



## Boron Nitride (BN) Grade HP

Boron Nitride is an advanced synthetic ceramic material available in powder, solid, liquid and aerosol spray forms. Its unique properties - from high heat capacity and outstanding thermal conductivity to easy machinability and superior dielectric strength - make boron nitride a truly outstanding material.

When higher thermal shock, more spall resistance and lower permanent expansion upon heating is required, Solid Boron Nitride Grade HP is a superior solid grade for formulations of  $\leq 1,000^{\circ}\text{C}$ . Additionally, Grade HP has ten times the moisture resistance of Grade A due to the addition of calcium which combines with boric oxide to form calcium borate. Commonly used for many light metal applications such as Al, Ti, Mg and Zn.

### Key Properties

- High corrosion resistance due to the addition of boron nitride; ten times the moisture resistance of other boron nitride solids due to the addition of calcium which combines with boric oxide to form calcium borate.
- Excellent thermal shock resistance and conductivity - commonly used in many light metal applications such as Al, Ti, Mg, and Zn.
- Low dielectric constant material - also commonly used in many high temperature insulators.
- Like other grades of Boron Nitride, Grade HP can be machined using standard high speed 'tool steel' equipment. Machining by grinding may be used if preferred or stringent tolerances are required.

### Applications

- High temperature electrical insulators and vacuum furnace supports which require electrical resistivity, high temperature strength, thermal shock resistance and low chemical reactivity
- Crucibles and containers for high purity molten metals

- Insulators and source fixtures for ion implantation systems which require high temperature purity and electrical insulation
- Radar components and antenna windows which require exacting electrical and thermal properties
- Setter plates for the processing of other advanced materials which require stable, inert surfaces
- Nozzles for powdered metal spraying

Typical Properties	
Binder	Boric Acid
Binder Melting Point	550 <sup>o</sup> C
Maximum Use Temperature	
Oxidizing vs. (Inert)	850 <sup>o</sup> C (1150 <sup>o</sup> C)
Specific Heat @ 700 <sup>o</sup> C (J/g <sup>o</sup> C):	1.468
Dielectric Strength (V/mil):	1700
Hardness-Knoop (kg/mm <sup>2</sup> )	13.79 - 18.95
Pressing Direction (Para Perp)	
Resistivity Ohm-cm RT:	>10 <sup>14</sup> (>10 <sup>15</sup> )
Loss Tangent @ 8.8 GHz:	.0014 (.0007)
Dielectric Constant @ RT:	4.30 (4.02)
Thermal Conductivity	
(W/m/K) @ 25 <sup>o</sup> C:	27.0 (29.0)
Thermal Expansion Coefficient	
(RT to 1500 <sup>o</sup> C) (in/in <sup>o</sup> C x 10 <sup>-6</sup> )	2.95 (0.87)
Flexural Strength (psi)*	
@25 <sup>o</sup> C:	6430 (8730)
@1500 <sup>o</sup> C:	1710 (2470)
Compressive Strength	
@25 <sup>o</sup> C:	4370 (6460)
Density (g/cc minimum):	2
Open Porosity (%):	3
Oxygen (%):	5
B <sub>2</sub> O <sub>3</sub> (%):	1
Calcium (%):	2.5
Other Impurities (%):	0.2

\*Based on 4pt bend test-Sample size = 51mm x 4mm x 3mm

The values presented are mean and typical of those resulted from test samples. They are provided as an indication only to serve as guidance in the design of ceramic components and are not guaranteed in any way. The actual values can vary according to the shape and size of the envisaged component.