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### Hot-Pressed Boron Nitride HBC Material Notes

Hot-pressed BN is compacted at temperatures up to 2000°C and pressures up to 2000 psi to form a dense, strong engineering material that is easily machined. It is available in standard and custom hot-pressed shapes and has several unique characteristics and physical properties which make it valuable for solving tough problems in a wide range of industrial applications.

- Thermal Management:**  
 The unique combination of being both an excellent electrical insulator and thermal conductor makes BN very useful as a heat sink in high power electronic applications. Its properties compare favorably with beryllium-oxide, aluminum-oxide and other electronic packaging materials, yet is easier to form and finish.
- High Temperature Applications:**  
 Temperature stability and excellent resistance to thermal shock makes BN the material of choice in the toughest high temperature applications such as equipment for plasma arc welding, diffusion source wafers, and semiconductor crystal growth equipment & processing.
- Molten Metal Handling:**  
 BN is inorganic, inert, non-reactive with halide salts and reagents, and is not wet by most molten metals and slags. These characteristics, combined with low thermal expansion, make it ideal for interface materials used in various molten metal processes.

Physical Properties	Metric	English	Comments
Density	1.95 g/cc	0.0704 lb/in <sup>3</sup>	typical
Water Absorption	0.6 %	0.6 %	400 hours, 100% RH
Open Porosity	13 %	13 %	
<b>Mechanical Properties</b>			
Hardness, Knoop	16	16	100 g
Modulus of Elasticity	20.6 GPa	2990 ksi	Perpendicular to pressing direction
Modulus of Elasticity	48.2 GPa	6990 ksi	Parallel to pressing direction
Flexural Strength	17.2 MPa	2490 psi	Perpendicular to pressing direction
Flexural Strength	20.6 MPa	2990 psi	Parallel to pressing direction
Compressive Yield Strength	41.3 MPa	5990 psi	Parallel to pressing direction
Compressive Yield Strength	51.7 MPa	7500 psi	Perpendicular to pressing direction
<b>Electrical Properties</b>			
Electrical Resistivity	Min 1e+015 ohm-cm	Min 1e+015 ohm-cm	
Dielectric Constant	4.1	4.1	1 MHz
Dielectric Strength	54 kV/mm	1370 kV/in	

Dissipation Factor	Max 0.0002	Max 0.0002	at 1 MHz
<b>Thermal Properties</b>			
CTE, linear 1000°C	0.4 $\mu\text{m}/\text{m}\cdot\text{°C}$	0.222 $\mu\text{in}/\text{in}$	25-1500°C. Perpendicular to pressing direction.
CTE, linear 1000°C	0.8 $\mu\text{m}/\text{m}\cdot\text{°C}$	0.444 $\mu\text{in}/\text{in}\cdot\text{°F}$	25-1500°C. Parallel to pressing direction.
Heat Capacity	0.808 J/g- °C	0.193 BTU/lb- °F	Value at 700°C is 1.846J/g-K
Thermal Conductivity	23 W/m-K	160 BTU-in/hr- ft <sup>2</sup> -°F	Perpendicular to pressing direction
Thermal Conductivity	28 W/m-K	194 BTU-in/hr- ft <sup>2</sup> -°F	Parallel to pressing direction
Maximum Service Temperature, Air	850 °C	1560 °F	oxidizing atmosphere
Maximum Service Temperature, Inert	2000 - 3000 °C	3630 - 5430 °F	Inert/Vacuum

Information provided by GE Advanced Ceramics.