

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



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CBN Tools SUMIBORON series

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

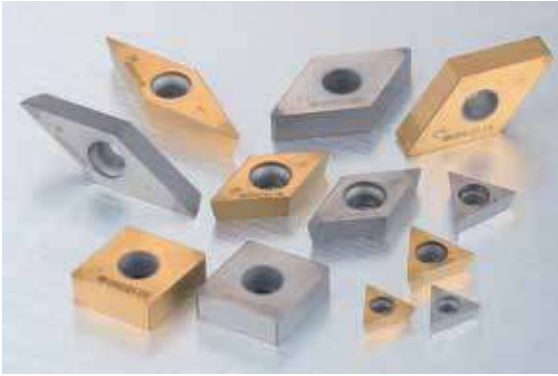
Classifications	Structure	Diagram	Grade	Work Material
With a high CBN content, where each grain is fused together, this group can be used for the machining of high-hardness materials like cast iron, heat-resistant alloys and sintered alloys.		CBN grain Metal binder	BN700	K (FC) S
			BN7000	
			BN7115	
			BN7500	
			BNS8125	K (FC/FCD) S
			BNS800	K (FC) S
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.		Special ceramic coating CBN	BNC8115	K (FC/FCD) S H
			BN1000	H
			BN2000	
			BN350	
			BNX10	
			BNX20	
			BNX25	
			BN500	K (FC/FCD)
			BNC2115	H
			BNC2125	
			BNC2010	
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.		Special ceramic coating CBN	BNC2020	H
			BNC300	
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.		CBN particles (no binder)	BNC100	
			BNC160	
			BNC200	
			BNC500	K (FC)
			NCB100	K (FC) S

Sintered Alloy

Cemented Carbide

Hard Brittle Material

Coated SUMIBORON Characteristics



New Coated SUMIBORON Series achieving

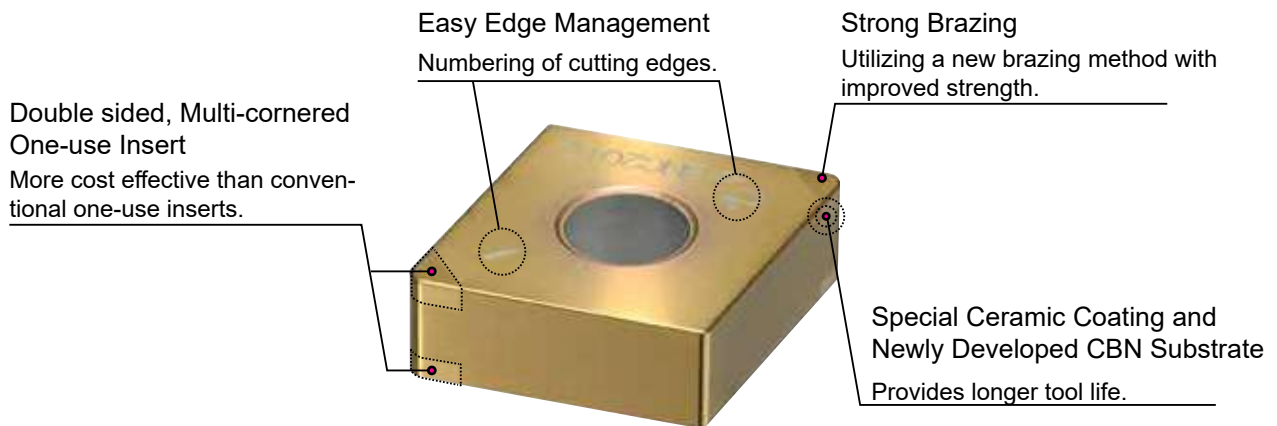
- higher speed
- higher efficiency and
- higher precision

■ General Features

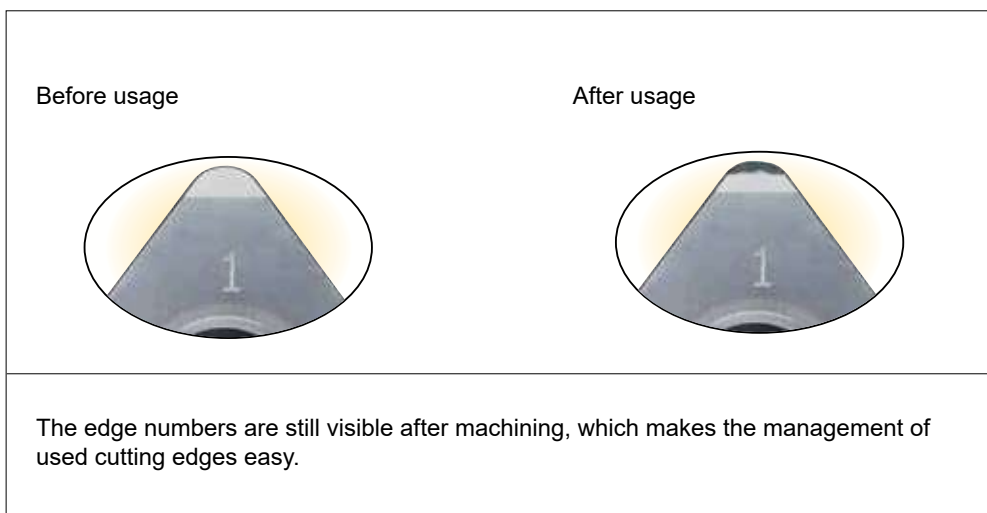
Using a high heat resistant and tough CBN substrate coupled with a special ceramic coating, this series caters to a wide variety of applications with improved precision and longer tool life as compared to conventional CBN.

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



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.

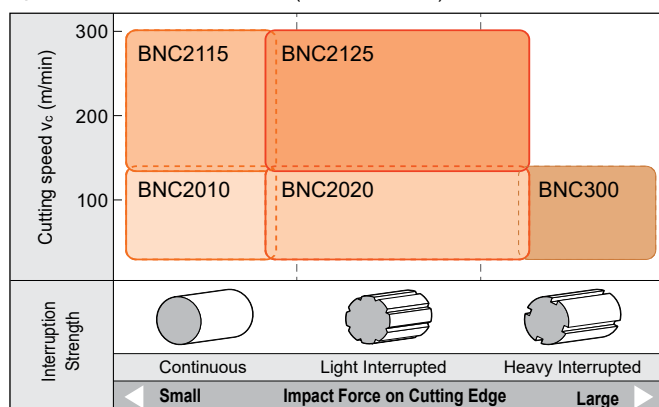
Recommended Grades

	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

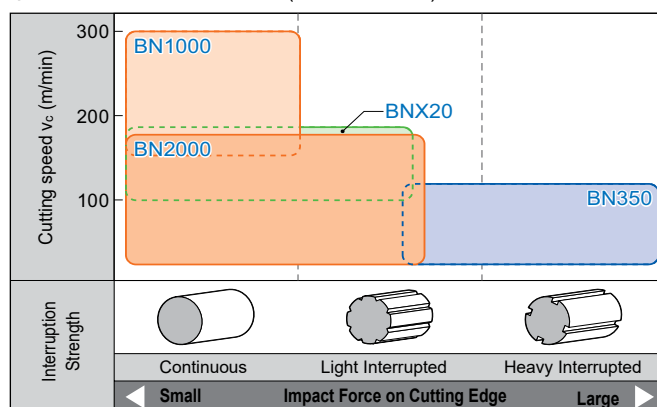
Coated SUMIBORON

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

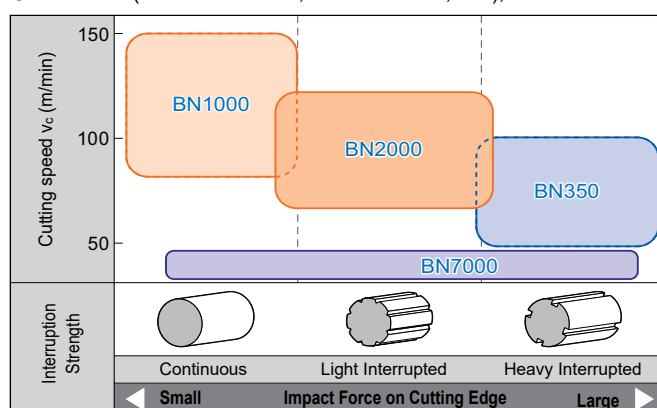


Uncoated SUMIBORON

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



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



Grade Guidance

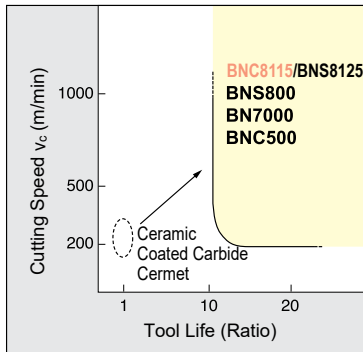
K Cast Iron Machining

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.

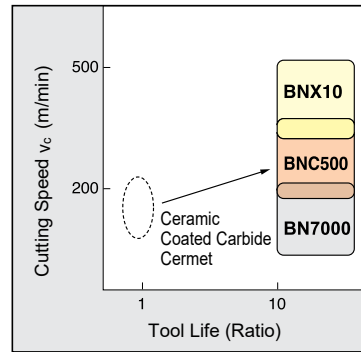
High Speed Machining

● Grey Cast Iron

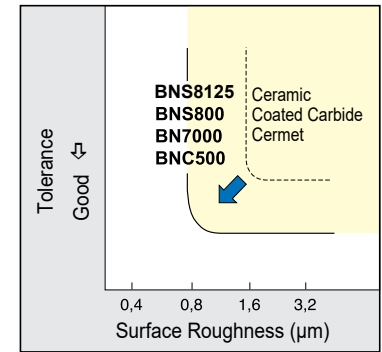


High Speed Machining

● Ductile Cast Iron



High Precision Machining

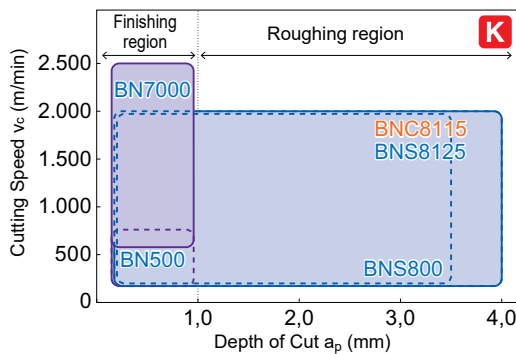


Recommended Grades

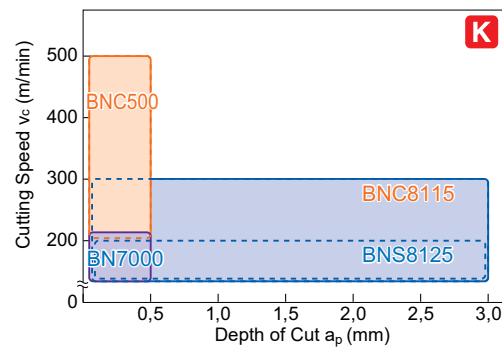
	Grade	Binder	CBN Content (%)	Grain Size (μm)	Hardness HV (GPa)	TRS (GPa)	Main Coating Components	Coating Thickness (μm)	Features
Uncoated	BNS8125 New	Al Alloy	85–90	8	39–42	0,95–1,15	–	–	Grade with 100% solid CBN structure that exhibits excellent wear and fracture resistance.
	BNS800	Al Alloy	85–90	8	39–42	0,9–1,1	–	–	Grade with solid CBN structure that has excellent thermal shock resistance.
	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.
	BN500	TiC	65–70	6	32–34	1,0–1,1	–	–	Grade optimised for cast iron cutting. Provides superior wear and fracture resistance.
Coated	BNC8115 New	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.
	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					



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.

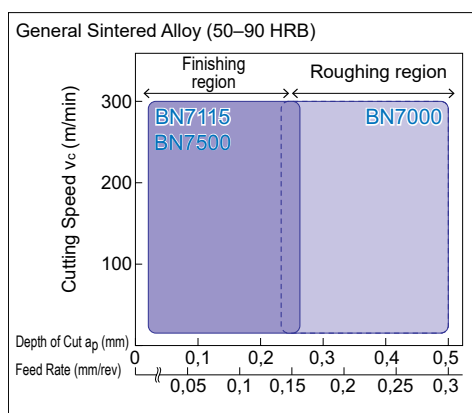
■ Recommended Grades

	Grade	Binder	CBN Content (%)	Grain Size (μm)	Hardness HV (GPa)	TRS* (GPa)	Main Coating Components	Coating Thickness (μm)	Features
Uncoated	BN7115	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.

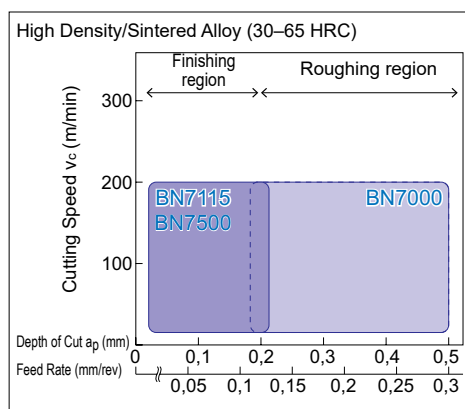
*Transverse rupture strength measured with test piece equivalent to insert CBN layer.

■ Application Range

● General Sintered Alloy



● High Density/Sintered Alloy



Titanium Alloy Cutting

■ Advantages

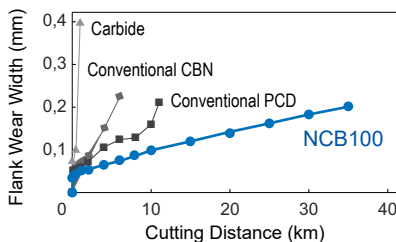
SUMIBORON enables high speed machining of titanium alloys that were previously difficult to machine with conventional tools, drastically improving machining efficiency.

■ 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.

*Transverse 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

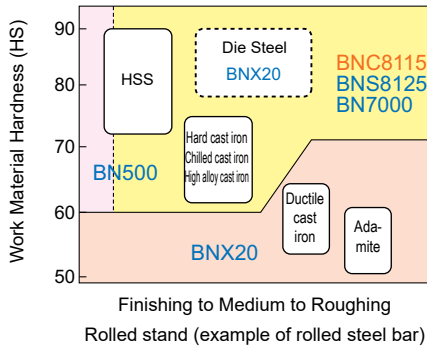
Work Material		Grade	Recommended Cutting Conditions		
Composition	Hardness (HRC)		Cutting Speed v_c (m/min) 50 100 150 200 250 300	Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
Ti-6Al-4V	30–35	NCB100	████████████████████	0,05–0,15–0,20	0,10–0,30–0,50
Ti-5Al-5V-5Mo-3Cr	32–38	NCB100	████████████████████	0,05–0,10–0,20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



■ Recommended Cutting Conditions

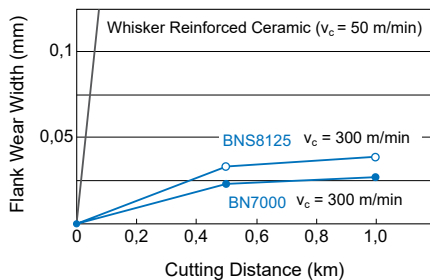
Work Material		Recommended Cutting Conditions						
Category	Hardness (HS)	Cutting Speed v_c (m/min)					Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
		20	40	60	80	100		
Adamite	≥ 40						0,1–0,5	0,2–3,0
Chilled cast iron	≥ 60						0,1–0,5	0,2–3,0
High-alloy cast iron	≥ 60						0,1–0,5	0,2–3,0
HSS	≥ 70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

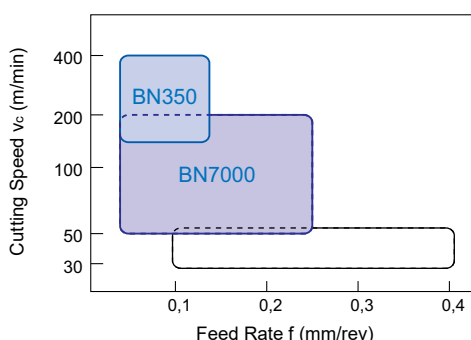
Work Material		Recommended Cutting Conditions					
Category	Material	Cutting Speed v_c (m/min)				Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
		50	100	200	300		
Ni-based self-fluxing alloy	Colmonoy No. 6					0,05–0,2	0,1–3,0
Co-based self-fluxing alloy	Stellite					0,05–0,2	0,1–1,0

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)				Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
		50	100	150	200		
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

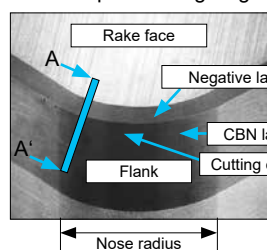
Sumiboron Inserts and Edge Preparation

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

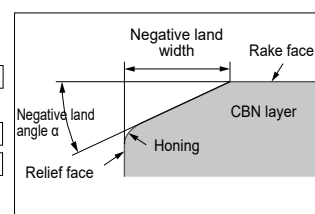
This is to avoid cutting edge fracture caused by the heavy loads generated during the machining of high hardness materials such as Hardened Steel.

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

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	Yes				
		BN350	Neg. Pos.	T01225	25°	0,12	No	—	—	—	—	—	HT	T01235	35°	0,12	No	No				
	Cast Iron	BN700	Neg./Pos.	T01215	15°	0,12	No	LF	(Sharp edge)	0°	0	No	HS	S01225	25°	0,12	Yes	Yes				
		BN7000	Neg./Pos.	T01215	15°	0,12	No	LF	(Sharp edge)	0°	0	No	HS	S01225	25°	0,12	Yes	Yes				
		Sintered Alloy	BN7115	Neg./Pos.	T01215	15°	0,12	Yes	LE	(Sharp edge)	0°	0	Yes	US	S01225	25°	0,12	Yes	Yes			
								—	LS	S00715	15°	0,05	—	—	—	—	—	—	—			
								No	LF	(Sharp edge)	0°	0	No	—	—	—	—	—	—	—		
		Exotic Alloy	BN7500	Neg./Pos.	T01215	15°	0,12	Yes	LE	(Sharp edge)	0°	0	Yes	HS	S00525	25°	0,05	Yes	Yes			
	Yes							LS	S00715	15°	0,07	Yes	—							—	—	—
	—							—	—	—	—	—	—							—	—	—
	Coated SUMIBORON	Hardened Steel	BNC2115	Neg./Pos.	S01225	25°	0,12	Yes	LS	S00515	15°	0,05	Yes	HS	S01730	30°	0,17	Yes	Yes			
			BNC2125	Neg./Pos.	S01225	25°	0,12	Yes	LS	S00515	15°	0,05	Yes	HS	S02735	35°	0,27	Yes	Yes			
BNC2010			Neg./Pos.	S01225	25°	0,12	Yes	LE	(Sharp edge)	0°	0	Yes	HS	S01730	30°	0,17	Yes	Yes				
BNC2020			Neg./Pos.	S01225	25°	0,12	Yes	LT	T00515	15°	0,05	No	HS	S02735	35°	0,27	Yes	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	Yes				
BNC200			Neg./Pos.	S01225	25°	0,12	Yes	LS	S01015	15°	0,10	Yes	HS	S01735	35°	0,17	Yes	Yes				
BNC300			Neg./Pos.	S01225	25°	0,12	Yes	LS	S00515	15°	0,05	Yes	HS	S01735	35°	0,17	Yes	Yes				
Cast Iron		BNC500	Neg./Pos.	S01215	15°	0,12	Yes	—	—	—	—	—	HS	S01225	25°	0,12	Yes	Yes				
Cast Iron, Hardened Steel	BNC8115	Neg.	S02020	20°	0,20	Yes	—	—	—	—	—	—	—	—	—	—						
Bridge-less CBN	Cast Iron, Exotic Alloy, Carbide, Cermet	NCB100	Neg./Pos.	T01215	15°	0,12	No	—	—	—	—	—	—	—	—	—	—					

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

Cutting Edge Preparation of Inserts with Wiper / Chipbreakers

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
H	Strong edge type	T	Negative land
		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

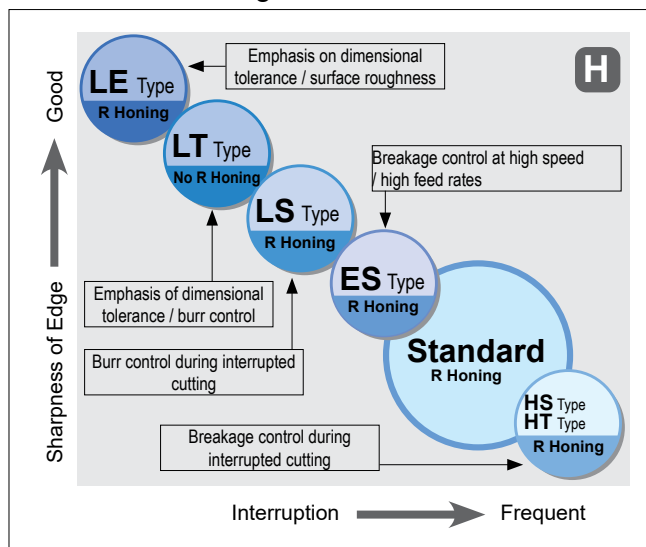


■ Characteristics

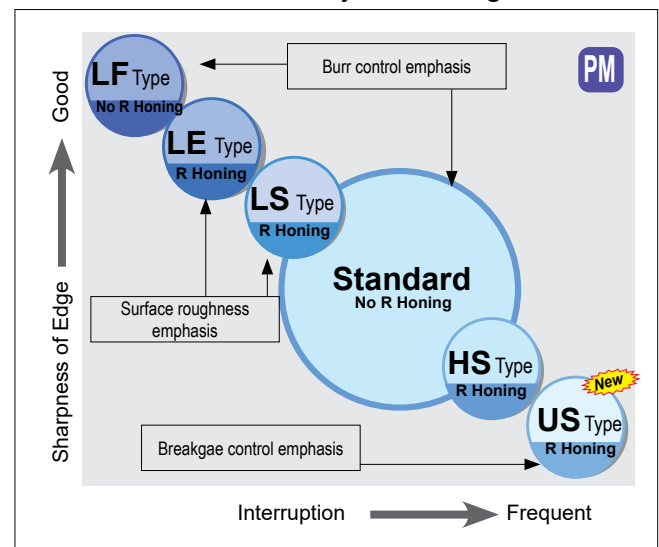
- One-use type inserts improve machining efficiency by using each cutting edge to its full potential following the numbering system on each cutting edge then throwing the insert away.
- Multi cornered inserts have a single piece of Sumiboron mounted on every useable corner. Single sided inserts use the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

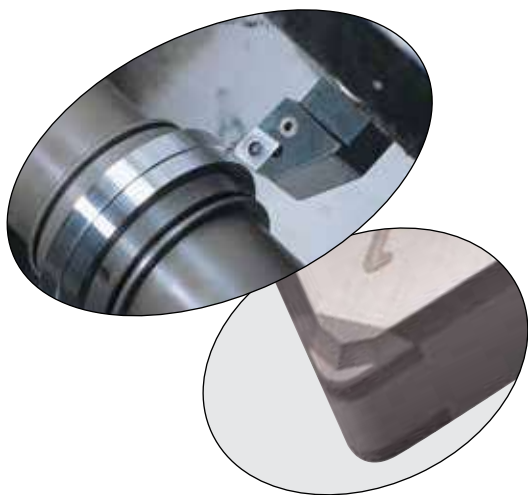


Break Master N-SV Type

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

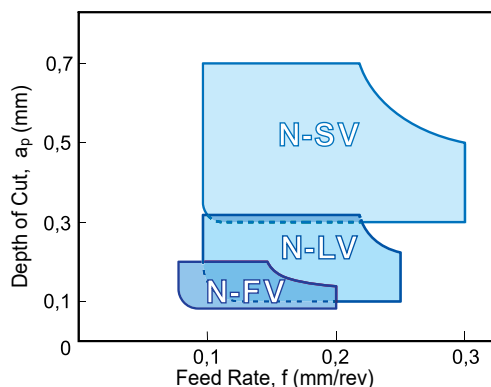
SUMIBORON Break Master N-FV /N-LV /N-SV



■ 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

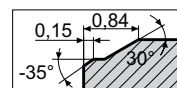


N-FV



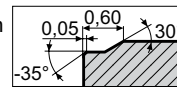
N-SV For Carburised Layer Removal

Ideal for carburised layer removal.



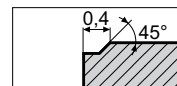
N-LV For Light Cutting

Excellent chip evacuation under conditions with depth of cut at ≤ 0.3 mm.



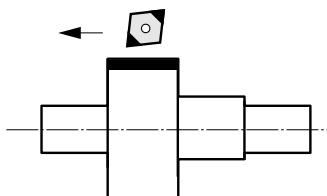
N-FV For Finishing

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

Work material: 42CrMo4, Carburised steel (shaft)
Insert: CNGG 120408 N-SV NC4 (BNC200)
Conditions: $v_c = 150$ m/min, $f = 0.15$ mm/rev, $a_p = 0.5$ mm, x 2 passes, wet



Break Master N-SV
Tool life = 200 pcs



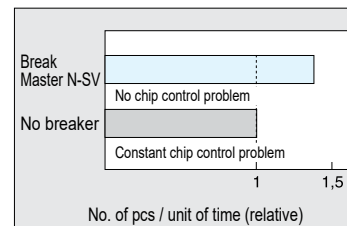
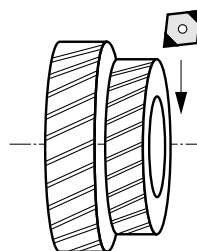
BNC200 (no breaker)
Tool life = 200 pcs



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

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

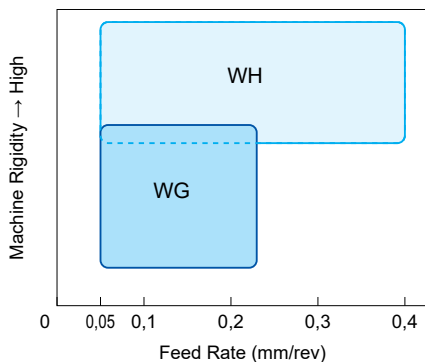


■ Characteristics

- 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

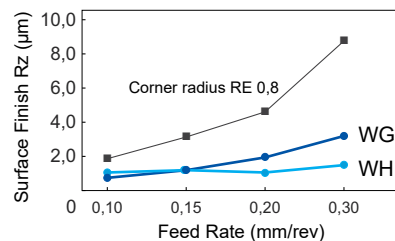


■ Application Range



- WH** type:
→ for high-rigidity workpieces and equipment
- WG** type:
→ for issues of undulation or chatter

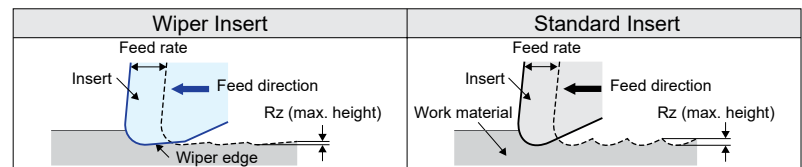
■ Finished Surface Roughness



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

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

■ Wiper Insert Operation

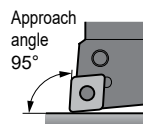


■ Tool-Setup WG / WH Wiper

CNGA / CCGW / WNGA Type Wiper

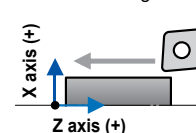
1. Use a holder with a 95° approach angle.
2. Tool compensation required.

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

External Turning



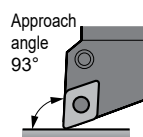
Nose Radius	Type	X-Direction	Z-Direction
RE 0,4	WG	-0,02	-0,02
	WH	-0,06	-0,06
RE 0,8/1,2	WG	-0,01	-0,01
	WH	-0,06	-0,06

DNGA / DCGW Type Wiper

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

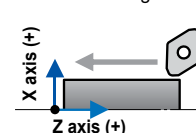
DNGA / DCGW type wiper inserts do not follow the ISO standard. Correction of the tool offset of the cutting edge as explained on the right.

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



Cutting Edge Position Compensation, Outer Processing

External Turning



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

Uncoated SUMIBORON BN1000/BN2000

H Hardened Steel



Uncoated CBN grades for hardened steel machining

General Features

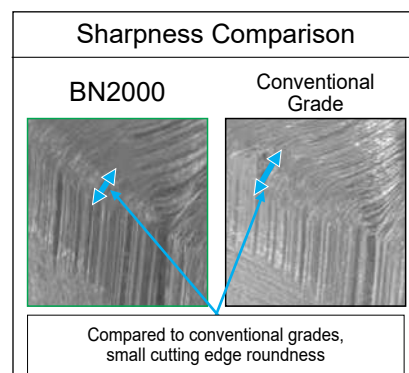
A new uncoated type of SUMIBORON that has a newly developed high-purity ceramic binder.

Both fracture and wear resistance are combined to achieve a stable tool life in a wide variety of hardened steel machining.

Available in single corner and multi-corner type inserts.

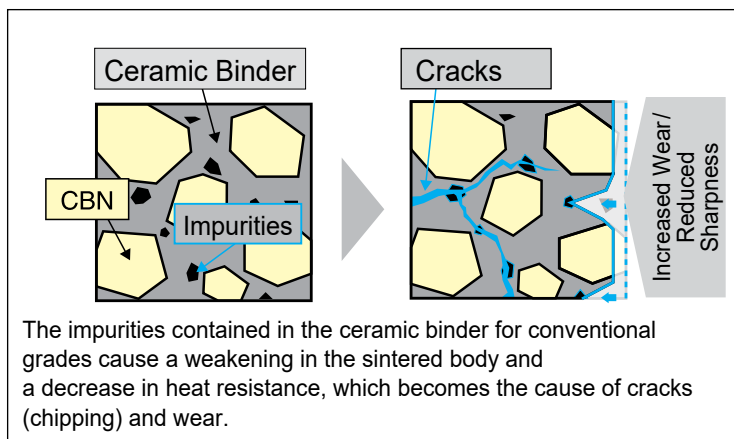
Characteristics

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

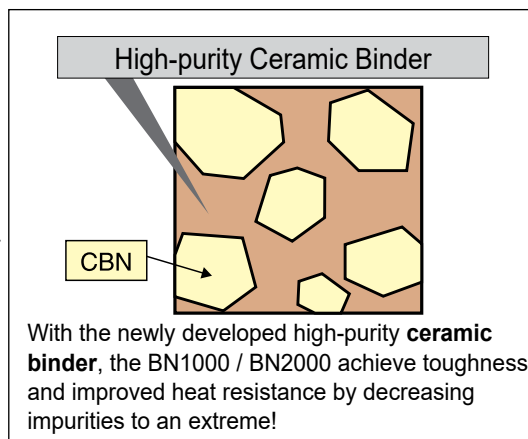


Newly Developed High-Purity Ceramic Binder

Conventional Grade

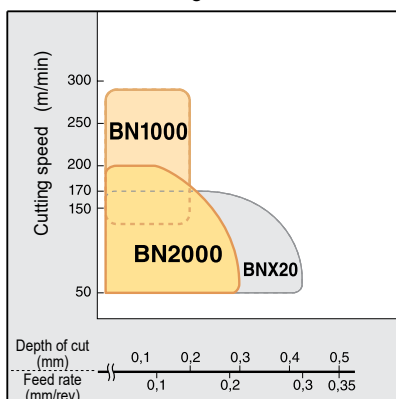


BN1000/BN2000

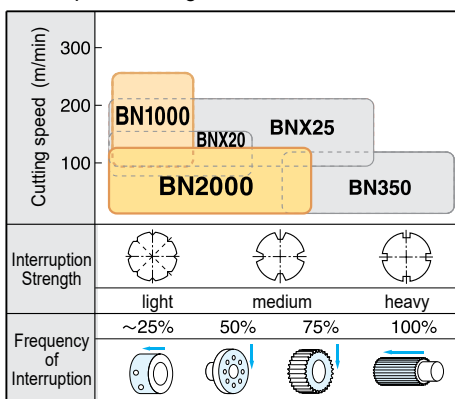


Recommended Application Range

Continuous Cutting



Interrupted Cutting



Cutting Conditions

BN1000

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

BN2000

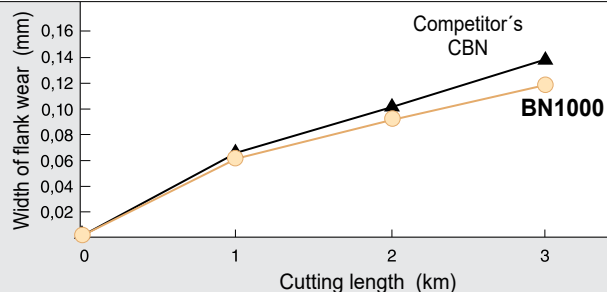
v_c (m/min)	f (mm/rev)	a_p (mm)
50 100 150 200 250	0,03-0,2	0,0-0,3
80 120		

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

■ Cutting Performance

BN1000

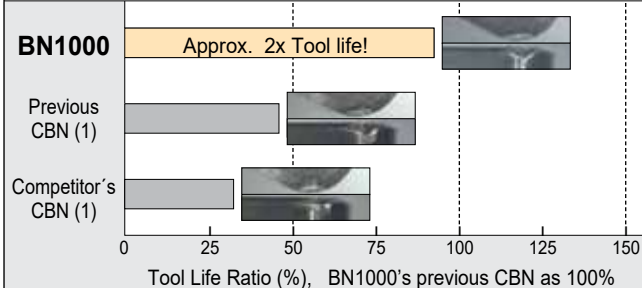
Wear Resistance Comparison



Work material: 100Cr6 (H_RC58-62), Round Bar
Insert: CNGA 120408 NU-2
Cutting data: $v_c = 150$ m/min, $f = 0.1$ mm/rev, $a_p = 0.2$ mm, dry

BN1000

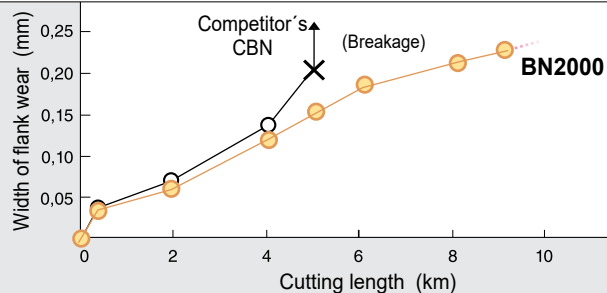
Chipping Resistance Comparison



Work material: 15CrMo5 (H_RC58-62), 8 Grooves
Insert: CNGA 120408 NU-2
Cutting data: $v_c = 150$ m/min, $f = 0.1$ mm/rev, $a_p = 0.2$ mm, dry

BN2000

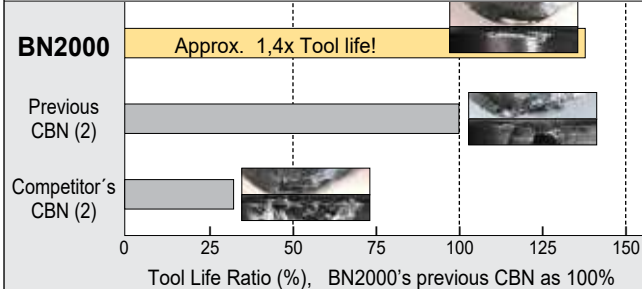
Wear Resistance Comparison



Work material: 15CrMo5 (H_RC58-62), Round Bar
Insert: CNGA 120408 NU-2
Cutting data: $v_c = 100$ m/min, $f = 0.1$ mm/rev, $a_p = 0.2$ mm, dry

BN2000

Chipping Resistance Comparison

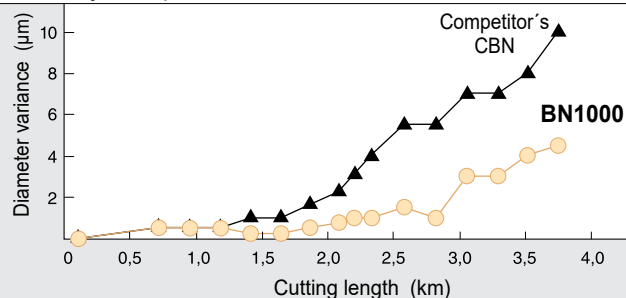


Work material: 15CrMo5 (H_RC58-62), 8 Grooves
Insert: CNGA 120408 NU-2
Cutting data: $v_c = 150$ m/min, $f = 0.1$ mm/rev, $a_p = 0.2$ mm, dry

■ Machining Precision

BN1000

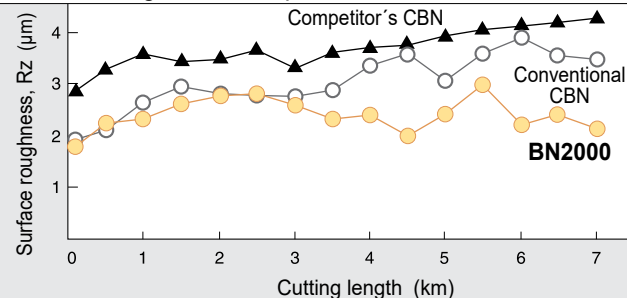
Accuracy Comparison



Work material: 15CrMo5 (H_RC58-62), Round Bar Ø 130
Insert: CNGA 120408 NU-2
Cutting data: $v_c = 200$ m/min, $f = 0.1$ mm/rev, $a_p = 0.1$ mm, wet

BN2000

Surface Roughness Comparison



Work material: 15CrMo5 (H_RC58-62), Round Bar
Insert: CNGA 120408 NU-2
Cutting data: $v_c = 100$ m/min, $f = 0.08$ mm/rev, $a_p = 0.2$ mm, dry



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-accuracy 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.

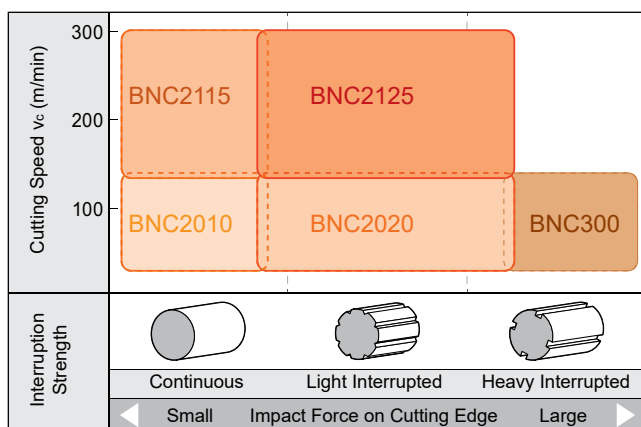
BNC2010

- 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.

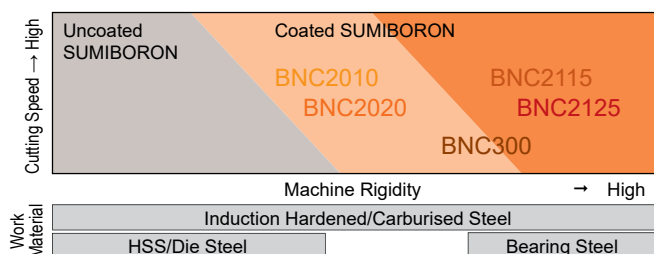
BNC2020

- 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



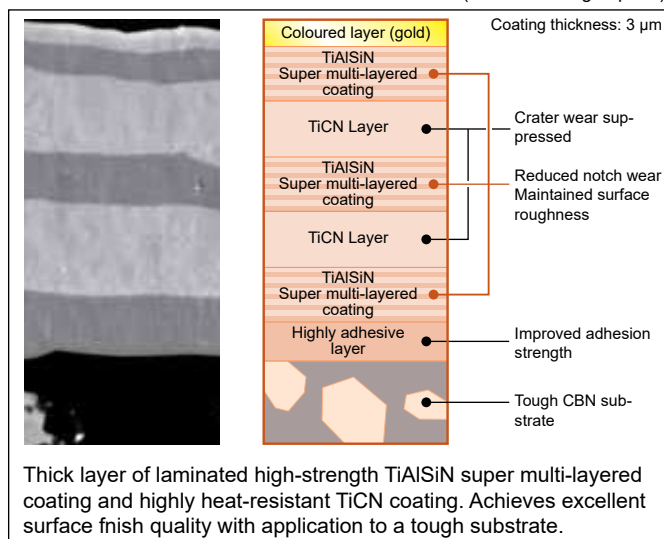
Differentiation



■ CBN Substrate und Coating Structure

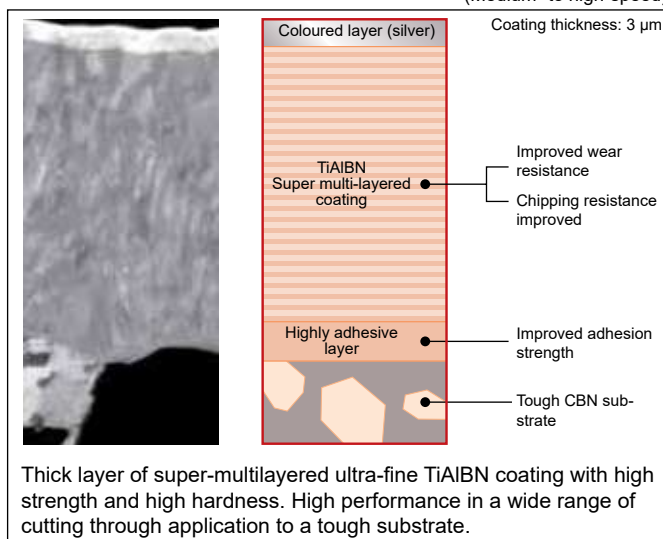
BNC2115

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



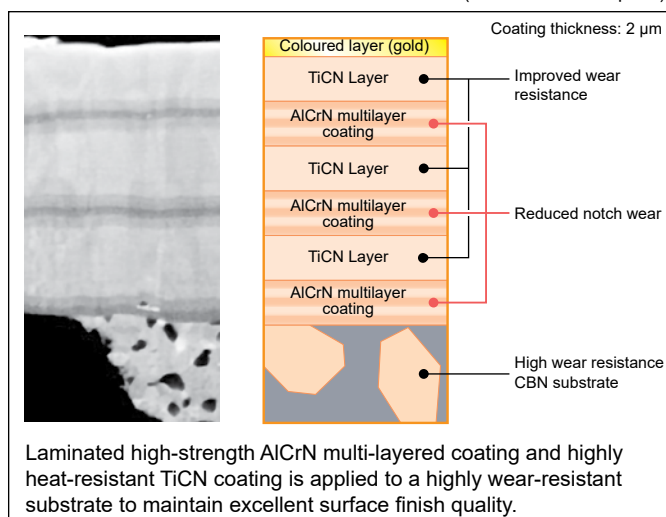
BNC2125

General Machining
(Medium- to high-speed)



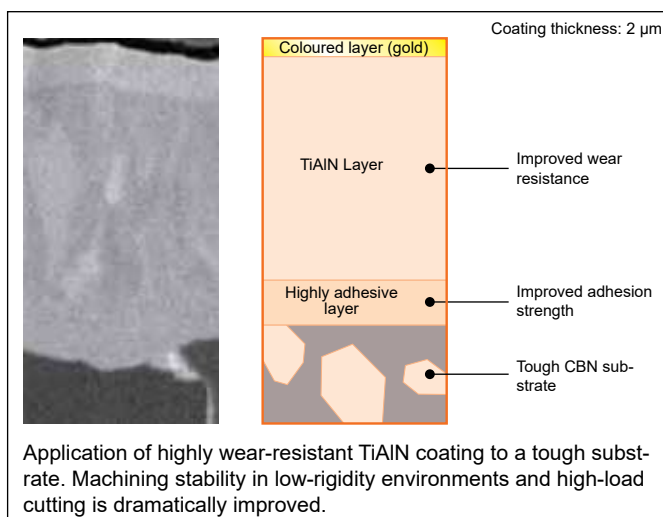
BNC2010

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



BNC2020

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



■ Recommended Cutting Conditions

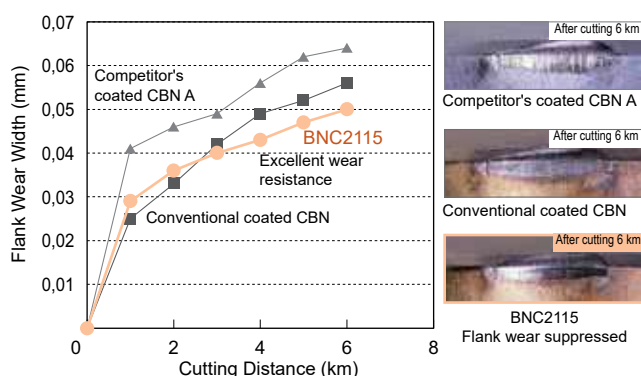
Grade	Cutting Speed v_c (m/min) Min.—Optimum—Max.	Feed Rate f (mm/rev) Min.—Optimum—Max.	Depth of Cut a_p (mm) Min.—Optimum—Max.
BNC2115	110— 180 —300	0,03— 0,10 —0,20	0,03— 0,20 —0,35
BNC2125	110— 160 —300	0,05— 0,20 —0,40	0,05— 0,30 —0,50
BNC2010	50— 140 —180	0,03— 0,10 —0,20	0,03— 0,20 —0,35
BNC2020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

Coated SUMIBORON BNC2115/BNC2125/BNC2010/BNC2020

■ Cutting Performance

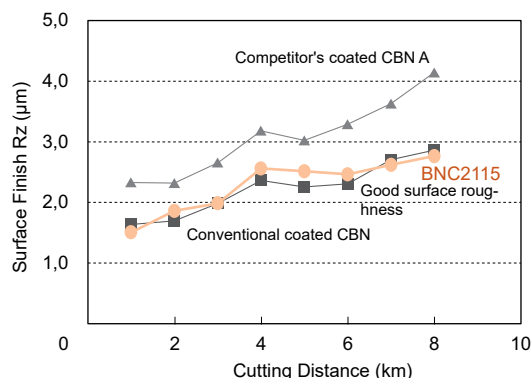
BNC2115

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

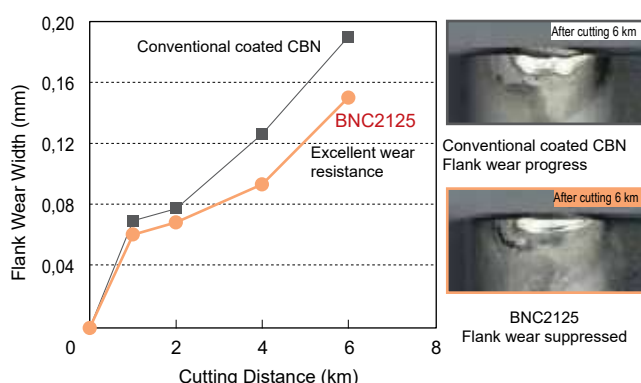
Continuous Cutting, Machined Surface Roughness



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

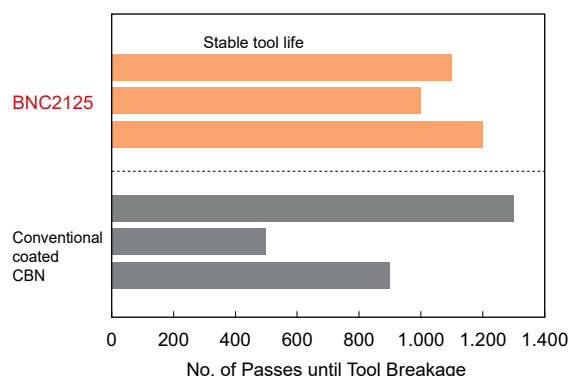
BNC2125

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

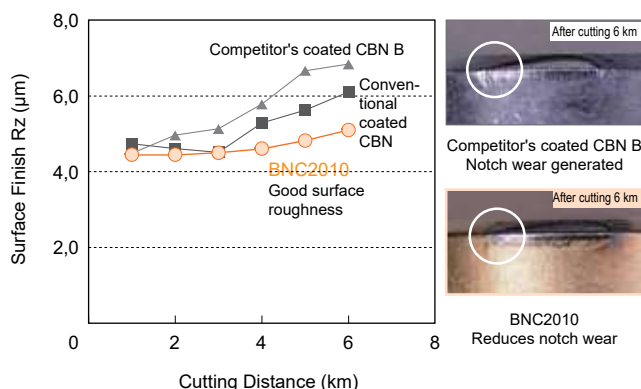
High-Load Cutting, Fracture Resistance



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

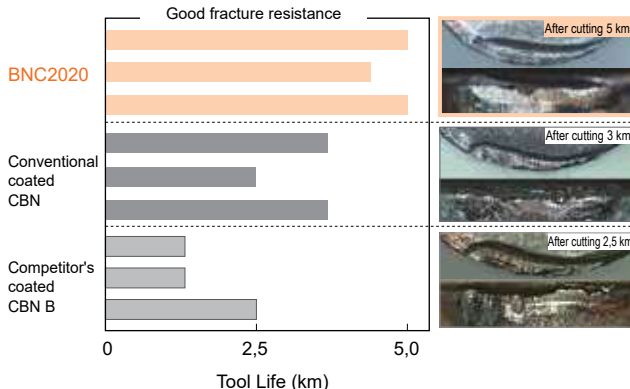
Continuous Cutting, Machined Surface Roughness



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

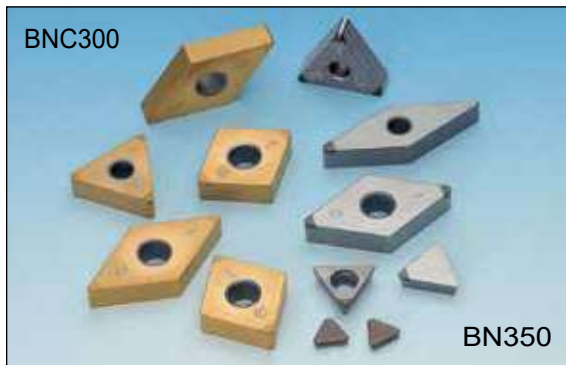
BNC2020

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

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



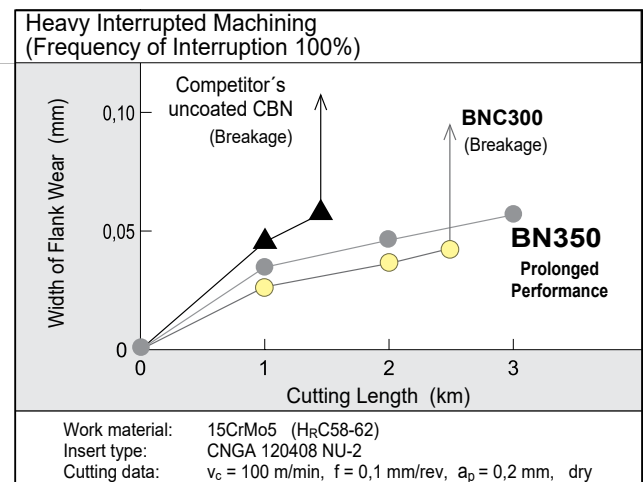
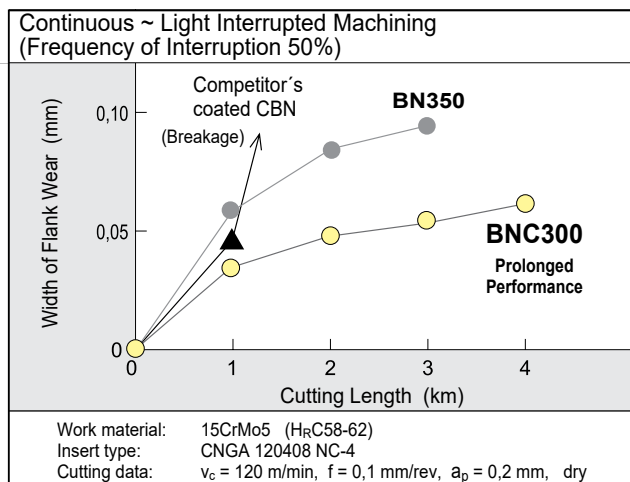
General Features

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

Characteristics

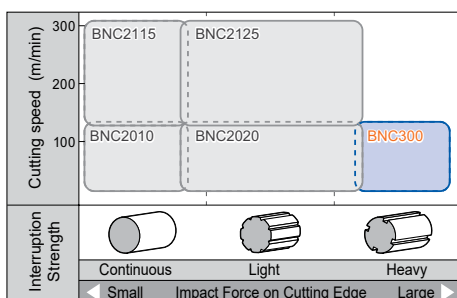
- BNC300**
- Stable and long tool life in interrupted cutting
Achieving stable and long tool life in heavy interrupted cutting, with superior fracture resistance.
 - Superior dimensional precision
Good adhesion strength, TiAlN based, high wear resistance coating. Achieving superior dimensional precision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

Performance

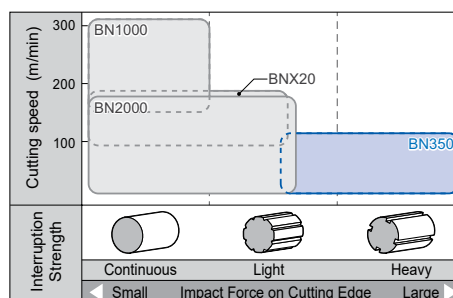


Recommended Application Range

Coated SUMIBORON



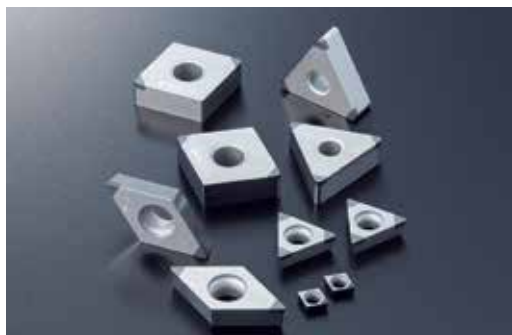
Uncoated SUMIBORON



Recommended Cutting Conditions (BNC300, BN350)

v_c (m/min)	f (mm/rev)	d_{oc} (mm)
50 100 150 200	80 120	0,03-0,2 0,03-0,3

Coolant ... Interrupted cutting: dry



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.



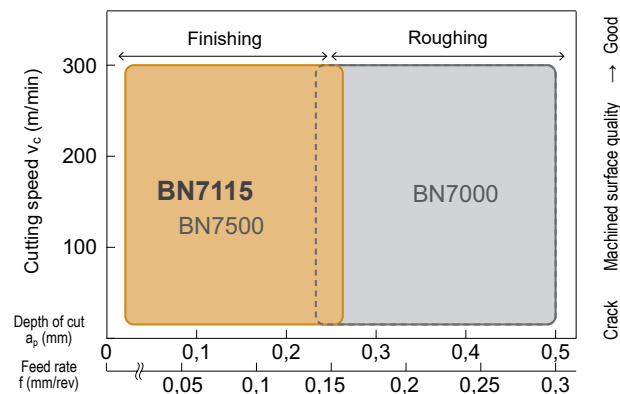
Removal of binder → comparison of CBN particles' binding strength

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

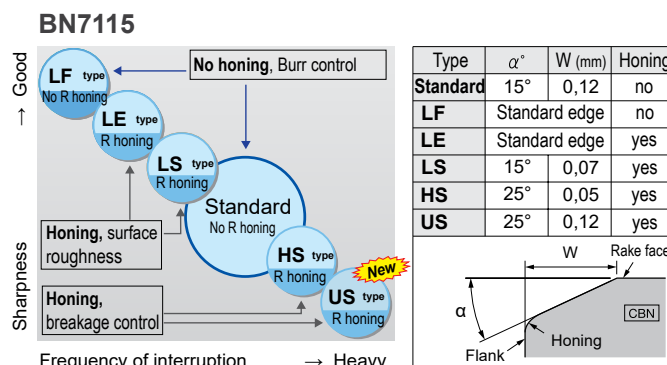
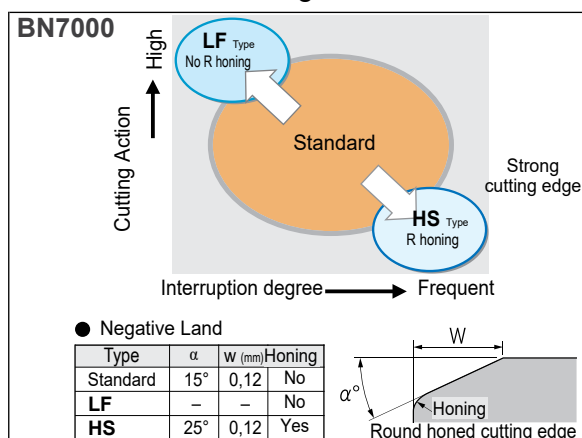
- Cast Iron **K**

Work material	Grade	Cutting conditions (min.–optimum–max.)		
		Cutting speed v_c (m/min)	Feed rate f (mm/rev)	Depth of cut a_p (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 v_c (m/min)	Feed rate f (mm/rev)	Depth of cut a_p (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

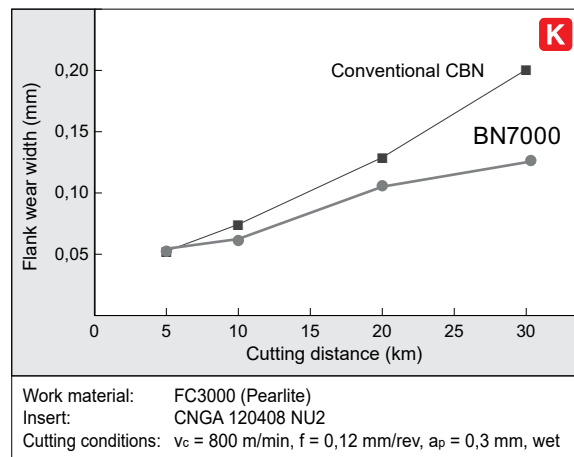
Recommended Edge Treatment



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

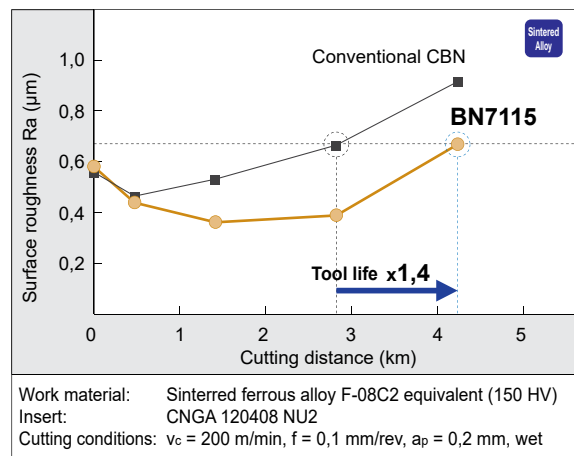
■ Cutting Performance (Cast Iron)

● BN7000 Continuous Cutting (Flank Wear)

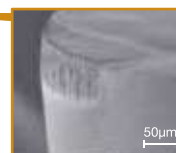
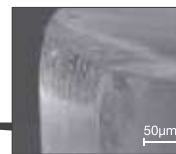
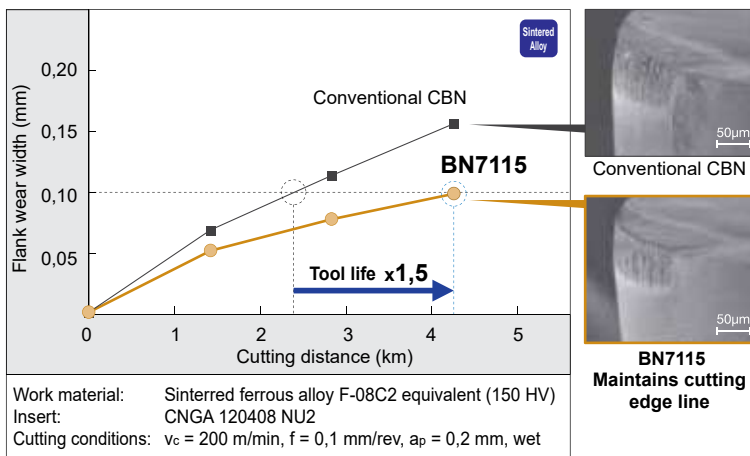


■ Cutting Performance (Sintered Alloy)

● BN7115 Continuous Cutting (Surface Roughness)

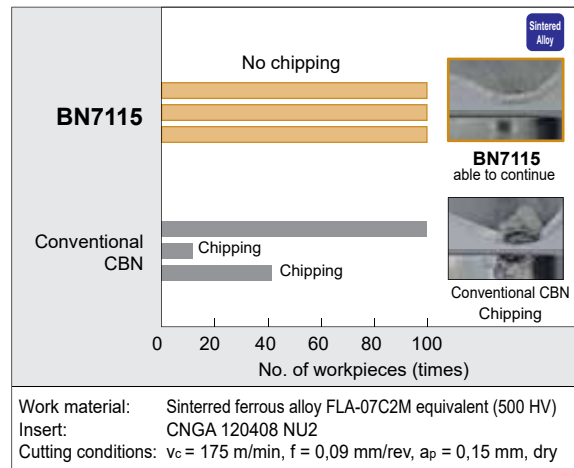


● BN7115 Continuous Cutting (Wear Resistance)

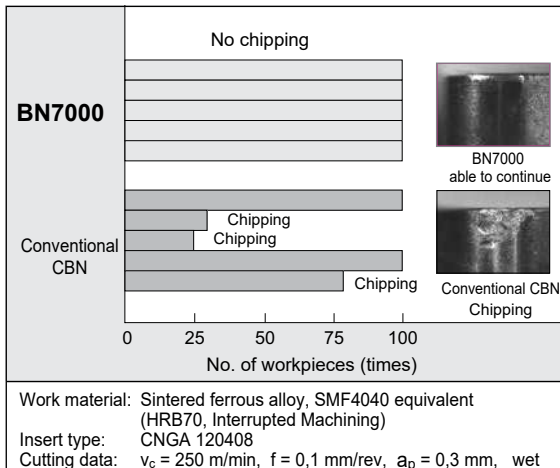


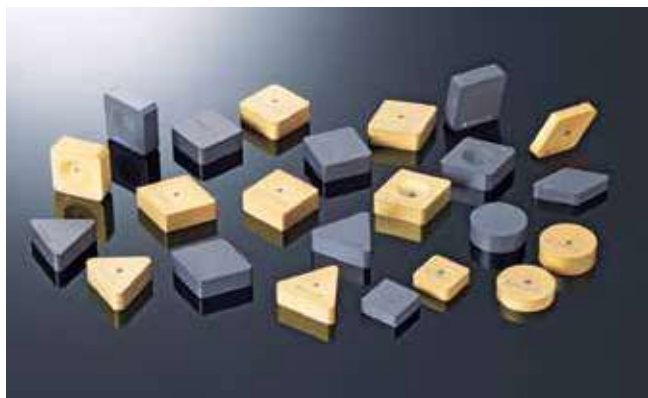
BN7115 Maintains cutting edge line

● BN7115 Interrupted Cutting (Fracture Resistance)



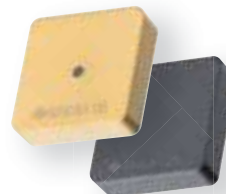
● BN7000 Interrupted Cutting (Fracture Resistance)





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.



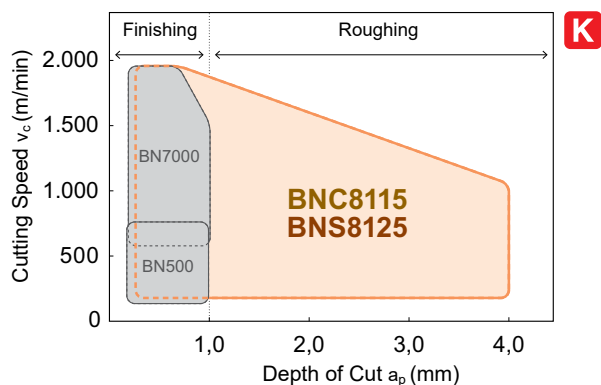
Features

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.

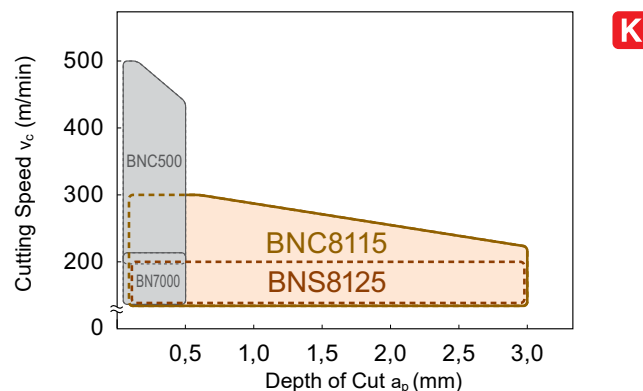
Application Range

Grey Cast Iron

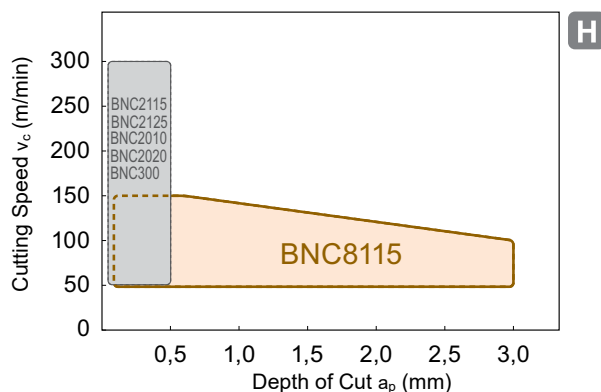


Wet machining is recommended for grey cast iron. In case of dry machining, our 1st recommendation are BNC8115/ BNS8125 for both roughing and finishing.

Ductile Cast Iron



Hardened Steel



Recommended Cutting Conditions

Cast Iron (Turning)

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)

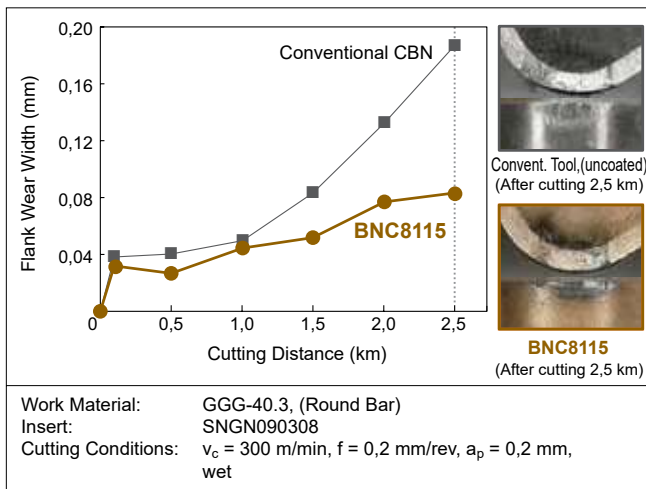
Work Material	Grade	Cutting Conditions Min.—Optimum—Max.		
		Cutting Speed v_c (m/min)	Feed Rate f (mm/rev)	Depth of Cut a_p (mm)
Hardened Steel	BNC8115	50–100–150	0,10–0,25–0,40	≤ 3,0

Cast Iron (Milling)

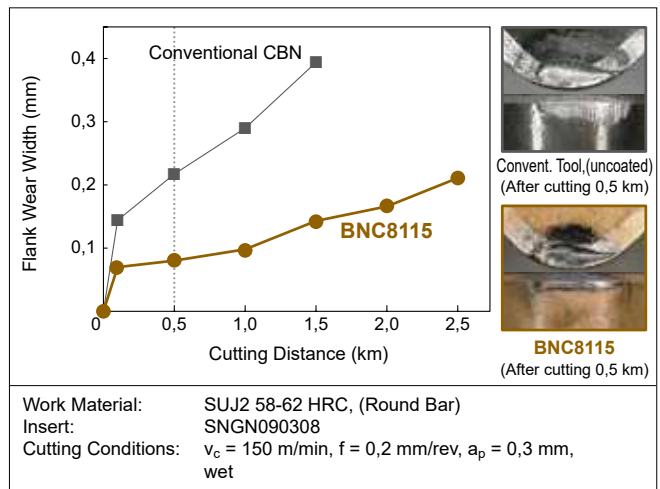
Work Material	Grade	Cutting Conditions Min.—Optimum—Max.		
		Cutting Speed (m/min)	Feed Rate (mm/rev)	Depth of Cut (mm)
Grey Cast Iron	BNC8115	800–1.400–2.000	0,10–0,50–1,00	≤ 4,0
	BNS8125	800–1.400–2.000	0,10–0,50–1,00	≤ 4,0

■ BNC8115 Cutting Performance

● Wear Resistance (Ductile Cast Iron Machining) K

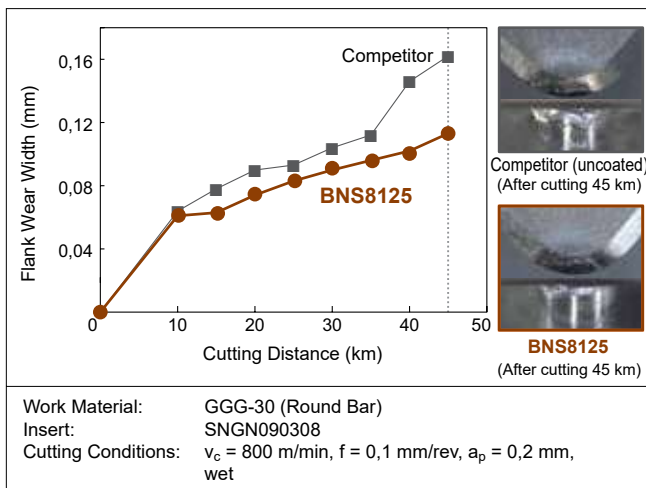


● Wear Resistance (Hardened Steel Machining) H

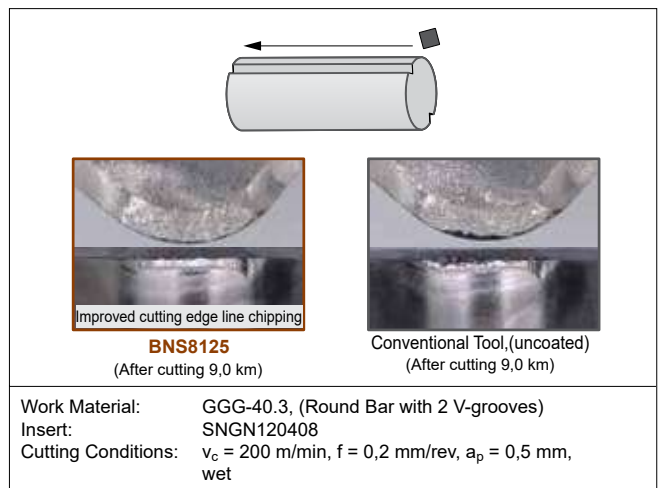


■ BNS8125 Cutting Performance

● Wear Resistance (Grey Cast Iron Machining) K



● Fracture Resistance (Ductile Cast Iron Machining) K



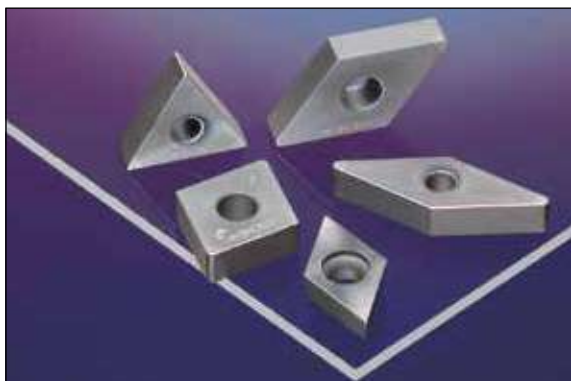
■ Choosing between BNC8115 and BNS8125 (Cast Iron/Hardened Steel)

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

○ Recommendation

× Not available

Coated CBN grade for ductile cast iron machining

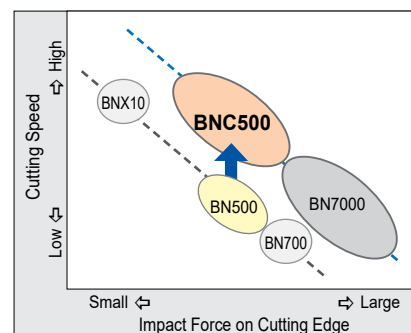


General Features

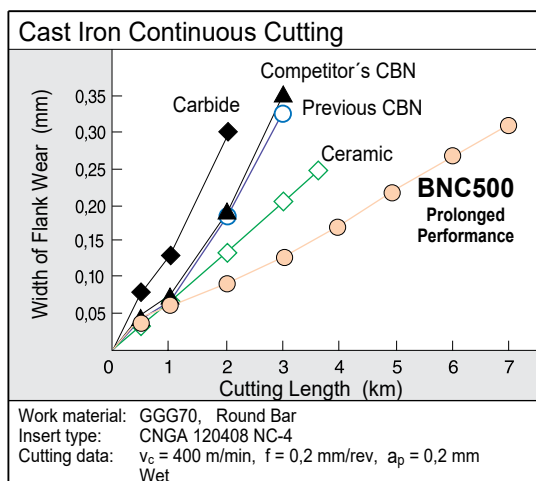
Further improvements in the toughness of the sintered CBN and wear resistance from the application of a newly developed high-purity TiC binder. In addition, it demonstrates exceptional wear resistance by combining a ceramic coating with excellent heat resistance. High-speed and high-precision machining 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

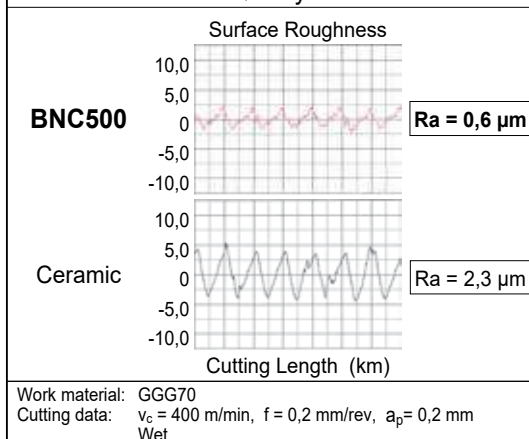
- Achieves a Long, Stable Tool Life at $v_c = 400$ m/min
Superior wear resistance, makes stable machining possible under high-speed conditions.
- Supports High-precision Machining
Can maintain excellent dimensional tolerance and surface roughness.



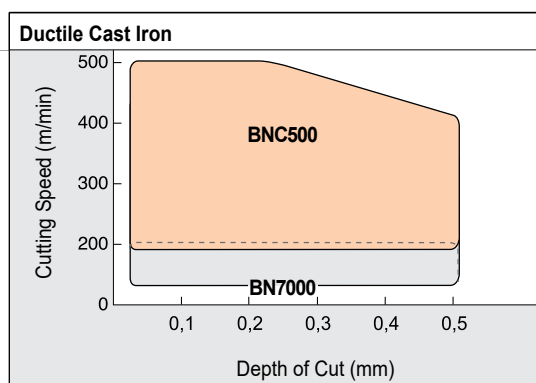
Cutting Performance



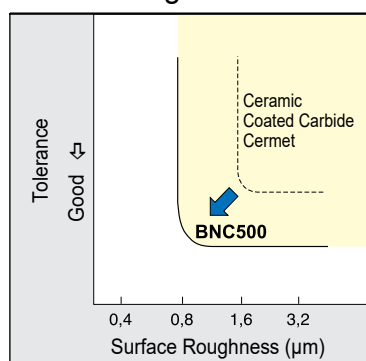
Machined Surface Quality



Application Range



High Precision Machining



Recommended Cutting Conditions

v_c (m/min)	
100	200 300 400 500
f (mm/rev)	a_p (mm)
0,1–0,4	0,03–0,5

* Coolant ... Wet

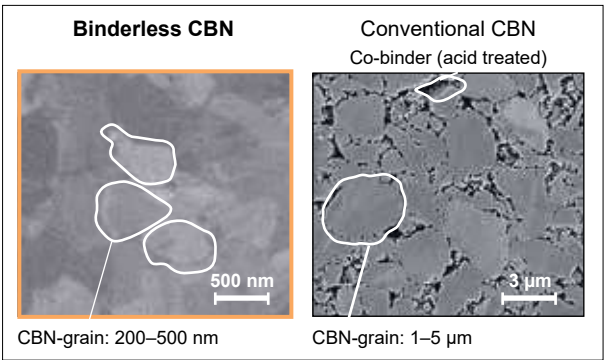
SUMIBORON Binderless NCB100



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

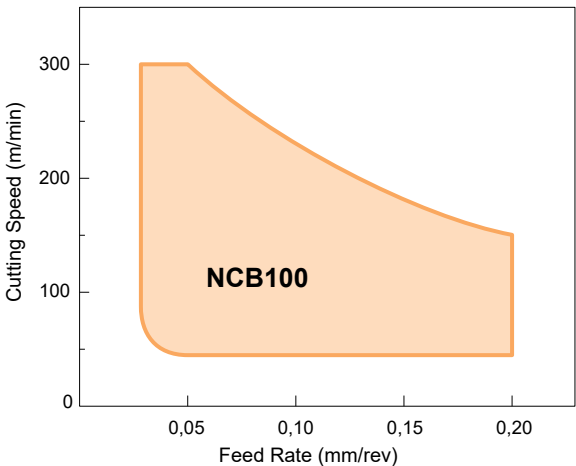
SUMIBORON Binderless CBN

Advantages

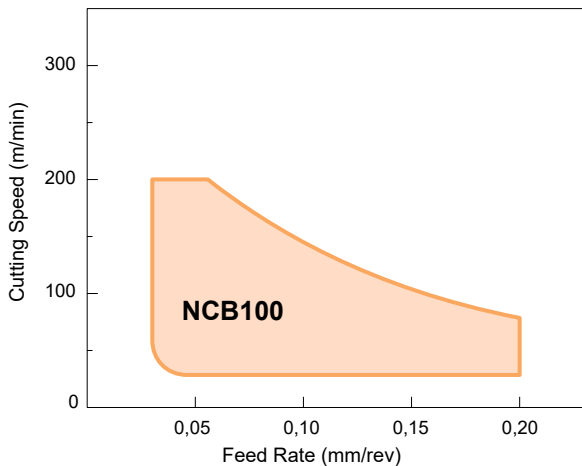
- Higher efficient machining and longer tool life have been realized by the effects of higher hardness and thermal conductivity than conventional CBN grades.
- Achieves high precise machining and better surface integrity because of less adhesion by not containing any binder materials.
- Ideal tool material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

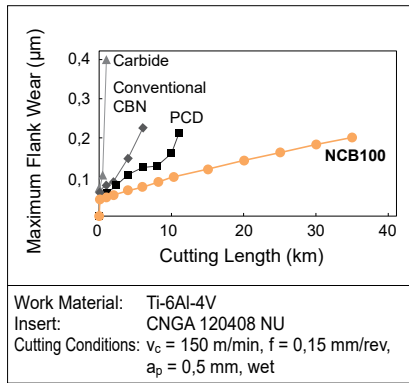


Turning of Cobalt-Chromium Alloy (Co-Cr)

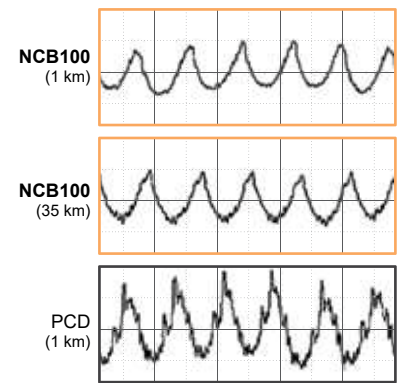
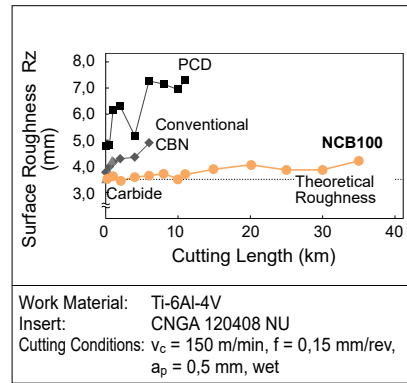


Turning of Titanium Alloy (Ti-6Al-4V)

Wear Resistance

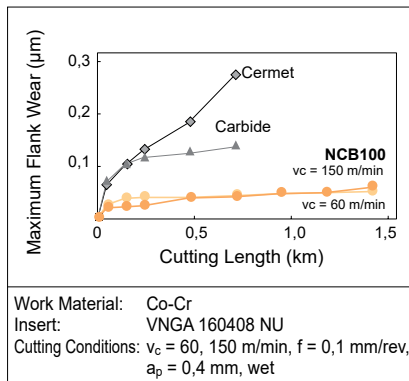


Surface Roughness

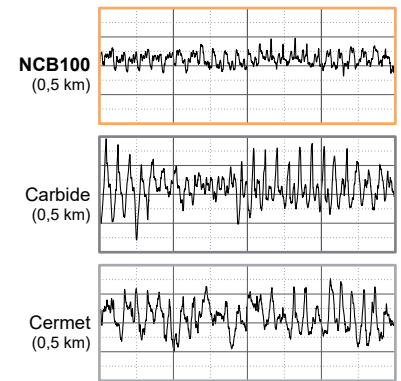
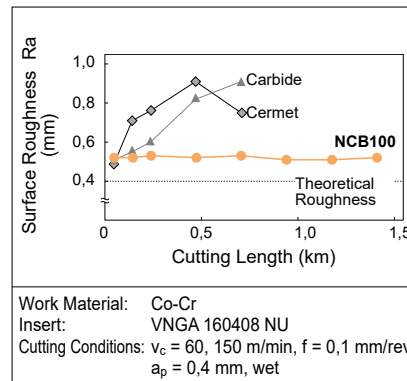


Turning of Cobalt-Chromium Alloy (Co-Cr)

Wear Resistance



Surface Roughness



Recommended Cutting Conditions

Titanium Alloys

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

Cobalt-Chromium Alloys

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

Carbides

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

SUMIDIA BINDERLESS NPD10 is recommended for: > 85 HRA

Other Work Materials

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

SUMIBORON / SUMIDIA Production Process



General

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

Production Process

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

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

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

Fig. 1

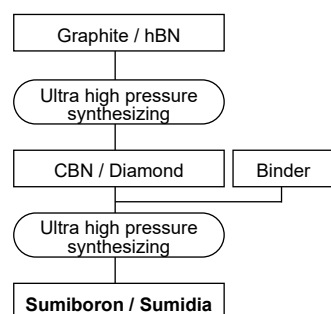
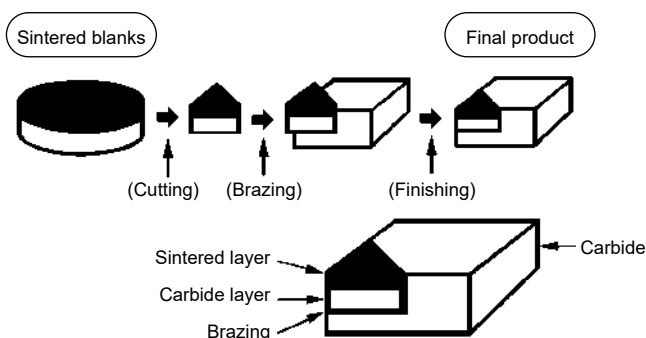
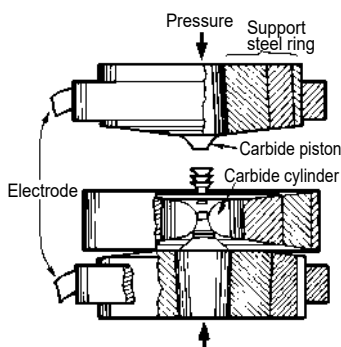


Fig. 2



SumiBoron / SumiDia Grinding Method

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

SUMIDIA Series



General Features

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

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

Series • Features • Application

Grade	Features	Application	Average size of Diamond grains (μm)	Hardness Hv	TRS (GPa)
SUMIDIA	DA1000 High density sintered material made of ultra-fine diamond particles that demonstrates optimum wear resistance and excellent edge sharpness.	- High silicon aluminium 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
	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
	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

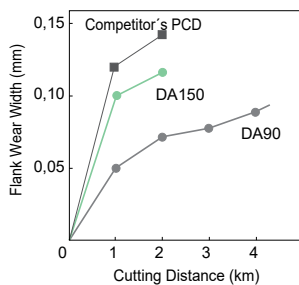
Machinability	Work Material	Turning		Milling	Example Part
		Roughing	Finishing		
Good ↑ ↓ Difficult	Sintered aluminium	DA1000		DA150	Cylinder liner
	Die cast aluminium (ADC12)				Transmission case, oil pan, cylinder block, aluminium wheel
	Low silicon (AC2B-T6, AC4C-T6)				Cylinder head
	High silicon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

Non-Aluminium

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

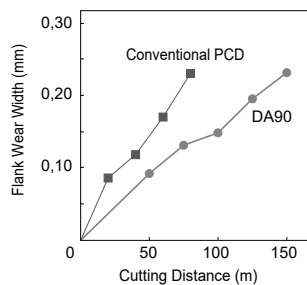
Cutting Performance

Continuous Cutting



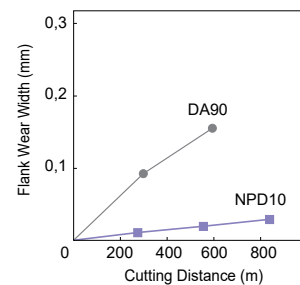
Work Material: MMC (Al-20% SiC)
Insert: CNMX 120408, Holder: PCLN2525
Cutting Cond.: $v_c = 350$ m/min, $f = 0,2$ mm/rev, $a_p = 0,18$ mm, wet

Continuous Cutting



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

Continuous Cutting



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

Recommended Cutting Conditions

Work Materials		Aluminium Alloys	Copper Alloy	Reinforced Plastics	Wood or Organic Materials	Carbide	Carbon
Cutting Conditions							
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

SUMIDIA Binderless

Nano-Polycrystalline Diamond



■ General Features

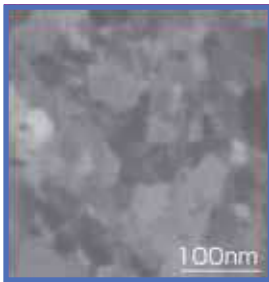
Nano-polycrystalline diamond is a type of polycrystalline diamond, produced by directly binding nano-level diamond grains without using any binders.

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

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

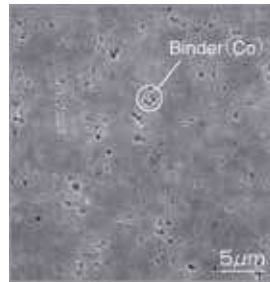
■ Micro-Structure Comparison

Nano-Polycrystalline Diamond
SEM Structure



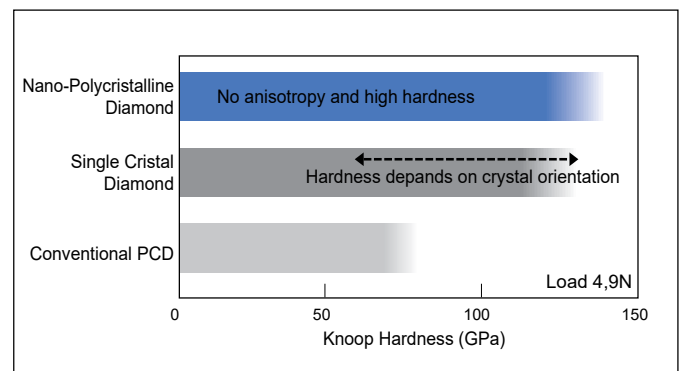
Diamond particle average grain diameter (30 - 50 nm)

Conventional PCD
SEM Structure



Diamond particle average grain diameter (1 - 10 µm)

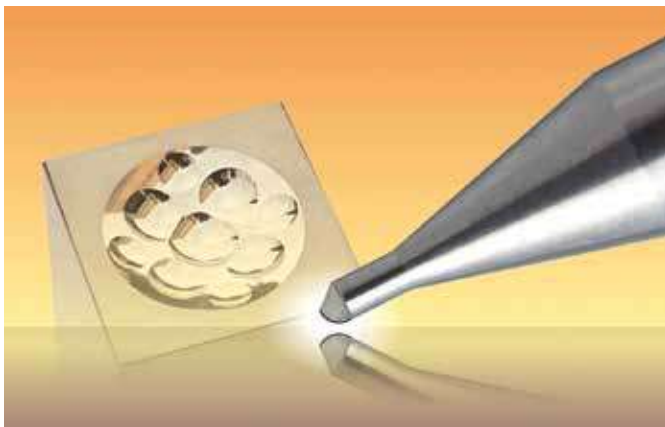
■ Hardness



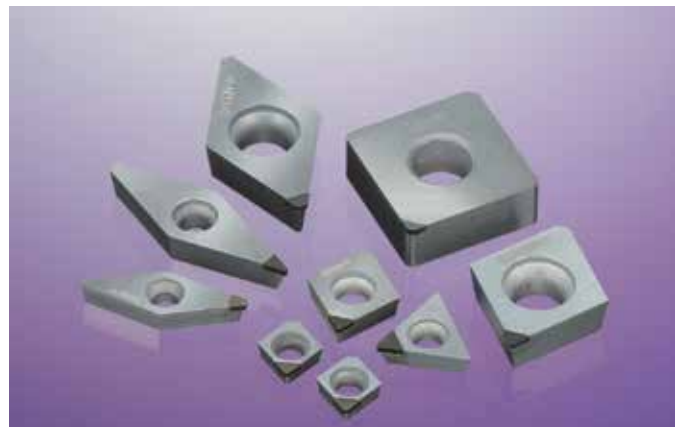
SUMIDIA Binderless

■ Application Examples

- Ballnose Endmill / Radius Endmill (Carbide Machining)



- Indexable Inserts (Carbide Machining)





General Features

NPD10 is made from high-hardness nano-polycrystalline diamond.

This is a pure diamond material, but unlike single-crystal diamonds, it has no anisotropy.

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

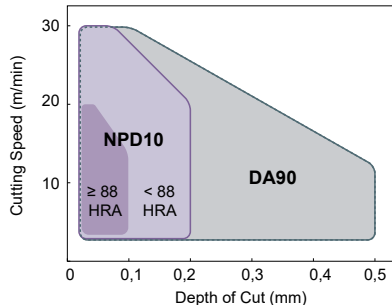
DA90 is a polycrystalline diamond grade in which coarse diamond particles have been sintered to form a dense structure. The high diamond content, with high wear resistance, makes it ideal for roughing of cemented carbide and hard brittle material.

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

Characteristics

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

Applicable Range (Cemented Carbide)



Applications of NPD10 and DA90 (Cemented Carbide)

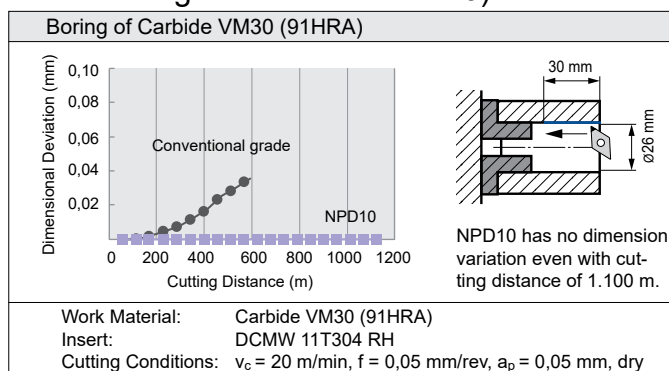
Grade	SUMIDIA Binderless NPD10		SUMIDIA DA90	
Dimensional Tolerance	⊙	Best	△	The first recommendation is NPD10
Tool Life (Wear Resistance)	⊙	Best $a_p \leq 0,2 \text{ mm}$, $f \leq 0,1 \text{ mm/rev}$	○	$a_p \geq 0,2 \text{ mm}$ can also be used
Sintered Surface Machining of Cemented Carbide	×	Impossible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

Recommended Cutting Conditions (Carbide Machining)

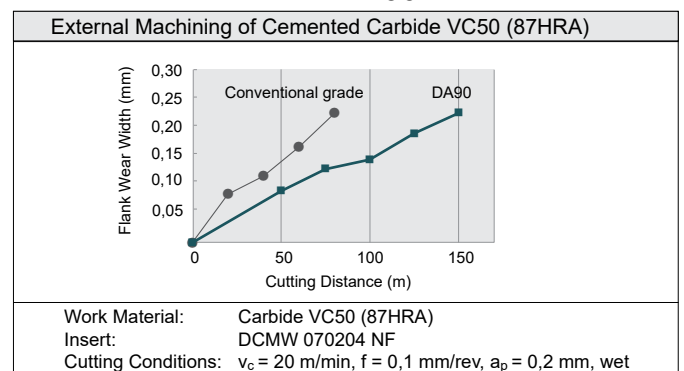
Work Material				Grade	Cutting Conditions		
Class	Hardness (HRA)	SEI Grades			Cutting Speed v_c (m/min)	Feed Rate f (mm/rev)	Depth of Cut a_p (mm/rev)
VM, VC	40	≥ 88	G5, D2	NPD10	5-15-20	0,03-0,05-0,07	0,03-0,05-0,07
VM, VC	70, 60, 50	83 - <88	G7, G6	NPD10	5-20-30	0,03-0,10-0,20	0,03-0,10-0,20
VM, VC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

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

Machining Precision of NPD10



Wear Resistance of DA90





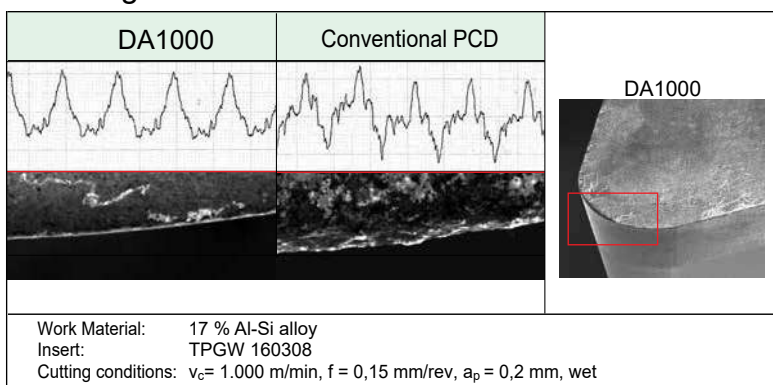
General Features

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

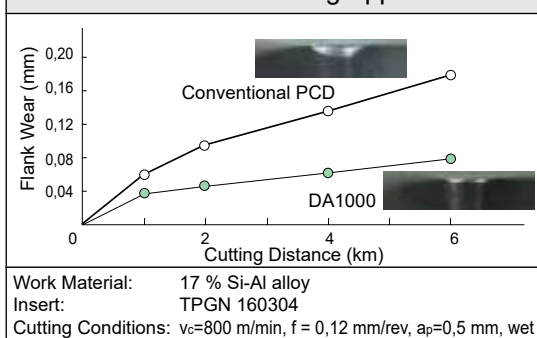
SumiDia DA1000, with its great improvement in fracture resistance, eliminates the breakage problems faced by conventional PCD tools especially during the milling of Aluminium alloys and achieves a longer and more stable tool life.

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

Cutting Performance



Wear Resistance in Turning Application



NF Type Inserts

General Features

● Total Cost Effectiveness with High Performance and Lower Price

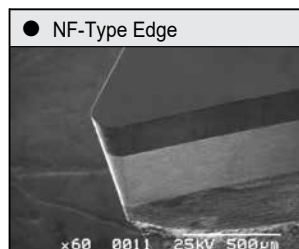
- Optimum design utilizing improved mass production techniques provides a relatively lower cost.
- Regrindable type results in huge total cost reduction.

● Wide Application Range

- Wide range of stocked items for small hole boring, OD turning to milling processes.
- Negative and positive type inserts that are applicable on standard lever-lock, pin-lock type holders.

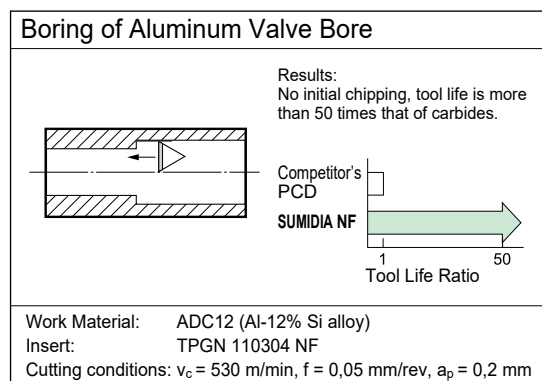
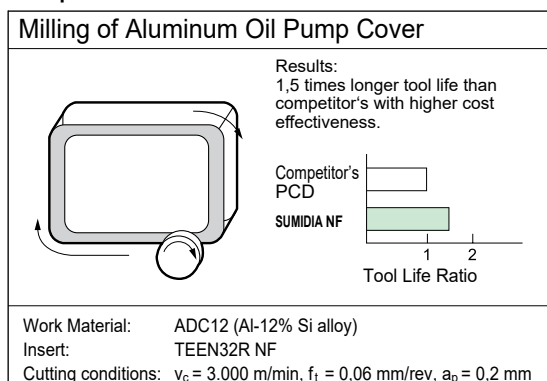
Efficiency

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



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

Application Examples



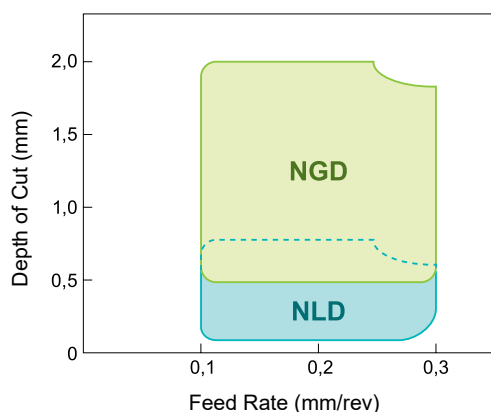


■ Characteristics

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

■ Applications Range

Wrought Aluminium Alloy (A6061)

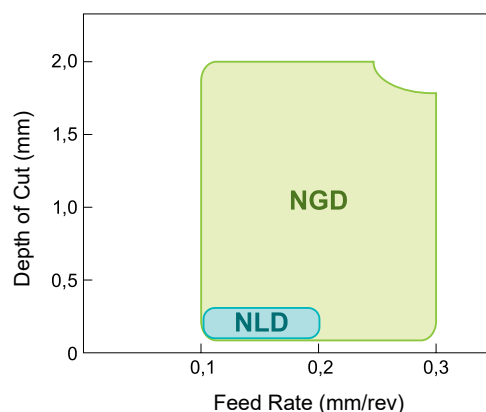


NLD Type Chipbreaker

Achieves excellent chip control for finishing.



Casted Aluminium Alloy (ADC12)



NGD Type Chipbreaker

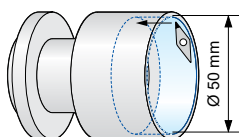
Achieves excellent chip control for semi finishing.



■ Application Examples

Internal Turning of Machine Component

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



Breakmaster **NLD** type

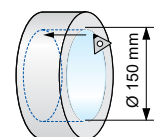


Without chip breaker

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

Internal Turning of Transmission Component

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



Breakmaster **NGD** type



Without chip breaker

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

SUMIDIA One-Use Inserts Break Master DM Type

N Non-ferrous Metal



General Features

Economy One-Use Insert

- Similar to SumiBoron One-Use type inserts

With Built-in Chipbreaker for Effective Chip Removal

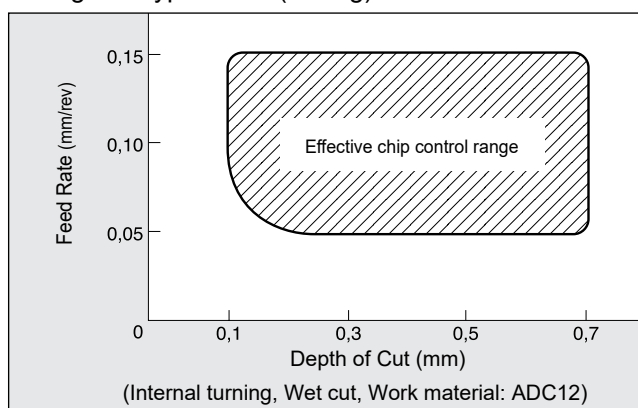
- Solving chip control problems and improving efficiency with DM-type chipbreaker.

Extensive Insert Range for External and Facing Operation

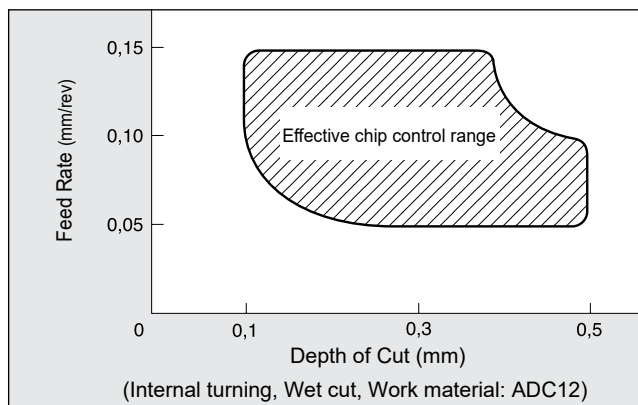
- 80° and 55° diamond shaped inserts are added to expand the application range of this series.

Application Range

Triangular Type Insert (Boring)



CCMT/DCMT Type (External Turning & Facing)



Chip Control

Break Master



No Chipbreaker



Application

Machining Details	Cutting Conditions	Results
Work Material: AC2A-T6 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 $Ra = 1 \mu m$. 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 CCMT 09T3__ L/R-DM NU		TPMT 0802__ L/R-DM NU TPMT 0902__ L/R-DM NU
	DCMT 0702__ L/R-DM NU DCMT 11T3__ L/R-DM NU		TPMR 1103__ L/R-DM NU ^(*) TPMR 1603__ L/R-DM NU ^(*)

(*) Stock in Japan
Delivery on request

SUMIBORON / SUMIDIA

Indexable Inserts & Tools

M1–M80

M



SUMIBORON / SUMIDIA Insert
C / 80° Diamond

D / 55° Diamond

R / Round

S / Square

T / Triangle

V / 35° Diamond

W / Polygon

Special

SUMIDIA Binderless

SUMIBORON / SUMIDIA Precision Tools
SUMIBORON

SUMIDIA

High Speed Non-Ferrous Mill Expansion

SUMIBORON "BN Finish Mill"

"Helical Master"

"Mould Finish Master"

SUMIDIA "Mould Finish Master" Binderless

SUMIDIA Drills

Insert Identification	M2-3
CC__ 7° pos. Type	M4-6,8
CP__ 11° pos. Type	M7
CN__ neg. Type	M9-13
DC__ 7° pos. Type	M14-17
DN__ neg. Type	M18-21
RN__ neg. Type	M22
SC__ 7° pos. Type	M23
SN__ neg. Type	M24
TB__ 5° pos. Type	M25
TC__ 7° pos. Type	M26
TN__ neg. Type	M27-30
TP__ 11° pos. Type (Without Hole)	M31
TP__ 11° pos. Type (With Hole)	M32-35
VB__ 5° pos. Type	M36-37
VC__ 7° pos. Type	M38-39
VN__ neg. Type	M40-42
WN__ neg. Type	M43
ZNEX neg.-pos. Type	M44
Neg.-pos. Type	M45

Guidance	M46-47
BSME / SEXC Type Small Hole Boring Bars	M48-51
BNBB Type Small Hole Boring Bars	M52
BNZ / BNB Type Small Hole Boring Bars	M53
GWB / PSC Type Grooving Holder	M54-55
BNGG Type Threading Holder	M56
DABB Type Small Hole Boring Bars	M57
ANX Type Face Mill	M58-69
RF Type Face Mill	M70
SRF Type Face Mill	M71

FMU Type Face Mill	M72-73
BNES Type Endmill	M74
BNBP Type Micro Ball Nose Endmill	M75
NPDRS / NPDB(S) Type	M76-77
DAL / DDL / DML Type Drills	M78-79

C

D

R

S

T

V

W

Z

SUMIBORON / SUMIDIA
Inserts/Tools

SUMIBORON

Insert Identification

Regrindable Type

CNMA 120408

B

①

Insert ISO Code
ISO ⇒ C2/C3

②

Additional Information
Chart 1

Chart 1

Symbol	Description
B	Full-top CBN insert

One-Use Type

CNMG 120408

N-SV

NC

WG

4

①

Insert ISO Code
ISO ⇒ C2/C3

②

Chip Breaker
Chart 2

③

One-Use Type
Chart 3

④

Wiper Insert
Chart 4

Chart 2

Symbol	Description
—	Standard Type
LF LE	Sharp cutting edge
LT	Small edge treatment type
LS	Low cutting force
ES	High efficiency type
HS	Strong cutting edge
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)

No. of Cutting Edges
Chart 5

Chart 5

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

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

C

D

R

S

T

V

W

Z

SUMIDIA

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)

[illegible]

● = 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

H		K K _H		H		K PM K _H		S		N	
Coated				Uncoated				Coated		Uncoated	
CBN				CBN				CBN		PCD	
BNC2115				BNC2115				BNS8125		NCB100	
BNC2125				BNC2125				BNS8125		NCB100	
BNC2010				BNC2010				BNS8125		NCB100	
BNC2020				BNC2020				BNS8125		NCB100	
BNC100				BNC100				BNS8125		NCB100	
BNC160				BNC160				BNS8125		NCB100	
BNC200				BNC200				BNS8125		NCB100	
BNC300				BNC300				BNS8125		NCB100	
BNC500				BNC500				BNS8125		NCB100	
BNC8115				BNC8115				BNS8125		NCB100	
BNC1000				BNC1000				BNS8125		NCB100	
BNC2000				BNC2000				BNS8125		NCB100	
BNCX10				BNCX10				BNS8125		NCB100	
BNCX20				BNCX20				BNS8125		NCB100	
BNCX25				BNCX25				BNS8125		NCB100	
BNC300				BNC300				BNS8125		NCB100	
BNC350				BNC350				BNS8125		NCB100	
BNC7000				BNC7000				BNS8125		NCB100	
BNC7115				BNC7115				BNS8125		NCB100	
BNS8125				BNS8125				BNS8125		NCB100	
NCB100				NCB100				NCB100		NCB100	
DA90				DA90				DA90		DA90	
DA150				DA150				DA150		DA150	
DA1000				DA1000				DA1000		DA1000	
NPD10				NPD10				NPD10		NPD10	

● SumiBoron (CBN, One-Use Type)

[illegible]

● G-Class SumiBoron (CBN, Regrindable Type)

		CCGW 09T304 CCGW 09T308	0,4 0,8																								
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● G-Class SumiBoron (CBN, One-Use Type)

[illegible]

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item

L8, L9 Edge Specification of SUMIBORON Inserts

Sumiboron / Sumidia Inserts

SUMIBORON / SUMIDIA Indexable Inserts

CC-- Type 7° pos. Inserts

80° Diamond Type

7° Relief
With Insert Hole

Uncoated

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

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

CCGT / CCGW

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

Shape		ISO Cat. No.	RE	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC
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● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item

 L8, L9 Edge Specification of SUMIBORON Inserts

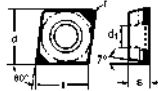
80° Diamond Type

11° Relief
With Insert Hole

Coated

CPGW

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

Shape	ISO Cat. No.	RE	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	NC	DA	DA	DA	NP	
  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	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN</
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● = Euro stock
○ = Stock item in Japan

L8, L9 Edge Specification of SUMIBORON Inserts

C

D

R

S

T

V

W

Z

SumiBoron / SumiDia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

CC-- Type 7° pos. Inserts

80° Diamond Type 7° Relief
With Insert Hole

Uncoated

CCMT / CCMW

● M-Class SumiDia (PCD, Regrindable Type)

Shape	ISO Cat. No.	RE														
	CCMT 060202	0,2														
	CCMT 060204	0,4														
	CCMT 09T302	0,2														
	CCMT 09T304	0,4														

● M-Class SumiDia (PCD, NF Type)

	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)

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														
Break Master - LD 	CCMT 060204 R-DM NU	0,4														
	CCMT 09T304 R-DM NU	0,4														
	CCMT 060202 N-LD NF	0,2														
	CCMT 060204 N-LD NF	0,4														
Break Master - LD 	CCMT 09T302 N-LD NF	0,2														
	CCMT 09T304 N-LD NF	0,4														
	CCMT 09T308 N-LD NF	0,8														
	CCMT 09T308 N-LD NF	0,8														
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														
Break Master - GD 	CCMT 09T308 N-GD NF	0,8														
	CCMT 09T308 N-GD NF	0,8														

● M-Class SumiDia (PCD, NF Type)

	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)

	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

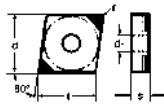
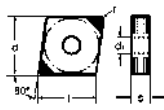
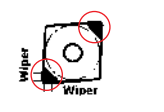
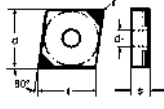
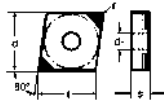
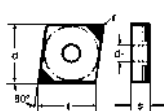
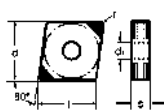
0° Relief

With Insert Hole

Coated

CNGA

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

Shape		ISO Cat. No.	RE	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	NC	DA	DA	DA	NPI
 Standard - Normal cut geometry	 with 2 CBN cutting edges	CNGA 120404 NC2 CNGA 120408 NC2 CNGA 120412 NC2 CNGA 120416 NC2 CNGA 120420 NC2 CNGA 120424 NC2	0,4 0,8 1,2 1,6 2,0 2,4	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○																			
	 with 4 CBN cutting edges	CNGA 120402 NC4 CNGA 120404 NC4 CNGA 120408 NC4 CNGA 120412 NC4 CNGA 120416 NC4 CNGA 120420 NC4 CNGA 120424 NC4	0,2 0,4 0,8 1,2 1,6 2,0 2,4	○ ● ● ● ○ ○ ○	○ ● ● ● ○ ○ ○	○ ● ● ● ○ ○ ○	○ ● ● ● ○ ○ ○																		
	 (Wiper Type)	CNGA 120404 NC-W4 CNGA 120408 NC-W4	0,4 0,8	● ●	● ●		● ●	● ●	● ●		● ●														
		CNGA 120404 NC-WG4 CNGA 120408 NC-WG4 CNGA 120412 NC-WG4	0,4 0,8 1,2	● ● ●	● ● ●	● ● ●		● ● ●	● ● ●																
		CNGA 120404 NC-WH4 CNGA 120408 NC-WH4 CNGA 120412 NC-WH4	0,4 0,8 1,2	● ● ●	● ● ●	● ● ●		● ● ●	● ● ●																
	 with 2 CBN cutting edges	CNGA 120404 LE-NC2 CNGA 120408 LE-NC2 CNGA 120412 LE-NC2	0,4 0,8 1,2		● ● ●																				
	 with 2 CBN cutting edges	CNGA 120402 LT-NC2 CNGA 120404 LT-NC2 CNGA 120408 LT-NC2 CNGA 120412 LT-NC2	0,2 0,4 0,8 1,2			○ ● ● ●																			
	 with 2 CBN cutting edges	CNGA 120402 LS-NC2 CNGA 120404 LS-NC2 CNGA 120408 LS-NC2 CNGA 120412 LS-NC2	0,2 0,4 0,8 1,2	○			● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ○															
		CNGA 120404 LS-NC4 CNGA 120408 LS-NC4 CNGA 120412 LS-NC4	0,4 0,8 1,2					○ ○ ○																	
	 with 4 CBN cutting edges	CNGA 120404 ES-NC4 CNGA 120408 ES-NC4 CNGA 120412 ES-NC4	0,4 0,8 1,2			● ● ●																			

● = Euro stock
○ = Stock item in Japan

L8, L9 Edge Specification of SUMIBORON Inserts

C

D

R

S

T

V

W

Z

SumiBoron / Sumidia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

CN- Type neg. Inserts

80° Diamond Type 0° Relief
With Insert Hole

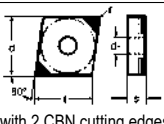
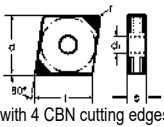
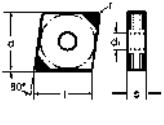
Coated

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	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
 HS - Type Strong cutting edge	 with 2 CBN cutting edges	CNGA 120404 HS-NC2 CNGA 120408 HS-NC2 CNGA 120412 HS-NC2	0,4 0,8 1,2	●	●	●		●	●	●																		
	 with 4 CBN cutting edges	CNGA 120404 HS-NC4 CNGA 120408 HS-NC4 CNGA 120412 HS-NC4	0,4 0,8 1,2	○	○		○			○	○																	
 Break Master - FV, LV, SV  CBN with chipbreaker	 with 4 CBN cutting edges	CNGG 120404 N-FV NC4 CNGG 120408 N-FV NC4 CNGG 120412 N-FV NC4	0,4 0,8 1,2	●	●	●	●		●																			
		CNGG 120404 N-LV NC4 CNGG 120408 N-LV NC4 CNGG 120412 N-LV NC4	0,4 0,8 1,2	●	●	●	●		●	●																		
		CNGG 120408 N-SV NC4 CNGG 120412 N-SV NC4	0,8 1,2	●	●		●		○	●																		

● = Euro stock
 ○ = Stock item in Japan

L8, L9

Edge Specification of SUMIBORON Inserts

80° Diamond Type

0° Relief

With Insert Hole

Uncoated

CNGA

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

Shape		ISO Cat. No.	RE	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN
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● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item

L8, L9 Edge Specification of SUMIBORON Inserts

SUMIBORON / SUMIDIA
Indexable Inserts

CN_ _ Type neg. Inserts

80° Diamond Type 0° Relief
With Insert Hole

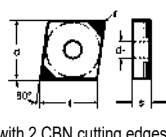
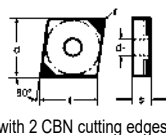
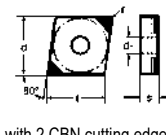
Uncoated

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

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

CNGA / CNGM

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

Shape		ISO Cat. No.	RE	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	NC	DA	DA	DA	NP
 HS - Type Strong cutting edge	 with 2 CBN cutting edges	CNGA 120404 HS-NU2 CNGA 120408 HS-NU2 CNGA 120412 HS-NU2	0,4 0,8 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 CNGM 120412 N-LV NU2	0,4 1,2																														

● G-Class SumiBoron (CBN, Binderless)

	CNGA 120404 NU CNGA 120408 NU CNGA 120412 NU	0,4 0,8 1,2																									
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● = Euro stock
○ = Stock item in Japan

 L8, L9 Edge Specification of SUMIBORON Inserts

80° Diamond Type

0° Relief

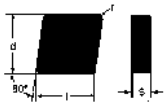
Coated / Uncoated

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)

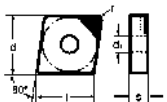
Shape		ISO Cat. No.	RE														
		CNGN 090308	0,8														
		CNGN 090312	1,2														
		CNGN 120408	0,8														
		CNGN 120412	1,2														
		CNGN 120416	1,6														

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

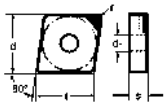
		CNGX 120412	1,2														
		CNGX 120416	1,6														

CNMA / CNMX

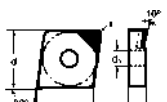
● M-Class SumiBoron (CBN, Regrindable Type)

Shape		ISO Cat. No.	RE														
		CNMA 120404	0,4														
		CNMA 120408	0,8														
		CNMA 120412	1,2														

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

		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)

		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

C

D

R

S

T

V

W

Z

SumiBoron / SumiDia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

DC-- Type 7° pos. Inserts

55° Diamond Type 7° Relief
With Insert Hole

Coated

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

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

DCGT / DCGW

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

Shape		ISO Cat. No.	RE	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN
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● = Euro stock
○ = Stock item in Japan

 L8, L9 Edge Specification of SUMIBORON Inserts

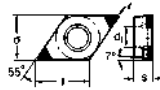
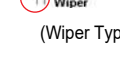
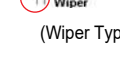
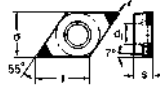
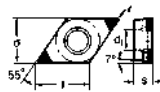
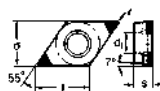
55° Diamond Type

7° Relief
With Insert Hole

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	NCT	DA90	DA150	DA1000	NPD10
Break Master - FV, LV  CBN with chipbreaker	 with 2 CBN cutting edges	DCGT 070204 N-FV NU2	0,4											●										
		DCGT 11T304 N-FV NU2	0,4												●									
		DCGT 11T308 N-FV 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)	 (Wiper Type)	DCGW 11T304 NU-WG2	0,4											●										
		DCGW 11T308 NU-WG2	0,8												●									
 (Wiper Type)	 (Wiper Type)	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

SUMIBORON / SUMIDIA Indexable Inserts

DC-- Type 7° pos. Inserts

55° Diamond Type 7° Relief
With Insert Hole

Uncoated

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

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

DCGT / DCGW

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

Shape		ISO Cat. No.	RE	Material Compatibility													
				Coated								Uncoated					
				CBN								Uncoated					
				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 DCGW 11T308 NS	0,4														
			0,8														
		DCGW 070202 NU DCGW 070204 NU DCGW 070208 NU DCGW 11T301 NU DCGW 11T302 NU DCGW 11T304 NU DCGW 11T308 NU DCGW 11T312 NU	0,2														
			0,4														
			0,8														
			0,1														
			0,2														
			0,4														
		DCGW 11T302 LF-NU	0,2														
		DCGW 070202 LT-NU DCGW 070204 LT-NU DCGW 070208 LT-NU DCGW 11T302 LT-NU DCGW 11T304 LT-NU DCGW 11T308 LT-NU DCGW 11T312 LT-NU	0,2														
			0,4														
			0,8														
			0,2														
			0,4														
			0,8														
		DCGW 11T302 HS-NU DCGW 11T304 HS-NU DCGW 11T308 HS-NU	0,2														
			0,4														
			0,2														
			0,4														
			0,8														
			0,8														

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item

L8, L9

55° Diamond Type

7° Relief
With Insert Hole

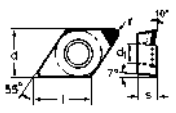
Uncoated

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

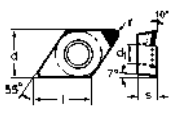
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
 Carbide/Hard Brittle Material

DCMT / DCMW

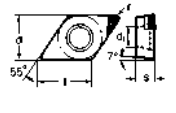
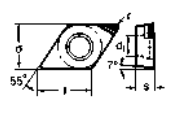
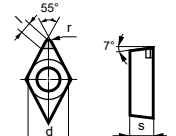
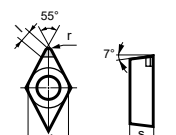
● M-Class SumiDia (PCD, Regrindable Type)

Shape		ISO Cat. No.	RE																
		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)

		DCMT 070202 L-DM NU	0,2																
		DCMT 070204 L-DM NU	0,4																
		DCMT 11T304 L-DM NU	0,4																
		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																
		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																
		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

SUMIBORON / SUMIDIA Indexable Inserts

DN- Type neg. Inserts

55° Diamond Type

0° Relief
With Insert Hole

Coated

Dimensions (mm)				
DN-..	L	IC	S	D ₁
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	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN
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● = 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

DNGA / DNGG

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

Shape		ISO Cat. No.	RE	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN
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● = Euro stock
○ = Stock item in Japan

L8, L9 Edge Specification of SUMIBORON Inserts

SUMIBORON / SUMIDIA Indexable Inserts

DN- Type neg. Inserts

55° Diamond Type

0° Relief
With Insert Hole

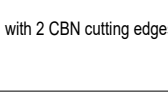
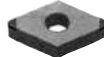
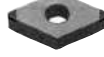
Uncoated

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

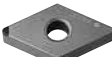
H	Hardened Steel
K	Cast Iron
N	Non-Ferrous Metal
S	Exotic Alloy
PM	Sintered Component
	Carbide/Hard Brittle Material

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													○						○	○					
	 with 2 CBN cutting edges	DNGA 150604 NU2	0,4											●	●	●				▲	●							
		DNGA 150608 NU2	0,8												●	▲	▲				▲	●						
		DNGA 150612 NU2	1,2													▲												
 (Wiper Type)	 (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	 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													○													
 CBN with chipbreaker	 with 2 CBN cutting edges	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

DNGN

● G-Class SumiBoron (Solid CBN Type)

Shape		ISO Cat. No.	RE	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN
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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

DNMA

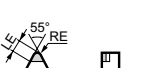
● M-Class SumiBoron (CBN, Regrindable Type)

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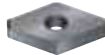
● M-Class SumiBoron (CBN, One-use Type)

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● M-Class SumiDia (PCD, NF Type)

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● M-Class SumiBoron (CBN, Binderless)

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● = Euro stock
 ○ = Stock item in Japan

▲ = To be replaced by new item

L8, L9 Edge Specification of SUMIBORON Inserts

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SumiBoron / SumiDia
Indexable Inserts

SUMIBORON / SUMIDIA
Indexable Inserts

RN-- neg. Type Inserts

Round Type

0° Relief
Without Insert Hole

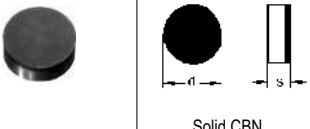
Coated / Uncoated

RNGN

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

Shape		ISO Cat. No.	RE	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	NC	DA	DA	DA	NP
	 Solid CBN	RNGN 090300 RNGN 120300 RNGN 120400	— — —																									

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

		RNGN 090300 B RNGN 120400 B	— —																									
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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

H										K		K		H		H		K		P		M		K		H		S		N	
Coated										Uncoated																		Uncoated			
										CBN																		PCD			
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							
									•										•												
									•										•												
									•										•												

● = Euro stock
○ = Stock item in Japan

L8, L9 Edge Specification of SUMIBORON 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)

[illegible]

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

		SCGW 09T304 NU SCGW 09T308 NU	0,4 0,8																							
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● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

[illegible]

● = Euro stock
○ = Stock item in Japan

L8, L9 Edge Specification of SUMIBORON Inserts

SUMIBORON / SUMIDIA Indexable Inserts

SN-- neg. Type Inserts

Square Type

0° Relief

Without Insert Hole

Coated / Uncoated

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 SNGN 090312	0,8 1,2										●										●					
	SNGN 120308 SNGN 120312	0,8 1,2										●										●					
	SNGN 120408 SNGN 120412 SNGN 120416 SNGN 120420	0,8 1,2 1,6 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 SNGX 120416	1,2 1,6										●										●					
												●										●					

Square Type

0° Relief

With Insert Hole

Uncoated

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 SNMA 120412 NS	0,8 1,2															●										
	SNMA 120408 NU SNMA 120412 NU	0,8 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 SNMA 120412 NF	0,8 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 SNMA 120412 RH	0,8 1,2																									○
																											○

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item

Edge Specification of SUMIBORON Inserts

60° Triangle Type

5° Relief

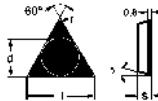
Coated / Uncoated

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

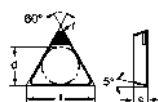
H	Hardened Steel
K	Cast Iron
N	Non-Ferrous Metal
S	Exotic Alloy
PM	Sintered Component
	Carbide/Hard Brittle Material

TBGN / TBGW

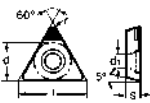
● G-Class SumiBoron (CBN, Full Top Type)

Shape		ISO Cat. No.	RE	BNC100	BNC160	BNC200	BNC2010	BNC2020	BNC2115	BNC2125	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300	BN350	BN7000	BN7115	BN8125	NCB100	DA90	DA150	DA1000	NPD10
		TBGN 060102 B TBGN 060104 B	0,2																									
			0,4						●						●	▲	●		▲		○						○	

● G-Class SumiDIA (PCD, NF Type)

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● G-Class SumiDIA (PCD, NF Type)

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● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item

 L8, L9 Edge Specification of SUMIBORON Inserts

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SumiBoron / SumiDIA
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

TC-- Type 7° pos. 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	Material															
				Coated									Uncoated						
				CBN									Uncoated						
				BNC2115	BNC2125	BNC2010	BNC2020	BNC100	BNC160	BNC200	BNC300	BNC500	BNC8115	BN1000	BN2000	BNX10	BNX20	BNX25	BN300
				BN7000	BN7115	BNS8125	NCB100	DA90	DA150	DA1000	NPD10								
		TCGW 090204 NC TCGW 090208 NC	0,4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		TCGW 110202 NC TCGW 110204 NC TCGW 110208 NC	0,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		TCGW 16T304 NC3 TCGW 16T308 NC3	0,4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		TCGW 090204 NU TCGW 090208 NU	0,4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		TCGW 110202 NU TCGW 110204 NU TCGW 110208 NU	0,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
		TCGW 16T304 NU TCGW 16T308 NU	0,4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0,8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

TCMT

● M-Class SumiDia (PCD, NF Type)

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

● = Euro stock
○ = Stock item in Japan

▲ = To be replaced by new item

Edge Specification of SUMIBORON Inserts

60° Triangle Type

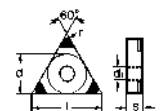
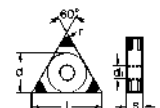
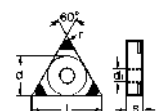
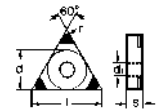
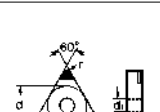
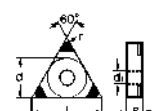
0° Relief

With Insert Hole

Coated

TNGA

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

Shape		ISO Cat. No.	RE	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	NC	DA	DA	DA	NPI
 Standard - Normal cut geometry	 with 3 CBN cutting edges	TNGA 160404 NC3 TNGA 160408 NC3 TNGA 160412 NC3 TNGA 160416 NC3 TNGA 160420 NC3 TNGA 160424 NC3	0,4 0,8 1,2 1,6 2,0 2,4	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○	
	 with 6 CBN cutting edges	TNGA 160402 NC6 TNGA 160404 NC6 TNGA 160408 NC6 TNGA 160412 NC6 TNGA 160416 NC6 TNGA 160420 NC6 TNGA 160424 NC6	0,2 0,4 0,8 1,2 1,6 2,0 2,4	○ ● ● ● ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○	
 LE - Type Low cutting force	 with 3 CBN cutting edges	TNGA 160404 LE-NC3 TNGA 160408 LE-NC3 TNGA 160412 LE-NC3	0,4 0,8 1,2	○ ○ ○	● ● ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	
 LT - Type Sharp cutting edge	 with 3 CBN cutting edges	TNGA 160402 LT-NC3 TNGA 160404 LT-NC3 TNGA 160408 LT-NC3 TNGA 160412 LT-NC3	0,2 0,4 0,8 1,2	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○		
 LS - Type Low cutting force	 with 3 CBN cutting edges	TNGA 160402 LS-NC3 TNGA 160404 LS-NC3 TNGA 160408 LS-NC3 TNGA 160412 LS-NC3	0,2 0,4 0,8 1,2	○ ● ● ○	○ ● ● ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	
 ES - Type Crater wear stability	 with 6 CBN cutting edges	TNGA 160404 ES-NC6 TNGA 160408 ES-NC6 TNGA 160412 ES-NC6	0,4 0,8 1,2	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	
 HS - Type Strong cutting edge	 with 3 CBN cutting edges	TNGA 160404 HS-NC3 TNGA 160408 HS-NC3 TNGA 160412 HS-NC3	0,4 0,8 1,2	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	
	 with 6 CBN cutting edges	TNGA 160404 HS-NC6 TNGA 160408 HS-NC6 TNGA 160412 HS-NC6	0,4 0,8 1,2	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○	

60° Triangle Type

0° Relief
With Insert Hole

Coated

Dimensions (mm)

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)

[illegible]

● = 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	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN
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TNGN

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

Shape		ISO Cat. No.	RE	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN
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● = 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	BN0	BN1	BN2	BN3	BN4	BN5	BN6	BN7	BN8	BN9	BN10	BN11	BN12	BN13	BN14	BN15	BN16	BN17	BN18	BN19	BN20	BN21	BN22	BN23	BN24	BN25	BN26	BN27	BN28	BN29	BN30	BN31	BN32	BN33	BN34	BN35	BN36	BN37	BN38	BN39	BN40	BN41	BN42	BN43	BN44	BN45	BN46	BN47	BN48	BN49	BN50	BN51	BN52	BN53	BN54	BN55	BN56	BN57	BN58	BN59	BN60	BN61	BN62	BN63	BN64	BN65	BN66	BN67	BN68	BN69	BN70	BN71	BN72	BN73	BN74	BN75	BN76	BN77	BN78	BN79	BN80	BN81	BN82	BN83	BN84	BN85	BN86	BN87	BN88	BN89	BN90	BN91	BN92	BN93	BN94	BN95	BN96	BN97	BN98	BN99	BN100	BN101	BN102	BN103	BN104	BN105	BN106	BN107	BN108	BN109	BN110	BN111	BN112	BN113	BN114	BN115	BN116	BN117	BN118	BN119	BN120	BN121	BN122	BN123	BN124	BN125	BN126	BN127	BN128	BN129	BN130	BN131	BN132	BN133	BN134	BN135	BN136	BN137	BN138	BN139	BN140	BN141	BN142	BN143	BN144	BN145	BN146	BN147	BN148	BN149	BN150	BN151	BN152	BN153	BN154	BN155	BN156	BN157	BN158	BN159	BN160	BN161	BN162	BN163	BN164	BN165	BN166	BN167	BN168	BN169	BN170	BN171	BN172	BN173	BN174	BN175	BN176	BN177	BN178	BN179	BN180	BN181	BN182	BN183	BN184	BN185	BN186	BN187	BN188	BN189	BN190	BN191	BN192	BN193	BN194	BN195	BN196	BN197	BN198	BN199	BN200	BN201	BN202	BN203	BN204	BN205	BN206	BN207	BN208	BN209	BN210	BN211	BN212	BN213	BN214	BN215	BN216	BN217	BN218	BN219	BN220	BN221	BN222	BN223	BN224	BN225	BN226	BN227	BN228	BN229	BN230	BN231	BN232	BN233	BN234	BN235	BN236	BN237	BN238	BN239	BN240	BN241	BN242	BN243	BN244	BN245	BN246	BN247	BN248	BN249	BN250	BN251	BN252	BN253	BN254	BN255	BN256	BN257	BN258	BN259	BN260	BN261	BN262	BN263	BN264	BN265	BN266	BN267	BN268	BN269	BN270	BN271	BN272	BN273	BN274	BN275	BN276	BN277	BN278	BN279	BN280	BN281	BN282	BN283	BN284	BN285	BN286	BN287	BN288	BN289	BN290	BN291	BN292	BN293	BN294	BN295	BN296	BN297	BN298	BN299	BN300	BN301	BN302	BN303	BN304	BN305	BN306	BN307	BN308	BN309	BN310	BN311	BN312	BN313	BN314	BN315	BN316	BN317	BN318	BN319	BN320	BN321	BN322	BN323	BN324	BN325	BN326	BN327	BN328	BN329	BN330	BN331	BN332	BN333	BN334	BN335	BN336	BN337	BN338	BN339	BN340	BN341	BN342	BN343	BN344	BN345	BN346	BN347	BN348	BN349	BN350	BN351	BN352	BN353	BN354	BN355	BN356	BN357	BN358	BN359	BN360	BN361	BN362	BN363	BN364	BN365	BN366	BN367	BN368	BN369	BN370	BN371	BN372	BN373	BN374	BN375	BN376	BN377	BN378	BN379	BN380	BN381	BN382	BN383	BN384	BN385	BN386	BN387	BN388	BN389	BN390	BN391	BN392	BN393	BN394	BN395	BN396	BN397	BN398	BN399	BN400	BN401	BN402	BN403	BN404	BN405	BN406	BN407	BN408	BN409	BN410	BN411	BN412	BN413	BN414	BN415	BN416	BN417	BN418	BN419	BN420	BN421	BN422	BN423	BN424	BN425	BN426	BN427	BN428	BN429	BN430	BN431	BN432	BN433	BN434	BN435	BN436	BN437	BN438	BN439	BN440	BN441	BN442	BN443	BN444	BN445	BN446	BN447	BN448	BN449	BN450	BN451	BN452	BN453	BN454	BN455	BN456	BN457	BN458	BN459	BN460	BN461	BN462	BN463	BN464	BN465	BN466	BN467	BN468	BN469	BN470	BN471	BN472	BN473	BN474	BN475	BN476	BN477	BN478	BN479	BN480	BN481	BN482	BN483	BN484	BN485	BN486	BN487	BN488	BN489	BN490	BN491	BN492	BN493	BN494	BN495	BN496	BN497	BN498	BN499	BN500	BN501	BN502	BN503	BN504	BN505	BN506	BN507	BN508	BN509	BN510	BN511	BN512	BN513	BN514	BN515	BN516	BN517	BN518	BN519	BN520	BN521	BN522	BN523	BN524	BN525	BN526	BN527	BN528	BN529	BN530	BN531	BN532	BN533	BN534	BN535	BN536	BN537	BN538	BN539	BN540	BN541	BN542	BN543	BN544	BN545	BN546	BN547	BN548	BN549	BN550	BN551	BN552	BN553	BN554	BN555	BN556	BN557	BN558	BN559	BN560	BN561	BN562	BN563	BN564	BN565	BN566	BN567	BN568	BN569	BN570	BN571	BN572	BN573	BN574	BN575	BN576	BN577	BN578	BN579	BN580	BN581	BN582	BN583	BN584	BN585	BN586	BN587	BN588	BN589	BN590	BN591	BN592	BN593	BN594	BN595	BN596	BN597	BN598	BN599	BN600	BN601	BN602	BN603	BN604	BN605	BN606	BN607	BN608	BN609	BN610	BN611	BN612	BN613	BN614	BN615	BN616	BN617	BN618	BN619	BN620	BN621	BN622	BN623	BN624	BN625	BN626	BN627	BN628	BN629	BN630	BN631	BN632	BN633	BN634	BN635	BN636	BN637	BN638	BN639	BN640	BN641	BN642	BN643	BN644	BN645	BN646	BN647	BN648	BN649	BN650	BN651	BN652	BN653	BN654	BN655	BN656	BN657	BN658	BN659	BN660	BN661	BN662	BN663	BN664	BN665	BN666	BN667	BN668	BN669	BN670	BN671	BN672	BN673	BN674	BN675	BN676	BN677	BN678	BN679	BN680	BN681	BN682	BN683	BN684	BN685	BN686	BN687	BN688	BN689	BN690	BN691	BN692	BN693	BN694	BN695	BN696	BN697	BN698	BN699	BN700	BN701	BN702	BN703	BN704	BN705	BN706	BN707	BN708	BN709	BN710	BN711	BN712	BN713	BN714	BN715	BN716	BN717	BN718	BN719	BN720	BN721	BN722	BN723	BN724	BN725	BN726	BN727	BN728	BN729	BN730	BN731	BN732	BN733	BN734	BN735	BN736	BN737	BN738	BN739	BN740	BN741	BN742	BN743	BN744	BN745	BN746	BN747	BN748	BN749	BN750	BN751	BN752	BN753	BN754	BN755	BN756	BN757	BN758	BN759	BN760	BN761	BN762	BN763	BN764	BN765	BN766	BN767	BN768	BN769	BN770	BN771	BN772	BN773	BN774	BN775	BN776	BN777	BN778	BN779	BN780	BN781	BN782	BN783	BN784	BN785	BN786	BN787	BN788	BN789	BN790	BN791	BN792	BN793	BN794	BN795	BN796	BN797	BN798	BN799	BN800	BN801	BN802	BN803	BN804	BN805	BN806	BN807	BN808	BN809	BN810	BN811	BN812	BN813	BN814	BN815	BN816	BN817	BN818	BN819	BN820	BN821	BN822	BN823	BN824	BN825	BN826	BN827	BN828	BN829	BN830	BN831	BN832	BN833	BN834	BN835	BN836	BN837	BN838	BN839	BN840	BN841	BN842	BN843	BN844	BN845	BN846	BN847	BN848	BN849	BN850	BN851	BN852	BN853	BN854	BN855	BN856	BN857	BN858	BN859	BN860	BN861	BN862	BN863	BN864	BN865	BN866	BN867	BN868	BN869	BN870	BN871	BN872	BN873	BN874	BN875	BN876	BN877	BN878	BN879	BN880	BN881	BN882	BN883	BN884	BN885	BN886	BN887	BN888	BN889	BN890	BN891	BN892	BN893	BN894	BN895	BN896	BN897	BN898	BN899	BN900	BN901	BN902	BN903	BN904	BN905	BN906	BN907	BN908	BN909	BN910	BN911	BN912	BN913	BN914	BN915	BN916	BN917	BN918	BN919	BN920	BN921	BN922	BN923	BN924	BN925	BN926	BN927	BN928	BN929	BN930	BN931	BN932	BN933	BN934	BN935	BN936	BN937	BN938	BN939	BN940	BN941	BN942	BN943	BN944	BN945	BN946	BN947	BN948	BN949	BN950	BN951	BN952	BN953	BN954	BN955	BN956	BN957	BN958	BN959	BN960	BN961	BN962	BN963	BN964	BN965	BN966	BN967	BN968	BN969	BN970	BN971	BN972	BN973	BN974	BN975	BN976	BN977	BN978	BN979	BN980	BN981	BN982	BN983	BN984	BN985	BN986	BN987	BN988	BN989	BN990	BN991	BN992	BN993	BN994	BN995	BN996	BN997	BN998	BN999	BN1000	BN1001	BN1002	BN1003	BN1004	BN1005	BN1006	BN1007	BN1008	BN1009	BN1010	BN1011	BN1012	BN1013	BN1014	BN1015	BN1016	BN1017	BN1018	BN1019	BN1020	BN1021	BN1022	BN1023	BN1024	BN1025	BN1026	BN1027	BN1028	BN1029	BN1030	BN1031	BN1032	BN1033	BN1034	BN1035	BN1036	BN1037	BN1038	BN1039	BN1040	BN1041	BN1042	BN1043	BN1044	BN1045	BN1046	BN1047	BN1048	BN1049	BN1050	BN1051	BN1052	BN1053	BN1054	BN1055	BN1056	BN1057	BN1058	BN1059	BN1060	BN1061	BN1062	BN1063	BN1064	BN1065	BN1066	BN1067	BN1068	BN1069	BN1070	BN1071	BN1072	BN1073	BN1074	BN1075	BN1076	BN1077	BN1078	BN1079	BN1080	BN1081	BN1082	BN1083	BN1084	BN1085	BN1086	BN1087	BN1088	BN1089	BN1090	BN1091	BN1092	BN1093	BN1094	BN1095	BN1096	BN1097	BN1098	BN1099	BN1100	BN1101	BN1102	BN1103	BN1104	BN1105	BN1106	BN1107	BN1108	BN1109	BN1110	BN1111	BN1112	BN1113	BN1114	BN1115	BN1116	BN1117	BN1118	BN1119	BN1120	BN1121	BN1122	BN1123	BN1124	BN1125	BN1126	BN1127	BN1128	BN1129	BN1130	BN1131	BN1132	BN1133	BN1134	BN1135	BN1136	BN1137	BN1138	BN1139	BN1140	BN1141	BN1142	BN1143	BN1144	BN1145	BN1146	BN1147	BN1148	BN1149	BN1150	BN1151	BN1152	BN1153	BN1154	BN1155	BN1156	BN1157	BN1158	BN1159	BN1160	BN1161	BN1162	BN1163	BN1164	BN1165	BN1166	BN1167	BN1168	BN1169	BN1170	BN1171	BN1172	BN1173	BN1174	BN1175	BN1176	BN1177	BN1178	BN1179	BN1180	BN1181	BN1182	BN1183	BN1184	BN1185	BN1186	BN1187	BN1188	BN1189	BN1190	BN1191	BN1192	BN1193	BN1194	BN1195	BN1196	BN1197	BN1198	BN1199	BN1200	BN1201	BN1202	BN1203	BN1204	BN1205	BN1206	BN1207	BN1208	BN1209	BN1210	BN1211	BN1212	BN1213	BN1214	BN1215	BN1216	BN1217	BN1218	BN1219	BN1220	BN1221	BN1222	BN1223	BN1224	BN1225	BN1226	BN1227	BN1228	BN1229	BN1230	BN1231	BN1232	BN1233	BN1234	BN1235	BN1236	BN1237	BN1238	BN1239	BN1240	BN1241	BN1242	BN1243	BN1244	BN1245	BN1246	BN1247	BN1248	BN1249	BN1250	BN1251	BN1252	BN1253	BN1254	BN1255	BN1256	BN1257	BN1258	BN1259	BN1260	BN1261	BN1262	BN1263	BN1264	BN1265	BN1266	BN1267	BN1268	BN1269	BN1270	BN1271	BN1272	BN1273	BN1274	BN1275	BN1276	BN1277	BN1278	BN1279	BN1280	BN1281	BN1282	BN1283	BN1284	BN1285	BN1286	BN1287	BN1288	BN1289	BN1290	BN1291	BN1292	BN1293	BN1294	BN1295	BN1296	BN1297	BN1298	BN1299	BN1300	BN1301	BN1302	BN1303	BN1304	BN1305	BN1306	BN1307	BN1308	BN1309	BN1310	BN1311	BN1312	BN1313	BN1314	BN1315	BN1316	BN1317	BN1318	BN1319	BN1320	BN1321	BN1322	BN1323	BN1324	BN1325	BN1326	BN1327	BN1328	BN1329	BN1330	BN1331	BN1332	BN1333	BN1334	BN1335	BN1336	BN1337	BN1338	BN1339	BN1340	BN1341	BN1342	BN1343	BN1344	BN1345	BN134
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- M-Class SumiBoron (CBN, One-Use Type)

[illegible]

TNMX ●●●●●●

- M-Class SumiDia (PCD, NF Type)

[illegible]

● = 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	

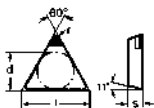
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
 Carbide/Hard Brittle Material

TPGN

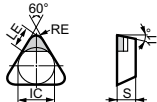
● G-Class SumiBoron (CBN, Regrindable Type)

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

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● G-Class SumiDia (PCD, NF Type)

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● = Euro stock
 ○ = Stock item in Japan

L8, L9 Edge Specification of SUMIBORON Inserts

SUMIBORON / SUMIDIA Indexable Inserts

TP-- Type 11° pos. Inserts

60° Triangle Type

11° Relief
With Insert Hole

Coated

TPGT / TPGW

Dimensions (mm)

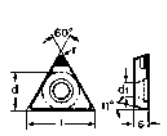
TP--	L	IC	S	D ₁
0802--	8,2	4,76	2,39	2,3
0902--	9,62	5,56	2,38	2,5
1102--	11,0	6,35	2,38	2,8
1103--			3,18	3,4
1604--	16,5	9,525	4,76	4,3

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

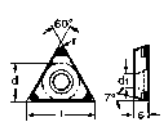
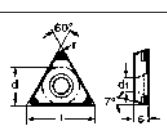
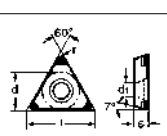
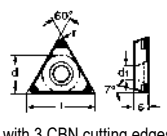
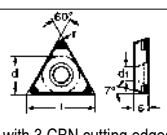
● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

Shape		ISO Cat. No.	RE	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC
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● G-Class SumiBoron (CBN, One-Use Type)

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

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

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

● = Euro stock
○ = Stock item in Japan

 L8, L9 Edge Specification of SUMIBORON Inserts

60° Triangle Type

11° Relief
With Insert Hole

Uncoated

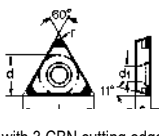
TPGT / TPGW

Dimensions (mm)

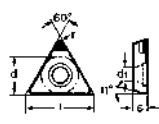
TP--	L	IC	S	D ₁
0802--	8,2	4,76	2,39	2,3
0902--	9,62	5,56	2,38	2,5
1102--	11,0	6,35	2,38	2,8
1103--			3,18	3,4
1604--	16,5	9,525	4,76	4,3

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

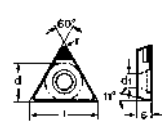
● G-Class SumiBoron (CBN, One-Use Multi-Corner Type)

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 NU3	0,4												●													

● G-Class SumiBoron (CBN, Regrindable Type)

 	TPGW 110304 TPGW 110308	0,4 0,8														●											
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● G-Class SumiBoron (CBN, One-Use Type)

		TPGW 080202 NU TPGW 080204 NU TPGW 090204 NU TPGW 110202 NU TPGW 110204 NU TPGW 110302 NU TPGW 110304 NU TPGW 110308 NU TPGW 160404 NU	0,2 0,4 0,4 0,2 0,4 0,2 0,4 0,8 0,4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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● = Euro stock
 ○ = Stock item in Japan

▲ = To be replaced by new item

L8, L9 Edge Specification of SUMIBORON Inserts

C

D

R

S

T

V

W

Z

SumiBoron / Sumidia
Inserts

SUMIBORON / SUMIDIA Indexable Inserts

TP-- Type 11° pos. Inserts

60° Triangle Type

11° Relief
With Insert Hole

Uncoated

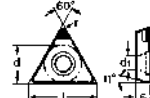
Dimensions (mm)

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	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	BNC	NC	DA	DA	DA	NPD	
		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)

	TPGW 110204 NU3 TPGW 110208 NU3 TPGW 110304 NU3 TPGW 110308 NU3	0,4 0,8 0,4 0,8																										
	TPGW 110302 LF NU3 TPGW 110304 LF NU3 TPGW 110308 LF NU3	0,2 0,4 0,8																										
	TPGW 110304 LE NU3	0,4																										

● G-Class SumiDia (PCD, NF Type)

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

● = Euro stock
 ○ = Stock item in Japan

 L8, L9 Edge Specification of SUMIBORON Inserts

60° Triangle Type

11° Relief
With Insert Hole

Uncoated

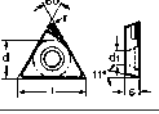
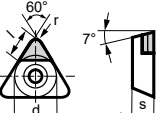
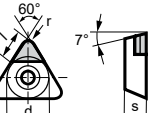
Dimensions (mm)

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	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 TPMT 080204 N-LD NF TPMT 090202 N-LD NF TPMT 090204 N-LD NF TPMT 110202 N-LD NF TPMT 110204 N-LD NF TPMT 110302 N-LD NF TPMT 110304 N-LD NF TPMT 110308 N-LD NF TPMT 160402 N-LD NF TPMT 160404 N-LD NF TPMT 160408 N-LD NF	0,2 0,4 0,2 0,4 0,2 0,4 0,2 0,4 0,8 0,2 0,4 0,8																							
Break Master - GD		TPMT 080202 N-GD NF TPMT 080204 N-GD NF TPMT 090202 N-GD NF TPMT 090204 N-GD NF TPMT 110202 N-GD NF TPMT 110204 N-GD NF TPMT 110302 N-GD NF TPMT 110304 N-GD NF TPMT 110308 N-GD NF TPMT 160402 N-GD NF TPMT 160404 N-GD NF TPMT 160408 N-GD NF	0,2 0,4 0,2 0,4 0,2 0,4 0,2 0,4 0,8 0,2 0,4 0,8																							

● M-Class SumiDia (PCD, NF Type)

	TPMW 080202 NF TPMW 080204 NF TPMW 110302 NF TPMW 110304 NF TPMW 110308 NF TPMW 160402 NF TPMW 160404 NF TPMW 160408 NF	0,2 0,4 0,2 0,4 0,8 0,2 0,4 0,8																								
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● M-Class SumiDia (PCD, Binderless)

	TPMW 080202 RH TPMW 080204 RH TPMW 110302 RH TPMW 110304 RH TPMW 110308 RH TPMW 160402 RH TPMW 160404 RH TPMW 160408 RH	0,2 0,4 0,2 0,4 0,8 0,2 0,4 0,8																								
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● = Euro stock
○ = Stock item in Japan

L8, L9 Edge Specification of SUMIBORON Inserts

SUMIBORON / SUMIDIA Indexable Inserts

VB_ _ Type 5° pos. Inserts

35° Diamond Type

5° Relief
With Insert Hole

Coated / Uncoated

VBGW

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

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

H				K KH		H				K PM KH		S	N																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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● = Euro stock
 ○ = Stock item in Japan

▲ = To be replaced by new item

 L8, L9 Edge Specification of SUMIBORON Inserts

35° Diamond Type

5° Relief

With Insert Hole

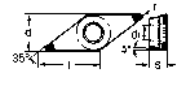
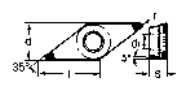
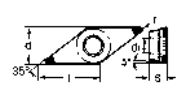
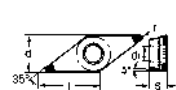
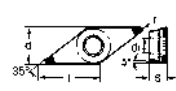
Coated / Uncoated

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 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	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				●																							
	 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			●																								
	 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				●																							
	 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	○	●			●	●	●																				
	 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)

[illegible]

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

[illegible]

● = Euro stock
○ = Stock item in Japan

L8, L9 Edge Specification of SUMIBORON Inserts

35° Diamond Type

7° Relief
With Insert Hole

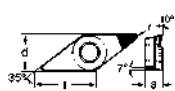
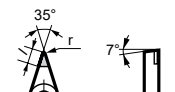
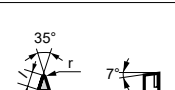
Uncoated

VCMT / VCGW

● M-Class (Regrindable Type)

Shape		ISO Cat. No.	RE	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	NC	DA	DA	DA	NP
		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																								○

● 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

SUMIBORON / SUMIDIA
Indexable Inserts

VN_A neg. Type Inserts

35° Diamond Type 0° Relief
With Insert Hole

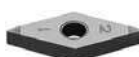
Uncoated

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 VNGA 160408 NU2	0,4 0,8											●	●		●			○	○	●		○				
 with 2 CBN cutting edges		VNGA 160404 LT NU2 VNGA 160408 LT NU2	0,4 0,8												○	○												
 with 2 CBN cutting edges		VNGA 160404 HS NU2 VNGA 160408 HS NU2	0,4 0,8												○	○												

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

	VNGA 160404 NU VNGA 160408 NU	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

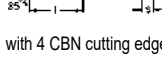
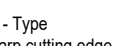
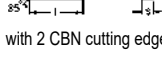
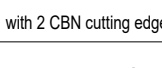
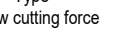
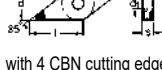
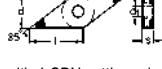
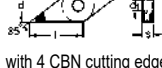
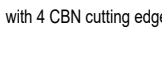
Coated

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	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	NC	DA	DA	DA	NP
				Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	Uncoated	
				CBN	Uncoated CBN	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	PCD	
	 with 2 CBN cutting edges	VNGA 160404 NC2	0,4		○	○	●				○																	
		VNGA 160408 NC2	0,8		○	○	●				○																	
		VNGA 160412 NC2	1,2		○																							
	 with 4 CBN cutting edges	VNGA 160402 NC4	0,2	○	○	○	○																					
		VNGA 160404 NC4	0,4	○	○	○	●	○		○	○	○	○															
		VNGA 160408 NC4	0,8	●	●	●	●			○	○	○	○															
	 with 4 CBN cutting edges	VNGA 160412 NC4	1,2	○	○						○																	
	 with 2 CBN cutting edges	VNGA 160402 LT-NC2	0,2					○																				
		VNGA 160404 LT-NC2	0,4					●																				
		VNGA 160408 LT-NC2	0,8					●																				
	 with 2 CBN cutting edges	VNGA 160412 LT-NC2	1,2					○																				
	 with 2 CBN cutting edges	VNGA 160402 LS-NC2	0,2		○																							
		VNGA 160404 LS-NC2	0,4		○	○																						
		VNGA 160408 LS-NC2	0,8		○	○																						
	 with 2 CBN cutting edges	VNGA 160412 LS-NC2	1,2		○	○																						
	 with 4 CBN cutting edges	VNGA 160404 LS-NC4	0,4					○																				
		VNGA 160408 LS-NC4	0,8					○		○																		
		VNGA 160412 LS-NC4	1,2							○																		
	 with 4 CBN cutting edges	VNGA 160404 HS-NC4	0,4	○	○																							
		VNGA 160408 HS-NC4	0,8	○	○						○	○																
		VNGA 160412 HS-NC4	1,2	○	○		○				○	○																
	 with 4 CBN cutting edges	VNGA 160404 ES-NC4	0,4					●																				
		VNGA 160408 ES-NC4	0,8					●																				
		VNGA 160412 ES-NC4	1,2					○																				
	 with 4 CBN cutting edges	VNGG 160404 N-FV NC4	0,4	●	○	●		●	●																			
		VNGG 160408 N-FV NC4	0,8	●	●	●		●	●		●	●																
		VNGG 160404 N-LV NC4	0,4	●	●	●		○	●																			
	 with 4 CBN cutting edges	VNGG 160408 N-LV NC4	0,8	●	●	●			●																			

● = Euro stock
 ○ = Stock item in Japan

L8, L9 Edge Specification of SUMIBORON Inserts

SUMIBORON / SUMIDIA Indexable Inserts

VN_A neg. Type and VNMX Special 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 CBN with chipbreaker with 2 CBN cutting edges	VNGM 160404 N-LV NU2 VNGM 160408 N-LV NU2	0,4 0,8																									

● M-Class SumiBoron (CBN, Regrindable Type)

 VNMA 160404 VNMA 160408	0,4 0,8																										
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● M-Class SumiBoron (CBN, One-Use Type)

 VNMA 160401 NU VNMA 160402 NU VNMA 160404 NU VNMA 160408 NU VNMA 160412 NU VNMA 160408 NS	0,1 0,2 0,4 0,8 1,2 0,8																										
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● M-Class SumiDia (PCD, NF Type)

 VNMA 160408 NF VNMA 160412 NF	0,8 1,2																										
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● M-Class SumiDia (PCD, Binderless)

 VNMA 160408 RH VNMA 160412 RH	0,8 1,2																										
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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 VNMX 160404 NF VNMX 160408 NF VNMX 160412	0,2 0,4 0,8 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

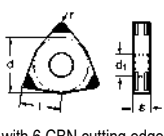
H Hardened Steel
K Cast Iron
N Non-Ferrous Metal
S Exotic Alloy
PM Sintered Component
 Carbide/Hard Brittle Material

WNGA

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

Shape	ISO Cat. No.	RE																			
	WNMA 080408 NU	0,8																			

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

	 with 6 CBN cutting edges	WNGA 080404 NC6 WNGA 080408 NC6 WNGA 080412 NC6	0,4 0,8 1,2	●●○●●●																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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● = Euro stock
 ○ = Stock item in Japan

L8, L9 Edge Specification of SUMIBORON Inserts

C

D

R

S

T

V

W

Z

SumiBoron / Sumidia
Inserts

SUMIBORON / SUMIDIA
Indexable Inserts

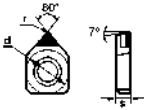
ZN-- Special Inserts

80° Special Type 7° Relief
With Insert Hole

Coated / Uncoated

ZNEX

● SumiBoron (CBN, One-Use Type)

Shape		ISO Cat. No.	RE	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	BN	NC	DA	DA	DA	NP
		ZNEX 040102 NC ZNEX 040104 NC	0,2 0,4			●	●	●	●																	
		ZNEX 040102 LE-NC ZNEX 040104 LE-NC	0,2 0,4		○																					
		ZNEX 040102 LT-NC ZNEX 040104 LT-NC	0,2 0,4			○																				
		ZNEX 040102 NU ZNEX 040104 NU	0,2 0,4									●	●	▲	●				○							

SUMIDIA Binderless PCD - Insert Grade NPD10

Negative Inserts

Application: Hard brittle material

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

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

Positive Inserts

Application: Hard brittle material

	Rake Angle	Shape	ISO Cat. No.	Dimensions (mm)					NPD10
				Inscribed Circle (IC)	Thick-ness	Hole Size	Nose Radius	Cutting Edge Length	
 80° Diamond Type	7°		CCMW 03X102 RH	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.

C

D

R

S

T

V

W

Z

SUMIDIA
Inserts



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 $\varnothing$ 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 $\varnothing$ 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 $\varnothing$ 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 $\varnothing$ 7,0 mm.



BNB

→ M53

Small hole boring bars

- Solid carbide boring bars with economical CBN and PCD insert.
- Min. boring dia. is $\varnothing$ 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

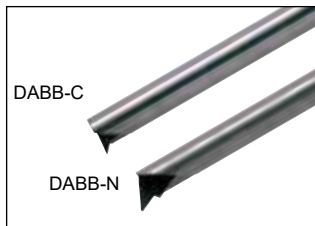


BNGG

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



RF → M70

High speed face mill for Aluminium

- Finishing and roughing aluminium alloys and non-ferrous materials
- High precision and highspeed machining $vc = 5000 \text{ m/min}$
- Aluminium alloy body
- Run-out less than $10 \mu\text{m}$
- 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 $\text{rpm} = 20.000$
- Economical PCD insert NF type



FMU → M72-73

"BN Finish Mill" for finishing grey cast iron

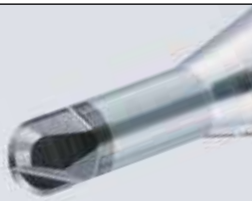
- High speed machining $vc = 1500 \text{ m/min}$
- Excellent surface roughness $R_z = 3,2$
- Run-out less than $10 \mu\text{m}$
- Easy assembling



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 : $\pm 0,005 \text{ mm}$



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

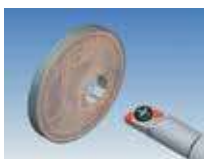
- PCD cutting edge is brazed on to a solid carbide shank.
- From general to high precision drilling of Aluminium alloys
- DML type is suitable for chamfering and stepped drilling

CBN Small Hole Boring Bar Systems

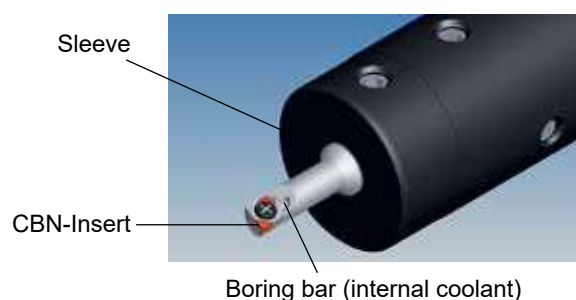
BSME/SEXC Series

■ Features

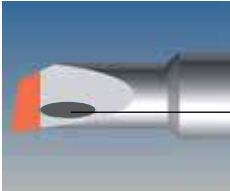
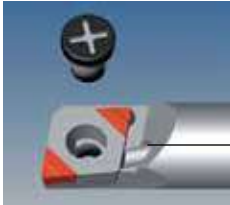
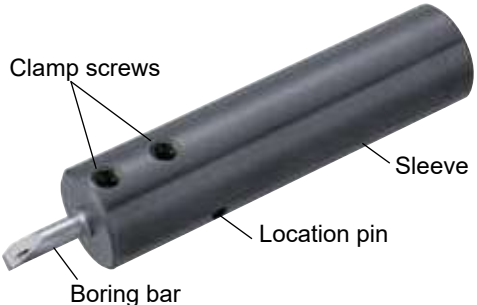
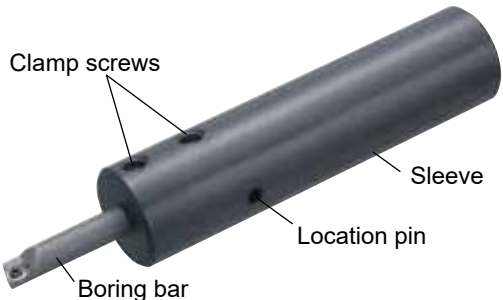
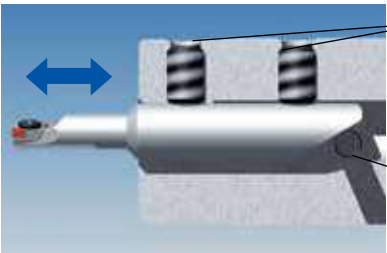
- New ultra small boring bar with CBN cutting edge
- Internal coolant
- Easy setting and handling
- High accuracy
- Carbide body for high rigidity
- One sleeve for different diameters



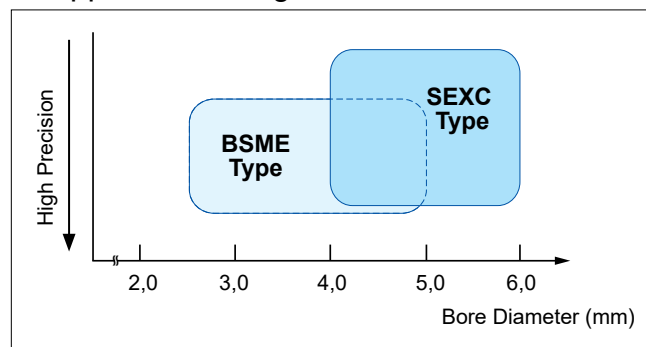
■ Basic System



■ 2 Types of CBN Small Hole Boring Bar System

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

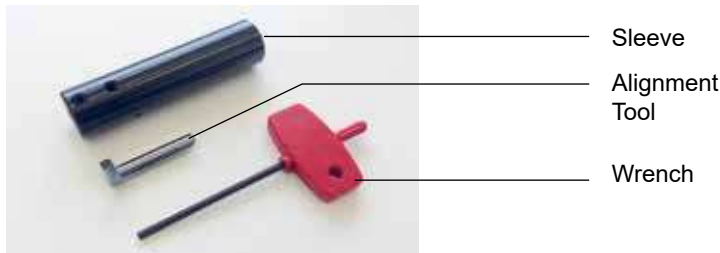
■ Application Range



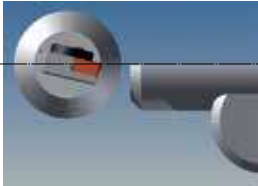
■ Recommended Cutting Conditions

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

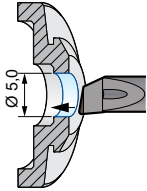
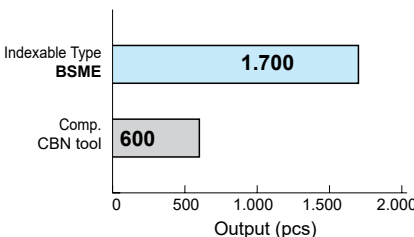
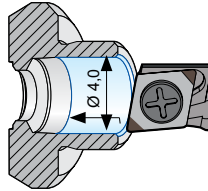
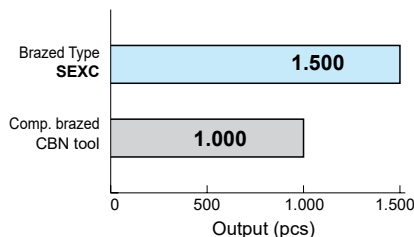
Accessories



Mounting Instruction

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	SEXC Bearing Steel Small Automotive Component												
The BSME type provides stable machining. Tool life is over 2 times longer than competitor's CBN tool.   <table border="1"> <caption>Output Comparison for BSME</caption> <thead> <tr> <th>Tool Type</th> <th>Output (pcs)</th> </tr> </thead> <tbody> <tr> <td>Indexable Type BSME</td> <td>1.700</td> </tr> <tr> <td>Comp. CBN tool</td> <td>600</td> </tr> </tbody> </table>	Tool Type	Output (pcs)	Indexable Type BSME	1.700	Comp. CBN tool	600	The SEXC type provides drastically reduced tool costs. Tool life is 1,5 times longer than competitor's brazed CBN tool.   <table border="1"> <caption>Output Comparison for SEXC</caption> <thead> <tr> <th>Tool Type</th> <th>Output (pcs)</th> </tr> </thead> <tbody> <tr> <td>Brazed Type SEXC</td> <td>1.500</td> </tr> <tr> <td>Comp. brazed CBN tool</td> <td>1.000</td> </tr> </tbody> </table>	Tool Type	Output (pcs)	Brazed Type SEXC	1.500	Comp. brazed CBN tool	1.000
Tool Type	Output (pcs)												
Indexable Type BSME	1.700												
Comp. CBN tool	600												
Tool Type	Output (pcs)												
Brazed Type SEXC	1.500												
Comp. brazed CBN tool	1.000												
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	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

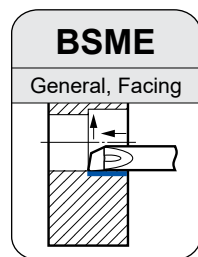


Fig. 1

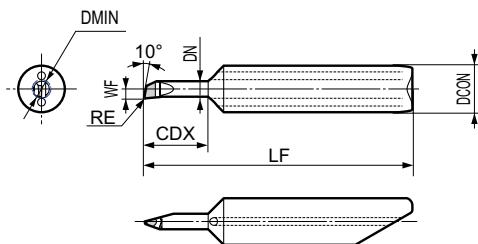
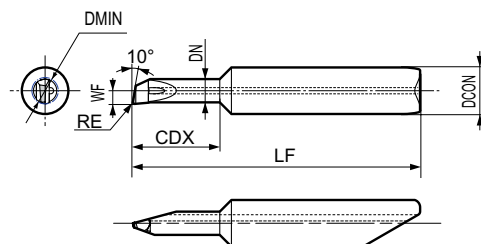


Fig. 2



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			6,0		0,2	2	HBSM6020				
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								6,0	0,2	2	HBSM6020
BSME R/L 45020D3S6	●	●				13,8	39,5											
BSME R/L 45020D4S6	□	□				18,3	44,0											
BSME R/L 50020D2S6	●	□	5,0	4,5	2,45	10,3	35,8											
BSME R/L 50020D3S6	●	●				15,3	40,8											
BSME R/L 50020D4S6	□	□				20,3	45,8											

Adapter Sleeve and Parts

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

Alignment Tool

Description	Stock
AFBSM60	●

Identification Details

B S M

Sumitomo
CBN Product
Special Mini

E

Solid Carbide
Bar with Inner
Coolant

R/L

R: Right Hand
L: Left Hand

3 5 0

Minimum
Bore Diameter
(ø 3,5 mm)

2 0

Nose Radius
of Edge
(ø 0,20 mm)

D 3

L/D - Ratio of
Working Length

S 6

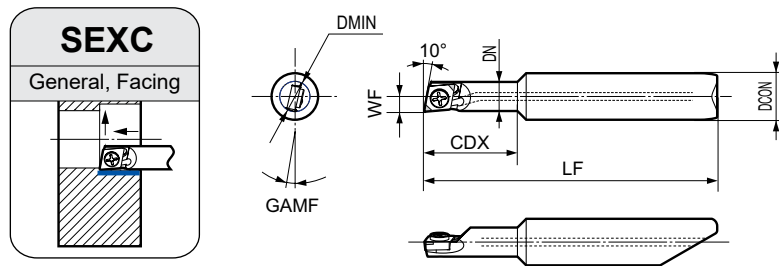
Shank
Diameter

● = Euro stock
□ = Delivery on request

Recommended Tightening Torque (N·m)

SEXC Series

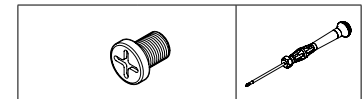
SEXC-Type with Internal Coolant



Boring Bar

Description	Stock		Dimensions (mm)							Applicable Sleeve	Insert Screw		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		12°		MIB1,6–2,5		
E06D2 SEXC R/L 03-05P	●	●	5,0	4,75	2,45	10	35,25						
E06D3 SEXC R/L 03-05P	●	●				15	40,25						
E06D2 SEXC R/L 03-06P	●	●	6,0	5,75	2,95	12	36,75						
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.

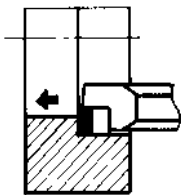
Identification Details

E	0 6	D 2	S	E	X	C	R/L	0 3	-	0 4	P
Carbide Bar with Coolant Hole	Shank Diameter (ø 6 mm)	L/D Ratio of Working Length	Insert Clamp System S = Screw Type	Insert Shape E = Diamond 75°	Approach Angle of Main Cutting Edge	Insert Relief Angle C = 7°	R: Right Hand L: Left Hand	Insert Size (ø IC)		Minimum Bore Diameter (ø 4,0 mm)	Standard Content includes Wrench

SUMIBORON Small Hole Boring Tools BNBB Type

For Hardened Steel

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



■ „Sumiboron“ Brazed Boring Tools for Small Hole Boring

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

■ Holder

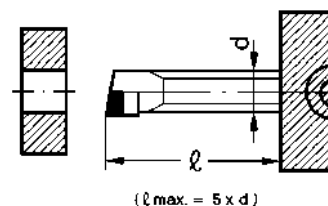
	Cat. No.	Stock	Dimensions (mm)				Screw	Wrench
			d1	LF	d2	H		
	HBB 316	●	16	100	3	15		
	HBB 416	●			4			
	HBB 516	●			5			
	HBB 616	●			6			
	HBB 816	●			8			
							BT 0404	TH 020

■ Spare Parts

■ Recommended Cutting Conditions

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

■ Precaution On Use



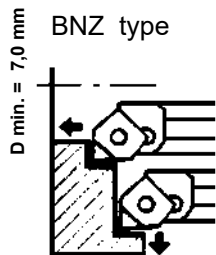
- Adjust overhang to achieve absolute minimum.
- For use of a small diameter brazed boring tool, select high speed and small feed rate, as much as possible.

Recommended Tightening Torque (N·m)

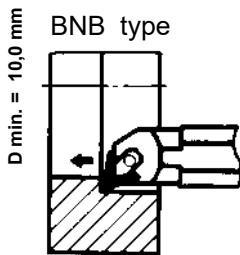
● = Euro stock
○ = Japan stock

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

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 040100	 ZNEX (CBN)
	BNZ 608 R	●	9	8	100	7,5	-12°		
	BNZ 610 R	●	11	10	125	9,5	-10°		
	BNZ 612 R	●	13	12	130	11	-8°		
	Holder "HBB616" for BNZ606 (ø d = 6 mm)								
BNB (Carbide shank) 	BNB 508 R/L	● ●	10	8	140	7	-9°	TBGN 060100	 TBGN (CBN)
	BNB 510 R/L	○ □	12	10	140	9	-8°		
	BNB 512 R/L	● ●	14	12	160	11	-6°		
	BNB 516 R/L	● ●	18	16	180	14	-5°		
	BNB 520 R/L	● ●	22	20	180	18	-4°		

■ Spare Parts for BNZ

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

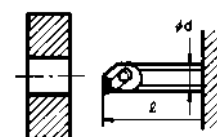
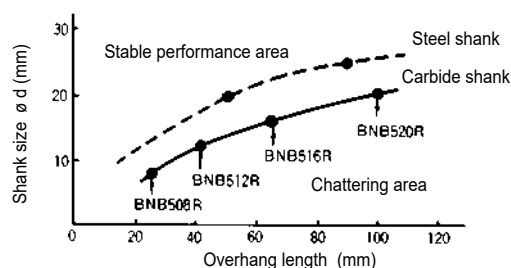
■ Spare Parts for BNB

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

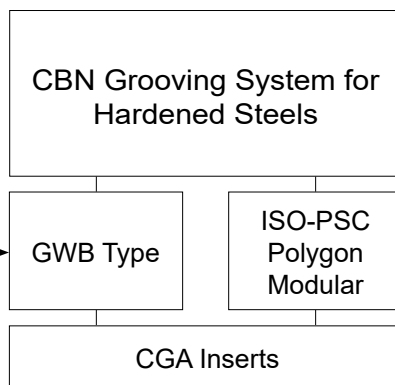
Cutting speed	80–120 m/min
Feed rate	0,03–0,1 mm/rev
Depth of cut	0,03–0,2 mm

■ Holders Performance Area



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

SUMIBORON Grooving Tool Holder GWB / PSC Type



■ Features

Tangential insert

80 degree tangentially mounted insert improves rigidity



Coated CBN grade BNC30G

Tough new coated CBN grade for interrupted hard grooving



Double clamping system

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

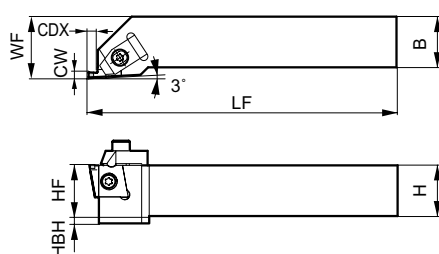
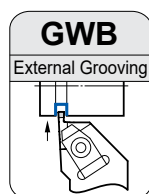
Wide insert range 1,5–6,0 mm

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



■ Holders

Cat. No.	Stock		Dimensions (mm)								Appl. Insert No.
	R	L	H	B	LF	WF	HF	HBH	CW (*)	CDX	
GWB R/L 2020-45	□	□	20	20	151 (150)	25	20	5	1,5≤cw≤4,5	3,5 – 5,0	①
GWB R/L 2525-45	●	●	25	25	151 (150)	30	25	–			
GWB R/L 2525-60	●	●	25	25	151	30	25	–	4,5≤cw≤6,0	5,0	②

■ Spare Parts

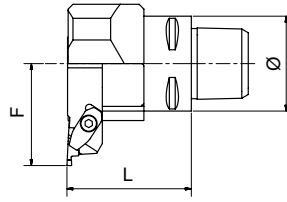
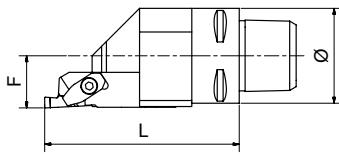
Clamp finger	Clamp screw	Insert screw	Spring	Wrench
TF 72 (Right handed)	BX 0520T	BFTX 0511N	GSP 06	TRX 20
TF 73 (Left handed)				

Right handed tool holders are applicable with right handed inserts.

Remark: Inserts are not included.

SUMIBORON Grooving Tool Holder GWB / PSC Type

ISO-PSC Polygon Modular CGA Grooving System



■ Holders

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

■ Cassette

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

■ CGA Inserts

Cat. No.	Stock						Dimensions (mm)				Insert No.	Applicable Holder
	BN250		BNC30G		BN2000		CW	CDX	IC	S		
	R	L	R	L	R	L						
CGA R/L 1504 150	▲	▲	●	●			1,5	3,5	15,875	4,76		GWB R/L 2020-45 GWB R/L 2525-45 GWBCM R/L-45
R/L 1504 200	▲	▲	●	□		○	2,0					
R/L 1504 250	▲	▲	●	●			2,5					
R/L 1504 300	▲	▲	●	●			3,0					
R/L 1504 350	▲	▲	●	●			3,5					
R/L 1504 400	▲	▲	●	□			4,0					
R/L 1504 450	▲	▲	□	●			4,5					
CGA R/L 1506 500	▲	▲	●	●		○	5,0	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

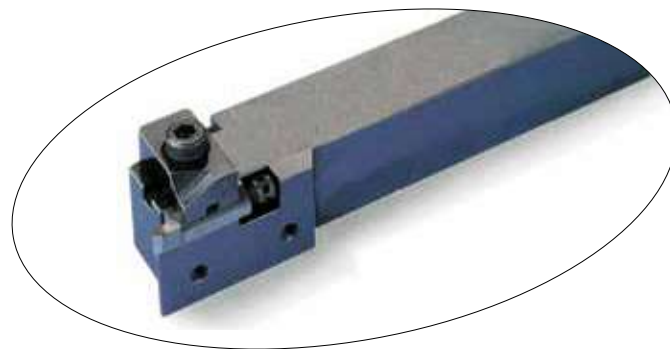
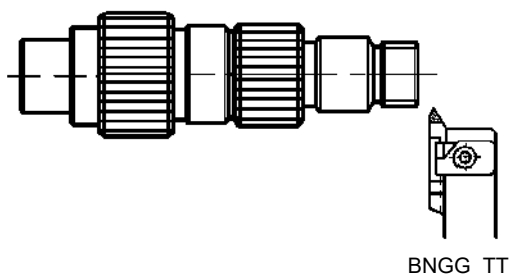
Material	Hardened steel
Cutting speed (m/min)	60 80 120 150
Feed rate (mm/rev)	0,03 0,04 0,08 0,1
Grade	BN250, BNC30G

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.

SUMIBORON Threading Tool Holder BNGG Type

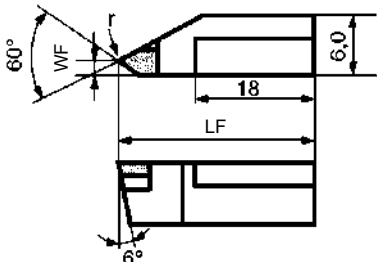
For Hardened Steel



■ „Sumiboron“ Holders

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

■ Inserts

	Cat. No.	Stock				Dimensions (mm)				Applicable Holder
		BN250		BNX20						
		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

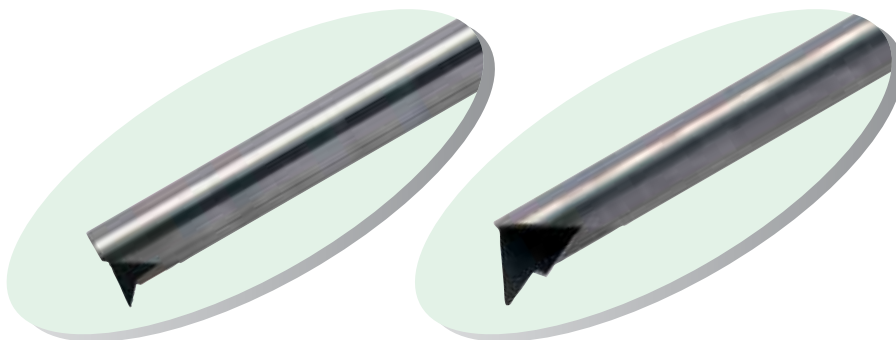
■ Recommended Cutting Conditions

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

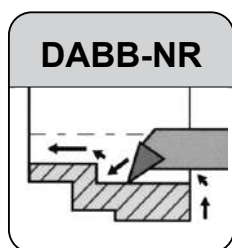
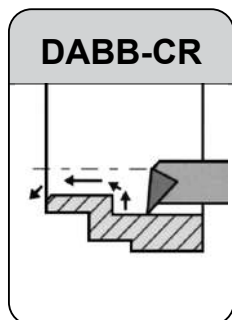
● = Euro stock
□ = Delivery on request

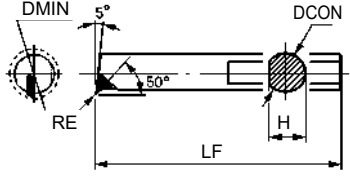
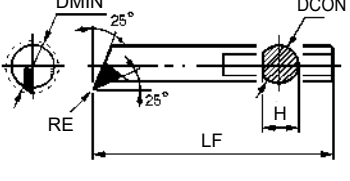
▲ = To be replaced by new item

DABB Type



■ „Sumidia“ Brazed Boring Tools for Small Hole Boring

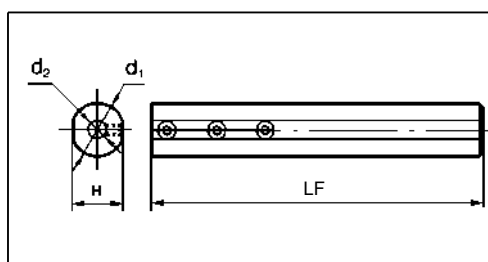


DABB (Solid carbide shank)	Cat. No.	Stock	Dimensions (mm)					Applicable Holder
		DA2200	DMIN	DCON	LF	H	RE	
For small boring 	DABB 025 CR	▲	3,0	2,5	60	2,2	0,1	HBB 2516
	DABB 035 CR	▲	4,0	3,5	60	3,2	0,1	HBB 3516
	DABB 045 CR	▲	5,0	4,5	80	4,1	0,1	HBB 4516
	DABB 060 CR	▲	7,0	6,0	80	5,2	0,1	HBB 616
For profiling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

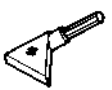
Spindle revolution	Feed rate	Depth of cut	Coolant
> 2000 rpm	0,03 – 0,1 mm/rev	0,03 – 0,2 mm	Wet

■ Holder



Cat. No.	Stock	Dimensions (mm)			
		d1	LF	d2	H
HBB 2516	●	16	100	2,5	15
HBB 3516	●			3,5	
HBB 4516	●			4,5	
HBB 616	●			6,0	

■ Spare Parts

Screw	Wrench
 BT 0404	 TH 020



■ Features

- **Drastically Reduced Runout Adjustment Time**
Simple screw-fastening structure enables fine adjustments to be made easily.
- **Blade Through Coolant**
Secures a supply of coolant to the cutting edge and breaks chips thoroughly.
- **Lightweight Aluminum Alloy Body**
Utilizing aluminum alloy to achieve a total weight of less than 1,3 kg for a Ø 125 mm cutter with 22 teeth.

■ Product Range

Type	Cat. No.	Body Material	Diameter Range (mm) / No of Teeth									
			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				
Modu-lar	ANXS 16000M	Steel	2	3, 4	3, 4	4, 6		→ H86				

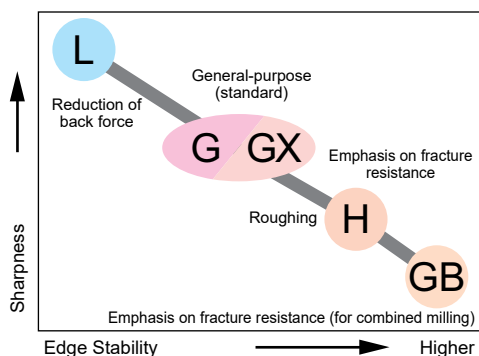
[Inch] Inch Bore

■ 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

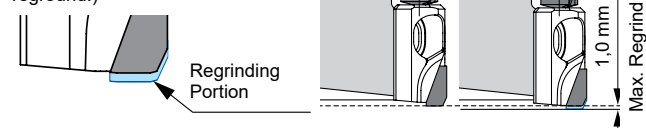
■ Edge Selection Guide



*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

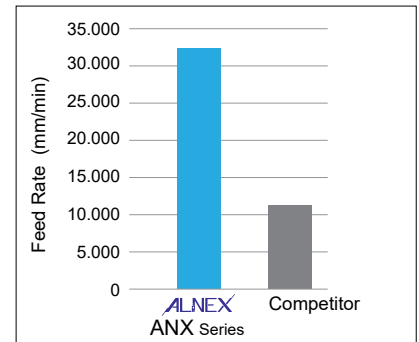
● High-Speed / High-Efficiency Cutting

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



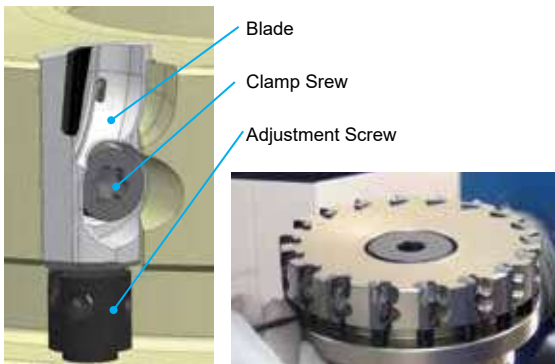
Comparison: Cutter Diameter $\varnothing$ 100 mm

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

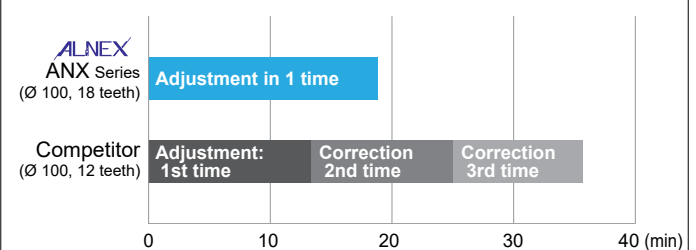


● Drastically Reduces Runout Adjustment Time

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



Adjustment Time for Runout Setting $\leq 5 \mu\text{m}$

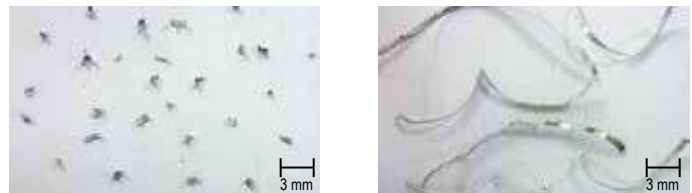


Already completed in 1st time setting, adjustment time reduced.

● Chip Control



Blade-Through Coolant Chip Breaking

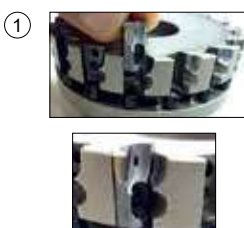


ALNEX ANX Series

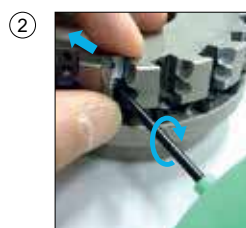
Competitor

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

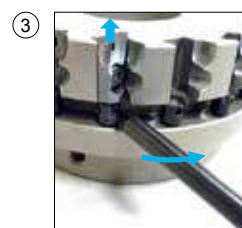
■ Adjustment of the Blades, Runout Alignment



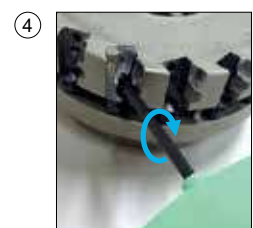
Insert the blade into its seat.



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)



■ CVD Single Crystal Diamond SCV10 Wiper Blade

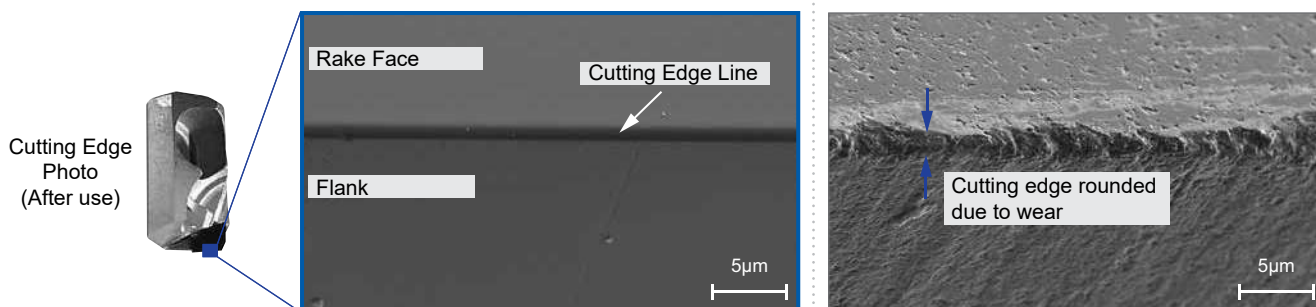
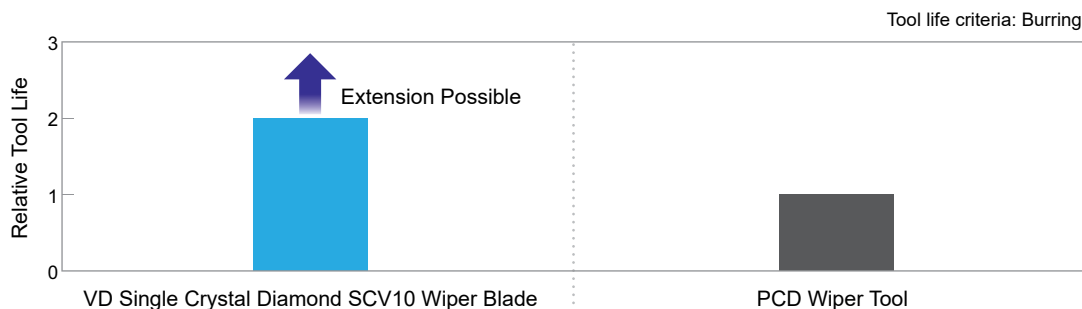
Wiper blade adopts high-strength single-crystal diamond using Sumitomo Electric Hardmetal's vapour phase synthesis technology.

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.

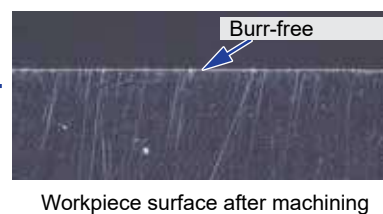
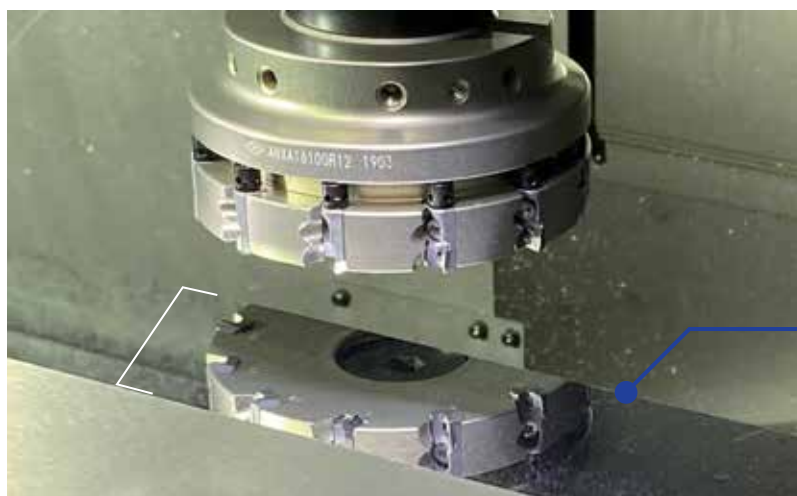
■ Burr-free

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



■ Mirror Finishing

Sharp cutting edge achieves mirror finish with cutting alone.



■ 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

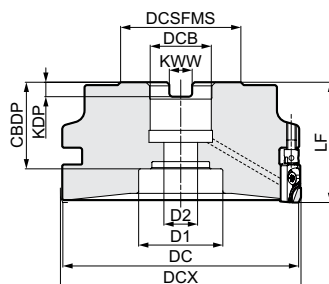
Grade	Features	Applications	Diamond share (%)	Average grain size of diamond particles (μm)	Hardness HK (GPa)	TRS (GPa)
DA1000	High-density sintered grade made of ultra-fine grain diamond that exhibits excellent wear and fracture resistance as well as edge sharpness.	Machining of High-Silicon Aluminum 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

Alnex 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								
General Purpose								
Roughing								
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. 4



Wiper Blade

Fig. 2

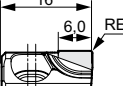


Fig. 5

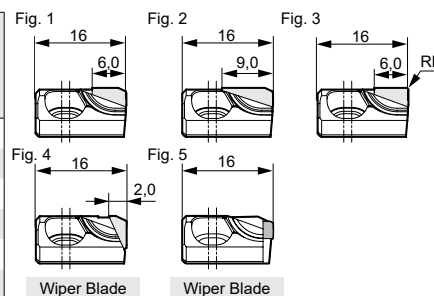


Wiper Blade

Fig. 3



* 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.

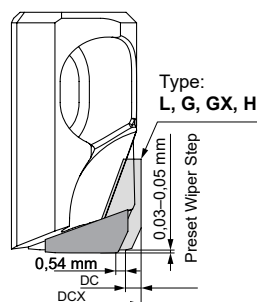
Spare Parts

Sold separately.

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

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

Alnex ANXS 16000 R(S)

Expansion



Fig. 1

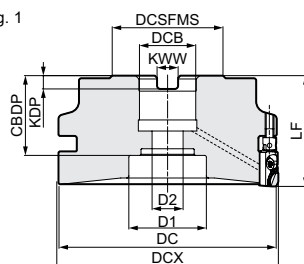
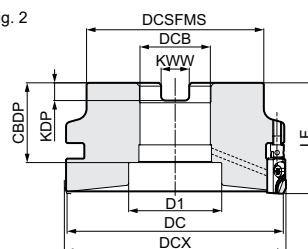


Fig. 2

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



■ 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

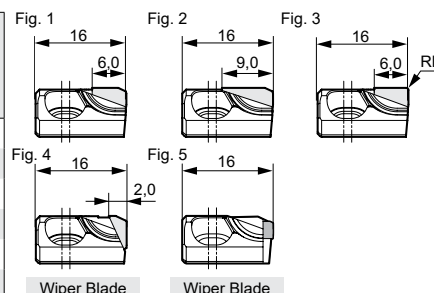
⌚ Recommended Tightening Torque (N·m)

Blades

Dimensions (mm)

Application	SUMIDIA	CVD							
High Speed / Light Cut	N	K	N						
General Purpose	N	K	N						
Roughing	N	K	N						
Cat. No.	DA1000	DA90	SCV10	Cutting Edge Length	RE	Wiper Edge Shape	Applications	Fig.	
ANB 1600R-L	●	—	—	6,0	—	Linear	Low Cutting Force	1	Fig. 1
1600R-G	●	—	—	6,0	—	Arc-Shaped	General Purpose	1	Fig. 2
1600R-GB	—	●	—	6,0	—	Arc-Shaped	Combined Milling*	1	Fig. 3
1600R-H	●	—	—	6,0	—	Arc-Shaped	Strong Edge	1	Fig. 4
1600R-GX	○	—	—	9,0	—	Arc-Shaped	Long Edge	2	Fig. 5
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	

* 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.

Spare Parts

Sold separately.

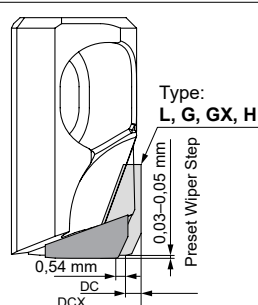
Applicable Cutters	Clamp Screw		Adjustment Screw	Wrench	Adjustment Wrench	Centre Bolt		Assembly Wrench
								
ANXS 16040RS	BXA0310IP	2,0	HFJ	TRXW10IP	ANT	BXH0825-D13	15	HFVT
16050RS						BXH1030-D16	25	
16063RS						BXH1235-D33	50	
16080RS						BXH1635-D40	100	
16100RS						BXH2036-D50	200	
16125RS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

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

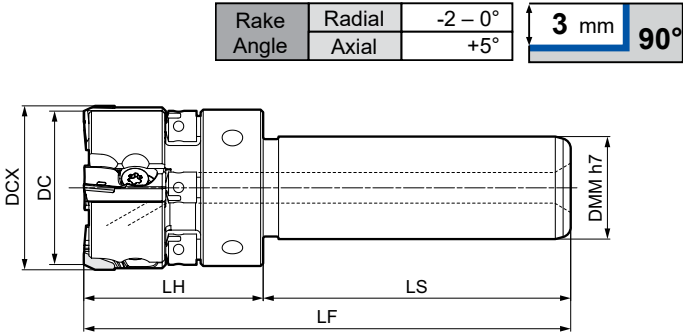


When using the wiper blade, in order to maintain balance, be sure to use a cutter with an even number of cutting edges and place the wiper blades at opposite positions.

Alnex

ANXS 16000 E

Expansion



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

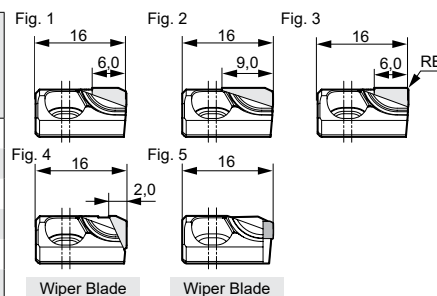
ANX	S	16	032	E	04
Cutter Series	Steel Body	Blade Size	Cutter Diameter	Round Shank	Number of Teeth

Blades

Dimensions (mm)

Application	SUMIDIA	CVD							
High Speed / Light Cut	N	K	N						
General Purpose	N	K	N						
Roughing	N	K	N						
Cat. No.	DA1000	DA90	SCV10	Cutting Edge Length	RE	Wiper Edge Shape	Applications	Fig.	
ANB 1600R-L	●	—	—	6,0	—	Linear	Low Cutting Force	1	Fig. 1
1600R-G	●	—	—	6,0	—	Arc-Shaped	General Purpose	1	Fig. 2
1600R-GB	—	●	—	6,0	—	Arc-Shaped	Combined Milling*	1	Fig. 3
1600R-H	●	—	—	6,0	—	Arc-Shaped	Strong Edge	1	Fig. 4
1600R-GX	○	—	—	9,0	—	Arc-Shaped	Long Edge	2	Fig. 5
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	

* 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 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

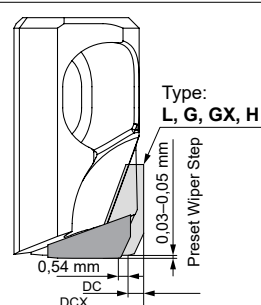
Spare Parts

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



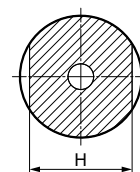
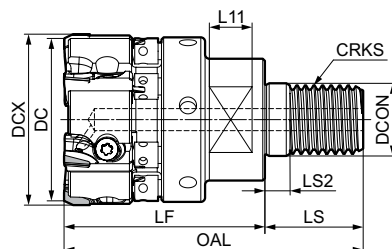
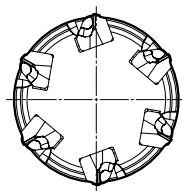
When using the wiper blade, in order to maintain balance, be sure to use a cutter with an even number of cutting edges and place the wiper blades at opposite positions.

Alnex ANXS 16000 M

New

Modular Type

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



■ 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

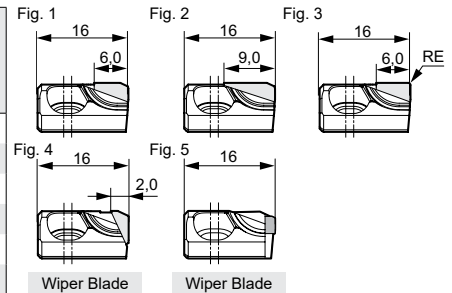
ANX	S	16	032	M16	Z03
Cutter Series	Steel Body	Blade Size	Cutter Diameter	Screw size	Number of Blades

Blades

Dimensions (mm)

Application	SUMIDIA	CVD							
High Speed / Light Cut	N	K	N						
General Purpose	N	K	N						
Roughing	N	K	N						
Cat. No.	DA1000	DA90	SCV10	Cutting Edge Length	RE	Wiper Edge Shape	Applications	Fig.	
ANB 1600R-L	●	—	—	6,0	—	Linear	Low Cutting Force	1	Fig. 1
1600R-G	●	—	—	6,0	—	Arc-Shaped	General Purpose	1	Fig. 2
1600R-GB	—	●	—	6,0	—	Arc-Shaped	Combined Milling*	1	Fig. 3
1600R-H	●	—	—	6,0	—	Arc-Shaped	Strong Edge	1	Fig. 4
1600R-GX	○	—	—	9,0	—	Arc-Shaped	Long Edge	2	Fig. 5
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	

* 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

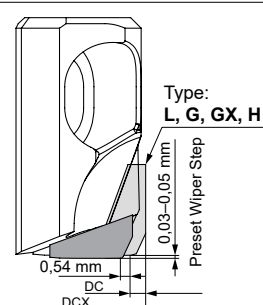
Spare Parts

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.

SUMIDIA Face Mill RF Type

High Speed Finishing of Aluminium Alloy



Fig. 1

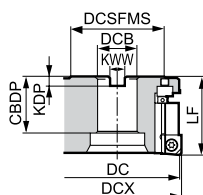
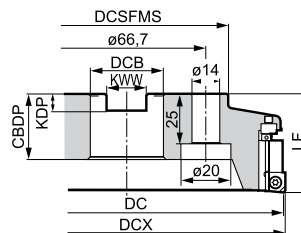


Fig. 2



Body

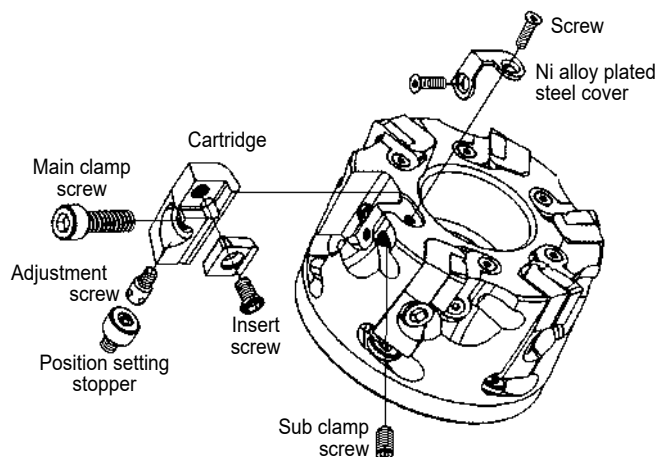
Cat. No.	Stock	Dimensions (mm)								Number of teeth	max. depth of cut	Weight (Kg)	Fig.
		DC	DCX	DCSFMS	LF	DCB	KWW	KDP	CDBP				
RF 4080 RS	●	80	82	60	50	27	12,4	7,0	29	6	3,0	0,7	1
RF 4100 RS	□	100	102	75	50	32	14,4	8,5	29	6		1,0	1
4125 RS	●	125	127	75	63	40	16,4	9,5	29	8		1,6	1
4160 RS	□	160	162	100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

Remark: PCD blades and inserts are not included.

Insert for Roughing and Finishing

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

Structure



"Sumidia" Blade

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

Dummy Blade

	RFD	○
--	-----	---

Cartridge

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

Cutting Insert Selection

For easy assembling:

PCD blade RFB
PCD blade RFB (wiper type)

For finishing:

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

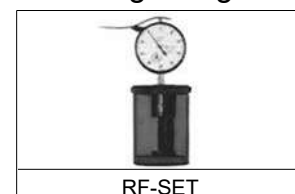
For roughing:

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

Spare Parts

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

Setting Gauge



Dial-gauge is not included.

● = Euro stock
○ = Japan stock

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

SUMIDIA Face Mill SRF Type

High Speed Finishing of Aluminium Alloy



Fig. 1

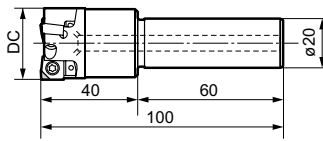
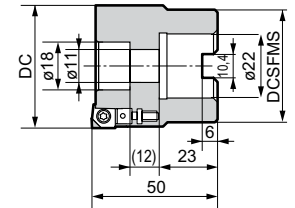


Fig. 2



Body

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

Inserts are sold separately.

Insert

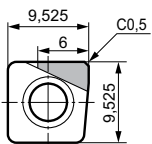


Fig. 1

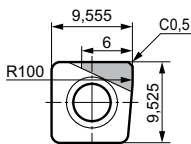


Fig. 2

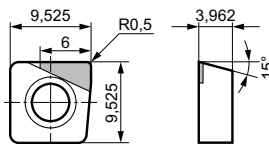
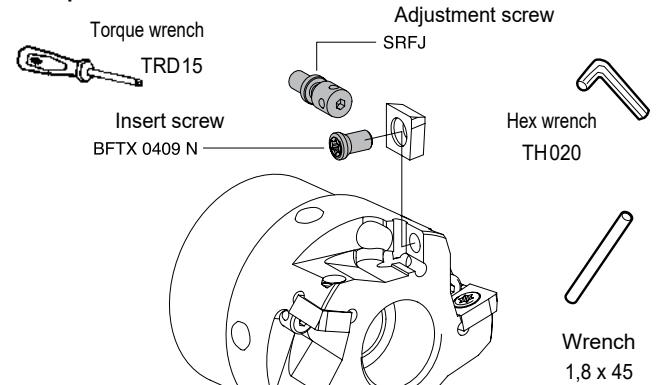


Fig. 3

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 reground 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 reground 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.

Feed D.O.C. (mm)	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)		Feed Rate (mm/tooth)	Depth of Cut (mm)	
				RF Type	SRF Type		RF Type	SRF Type
Aluminium Alloy	Si < 13 %	Finishing	DA1000 (PCD)	2.000–5.000	– 4.000	0,05–0,2	– 3,0	– 5,0
		Roughing	H1 (Carbide)	1.000–2.500	—			
	Si ≥ 13 %	Finishing	DA1000 (PCD)	400–800	– 800			
		Roughing	H1 (Carbide)	200–400	—			

SUMIBORON "BN Finish Mill" FMU Type

High Speed Finishing of Grey Cast Iron



■ Features

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

■ Application

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

■ Specifications

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

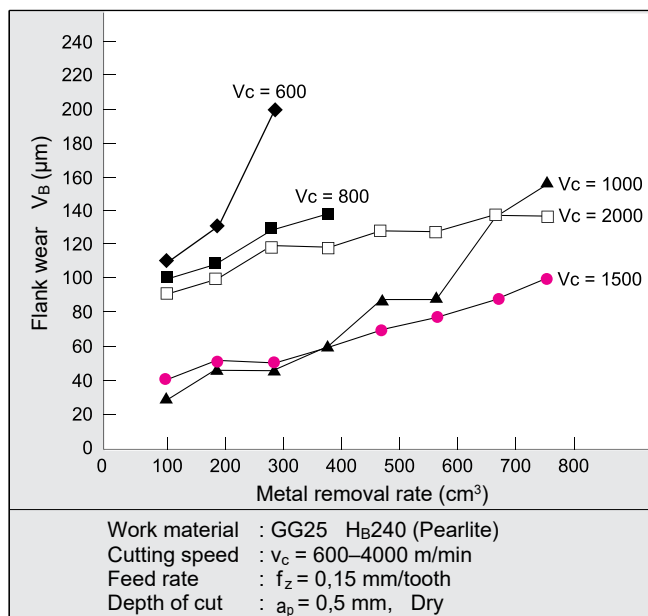
■ Recommended Cutting Conditions

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

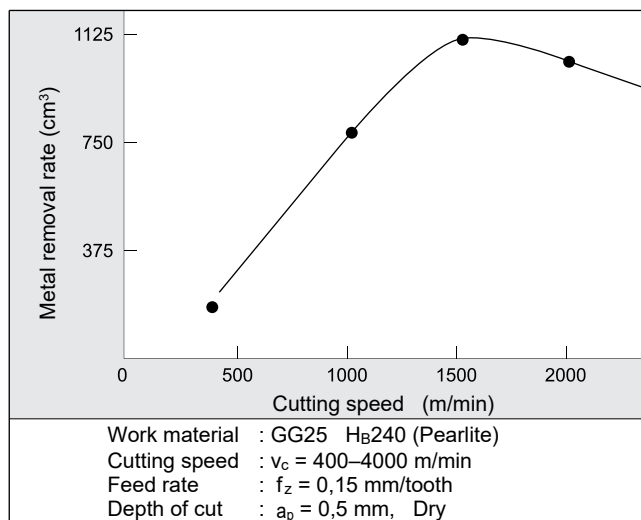


■ Performance

● Tool Life Diagram



● Estimated Tool Life



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

● = Euro stock
○ = Japan stock

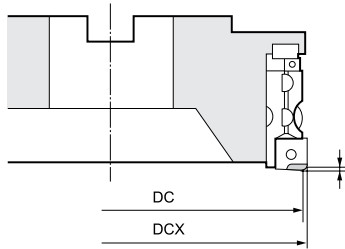
□ = Delivery on request
▲ = To be replaced by new item

⌚ Recommended Tightening Torque (N·m)

SUMIBORON "BN Finish Mill" FMU Type

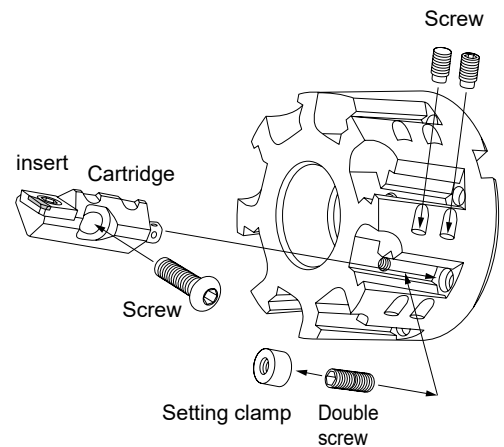
Specifications

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



Max. depth of cut: 0,5 mm

Structure



Body

Fig. 1

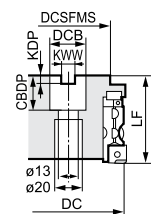


Fig. 2

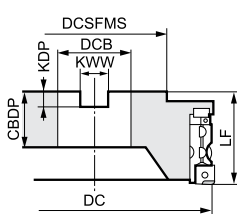


Fig. 3

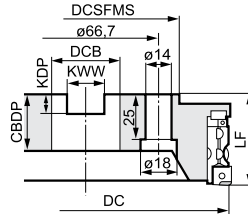


Fig. 4

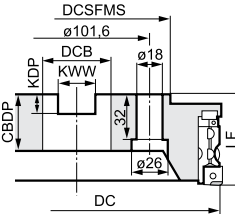
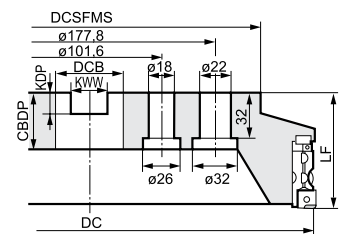


Fig. 5



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

Inserts

Fig. 1

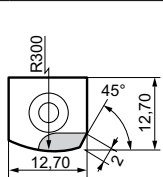
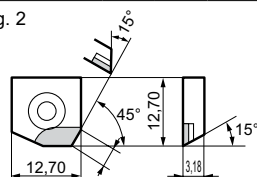


Fig. 2



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

Cartridge

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

Spare Parts

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

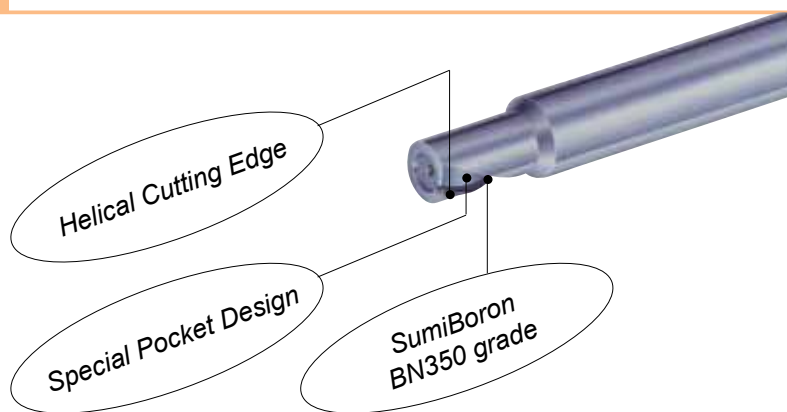
Gauge



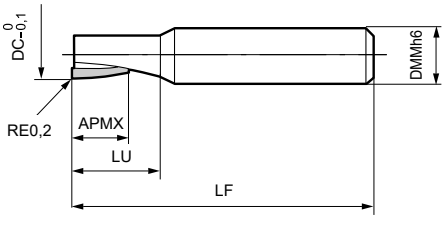
Dial-gauge is not included.

SUMIBORON "Helical Master" BNES Type

Spiral CBN Endmill for Hardened Steel

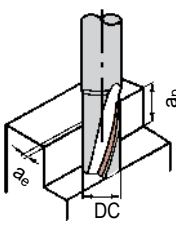


■ Endmills BNES Type with 1 Spiral Flute

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

■ Recommended Cutting Conditions

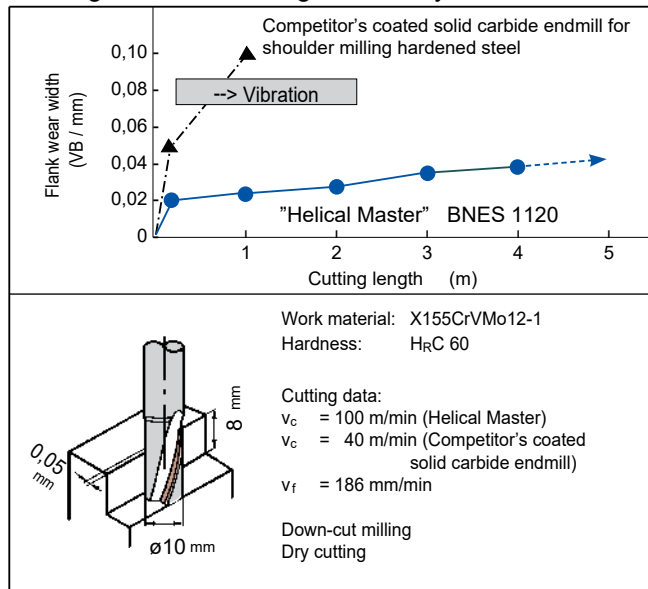
Cutting speed: v_c (m/min), Spindle revolutions: n (rpm), Feed per tooth: f_z (mm/tooth), Feed speed: v_f (mm/min)

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

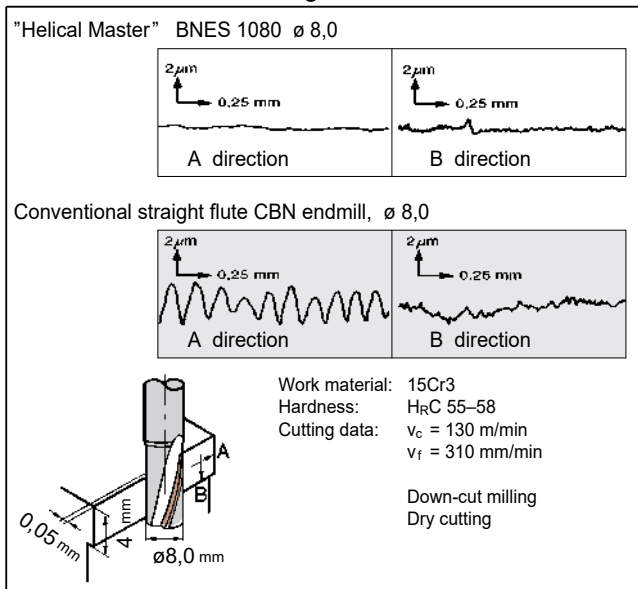
Recommendation: Dry cutting (Air coolant)
Down-cut milling
Minimise the overhang
Use a rigid machine

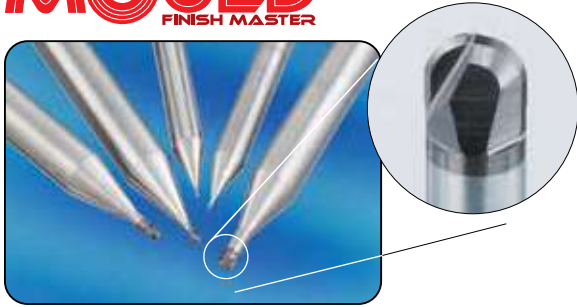
■ Performance

● Long Tool Life and High Efficiency



● Excellent Surface Roughness

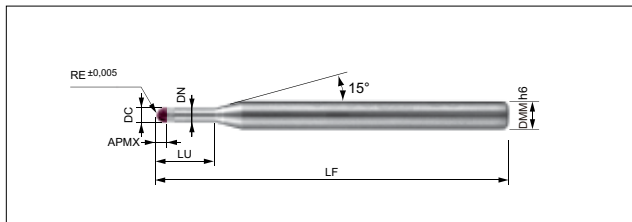


MOULD
FINISH MASTER

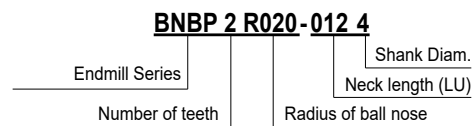
■ Characteristics / Application

- 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 : $\pm 0,005$ 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

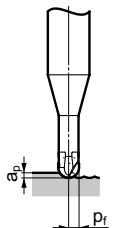
Grade: BN350

■ 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

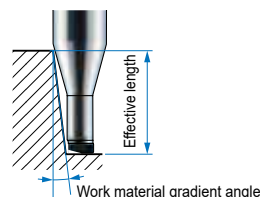
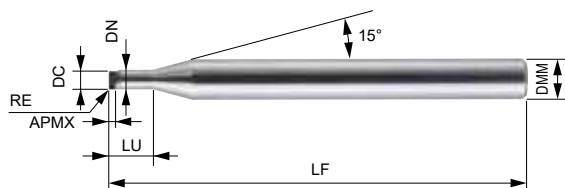
Important Notes

- (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.



SUMIDIA "MOULD Finish Master" NPDRS Type

SUMIDIA Binderless Radius Endmill NPDRS Type



NPDRS Type Body (for Standard Finishing)

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

Identification Details

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

Cutting Diameter and Nose Radius Combinations

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

Recommended Cutting Conditions

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

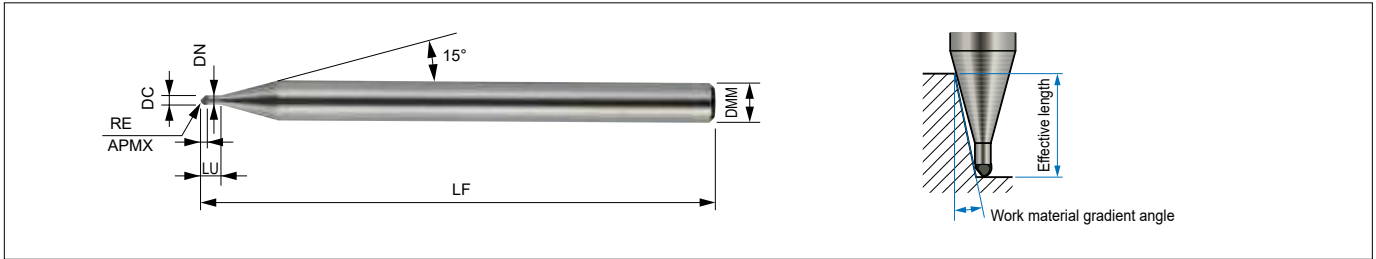
Work Material		Carbide			
RE (mm)	LU	Spindle Speed (min ⁻¹)	Feed Rate (mm/min)	a _p (mm)	a _e (mm)
0,2	0,10	40.000	100	0,001	0,001
0,3	0,15	40.000	150	0,002	0,001
0,5	0,25	40.000	200	0,003	0,001
1,0	0,55	40.000	400	0,005	0,003
2,0	0,55	40.000	600	0,010	0,005



○ = Japan stock



SUMIDIA Binderless Ballnose Endmill NPDBS Type / NPDB Type



NPDBS Type Body (for Standard Finishing)

Cat. No.	Stock	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	(S)	1	030	- 010
Series Code	For standard finishing	No. of flutes	Ballnose radius	Length below neck

Recommended Cutting Conditions

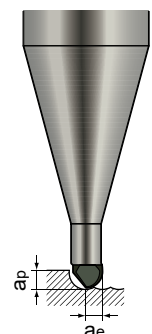
- Use a machine with high rigidity for stable cutting.
- Non-water soluble coolant recommended. Supply as a mist or external coolant.
Take fire prevention precautions to avoid fire hazards caused by sparks igniting during machining or tool breakage.
- Shorten overhang as much as possible.
- Adjust cutting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

Flat Surface Finishing

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

Copy Finishing

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



SUMIDIA Drills

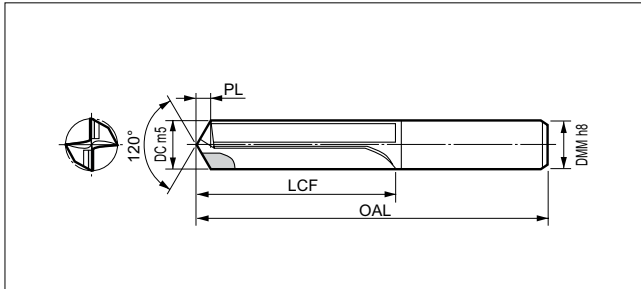
DAL/DDL/DML Type



From general to High Precision Drilling of Aluminum Alloys!

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

■ DAL Type



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

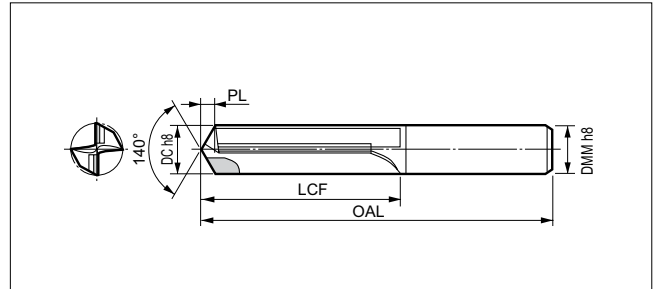
■ Recommended Conditions

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

■ Application Examples (DAL Type)

Work Shape	Work	Conditions	Results
	A390 High silicon Aluminum	$V_c=100\text{m/min}$ $f=0,1\text{mm/rev}$	• Holes by carbide drill was out of specifications after 2.000 holes/reg. • SumiDia drill could drill up to 30.000 holes/reg. • 15 times tool life that of carbide drills.
	A390 High silicon Aluminum (pre-cast hole of $\emptyset 10$)	$V_c=120\text{m/min}$ $f=0,12\text{mm/rev}$	• Average 40.000 holes/reg • Surface roughness $R_y = 1 \mu\text{m}$
	ADC10 Aluminum Die Cast	$V_c=90\text{m/min}$ $f=0,08\text{mm/rev}$	• More than 50.000 holes and still running

■ DDL Type



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

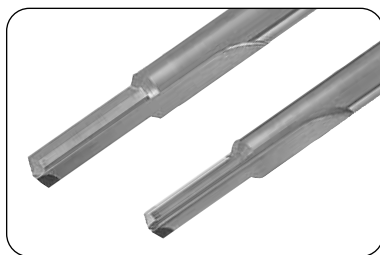
■ Important Notes

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

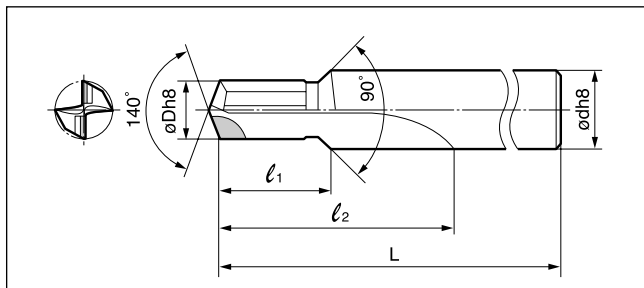
■ Application Examples (DDL Type)

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

□ = Delivery on request



■ DML Type

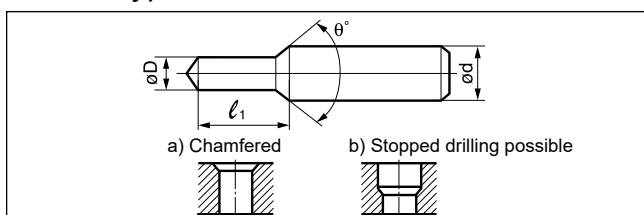


Applicable Tap Size	Cat. No.	Stock	ϕD	ϕd	L	ℓ_1	ℓ_2
		DA2200					
M6	DML 050V	□	5	8	90	18	36
M8	DML 068V	□	6,8	10	104	24	48
M10	DML 085V	□	8,5	12	122	30	60
M12	DML 103V	□	10,3	14	136	36	72

■ Application Examples (DML Type)

Work Shape	Work	Conditions	Results
	AC4C-T6 Aluminum Casting M6 Pre-tap holes	$V_c=100\text{m/min}$ $f=0,1\text{mm/rev}$ $m/c=6$ spindles	• Regrind after 150.000 holes • Tool life for carbide drill is 500 holes. • 30 times tool life that of carbide drills
	AC2C-T2 Aluminum Casting M8 Pre-tap holes	$V_c=210\text{m/min}$ $f=0,15\text{mm/rev}$	• 100.000 holes/reg (2.000m) and still running. • Drilling and chamfering in the same process
	AC4C-T6 Aluminum Casting M10 Pre-tap holes	$V_c=250\text{m/min}$ $f=0,2\text{mm/rev}$	• 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° .

