DATA SHEET

Rev. N° 0 - 20.04.2021

1AS.005
Boron Nitrid Ceramic

Overview

Boron nitride is an advanced synthetic ceramic material available as a powder, solid, liquid or aerosol. It has exceptional temperature resistance, dielectric strength, and thermal conductivity. Thanks to these various properties, boron nitride is an easily machinable material. Boron nitride is comparable to graphite, in terms of its lubricating properties and good thermal conductivity, but is a white material, with very good electrical insulating properties.

Manufacturing:

To obtain sintered boron nitride, the boron nitride powder is pressed at a very high temperature. The following two methods used are:

- uniaxial hot pressing (HP)
- hot isostatic pressing (HIP)

In its solid form, boron nitride can easily be machined in virtually any form. Boron nitride is resistant to temperatures above 2,000 °C in inert and reducing atmospheres. Plus, it is not wetted by most molten metals and slags and can therefore be used as a container for most molten metals, including aluminium, sodium, iron, steel, silicon, boron and copper.

Final Advanced Materials Sàrl
4 avenue de Strasbourg
68350 Didenheim – France
Tel : +33 (0) 3 67 78 78 78

Final Advanced Materials GmbH
Basler Strasse 115
79115 Freiburg – Deutschland
Tel: + 49 (0) 761 47 87 336

www.final-materials.com

info@final-materials.com

Applications

- Protection and sheathing for thermocouples and measuring probes
- Protection for casting tools
- Electrical insulation at very high temperatures
- Smelting and sintering crucibles
- Resistance support
- Furnace structures:
  - tubes and insulation sleeves
- Soldering and brazing:
  - nozzles, brazing supports
- PVD installations:
  - masking supports, coating supports

Products

Final Advanced Materials offers three standard products:

- **Final®BN -** Boron nitride with binder
- **Final®BN HP** - High-purity boron nitride without binder
- **Final®BN HD2** - Boron nitride with greater mechanical resistance

We can offer various grades of boron nitride whose compositions contain other ceramics such as SiC, ZrO_2, SiO_2, AlN. We can also provide boron nitrides on request from Saint-Gobain, COMBAT® products (grade A, HP, AX05, M, M26 and ZSBN).

- **Final®BN P**
- **Final®BN C**
- **Final®BN I**
- **Final®BN Z20**
- **Final®BN Z40**
- **Final®BN Z40D**
- **Final®BN S**

Final®BN A

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Technical Data for Standard Products

Property		Unit	Final®BN		Final®BN HP		Final®BN HD2	
Item N°			200-0080		200-0095		200-0090	
Composition			B_2O_3: 0.4 % O_2: 3-5 % Ca: 0.5-3 % Other: 0,03 %		B_2O_3 max: < 0.2 % O_2 max: 0.4 % Ca max: 0.04 % Impurity: 0.05 %		F:< 0.01 % Al: 0.01 % Si:0.01 %	Ca: 0.04 % Ti: 0.01 % O: 1 %
Structure			anisotropic		anisotropic		anisotropic	
Purity		% BN	~91.6 - 96.1		~99.3		~98.9	
Binder			Calcium borate Borate oxyde		-		Borate oxyde	
Density		g/cm³	1.90-1.95		1.91		>=1.9	
Max. Peak Temperature	in oxidizing atmosphere	°C	850		850		850	
	in inert atmosphere	°C	1,150		2,000		2,000	
Orientation of the pressure			∥	⊥	∥	⊥	∥	⊥
Thermal Conductibility at 20 °C		$W.m^{-1}.K^{-1}$	27.22	30.98	71.3	121.2	21	
Thermal Expansion Coefficient	20-1,000 °C	$10^{-6}/K^{-1}$	-	-	-	-	5.5	1
	20-1,500 °C		2.95	0.87	0.57	-0.46	-	
Flexural Strength at 20 °C		MPa	43.7	60.2	13.96	21.54	14	30
Elasticity Modulus (Young) at 20 °C		GPa	34.1	75.2	34.1	75.2	-	
Compressive Strength		MPa	30	48	17.92	23.44	-	
Electric Resistivity at 20 °C		Ω.m	1.7> 10^{12}	4.0> 10^{13}	> 10^{12}	> 10^{13}	-	
Dielectric Strength		kV/mm	39.4	39.4	-		> 70	
Applications			Vacuum oven isolator High temperature isolator		Vacuum oven isolator High temperature isolator Atomization nozzle Electrical isolator		Vacuum oven isolator High temperature isolator	

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Technical Data for Specific Products

Property		Unit	Final®BN P		Final®BN C		Final®BN I		Final® BN Z20		Final® BN Z40		Final® BN Z40D		Final®BN S		Final®BN A	
Item N°			116-0401		116-0402		116-0403		116-0404		116-0405		116-0406		116-0407		116-0408	
Composition			hBN		hBN		hBN		hBN SiC ZrO_2		hBN SiC ZrO_2		hBN SiC ZrO_2		hBN SiO_2		hBN AlN	
Structure			anisotropic		anisotropic		isotropy		anisotropic		anisotropic		anisotropic		anisotropic		anisotropic	
Binder			-		Calcium borate		-		-		Borate oxyde		Borate oxyde		-		Borate oxyde Calcium borate	
Density		g/cm³	1.9		1.9		2.0		2.3		2.9		2.9		2.1		2.5	
Max. Peak Temp.	**in oxidizing atmosphere**	°C	900		900		900		900		900		900		900		900	
	in inert atmosphere	°C	2,300		1,600		2,300		1,800		1,800		1,800		1,500		1,600	
Orientation of the pressure			∥	⊥	∥	⊥	∥	⊥	∥	⊥	∥	⊥	∥	⊥	∥	⊥	∥	⊥
Thermal Conductibility at 20 °C		$W.m^{-1}.K^{-1}$	20	30	33	35	25	25	28	45	28	38	34	10	10	30	65	75
Thermal Expansion Coeff. 20-1,500°C		$10^{-6}K^{-1}$	1.0	0.5	4.0	3.0	3.0	3.0	4.5	3.0	8.0	4.0	4.0	3.0	3.0	0.1	5.6	5.4
Flexural Strength		MPa	8	10	35	40	20	20	40	70	80	120	144	35	35	65	80	105
Elasticity Modulus		GPa	20	23	25	30	23	23	20	35	30	45	71	75	75	85	40	60
Compressive Strength		MPa	23	22	60	52	35	35	105	88	170	170	160	130	130	50	190	185
Electric Resistivity at 20 °C		Ω.m	> 10^{10}		> 10^{10}		> 10^{10}		> 10^{10}		> 10^{10}		-		> 10^{12}		> 10^{15}	
Application			> 1,600 °C Oven structure		~1,600 °C PVD, oven structure		> 1,800 °C capillary tube, thermocouple		> 1,800 °C Casting nozzle, crucibles for motlen metals		> 1,800 °C Casting nozzle, crucibles for motlen metals		> 1,800 °C ex : metallurgy industry		1,500 °C PVD		Glass industry	

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