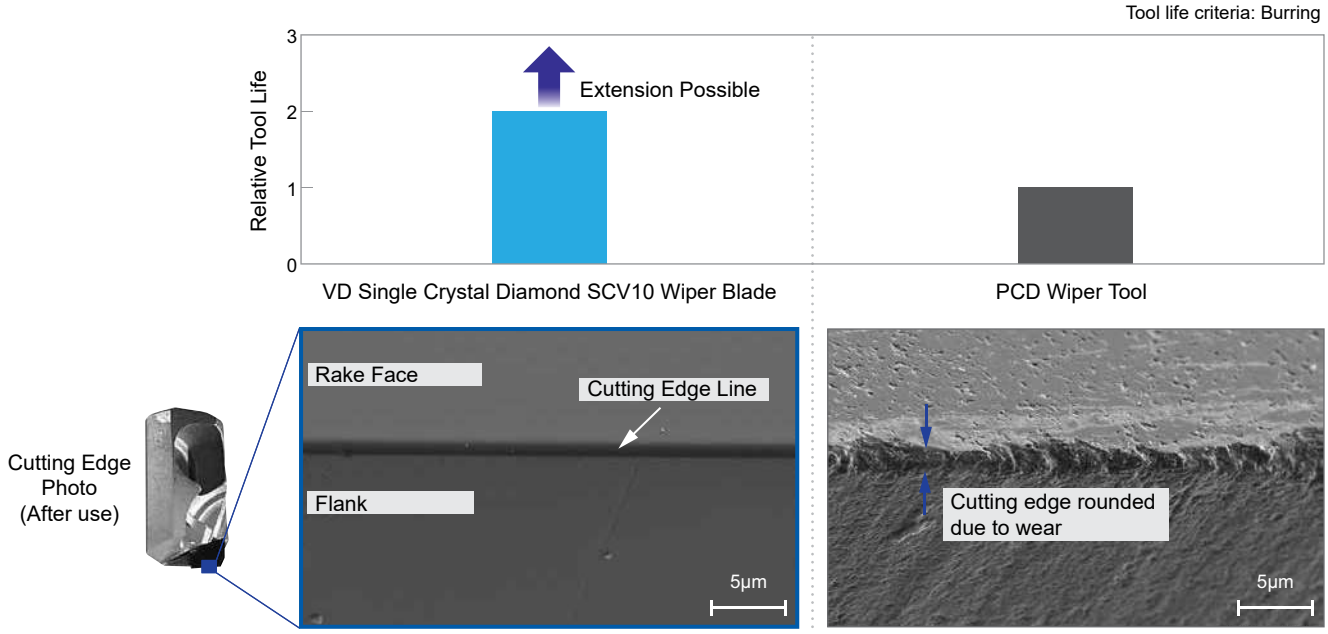
Expansion

CVD Single Crystal Diamond SCV10 Wiper Blade

Wiper blade adopts high-strength single-crystal diamond using Sumitomo Electric Hardmetal's vapour phase synthesis technology.
Sharp cutting edge realises burr-free, mirror finish surface quality in aluminum alloy machining.
Superior wear resistance maintains cutting edge sharpness for a long time, reducing total tool costs.

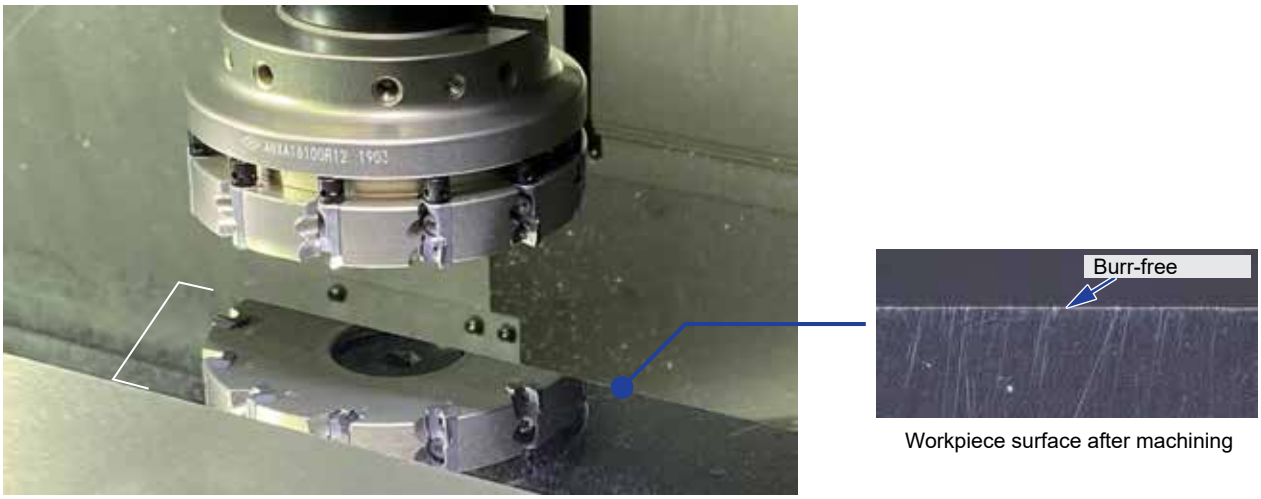
Burr-free

Sharp cutting edge and excellent wear resistance suppress burrs over the long term.



Mirror Finishing

Sharp cutting edge achieves mirror finish with cutting alone.



Workpiece surface after machining

Polycrystalline Diamond SUMIDIA DA1000 / DA90

Through the ideal combination of diamond particle size and binder, SUMIDIA DA1000/DA90 possess various features and is suitable for all kinds of applications such as machining of aluminum alloy and cemented carbide.

Grades, Features and Applications

Grade	Features	Applications	Diamond share (%)	Average grain size of diamond particles (μm)	Hardness HK (GPa)	TRS (GPa)
DA1000	High-density sintered grade made of ultra-fine grain diamond that exhibits excellent wear and fracture resistance as well as edge sharpness.	Machining of High-Silicon Aluminum Alloy, Rough, Interrupt and Finish Machining of Aluminum Alloy, Woodcraft or Wooden Board Cutting/Facing, General Finishing of Non-Ferrous Metals	90–95	≤ 0,5	50–60	≈ 2,60
DA90	Contains coarser diamond particles than other grades, giving it good wear resistance suitable for the machining of carbides and high-silicon aluminum. Shows the highest diamond content for excellent wear resistance.	Machining of High-Silicon Aluminum Alloy, Machining of Aluminum Composite (MMC), Green or Semi-Sintered Cemented Carbide & Ceramic Roughing, Machining of Sintered Ceramic/Stone/Rock	90–95	≤ 50	50–65	≈ 1,10

Grade Applications

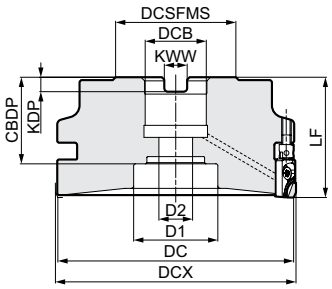
	Work Material	Applicable Grade	Example Parts
Aluminum	Sintered Aluminum, Wrought Aluminum Alloy	DA1000	Piston Liners, Machine Parts, etc.
	Alloys for Die Casting		Transmission Case, Oil Pan, Cylinder Block
	Alloys for Casting Low Si (≤ 12%)		Cylinder Head
	Alloys for Casting High Si (> 12%)		Cylinder Block
Non-ferrous metal	Non-Ferrous Sintered Alloy	DA1000	Bush
	Gunmetal, Carbon		Connecting Rod
	Fe Combined	DA90	Cylinder Block, Bearing Cap

ANXA 16000 R(S)

Expansion

Rake Angle	Radial	+5°
	Axial	+5°

3 mm 90°



Body - ANXA (Aluminum Alloy)

Dimensions (mm)

	Cat. No.	Stock	DC	DCX	DCSFMS	LF	DCB	KWW	KDP	CBDP	D1	D2	No. of Teeth	Weight (kg)
Metric	ANXA 16080RS06	❍	78	80	50	50	27	12,4	7	34	35	14	6	0,5
	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
	16100RS08	❍	98	100	50	59	27	12,4	7	34	35	14	8	0,8
	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
	16125RS10	❍	123	125	50	50	27	12,4	7	34	35	14	10	1,2
	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
	16160RS12	❍	158	160	80	63	40	16,4	9	35	52	29	12	2,6
	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 16080R06	❍	78	80	50	50	25,4	9,5	6	34	35	14	6	0,5
	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
	16100R08	❍	98	100	50	50	25,4	9,5	6	34	35	14	8	0,8
	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
	16125R10	❍	123	125	50	50	25,4	9,5	6	34	35	14	10	1,2
	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
	16160R12	❍	158	160	80	63	38,1	15,9	10	42,5	55	30	12	2,3
	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/ANB1608R), DC = DCX.
The weight includes the weight of the blade and parts (excluding the centre bolt).
All aluminium alloy bodies with a maximum blade diameter (DCX) of Ø 80 to Ø 125 have the same diameter (DCB) of the retainer hole (metric Ø 27/in Ø 25,4).

Identification Details

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

● = Euro stock
❍ = Japan stock
❑ = Delivery on request
Recommended Tightening Torque (N·m)

Blades

Dimensions (mm)

Application	SUMIDIA		CVD
High Speed / Light Cut	N	KN	N
General Purpose	N	KN	
Roughing	N	KN	

Cat. No.	DA1000	DA90	SCV10	Cutting Edge Length	RE	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-GB		●	–	6,0	–	Arc-Shaped	Combined Milling*	1
1600R-H	●	–	–	6,0	–	Arc-Shaped	Strong Edge	1
1600R-GX	❍		–	9,0	–	Arc-Shaped	Long Edge	2
1604R	❍		–	6,0	0,4	Linear	Corner Radius	3
1608R	❍		–	6,0	0,8	Linear	Corner Radius	3
1600R-W	❍		–	2,0	–	Arc-Shaped	Wiper	4
1600R-WS	–	–	❒	–	–	Arc-Shaped	Wiper	5

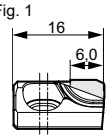
Fig. 1 

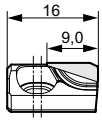
Fig. 2 

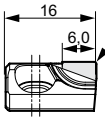
Fig. 3 

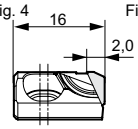
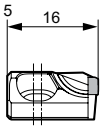
Fig. 4 

Fig. 5 

Wiper Blade

Wiper Blade

* Cast Iron/Aluminum Alloy

Recommended Cutting Conditions

Si content ≤ 12,6 %

Min. - **Optimum** - Max.

ISO	Work Material	Hard-ness	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	Hard-ness	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 DA90

Combined Milling of Cast Iron/Aluminum Alloy

Min. - **Optimum** - Max.

ISO	Work Material	Hard-ness	Cutting Speed v_c (m/min)	Feed Rate f_z (mm/t)	Grade
K N	Cast Iron/ Aluminum Alloy	–	300–**400**–500	0,05–**0,13**–0,20	DA90

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.

Max. Allowable Spindle Speed

Cat. No.	n max (min^{-1})
ANXA 16080RS06	20.000
16080RS10	20.000
16080RS14	20.000
16100RS08	18.000
16100RS12	18.000
16100RS18	18.000
16125RS10	16.000
16125RS14	16.000
16125RS22	16.000
16160RS12	14.000
16160RS20	14.000
16160RS28	14.000
ANXA 16080R06	20.000
16080R10	20.000
16080R14	20.000
16100R08	18.000
16100R12	18.000
16100R18	18.000
16125R10	16.000
16125R14	16.000
16125R22	16.000
16160R12	14.000
16160R20	14.000
16160R28	14.000

Spare Parts

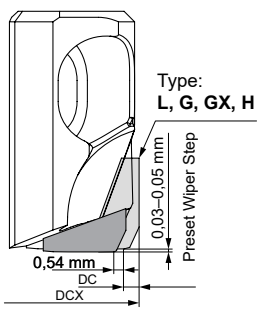
Sold separately.

Applicable Cutters	Clamp Screw		Adjustment Screw	Wrench	Adjustment Wrench	Centre Bolt		Assembly Wrench
								
ANXA 16080R(S)_ _ 16100R(S)_ _ 16125R(S)_ _ 16160R(S)_ _	BXA0310IP	2,0	HFJ	TRXW10IP	ANT	BXH1235-D33	50	HFVT
						BXH2036-D50	200	

The adjustment spanner (ANT) can also be used for height adjustment of the RF type cutters for high speed machining and the HF type cutters for high efficiency machining.

Wiper Blade Step Amount

When using the wiper blade, in order to maintain balance, be sure to use a cutter with an even number of cutting edges and place the wiper blades at opposite positions.



ANXS 16000 R(S)

Expansion

Rake Angle	Radial	+5°
	Axial	+5°

3 mm 90°

Fig. 1

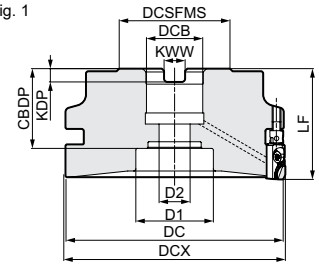
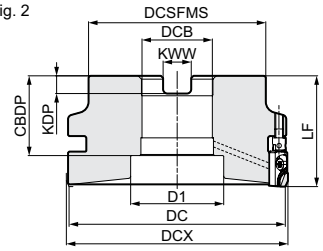


Fig. 2



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 16040RS04	❍	38	40	38,5	40	16	8,4	5,6	26	14	9	4	0,3	1
	16040RS06	●	38	40	38,5	40	16	8,4	5,6	26	14	9	6	0,3	1
	16050RS04	❍	48	50	48,5	40	22	10,4	6,3	26	18	11	4	0,4	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
	16063RS06	❍	61	63	50	40	22	10,4	6,3	26	18	11	6	0,7	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
	16080RS06	❍	78	80	50	40	27	12,4	7	34	35	14	6	1,2	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
	16100RS08	❍	98	100	80	50	32	14,4	8	32	46	–	8	1,9	2
	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
	16125RS10	❍	123	125	80	63	40	16,4	9	35	52	–	10	3,8	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 16063R06	❍	61	63	50	50	25,4	9,5	6	31	20	14	6	0,9	1
	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
	16080R06	❍	78	80	50	50	25,4	9,5	6	34	35	14	6	1,2	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
	16100R08	❍	98	100	80	50	31,75	12,7	8	36	42	–	8	1,9	2
	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
	16125R10	❍	123	125	80	63	38,1	15,9	10	42,5	52	–	10	3,9	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/ANB1608R), DC = DCX.
The weight includes the weight of the blade and parts (excluding the centre bolt).

Identification Details

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

● = Euro stock
❍ = Japan stock

❑ = Delivery on request

Recommended Tightening Torque (N·m)

Blades

Dimensions (mm)

Application	SUMIDIA		CVD
High Speed / Light Cut	N	KN	N
General Purpose	N	KN	
Roughing	N	KN	

Cat. No.	DA1000	DA90	SCV10	Cutting Edge Length	RE	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-GB		●	–	6,0	–	Arc-Shaped	Combined Milling*	1
1600R-H	●	–	–	6,0	–	Arc-Shaped	Strong Edge	1
1600R-GX	❍		–	9,0	–	Arc-Shaped	Long Edge	2
1604R	❍		–	6,0	0,4	Linear	Corner Radius	3
1608R	❍		–	6,0	0,8	Linear	Corner Radius	3
1600R-W	❍		–	2,0	–	Arc-Shaped	Wiper	4
1600R-WS	–	–	❒	–	–	Arc-Shaped	Wiper	5

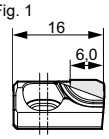
Fig. 1 

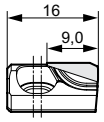
Fig. 2 

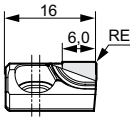
Fig. 3 

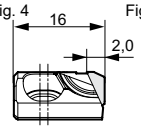
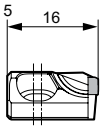
Fig. 4 

Fig. 5 

Wiper Blade

Wiper Blade

* Cast Iron/Aluminum Alloy

Recommended Cutting Conditions

Si content ≤ 12,6 %

Min. - **Optimum** - Max.

ISO	Work Material	Hard-ness	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	Hard-ness	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 DA90

Combined Milling of Cast Iron/Aluminum Alloy

Min. - **Optimum** - Max.

ISO	Work Material	Hard-ness	Cutting Speed v_c (m/min)	Feed Rate f_z (mm/t)	Grade
K N	Cast Iron/ Aluminum Alloy	–	300–**400**–500	0,05–**0,13**–0,20	DA90

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.

Spare Parts

Sold separately.

Applicable Cutters	Clamp Screw		Adjustment Screw	Wrench	Adjustment Wrench	Centre Bolt		Assembly Wrench
ANXS 16040RS_ _	BXA0310IP	2,0	HFJ	TRXW10IP	ANT	BXH0825-D13	15	HFVT
16050RS_ _						BXH1030-D16	25	
16063RS_ _								
16080RS_ _						BXH1235-D33	50	
16100RS_ _						BXH1635-D40	100	
16125RS_ _						BXH2036-D50	200	
16063R_ _	BXA0310IP	2,0	HFJ	TRXW10IP	ANT	BXH1235-D18	40	
16080R_ _						BXH1235-D33	50	
16100R_ _						BXH1635-D40	100	
16125R_ _						BXH2036-D50	200	

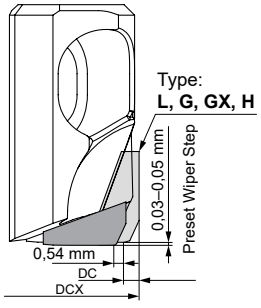
The adjustment spanner (ANT) can also be used for height adjustment of the RF type cutters for high speed machining and the HF type cutters for high efficiency machining.

Max. Allowable Spindle Speed

Cat. No.	n max (min^{-1})
ANXS 16040RS04	25.000
16040RS06	25.000
16050RS04	25.000
16050RS06	25.000
16050RS09	25.000
16063RS06	22.000
16063RS08	22.000
16063RS12	22.000
16080RS06	20.000
16080RS10	20.000
16080RS14	20.000
16100RS08	18.000
16100RS12	18.000
16100RS18	18.000
16125RS10	16.000
16125RS14	16.000
16125RS22	16.000
ANXS 16063R06	22.000
16063R08	22.000
16063R12	22.000
16080R06	20.000
16080R10	20.000
16080R14	20.000
16100R08	18.000
16100R12	18.000
16100R18	18.000
16125R10	16.000
16125R14	16.000
16125R22	16.000

Wiper Blade Step Amount

When using the wiper blade, in order to maintain balance, be sure to use a cutter with an even number of cutting edges and place the wiper blades at opposite positions.

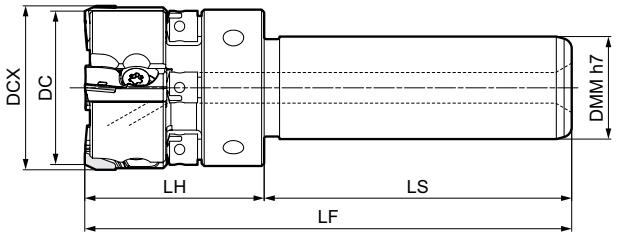


Alnex
ANXS 16000 E

Expansion

Rake Angle	Radial	-2 – 0°
	Axial	+5°

3 mm 90°



Body - ANXS (Steel)

Dimensions (mm)

Cat. No.	Stock	DC	DCX	DMM	LH	LS	LF	No. of Teeth	Weight (kg)
ANXS 16025E02	●	23	25	20	35	60	95	2	0,2
16030E03	●	28	30	20	35	60	95	3	0,3
16030E04	●	28	30	20	35	60	95	4	0,3
16032E03	●	30	32	20	35	60	95	3	0,3
16032E04	●	30	32	20	35	60	95	4	0,3
16040E04	●	38	40	20	40	60	100	4	0,4
16040E06	●	38	40	20	40	60	100	6	0,5
16050E04	❍	48	50	32	40	80	120	4	1,0
16050E06	●	48	50	32	40	80	120	6	1,0
16050E09	●	48	50	32	40	80	120	9	1,0

Blades are sold separately. If using a blade for corner radius machining (ANB1604R/ANB1608R), DC = DCX.
The weight includes the weight of the blade and parts.

Identification Details

ANX	S	16	032	E	04
Cutter Series	Steel Body	Blade Size	Cutter Diameter	Round Shank	Number of Teeth

● = Euro stock
❍ = Japan stock

❑ = Delivery on request

Recommended Tightening Torque (N·m)

Blades

Dimensions (mm)

Application	SUMIDIA		CVD
High Speed / Light Cut	N	KN	N
General Purpose	N	KN	
Roughing	N	KN	

Cat. No.	DA1000	DA90	SCV10	Cutting Edge Length	RE	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-GB		●	–	6,0	–	Arc-Shaped	Combined Milling*	1
1600R-H	●	–	–	6,0	–	Arc-Shaped	Strong Edge	1
1600R-GX	❍		–	9,0	–	Arc-Shaped	Long Edge	2
1604R	❍		–	6,0	0,4	Linear	Corner Radius	3
1608R	❍		–	6,0	0,8	Linear	Corner Radius	3
1600R-W	❍		–	2,0	–	Arc-Shaped	Wiper	4
1600R-WS	–	–	❒	–	–	Arc-Shaped	Wiper	5

Fig. 1

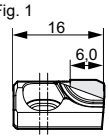


Fig. 2

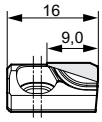


Fig. 3

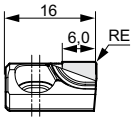
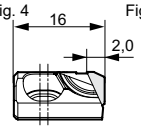
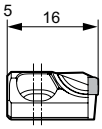


Fig. 4



Wiper Blade

Fig. 5



Wiper Blade

* Cast Iron/Aluminum Alloy

Recommended Cutting Conditions

Si content ≤ 12,6 %

Min. - **Optimum** - Max.

ISO	Work Material	Hard-ness	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	Hard-ness	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 DA90

Combined Milling of Cast Iron/Aluminum Alloy

Min. - **Optimum** - Max.

ISO	Work Material	Hard-ness	Cutting Speed v_c (m/min)	Feed Rate f_z (mm/t)	Grade
K N	Cast Iron/ Aluminum Alloy	–	300–**400**–500	0,05–**0,13**–0,20	DA90

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.

Max. Allowable Spindle Speed

Cat. No.	n max (min^{-1})
ANXS 16025E02	10.000
16030E03	10.000
16030E04	10.000
16032E03	10.000
16032E04	10.000
16040E04	10.000
16040E06	10.000
16050E04	10.000
16050E06	10.000
16050E09	10.000

Spare Parts

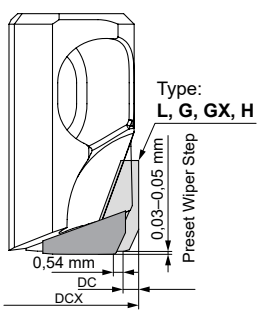
Sold separately.

Applicable Cutters	Clamp Screw		Adjustment Screw	Wrench	Adjustment Wrench	Assembly Wrench
						
ANXS 160_ _E_ _	BXA0310IP	2,0	HFJ	TRXW10IP	ANT	HFVT

The adjustment spanner (ANT) can also be used for height adjustment of the RF type cutters for high speed machining and the HF type cutters for high efficiency machining.

Wiper Blade Step Amount

When using the wiper blade, in order to maintain balance, be sure to use a cutter with an even number of cutting edges and place the wiper blades at opposite positions.



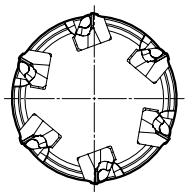
Alnex
ANXS 16000 M

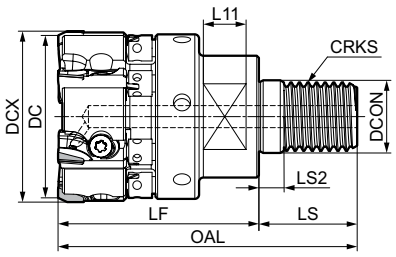
New

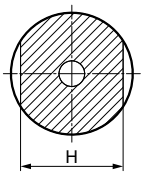
Modular Type

Rake Angle	Radial	-2 – 0°
	Axial	+5°

3 mm 90°







Body - ANXS (Steel)

Dimensions (mm)

Cat. No.	Stock	DC	DCX	DCON	CRKS	OAL	LF	LS2	LS	L11	H	No. of Teeth	Weight (kg)
ANXS 16025M12Z02	❍	23	25	12,5	**M12**	61	40	5	21	10	19	2	0,1
16030M16Z03	❍	28	30	17,0	**M16**	70	47	5	23	10	24	3	0,2
16030M16Z04	❍	28	30	17,0	**M16**	70	47	5	23	10	24	4	0,2
16032M16Z03	❍	30	32	17,0	**M16**	70	47	5	23	10	24	3	0,3
16032M16Z04	❍	30	32	17,0	**M16**	70	47	5	23	10	24	4	0,3
16040M16Z04	❍	38	40	17,0	**M16**	70	47	5	23	10	24	4	0,4
16040M16Z06	❍	38	40	17,0	**M16**	70	47	5	23	10	24	6	0,4

Blades are sold separately. If using a blade for corner radius machining (ANB1604R/ANB1608R), DC = DCX.
The weight includes the weight of the blade and parts.

Identification Details

ANX	S	16	032	M16	Z03
Cutter Series	Steel Body	Blade Size	Cutter Diameter	Screw size	Number of Blades

● = Euro stock
❍ = Japan stock
❑ = Delivery on request
Recommended Tightening Torque (N·m)

Blades

Dimensions (mm)

Application	SUMIDIA		CVD
High Speed / Light Cut	N	KN	N
General Purpose	N	KN	
Roughing	N	KN	

Cat. No.	DA1000	DA90	SCV10	Cutting Edge Length	RE	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-GB		●	–	6,0	–	Arc-Shaped	Combined Milling*	1
1600R-H	●	–	–	6,0	–	Arc-Shaped	Strong Edge	1
1600R-GX	❍		–	9,0	–	Arc-Shaped	Long Edge	2
1604R	❍		–	6,0	0,4	Linear	Corner Radius	3
1608R	❍		–	6,0	0,8	Linear	Corner Radius	3
1600R-W	❍		–	2,0	–	Arc-Shaped	Wiper	4
1600R-WS	–	–	❒	–	–	Arc-Shaped	Wiper	5

Fig. 1 Fig. 2 Fig. 3

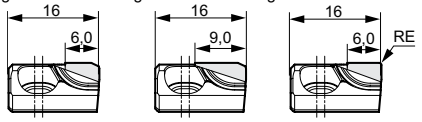
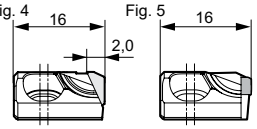


Fig. 4 Fig. 5



Wiper Blade Wiper Blade

* Cast Iron/Aluminum Alloy

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 DA90

Combined Milling of Cast Iron/Aluminum Alloy

Min. - **Optimum** - Max.

ISO	Work Material	Hardness	Cutting Speed v_c (m/min)	Feed Rate f_z (mm/t)	Grade
K N	Cast Iron/ Aluminum Alloy	–	300–**400**–500	0,05–**0,13**–0,20	DA90

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.

Max. Allowable Spindle Speed

Cat. No.	n max (min^{-1})
ANXS 16025M12Z02	10.000
16030M16Z03	10.000
16030M16Z04	10.000
16032M16Z03	10.000
16032M16Z04	10.000
16040M16Z04	10.000
16040M16Z06	10.000

Spare Parts

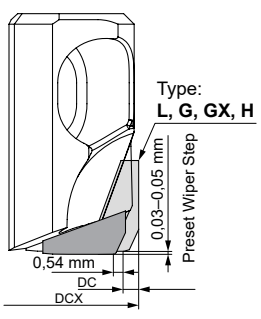
Sold separately.

Applicable Cutters	Clamp Screw		Adjustment Screw	Wrench	Adjustment Wrench	Assembly Wrench
						
ANXS160_ _M_Z_ _	BXA0310IP	2,0	HFJ	TRXW10IP	ANT	HFVT

The adjustment spanner (ANT) can also be used for height adjustment of the RF type cutters for high speed machining and the HF type cutters for high efficiency machining.

Wiper Blade Step Amount

When using the wiper blade, in order to maintain balance, be sure to use a cutter with an even number of cutting edges and place the wiper blades at opposite positions.



RF Type

High Speed Finishing of Aluminium Alloy

Fig. 1

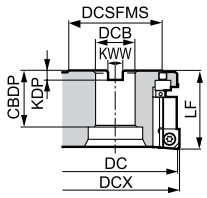
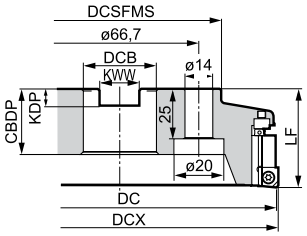


Fig. 2



■ 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

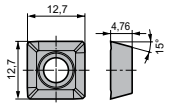


Fig. 1

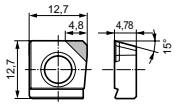


Fig. 2

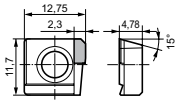
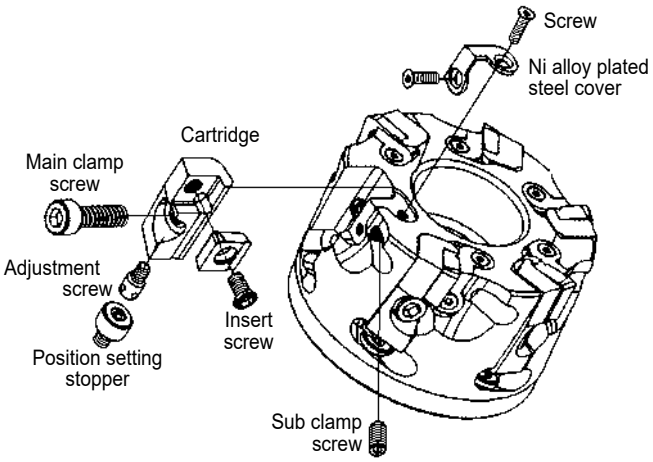


Fig. 3

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

		 10,0 N·m	 3,0 N·m			 5,0 N·m	 TH050 TH015,TH025	
Cover	Position setting stoper	Main clamp screw	Sub clamp screw	Cover clamp screw	Adjustment screw	Insert clamp screw	Hex wrench	Torque wrench
RFC	RFS	BX0620	BTD0510	FBUP2-A0-8	RFJ	BFTX0509N	TH015, TH025 TH050	TTX20

■ Setting Gauge

RF-SET

Dial-gauge is not included.

● = Euro stock
❍ = Japan stock
❑ = Delivery on request
▲ = To be replaced by new item

High Speed Finishing of Aluminium Alloy

Fig. 1

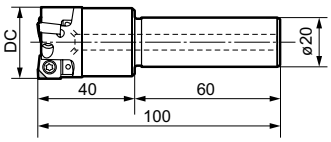
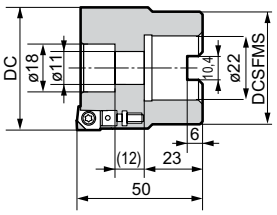


Fig. 2



Body

Cat. No.	Stock	Dimensions (mm) DC	Dimensions (mm) DCSFMS	No. of teeth	Fig.	Weight (Kg)
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 seperately.

Insert

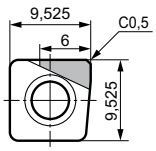


Fig. 1

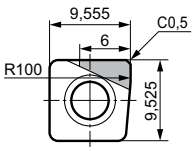


Fig. 2

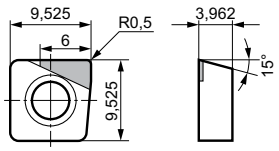


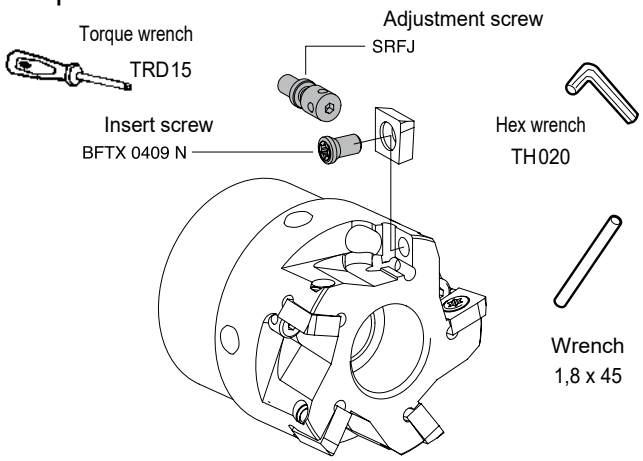
Fig. 3

Application	SUMIDIA
High Speed / Light cut	N
General Purpose	N
Roughing	N

Cat. No.	DA1000	Cutting Edge	Fig.
SNEW 09T3 ADTR-NF	❑	Standard	1
09T3 ADTR-U-NF	❑	Wiper	2
09T3 ADTR-R-NF	❍	Nose Radius	3

- 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.

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.

D.O.C. (mm) \ Feed	Feed Speed, v_f (mm/min) 2.500	4.000	5.000
	Feed Rate, f_z (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

Recommended Cutting Conditions for RF and SRF Type Cutters

Work Material		Process	Grade	Cutting Speed (m/min) RF Type	Cutting Speed (m/min) SRF Type	Feed Rate (mm/tooth)	Depth of Cut (mm) RF Type	Depth of Cut (mm) 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	–			

FMU Type

High Speed Finishing of Grey Cast Iron

Features

- High speed machining v_c = 1.500 m/min
- Excellent surface roughness Rz = 3,2 (Ra = 1,0)
- Safety structure for the centrifugal force under high speed cutting conditions
- Run-out is less than 10 µm
- 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

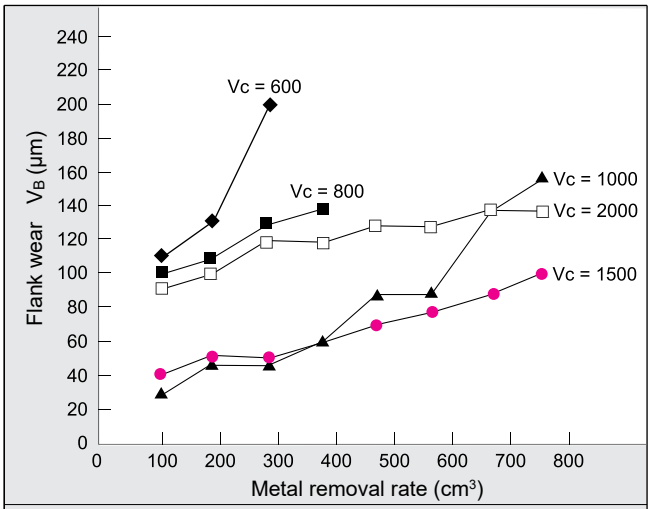
FMU Type: ø 80–ø 315 mm
Insert: SNEW1203ADTR/L
Low cutting force type: SNEW1203ADTR/L-S

Recommended Cutting Conditions

Speed: v_c = 800–2000 m/min
Feed: f_z = 0,1–0,3 mm/tooth
Depth: a_p = 0,5 mm or less
Dry cutting

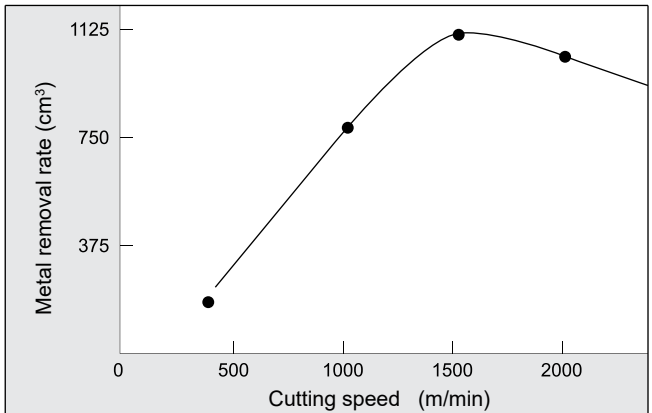
Performance

● Tool Life Diagram



Work material : GG25 H_B240 (Pearlite)
Cutting speed : v_c = 600–4000 m/min
Feed rate : f_z = 0,15 mm/tooth
Depth of cut : a_p = 0,5 mm, Dry

● Estimated Tool Life



Work material : GG25 H_B240 (Pearlite)
Cutting speed : v_c = 400–4000 m/min
Feed rate : f_z = 0,15 mm/tooth
Depth of cut : a_p = 0,5 mm, Dry

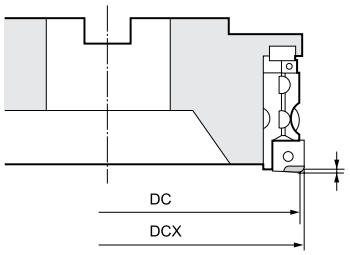
● Milling of ductile cast iron and alloy steel casting do not produce the best results.
● Dry cutting is recommended. Wet cutting will result in chipping of cutting edges in the early stages due to thermal cracking.

● = Euro stock
❍ = Japan stock
❑ = Delivery on request
▲ = To be replaced by new item
(N·m) Recommended Tightening Torque (N·m)

FMU Type

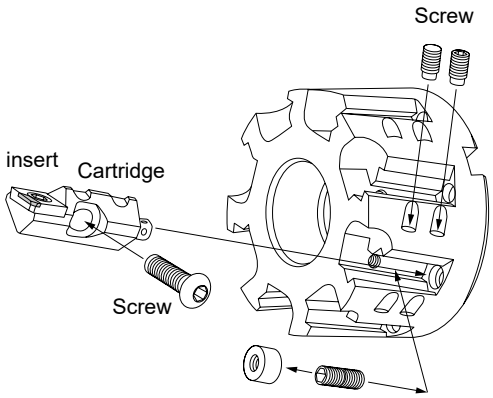
Specifications

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



Max. depth of cut: 0,5 mm

Structure



Body

Fig. 1

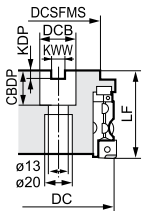


Fig. 2

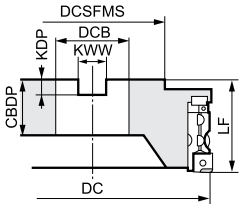


Fig. 3

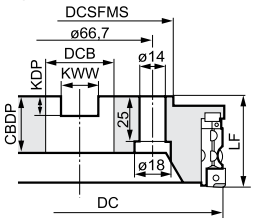


Fig. 4

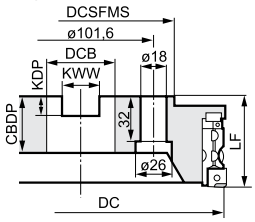
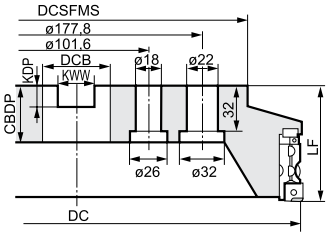


Fig. 5



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

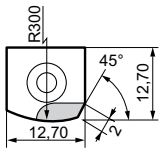
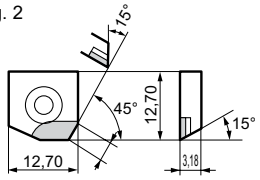


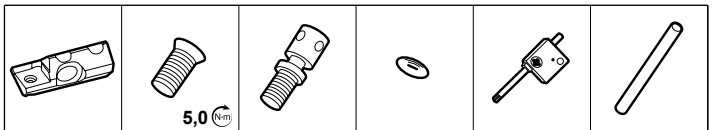
Fig. 2



Application	CBN	
High Speed / Light cut	K	K
General Purpose	K	K
Roughing		

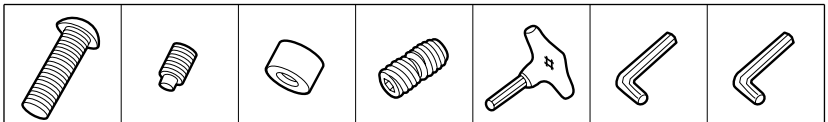
Cat. No.	BN700	BN7000	Figure
SNEW 1203 ADT R	▲	❍	1
1203 ADT R-S	▲	❍	2

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

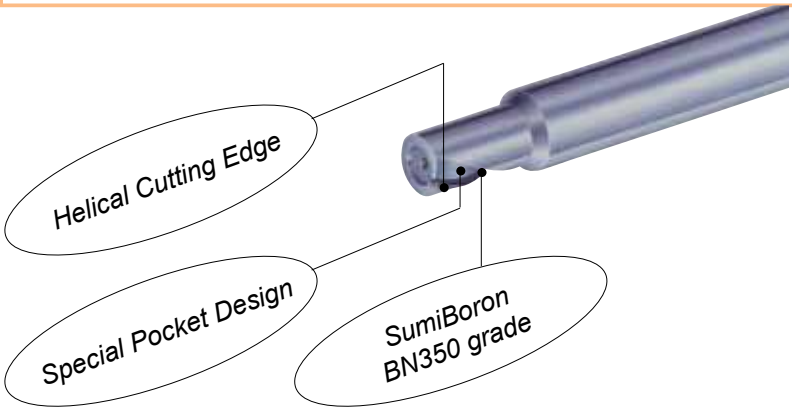
Gauge

RF-SET

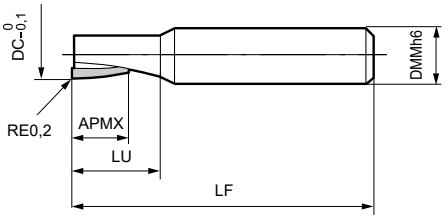
Dial-gauge is not included.

BNES Type

Spiral CBN Endmill for Hardened Steel



■ Endmills BNES Type with 1 Spiral Flute

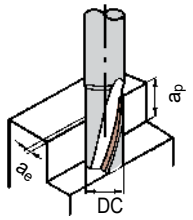


Helix angle : 15°
right-hand cut, right-hand helix

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

■ Recommended Cutting Conditions

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

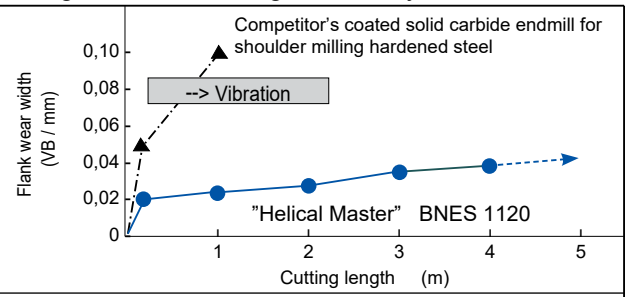
Tooling example	DC	Hardened steel (H_RC 50–57) v_c = 100–170 m/min			Hardened steel (H_RC 58–65) v_c = 80–150m/min		
	ø 6–8	$a_e \leq$ 0,1 mm	n = 4000–9000	v_f (mm/min) = 240–540	$a_e \leq$ 0,08 mm	n = 3200–8000	v_f (mm/min) = 150–370
	ø 10–12	$a_e \leq$ 0,15 mm	n = 2700–5400	v_f (mm/min) = 180–360	$a_e \leq$ 0,12 mm	n = 2100–4800	v_f (mm/min) 120–270
	ø 14–16	$a_e \leq$ 0,2 mm	n = 2000–3800	v_f (mm/min) = 140–260	$a_e \leq$ 0,15 mm	n = 1600–3400	v_f (mm/min) = 110–230

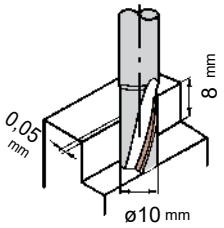
Depth of cut : $a_p \leq$ DC

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

■ Performance

● Long Tool Life and High Efficiency





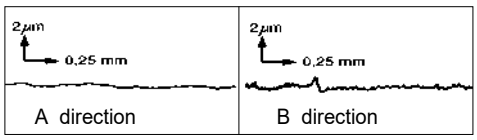
Work material: X155CrVMo12-1
Hardness: H_RC 60

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

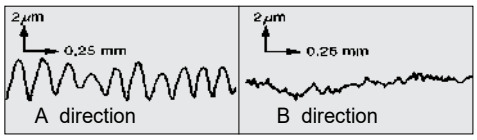
Down-cut milling
Dry cutting

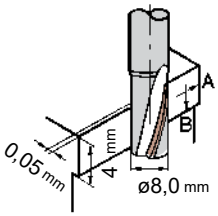
● Excellent Surface Roughness

"Helical Master" BNES 1080 ø 8,0



Conventional straight flute CBN endmill, ø 8,0





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

Down-cut milling
Dry cutting

● = Euro stock
❍ = Japan stock

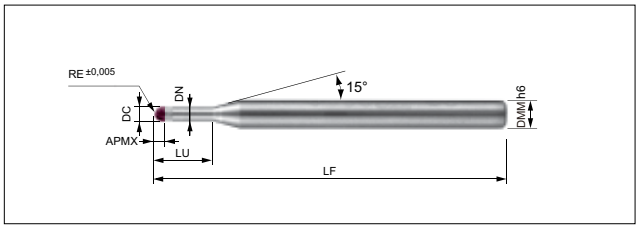
SUMIBORON "MOULD Finish Master"

BNBP Type

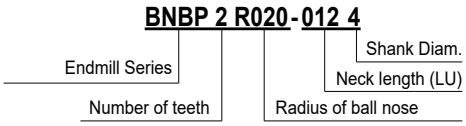
Characteristics / Application

- 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



Identification Details



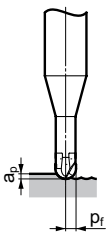
Dimensions (mm)

Cat. No.	Stock	RE	DC	APMX	LU	LF	DN	DMM
BNBP 2R0200124	●	0,20	0,4	0,3	1,2	50	0,37	4
2R0200126	●	0,20	0,4	0,3	1,2	50	0,37	6
2R0200204	❍	0,20	0,4	0,3	2,0	50	0,37	4
2R0200304	❍	0,20	0,4	0,3	3,0	50	0,37	4
2R0200404	❍	0,20	0,4	0,3	4,0	50	0,37	4
BNBP 2R0300154	●	0,30	0,6	0,4	1,5	50	0,57	4
2R0300156	●	0,30	0,6	0,4	1,5	50	0,57	6
2R0300304	❍	0,30	0,6	0,4	3,0	50	0,57	4
2R0300404	❍	0,30	0,6	0,4	4,0	50	0,57	4
2R0300504	❍	0,30	0,6	0,4	5,0	50	0,57	4
2R0300604	❍	0,30	0,6	0,4	0,6	50	0,57	4
BNBP 2R0500254	●	0,50	1,0	0,6	2,5	50	0,97	4
2R0500256	●	0,50	1,0	0,6	2,5	50	0,97	6
2R0500304	❍	0,50	1,0	0,6	3,0	50	0,97	4
2R0500404	❍	0,50	1,0	0,6	4,0	50	0,97	4
2R0500604	❍	0,50	1,0	0,6	0,6	50	0,97	4
2R0500804	❍	0,50	1,0	0,6	8,0	50	0,97	4
BNBP 2R0750404	❍	0,75	1,5	0,9	4,0	50	1,47	4
2R0750406	●	0,75	1,5	0,9	4,0	50	1,47	6
BNBP 2R1000554	●	1,00	2,0	1,4	5,5	50	1,97	4
2R1000556	●	1,00	2,0	1,4	5,5	50	1,97	6
2R1000804	❍	1,00	2,0	1,4	8,0	50	1,97	4

Grade: BN350

Recommended Cutting Conditions

Work Material		STAVAX, NAK80, SKD61 (< 52HRC)				ELMAX, DC53, SKD11 (< 62HRC)				YXR3, SKH (< 70HRC)			
RE (mm)	LU (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	ap (mm)	pf (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	ap (mm)	pf (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	ap (mm)	pf (mm)
0,2	1,2	40.000	1.000	0,005	0,010	40.000	800	0,005	0,010	40.000	600	0,005	0,005
	2,0	40.000	800	0,005	0,010	40.000	600	0,005	0,010	40.000	400	0,005	0,005
	3,0	40.000	600	0,005	0,010	40.000	500	0,005	0,010	40.000	300	0,005	0,005
	4,0	40.000	500	0,005	0,010	40.000	400	0,005	0,005	40.000	200	0,005	0,005
0,3	1,5	40.000	1.600	0,020	0,020	40.000	1.400	0,010	0,020	40.000	1.200	0,010	0,020
	2,0	40.000	1.500	0,010	0,020	40.000	1.300	0,010	0,020	40.000	1.100	0,010	0,010
	3,0	40.000	1.400	0,010	0,020	40.000	1.200	0,010	0,020	40.000	1.000	0,010	0,010
	4,0	30.000	1.200	0,010	0,010	30.000	1.000	0,010	0,010	30.000	700	0,005	0,010
	5,0	30.000	800	0,010	0,010	30.000	700	0,005	0,010	30.000	600	0,005	0,005
	6,0	30.000	600	0,005	0,010	30.000	500	0,005	0,005	30.000	400	0,005	0,005
0,5	2,5	40.000	2.800	0,040	0,050	40.000	2.800	0,030	0,040	40.000	2.200	0,020	0,030
	3,0	40.000	2.600	0,040	0,050	40.000	2.600	0,030	0,040	40.000	2.100	0,020	0,030
	4,0	40.000	2.400	0,030	0,050	40.000	2.400	0,020	0,030	40.000	2.000	0,020	0,020
	6,0	25.000	1.500	0,020	0,030	25.000	1.500	0,010	0,020	25.000	1.300	0,010	0,010
	8,0	16.000	1.200	0,020	0,020	16.000	1.100	0,010	0,020	16.000	850	0,010	0,010
0,75	4,0	32.000	2.400	0,030	0,030	32.000	2.200	0,020	0,030	32.000	2.000	0,020	0,020
1,0	5,5	40.000	4.000	0,050	0,050	40.000	4.000	0,030	0,030	40.000	3.000	0,020	0,030
	8,0	32.000	3.000	0,030	0,050	32.000	2.600	0,020	0,030	32.000	2.200	0,010	0,020

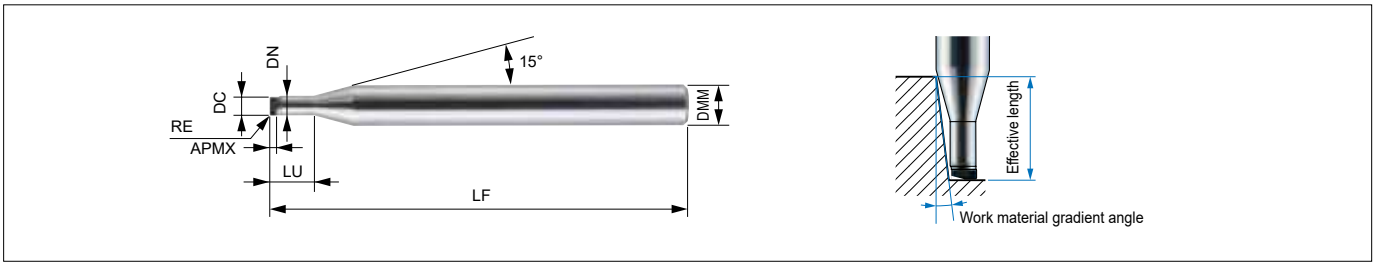


Important Notes

(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.

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

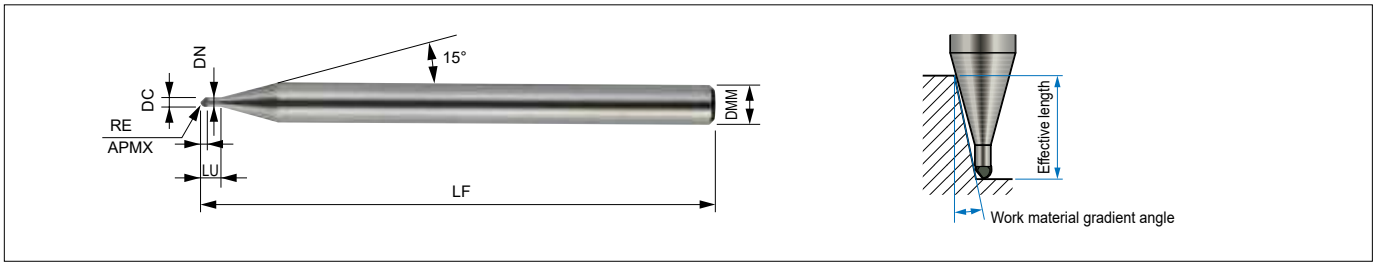
- Use a machine with high rigidity for stable cutting.
- Non-water soluble coolant recommended. Supply as a mist or external coolant.
  Take fire prevention precautions to avoid fire hazards caused by sparks igniting during machining or tool breakage.
- Shorten overhang as much as possible.
- Adjust 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

NPDB(S) Type

SUMIDIA Binderless Ballnose Endmill **NPDBS** Type / **NPDB** Type



■ NPDBS Type Body (for Standard Finishing)

Cat. No.	Stock	Dimensions (mm)							Real effective length with respect to work material gradient angle				
	NPD10	RE	DC	APMX	LU	LF	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	Dimensions (mm)							Real effective length with respect to work material gradient angle				
	NPD10	RE	DC	APMX	LU	LF	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 (Series Code) **(S)** (For standard finishing) **1** (No. of flutes) **030** (Ballnose radius) - **010** (Length below neck)

■ Recommended Cutting Conditions

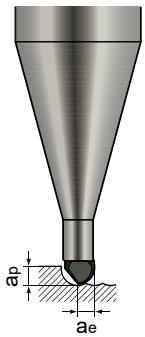
- Use a machine with high rigidity for stable cutting.
- Non-water soluble coolant recommended. Supply as a mist or external coolant.
  Take fire prevention precautions to avoid fire hazards caused by sparks igniting during machining or tool breakage.
- Shorten overhang as much as possible.
- Adjust 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

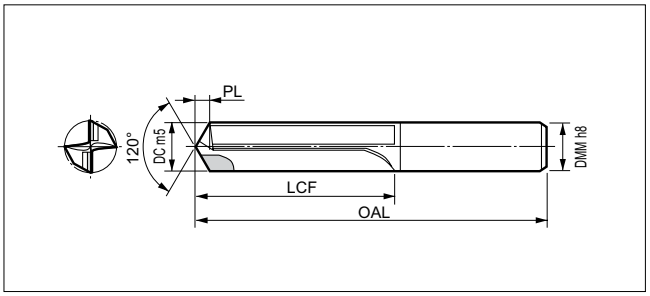


DAL/DDL/DML Type

From general to High Precision Drilling of Aluminum Alloys!

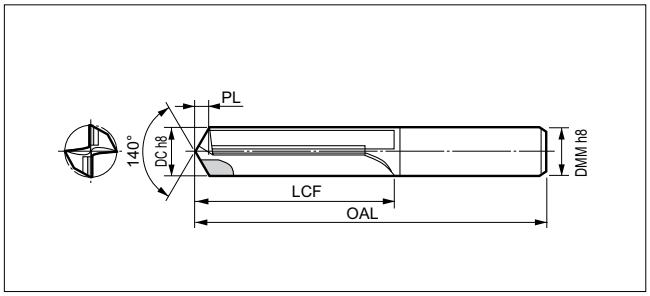
- High precision DAL type is able to produce holes of IT Class of 7 – 8.
- General DDL type is able to produce holes of IT class of 11 – 12, mainly for drilling of pre-tap holes.
- DML type is DDL type with a chamfer edge, incorporating 2 processes in one operation.

■ DAL Type



Cat. No.	DA2200	DC (DMM)	LCF	OAL	PL
DAL 0500H – 0600H	❑	Ø5 ≤ DC ≤ Ø6	31,6	84,6	1,6
0601H – 0700H	❑	Ø6 < DC ≤ Ø7	36,9	91,9	1,9
0701H – 0800H	❑	Ø7 < DC ≤ Ø8	37,2	92,2	2,2
0801H – 0900H	❑	Ø8 < DC ≤ Ø9	42,5	102,5	2,5
0901H – 1000H	❑	Ø9 < DC ≤ Ø10	42,8	102,8	2,8
1001H – 1100H	❑	Ø10 < DC ≤ Ø11	53,1	113,1	3,1
1101H – 1200H	❑	Ø11 < DC ≤ Ø12	53,4	113,4	3,4

■ DDL Type



Cat. No.	DA2200	DC (DMM)	LCF	OAL	PL
DDL 050V – 060V	❑	Ø5 ≤ DC ≤ Ø6	31,5	81,0	1,0
061V – 070V	❑	Ø6 < DC ≤ Ø7	36,2	91,2	1,2
071V – 080V	❑	Ø7 < DC ≤ Ø8	36,4	91,4	1,4
081V – 090V	❑	Ø8 < DC ≤ Ø9	41,6	101,6	1,6
091V – 100V	❑	Ø9 < DC ≤ Ø10	41,7	101,7	1,7
101V – 110V	❑	Ø10 < DC ≤ Ø11	51,9	111,9	1,9
111V – 120V	❑	Ø11 < DC ≤ Ø12	52,1	112,1	2,1

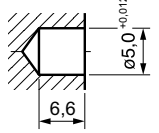
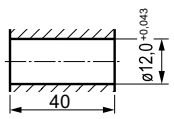
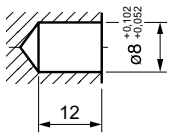
■ Recommended Conditions

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
≥ 8 ≤ 12		0,1–0,3		

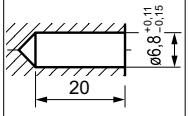
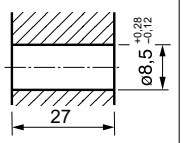
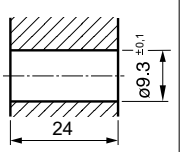
■ Important Notes

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

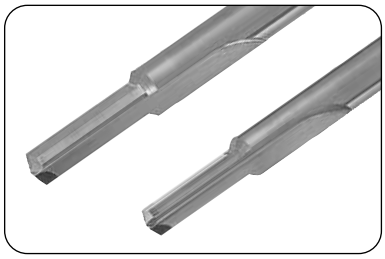
■ Application Examples (DAL Type)

Work Shape	Work	Conditions	Results
	A390 High silicon Aluminum	Vc=100m/min f=0,1mm/rev	• 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 ø10)	Vc=120m/min f=0,12mm/rev	• Average 40,000 holes/reg • Surface roughness Ry = 1 µm
	ADC10 Aluminum Die Cast	Vc=90m/min f=0,08mm/rev	• More than 50.000 holes and still running

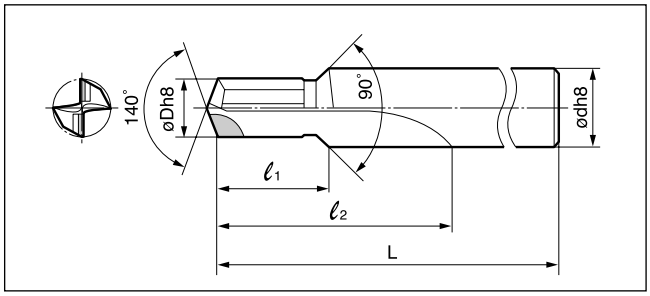
■ Application Examples (DDL Type)

Work Shape	Work	Conditions	Results
	ADC12 Aluminum Die Cast M8 Pre-tap holes	Vc=214m/min f=0,14mm/rev	• Regrind after 100.000 holes
	ADC12 Aluminum Die Cast	Vc=200m/min f=0,17 mm/rev	• Regrind after 74.000 holes (2.000m) (Preset tool change)
	AC2A Aluminum Casting	Vc=234m/min f=0,28 mm/rev	• Regrind after 80.000 holes (Preset tool change)

❑ = Delivery on request

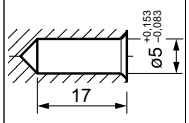
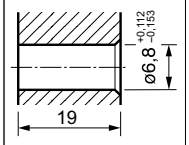
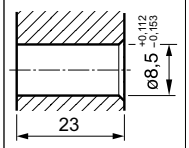


■ DML Type

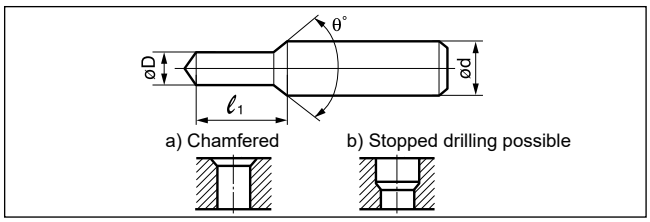


Applicable Tap Size	Cat. No.	Stock DA2200	øD	ød	L	ℓ1	ℓ2
M6	DML 050V	❑	5	8	90	18	36
M8	DML 068V	❑	6,8	10	104	24	48
M10	DML 085V	❑	8,5	12	122	30	60
M12	DML 103V	❑	10,3	14	136	36	72

■ Application Examples (DML Type)

Work Shape	Work	Conditions	Results
	AC4C-T6 Aluminum Casting M6 Pre-tap holes	Vc=100m/min f=0,1mm/rev m/c=6 spindles	• 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	Vc=210m/min f=0,15mm/rev	• 100.000 holes/reg (2.000m) and still running. • Dilling and chamfering in the same process
	AC4C-T6 Aluminum Casting M10 Pre-tap holes	Vc=250m/min f=0,2mm/rev	• 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°.