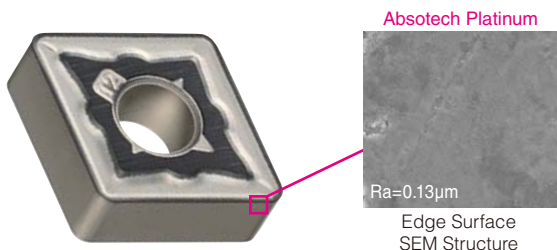


Sumitomo Electric Hardmetal's Coated Series are high-quality, high-performance grades that combines a proprietary, special ultra-hard carbide substrate with a multi-layered coating that provides excellent wear and heat resistance plus superior adhesion strength. Utilised in high-speed, high-efficiency applications on a wide range of work material including, steel, cast iron, and exotic alloys.

### Characteristics

#### Absotech Platinum

**New CVD**

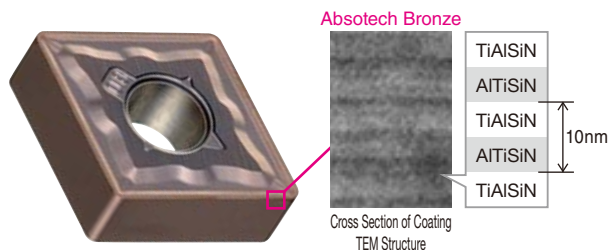


Achieves a good balance between drastically-improved coating strength and excellent surface smoothness and enables stable machining thanks to newly-developed boride-based titanium compound coating.

- Achieves over 2 times chipping resistance compared with conventional coating thanks to the improved coating strength.
  - Drastically improves the adhesion resistance and reduces the occurrence of abnormal damage thanks to excellent surface smoothness.
  - Improves the corner visibility with a unique color tone.
- Applicable Grades : (For Stainless Steel Turning) AC6030M

#### Absotech Bronze

**New PVD**

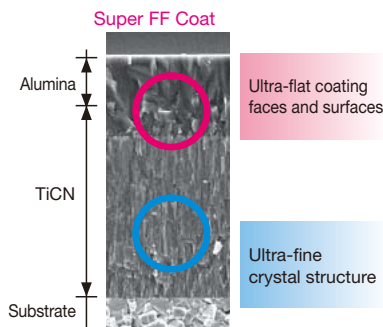


Employing our unique super multi-layered thin coating structure, similar to the Super ZX Coat, this new composition is a highly thermal resistant coating with improved coating adhesion strength to the substrate.

- Utilizing a new TiAlSiN-based super multi-layered composition structure to achieve excellent wear and oxidation resistance.
  - Drastically improves the peel-off resistance of the coating by improving the boundary control technology between the carbide substrate and coating.
  - Achieves over 2 times greater fracture resistance in stainless steel machining compared with conventional grades.
- Applicable Grades : (For Stainless Steel Turning) AC6040M

#### Super FF Coat

**CVD**

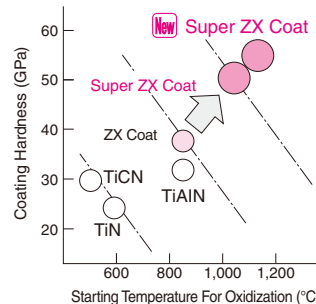


Our unique CVD process achieves ultra-flat boundary faces between coating layers and super ultra-fine coating particles.

- Smooth coating surface provides excellent adhesion and chipping resistance. Improved coating adhesion strength.
  - Harder than conventional coatings with huge improvements in wear resistance.
  - High speed, high efficiency machining of more than 1.5 times that of conventional grades is possible.
  - Achieving more than double the tool life of conventional grades under conventional cutting conditions.
- Applicable Grades : (For Steel Turning) AC810P, AC820P, AC830P  
(For Cast Iron Turning) AC405K, AC415K, AC420K  
(For Stainless Steel Turning) AC610M, AC630M  
(For Milling) ACP100, ACK200

#### NEW Super ZX Coat / Super ZX Coat

**PVD**



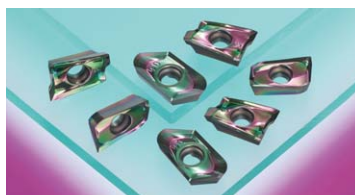
Utilising our proprietary thin layer coating technology and advanced nanotechnology, high coating hardness and excellent oxidation resistance are achieved by a coating structure that consist of approximately 1,000 alternating, nanometre-thin (1 nanometre = 1 billionth of a metre) layers.

- Coating hardness increased by 40% and starting temperature for of oxidation increased by 200°C compared to conventional grades.
  - At least 1.5x improvement in high-speed and high-efficiency cutting compared to conventional grades.
  - Achieving more than double the tool life of conventional grades under conventional cutting conditions.
- Applicable Grades : (For Turning) AC503U, AC510U, AC520U, AC530U  
(For Milling) ACK300, ACP200, ACP300

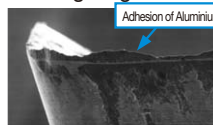
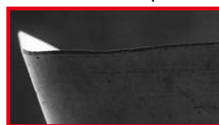
#### AURORA Coat (DLC:Diamond Like Carbon)

**PVD**

Using our proprietary PVD process technology, we have developed a hydrogen-free DLC coating that is extremely hard and smooth.



#### ADC12 Comparison of Cutting Edge Adhesion After Cutting






Work Material : ADC12  
Cutting Conditions :  $V_c$ : 300m/min  
 $f_z$ : 0.15mm/t  
 $a_p$ : 5mm  
 $a_e$ : 5mm Dry

- Second only to diamond in terms of hardness, this smooth coating has a low coefficient of friction and provides excellent adhesion resistance to deliver better-quality machined surfaces.
- Can be used for high-speed, high-efficiency cutting of aluminium alloys, copper alloys, resins, and more.




- Adopted Grades (For Milling) DL1000  
(For Endmilling) DL1000, DL1200  
(For Drilling) DL1300, DL1500

## Characteristic Values

## For Turning(CVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness (μm)	Characteristics	Old Grades
	<b>AC810P</b>	91.0	2.2	Super FF Coat	18	A P10 grade with excellent wear resistance that utilises a special carbide substrate with Super FF Coat for high to medium speed cutting.	AC700G
	<b>AC820P</b>	90.1	2.2	Super FF Coat	14	A P20 grade that features stability and longer tool life. Employs special carbide substrate and Super FF Coat to improve on P20 wear and fracture resistance.	AC2000
	<b>AC830P</b>	89.4	2.6	Super FF Coat	8	Stable long-life grade employs special tough, carbide substrate and Super FF Coat. Improves on P30 grade fracture resistance and approaches P20 grade in terms of wear resistance.	AC3000
	<b>AC630M</b>	89.5	2.7	Super FF Coat	5	Superior performance in continuous and light cutting, and other low-speed applications that require sharp edges.	AC230
	<b>AC610M</b>	91.0	2.2	Super FF Coat	5	A high efficiency M10 grade featuring improved wear resistance during stainless steel cutting. Employs special, ultra-hard substrate and thin Super FF Coat.	—
	<b>AC6030M</b>	89.5	2.7	Absotech Platinum	5	The first recommended grade for general machining of stainless steel that drastically reduces the occurrence of abnormal damage in stainless steel machining and achieves long and stable tool life by employing a new coating: Absotech Platinum.	—
	<b>AC630M</b>	89.5	2.7	Super FF Coat	5	A general purpose grade featuring improved wear and fracture resistance during stainless steel cutting. Utilises a special tough carbide substrate with a thin Super FF Coat.	AC304
	<b>AC405K</b>	92.0	2.4	Super FF Coat	18	Employs an ultra-hard substrate and ultra-hard Super FF Coat to provide excellent resistance to wear and plastic deformation. Suitable for high-speed continuous cutting of cast iron.	AC410K
	<b>AC415K</b>	91.1	2.5	Super FF Coat	18	Employs a special dedicated ultra-hard substrate that is also suitable for interrupted cutting and ultra-hard Super FF Coat to provide stability and long tool life in a wide range of processes. First recommended grade for cast iron turning.	AC410K
	<b>AC420K</b>	91.1	2.5	Super FF Coat	12	A new, extremely versatile grade that can be used for rough, interrupted cutting of ductile and grey cast iron. Employs special, ultra-hard carbide substrate and Super FF Coat to provide stability and long tool life.	AC700G
	<b>AC820P</b>	90.1	2.2	Super FF Coat	14	A grade suited to heavy interrupted cutting of ductile cast iron.	AC2000

## For Milling(CVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness (μm)	Characteristics	Old Grades
	<b>ACP100</b>	89.3	3.1	Super FF Coat	6	A grade that employs a tough carbide substrate and thin-layer Super FF Coat to provide superior thermal crack and wear resistance in high-speed milling of steel.	AC230
	<b>ACM200</b>	89.8	3.4	Super FF Coat	6	A grade ideal for hardened steel machining that provides excellent wear and heat resistance by employing a newly-developed ultra-hard carbide and Super FF Coat.	AC230
	<b>ACK200</b>	91.7	2.5	Super FF Coat	6	A grade that employs a tough carbide substrate and thin-layer Super FF Coat to provide superior thermal crack and wear resistance for high-speed milling.	AC211

A

Grades

Coated Carbide

Cermets

Ceramic

Carbide

CBN Layer

PCD

### Characteristic Values

#### For Turning (PVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Main Coating Components	Coating Thickness (µm)	Characteristics	Old Grades
<b>P</b> Steel	<b>T1500Z</b> (Cermet)	92.0	2.2	Brilliant Coat*	3	• Brilliant Coat* PVD coating gives excellent lubricity for higher quality machining. General-purpose coated cermet grade that can maintain high-quality machined surfaces and also gives excellent wear resistance.	T2000Z
	<b>T3000Z</b> (Cermet)	91.3	2.4	ZX Coat	3	• An ultra-reliable coating grade with tough cermet substrate.	—
	<b>AC530U</b>	91.4	3.3	Super ZX Coat	3	• For interrupted and general steel cutting. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.	ACZ310
	<b>AC520U</b>	91.7	3.0	Super ZX Coat	3	• Interrupted machining and stainless steel machining. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a super tough substrate for excellent fracture resistance.	EH520Z EH20Z
<b>M</b> Stainless Steel	<b>AC6040M</b>	91.6	3.8	Absotech Bronze	3	• The first recommended grade for interrupted machining of stainless steel that drastically improves the reliability in unstable machining thanks to the excellent adhesion and peel-off resistance of the new Absotech Bronze PVD coating, as well as the improved fracture resistance of the exclusive ultra-hard carbide substrate.	AC530U
	<b>AC530U</b>	91.4	3.3	Super ZX Coat	3	• Heavy interrupted machining and stainless steel machining. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.	ACZ310
<b>K</b> Cast Iron	<b>AC510U</b>	92.6	2.6	Super ZX Coat	3	• General to interrupted machining of cast iron and ductile cast iron. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.	EH510Z EH10Z
<b>S</b> Exotic Alloy	<b>AC510U</b>	92.6	2.6	Super ZX Coat	3	• Finishing to medium cutting of exotic alloys. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. Superior wear and heat resistance, and stable, long tool life.	EH510Z EH10Z
	<b>AC520U</b>	91.7	3.0	Super ZX Coat	3	• Medium to rough cutting of exotic alloys. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers. Superior wear and heat resistance, and stable, long tool life even in interrupted cutting.	EH520Z EH20Z
<b>H</b> Hardened Steel	<b>AC503U</b>	93.2	1.7	Super ZX Coat	3	• For hardened steel. • Utilizing the super multi-layered PVD coating of nanometre thick TiAlN and AlCrN layers, coupled with an ultra-hard substrate for excellent wear resistance.	—
Small Product Machining	<b>ACZ150</b>	91.4	3.3	ZX Coat	1	• For small tools, and high-precision finishing to general finishing applications. • TiN ultra-thin coating and fine-grained, super tough substrate combine to give good edge sharpness and superior cut finish.	—

#### For Milling (PVD)

Class	Grade	Hardness (HRA)	TRS (GPa)	Main Coating Components	Coating Thickness (µm)	Characteristics	Old Grades
<b>P</b> Steel	<b>ACP200</b>	89.5	3.2	(New) Super ZX Coat	3	• For general machining of general and die steel. • Employs PVD coating consisting of multiple nanometre-thin layers. A general grade that achieves a good balance between fracture resistance and wear resistance when combined with an exclusive tough substrate.	ACZ330
	<b>ACP300</b>	89.3	3.1	(New) Super ZX Coat	3	• For interrupted machining and stainless steel machining. • Employs PVD coating consisting of multiple nanometre-thin layers. Provides excellent fracture resistance when combined with an ultra-tough substrate.	ACZ350
<b>M</b> Stainless Steel	<b>ACM100</b>	91.4	3.3	(New) Super ZX Coat	3	• A grade that provides excellent wear resistance by employing an ultra-hard fine-grained carbide and New Super ZX Coating.	ACZ310
	<b>ACM300</b>	89.8	3.4	(New) Super ZX Coat	3	• The first recommended grade for stainless steel machining that achieves a good balance between wear resistance and fracture resistance by employing a newly-developed ultra-hard carbide and New Super ZX Coating.	—
<b>K</b> Cast Iron	<b>ACK300</b>	91.4	3.3	(New) Super ZX Coat	3	• For general and interrupted machining of cast iron and ductile cast iron. • Employs PVD coating consisting of multiple nanometre-thin layers. Provides excellent fracture resistance when combined with a fine-grained tough substrate.	ACZ310
<b>N</b> Non-Ferrous Metal	<b>DL1000</b>	92.9	2.1	AURORA Coat (DLC Coat)	0.5	• For machining of non-ferrous metals including aluminum and copper alloy as well as resin. • Coated with DLC, which provides a low friction coefficient and excellent adhesion resistance.	—

\*There may be minor differences in the colour tone/lustre of Brilliant Coat grades due to the interference of light. Such differences have no effect on performance.



## Various grades and expanded lineup of catalogue items meet a wide range of finishing needs.

Lineup includes wear-resistant T1000A, general purpose T1500A, general purpose coated cermet T1500Z, and tough T3000Z grades.

Expanded lineup of catalogue items for a wide variety of finishing applications.

### Characteristics

#### Uncoated Cermet

##### T1000A (Exclusive Grade)

**Exclusive cermet grade with excellent wear resistance**

- Improved wear and fracture resistance.
- Solid solution hard phase reduces reaction with steel.
- Perfect for high-speed continuous finishing of steel, cast iron, and powdered metal.



##### T1500A (New General Purpose Grade)

**General purpose coated cermet grade that employs new Brilliant Coat\* PVD coating with excellent lubricity**

- Excellent wear resistance provides long tool life.
- Reduces adhesion of work material for beautiful finished surfaces.



#### Coated Cermet

##### T1500A (General Purpose Grade)

**General purpose cermet grade that provides both wear and fracture resistance with better quality finished surfaces**

- Mixing hard phases of different functionality, grain size, and compositions improves balance of wear and fracture resistance.
- Improved edge treatment technology provides beautiful finished surfaces.

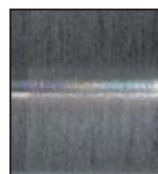


Surface Finish Comparison



**T1500Z**

Excellent Wear Resistance



Conventional Coated Cermet

Glossy Finished Surfaces

Reduced Blemishes

Work Material : STKM13A  
Insert : CNMG120408N-LU  
Cutting Conditions :  $v_c=100\text{m/min}$   
 $f=0.15\text{mm/rev}$   
 $a_p=1.0\text{mm}$  Wet

### Characteristic Values

#### For Turning

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness (μm)	Characteristics	Old Grades
<b>P</b> Steel	<b>T1000A</b>	93.3	1.8	—	—	Uncoated cermet grade with excellent wear resistance that provides good cost efficiency. Demonstrates excellent wear resistance in continuous finishing applications, and stable finishing of cast iron and sintered alloy as well as steel.	T110A
	<b>T1500A</b>	92.0	2.2	—	—	A general purpose grade that employs a substrate with improved balance of fracture and wear resistance to deliver superior finished surfaces in a wide variety of cutting conditions.	T1200A
	<b>T1500Z</b>	92.0	2.2	PVD Brilliant Coat*	3	Brilliant Coat's* new PVD coating gives excellent lubricity for higher quality machining. General-purpose coated cermet grade that can maintain high-quality machined surfaces and also gives excellent wear resistance.	T2000Z
	<b>T3000Z</b>	91.3	2.4	PVD ZX Coat	3	An ultra-reliable coating grade with tough cermet substrate.	—
<b>K</b> Cast Iron	<b>T1000A</b>	93.3	1.8	—	—	Exclusive uncoated cermet grade with excellent cost efficiency suitable for cast iron finishing, which requires high hardness.	T110A

#### For Milling

Class	Grade	Hardness (HRA)	TRS (GPa)	Coating Type	Coating Thickness (μm)	Characteristics	Old Grades
<b>P</b> Steel	<b>T1500A</b>	92.0	2.2	—	—	A general-purpose grade that employs a substrate with an improved balance between fracture and wear resistance to deliver superior finished surfaces in a wide variety of cutting conditions.	T1200A
<b>M</b> Stainless Steel	<b>T250A</b>	91.4	2.1	—	—	Tough cermet grade with enhanced crack advancement resistance.	—
	<b>T4500A</b>	91.0	2.3	—	—	Cermet grade with excellent fracture resistance and reduced occurrence of thermal cracking.	—

\*There may be minor differences in the colour tone/lustre of Brilliant Coat grades due to the interference of light. Such differences have no effect on performance.



Igetalloy carbides have a solid history and a wide variety of grades to suit many different applications. They are widely used and appreciated for their superior performance.

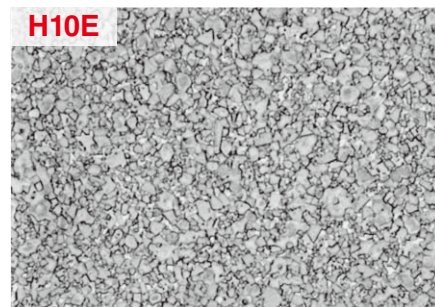
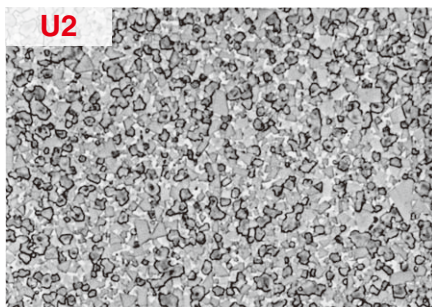
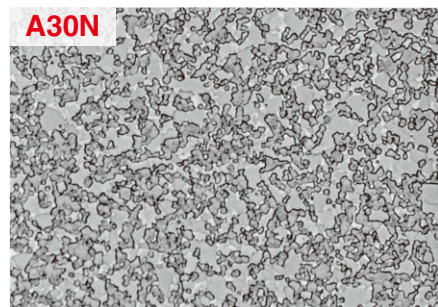
The Igetalloy line-up consists of a variety of characteristics that correspond to the uses of the tools. This is possible by varying the components: the WC structure (the main component) and the additives amounts such as TiC, TaC, and Co (the binder).

The wide selection of Igetalloy grades provide excellent wear resistance and toughness in various cutting conditions.

● For Steel

● For Stainless Steel

● For Cast Iron



### Characteristic Values

Application	Grade	Hardness (HRA)	TRS (GPa)	Thermal Conductivity (W/m·°C)	Young Modulus (GPa)	Compressive Strength (GPa)	Linear-Thermal Expansion Coefficient (X 10 <sup>-6</sup> /°C)
<b>P</b> Steel	ST10P	92.1	1.9	25	470	4.9	6.2
	ST20E	91.8	1.9	42	550	4.8	5.2
	A30	91.3	2.1	35	520	—	5.2
	A30N	91.2	2.2	35	520	—	—
	ST40E	90.4	2.6	75	—	—	—
<b>M</b> Stainless Steel	U10E	92.4	1.8	—	460	5.9	—
	EH510	92.6	2.6	76	—	—	—
	U2	91.5	2.2	88	—	—	—
	EH520	91.7	3.0	78	—	—	—
	A30	91.3	2.1	35	520	—	5.2
	A30N	91.0	2.4	35	—	—	—
<b>K</b> Cast Iron	BL130	94.3	2.9	56	—	—	—
	H2	93.2	1.8	105	600	6.1	4.4
	H1	92.9	2.1	109	650	6.1	4.7
	EH10	92.4	3.4	105	640	—	4.5
	EH510	92.6	2.6	76	—	—	—
	H10E	92.3	2.0	67	—	—	—
	EH20	91.3	3.5	105	620	—	4.5
	EH520	91.7	3.0	78	—	—	—
	G10E	91.1	2.2	105	620	5.7	—
<b>N</b> Non-Ferrous Metal	H1	92.9	2.1	109	650	6.1	4.7
<b>S</b> Exotic Alloy	EH510	92.6	2.6	76	—	—	—
	EH520	91.7	3.0	78	—	—	—

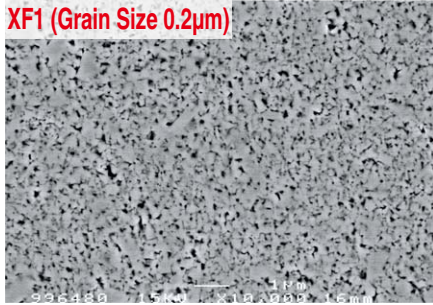
The Igetalloy micro-fine grained carbide series provides world class levels of micro-fine grain structure and delivers superior performance in small drills and other tools.

Igetalloy micro-fine grained carbides feature a WC structure of between 0.2 to 1µm, and are extremely strong and hard. They also provide excellent sharpness and superb surface quality on worked surfaces.

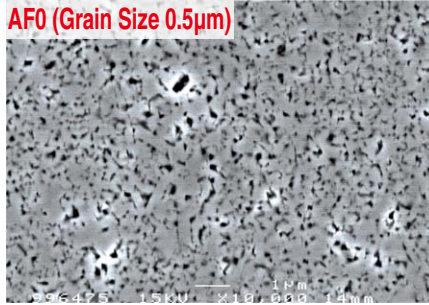
These features give excellent performance in a variety of applications from ø0.1mm PCB drills and endmill materials, to thin slitting blades and precision dies.

## ● Ultra-fine Grain

**XF1 (Grain Size 0.2µm)**

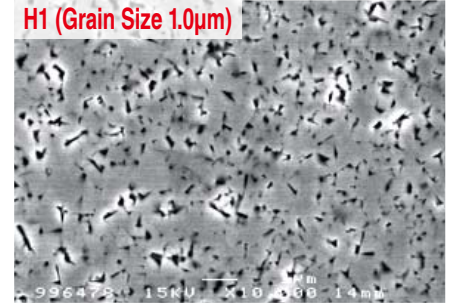


**AF0 (Grain Size 0.5µm)**



## ● Fine-grained Carbide

**H1 (Grain Size 1.0µm)**



## Characteristic Values

Class	Grade	Properties					Characteristics	Applications
		Grain Size (µm)	CO Content (wt%)	TRS (GPa)	Hardness (HRA)	Hardness HV (GPa)		
Ultra-fine Grain	<b>XF1</b>	0.2	9.0	4.0	93.5	19.2	World's smallest grained carbide.	Micro drills, Small diameter drills
	<b>AF1</b>	0.5	12.0	4.4	92.5	17.3	World's toughest ultra-fine grained carbide.	Micro drills, Mini tools, Punches
	<b>AF0</b>	0.5	10.0	4.1	93.0	18.0	High toughness and wear resistant ultra-fine grained carbide.	Micro drills, Routers
	<b>AFU</b>	0.5	8.0	3.8	93.6	19.4	Enhanced wear resistant ultra-fine grained carbide.	Micro drills, Endmills for ultra-hard materials
Micro-fine Grained Carbide	<b>A1</b>	0.7	13.0	3.2	91.4	15.6	Tough micro-grained carbide.	Endmills, Taps, Drills for cast iron, Punches
	<b>KH12</b>	0.7	10.0	4.0	92.4	17.2	Micro-fine grained carbide with good balance of hardness and toughness.	Endmills, Drills for steel
	<b>F0</b>	0.7	5.0	2.0	93.6	20.1	Superior wear resistant micrograined carbide.	Micro drills, Routers
Fine-grained Carbide	<b>KH03</b>	1.0	10.0	3.3	91.4	15.2	Fine-grained carbide with good hardness and toughness.	Dies, Drills, Endmills
	<b>KH05</b>	1.0	13.0	3.5	90.4	13.6	High toughness fine grained carbide.	Dies
	<b>H1</b>	1.0	5.0	2.1	92.9	17.7	Superior wear resistant finegrained carbide.	Drills for cast iron, Reamers
	<b>EH10</b>	1.2	6.0	3.4	92.4	17.3	Fine-grained carbide with good balance of hardness and toughness. Fine-grained carbide.	Drills for exotic alloy, Reamers
	<b>ZF16</b>	1.0	6.0	3.5	93.0	18.6	Wear and chipping resistant fine-grained carbide for high speed machining.	Micro drills

Carbide Materials... [From pages K2](#)



### High hardness and heat resistance for cutting high hardness steel and hard cast iron. Long tool life with high-speed finishing of grey cast iron.

In 1977, Sumitomo Electric successfully developed a revolutionary CBN sintered tool - SUMIBORON. The main component in SUMIBORON is Cubic Boron Nitride with a special ceramic binder sintered under super high pressure and temperature. As compared to other conventional tool materials, CBN has higher hardness and excellent heat resistance.

With these distinct characteristics, SUMIBORON can perform machining of hardened steel, high hardness cast iron and exotic metals where previously only grinding was done. Furthermore, excellent efficiency and longer tool life can also be achieved from high speed machining of cast irons.

### Characteristics

Classifications	Structure	CBN Content	Hardness (GPa)	Grades	Application	Characteristics
Mainly CBN grains fused together		High	44	BN700 BN7000 BN7500 BNS800	<ul style="list-style-type: none"> <li>Carbide</li> <li>Chilled cast iron</li> <li>Ni-Hard cast iron</li> <li>Heat-resistant alloy, Cast iron</li> <li>Sintered ferrous alloy</li> </ul>	<ul style="list-style-type: none"> <li>High carbon content. Structure consists of strongly fused CBN grains.</li> <li>Suited to cutting cast iron, heat-resistant alloy, ultra-hard alloy, and other hard materials.</li> </ul>
Mainly CBN grains held together with a binder		Low	21	BN500 · BNC500 BN1000 · BN2000 BN350 · BNX10 BNX20 · BNX25 BNC2010 · BNC2020 BNC100 · BNC160 BNC300 · BNC200	<ul style="list-style-type: none"> <li>Alloy steel</li> <li>Case hardened steel</li> <li>Carbon tool steels</li> <li>Bearing steel, Die steel</li> <li>Ductile cast iron</li> </ul>	<ul style="list-style-type: none"> <li>CBN grains are fused together strongly with a special ceramic binder.</li> <li>Strong CBN binding force gives superior wear resistance and toughness when cutting hardened steel and cast iron.</li> </ul>

### Grade Range Map

Application	Series	Finishing to Light		Medium	Medium	Rough to Heavy	
<div>H Hardened Steel</div>	Classification	—	H01	H10	H20	H30	
	Coated SUMIBORON	New BNC2010		New BNC2020		BNC300	
		BNC100		BNC160	BNC200		
		BN1000		BN2000		BNX25,BN350	
		BNX10	BNX20				
	Uncoted SUMIBORON						
	<div>Sintered alloy</div>	Classification	—	01	10	20	30
		Uncoted SUMIBORON	BN7500		BN7000		
<div>K Cast Iron</div>	Classification	—	K01	K10	K20	K30	
	Coated SUMIBORON	BNC500*					
	Uncoted SUMIBORON			BNS800			
		BN7000					
		BN500					

\*For Ductile Cast Iron

### Characteristic Values

Class	Grade	Binder	Carbon Content (%)	Grain Size (μm)	Hardness HV (GPa)	TRS (GPa)	Main Coating Components	Coating Thickness (μm)	Characteristics
<b>H</b> Hardened Steel	<b>New</b> <b>BNC2010</b>	TiCN	50 to 55	2	30 to 32	1.10 to 1.20	TiCN multi-layered	1.5	Improves the wear resistance of coating and substrate and stably achieves excellent surface roughness.
	<b>New</b> <b>BNC2020</b>	TiN	70 to 75	5	34 to 36	1.20 to 1.30	TiAlN multi-layered	1.5	Provides long tool life in general and high-efficiency cutting thanks to tough substrate coated with a highly wear-resistant and highly adhesive layer.
	<b>BNC300</b>	TiN	60 to 65	1	33 to 35	1.15 to 1.25	TiAlN	1	Suited for finishing when there is a combination of continuous and interrupted cutting.
	<b>BNC100</b>	TiN	40 to 45	1	29 to 32	1.05 to 1.15	TiAlN/TiCN	2	Highly wear resistant coating makes this grade suited for high speed finishing.
	<b>BNC160</b>	TiN	60 to 65	3	31 to 33	1.10 to 1.20	TiAlN/TiCN	2	Stable, high precision finishing of hardened steel.
	<b>BNC200</b>	TiN	65 to 70	4	33 to 35	1.15 to 1.25	TiAlN	2	Tough substrate with high wear resistant coating provide longer tool life.
	<b>BN1000</b>	TiCN	40 to 45	1	27 to 31	0.90 to 1.00	—	—	Ultimate wear and fracture resistance. Suited to high-speed cutting.
	<b>BN2000</b>	TiN	50 to 55	2	31 to 34	1.05 to 1.15	—	—	A general purpose grade for hardened steel that provides a high degree of fracture and wear resistance.
	<b>BNX20</b>	TiN	55 to 60	3	31 to 33	0.95 to 1.10	—	—	Crater resistant grade, suitable for high efficiency cutting under high temperature conditions.
	<b>BN350</b>	TiN	60 to 65	1	33 to 35	1.20 to 1.30	—	—	High cutting edge strength, suited to heavy interrupted cutting.
	<b>BNX10</b>	TiCN	40 to 45	3	27 to 31	0.80 to 0.90	—	—	Optimum wear resistance. Suited to continuous, high-speed cutting.
	<b>BNX25</b>	TiN	65 to 70	4	29 to 31	1.00 to 1.10	—	—	Excellent fracture resistance during high speed cutting. Suited to high speed interrupted cutting of hardened steel.
<b>Sintered alloy</b>	<b>BN7500</b>	Co Compound	90 to 95	1	41 to 44	1.40 to 1.50	—	—	Maintains optimum cutting edge sharpness. Suited for finishing of sintered alloy.
	<b>BN7000</b>	Co Compound	90 to 95	2	41 to 44	1.30 to 1.40	—	—	Improved wear and fracture resistance in rough cutting of sintered components.
<b>K</b> Cast Iron	<b>BNS800</b>	Al Alloy	85 to 90	8	39 to 42	0.95 to 1.10	—	—	100% solid CBN structure with good thermal impact resistance.
	<b>BN7000</b>	Co Compound	90 to 95	2	41 to 44	1.30 to 1.40	—	—	Improved wear and fracture resistance in rough cutting of cast iron and exotic alloy.
	<b>BN500</b>	TiC	65 to 70	6	32 to 34	1.00 to 1.10	—	—	Optimized for cast iron cutting. Maintains good wear and fracture resistance.
	<b>BNC500</b> (For Ductile Cast Iron)	TiC	60 to 65	4	32 to 34	1.00 to 1.10	TiAlN	2	Substrate with excellent wear resistance and coating makes this grade suited for hard-to-cut cast iron.

A

Grades

Coated  
Carbide

Cermets

Ceramic

Carbide

CBN  
Layer

PCD



SUMIBORON / Coated SUMIBORON Series ... From page L2





**Excellent wear resistance, longer tool life, and high-speed, high-efficiency, high-precision cutting of non-ferrous metals and non-metals.**

SUMIDIA is a polycrystalline diamond material made from sintered diamond powder that was first created using our proprietary technology in 1978.

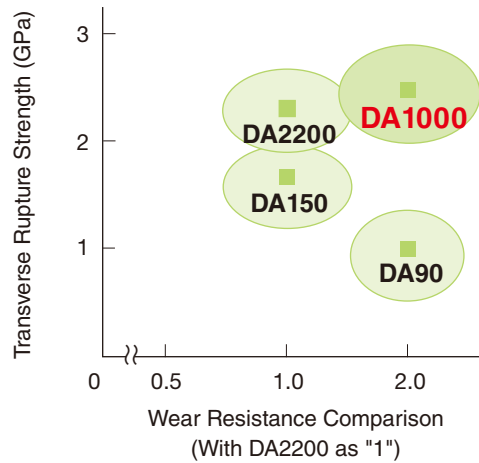
SUMIDIA's superior wear resistance achieves longer tool life, high speed, high efficiency and high precision in non-metal cutting and non-ferrous metal applications including aluminium, copper, magnesium and zinc alloys.



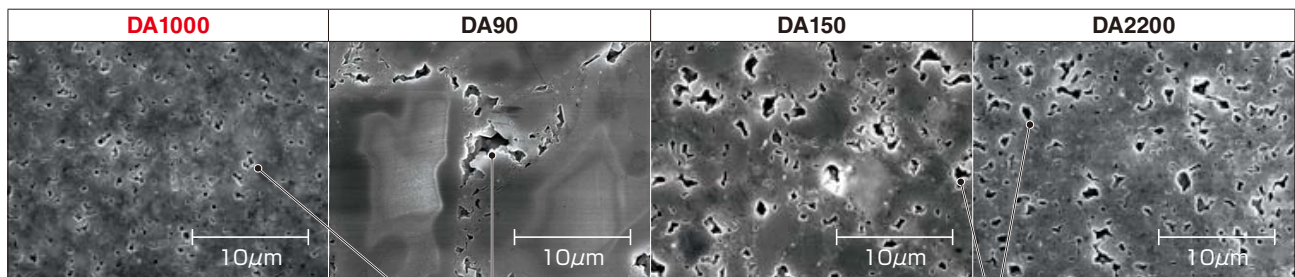
### Characteristics

#### DA1000

The DA1000 utilises Sumitomo Electric Hardmetal's proprietary sintering technology to achieve a high-density sintered material made of ultra-fine diamond particles that has superior wear and fracture resistance and longer tool life.




### Polycrystalline Diamond Subjected to Acid Treatment



Holes formed when binder is dissolved during acid treatment

## Grade Range Map

Class	Series	Finishing to Light		Medium	Rough to Heavy
	Classification	N01	N10	N20	N30
	SUMIDIA	DA1000			
		DA2200			
		DA150			
		DA90			

## Characteristic Values

Class	Grade	Binder	Carbon Content (%)	Grain Size (μm)	Hardness HV (GPa)	TRS (GPa)	Characteristics
	DA1000	Co	90 to 95	Up to 0.5	110 to 120	≈ 2.60	High density sintered material made of ultra-fine diamond particles that demonstrates optimum wear and fracture resistance, and edge sharpness.
	DA2200	Co	85 to 90	0.5	90 to 100	≈ 2.45	Sintered material made of ultra-fine diamond particles that demonstrates optimum wear and fracture resistance, and edge sharpness.
	DA150	Co	85 to 90	5	100 to 120	≈ 1.95	Sintered material made of fine diamond particles that provides a good balance of workability and wear resistance.
	DA90	Co	90 to 95	50	100 to 120	≈ 1.10	Sintered material made of coarse diamond particles with high diamond content and excellent wear resistance.



SUMIDIA Series ...



From page M2

A

Grades

Coated  
Carbide

Cermets

Ceramic

Carbide

CBN  
Layer

PCD






### Superb wear for ultra-high speed machining.

Sumitomo Electric Hardmetal's "Advanced Ceramic" is created through a unique process that ensures excellent sharpness, making possible stable ultra-high speed cutting of cast iron, and cutting of heat-resistant alloys and ultra-hard rolled materials.

### Grade Range Map





#### For Turning

For Turning	High-Speed	Finishing to Light	Medium	Rough to Heavy		
	—	01	10	20	30	40
<div></div>	NB90S					
<div></div>	WX120					
<div></div>	NB100C					



#### For Milling

	High-Speed	Finishing to Light		Medium	Rough to Heavy	
For Milling	—	01	10	20	30	40
						

### Characteristic Values



#### For Turning

Class	Grade	Hardness (HRA)	TRS (GPa)	Main Coating Components	Coating Thickness (μm)	Characteristics
<b>K</b> Cast Iron	NB90S	94.8	0.9	—	—	Contains Al <sub>2</sub> O <sub>3</sub> and carbide. Suitable for medium to finishing of cast iron.
<b>S</b> Exotic Alloy	WX120	90.0	1.2	—	—	Enhanced with SiC whiskers. For heat-resistant alloy and ultra-hard roll cutting.
<b>H</b> Hardened Steel	NB100C	95.0	1.0	TiAlN	2	Ultra-strong. Contains Al <sub>2</sub> O <sub>3</sub> and ZX Coat. Continuous low-speed turning of hardened steel.



#### For Milling

Class	Grade	Hardness (HRA)	TRS (GPa)	Main Coating Components	Coating Thickness (μm)	Characteristics
<b>K</b> Cast Iron	NB90M	94.5	0.7	—	—	Contains Al <sub>2</sub> O <sub>3</sub> and tough carbide. For high speed finish milling of cast iron.

## Material Properties

Material		Specific Gravity	Micro Vickers Hardness (mHv) (GPa)	Young Modulus (GPa)	Thermal Conductivity (W/m·°C)	Linear-Thermal Expansion Coefficient (X 10 <sup>-6</sup> /°C)	Melting Point (°C)
Tungsten Carbide	<b>WC</b>	15.6	21	690	126	5.1	2,900
Titanium Carbide	<b>TiC</b>	4.94	31	450	17	7.6	3,200
Tantalum Carbide	<b>TaC</b>	14.5	18	280	21	6.6	3,800
Nobium Carbide	<b>NbC</b>	8.2	20	340	17	6.8	3,500
Titanium Nitrate	<b>TiN</b>	5.43	20	260	29	9.2	2,950
Aluminium Oxide	<b>Al<sub>2</sub>O<sub>3</sub></b>	3.98	29	410	29	8.5	2,050
Silicon Nitride	<b>Si<sub>3</sub>N<sub>4</sub></b>	3.17	25	310	29	3.0	>1,900 (decomposes)
Cubic Boron Nitride	<b>cBN</b>	3.48	44	700	1,300	4.7	—
Diamond	<b>C</b>	3.52	>90	970	2,100	3.1	—
Cobalt	<b>Co</b>	8.9	—	100 to 180	69	12.3	1,495
Nickel	<b>Ni</b>	8.9	—	200	92	13.3	1,455
Carbide	<b>WC-5% Co</b>	15.0	18	630	79	5.0	—
	<b>WC-10% Co</b>	14.6	14	580	75	5.0	—
	<b>WC-20% Co</b>	13.5	10	530	67	6.0	—
High Speed Steel		8.7	8	210	17	11.0	—