

# Combat<sup>®</sup> Solid Boron Nitride Composite Grades M and M26

## Product Datasheet

### High thermal shock + moisture resistance = Grade M.

Combat Solid Boron Nitride Grade M is a truly hydrophobic advanced ceramic. Composed of boron nitride and silica, it is completely resistant to moisture and has a MIL-I-10A grade of L542, a test requiring immersion in water for 48 hours prior to testing at elevated frequencies. Grade M is suitable for the most severe electrical applications. It is an excellent refractory material at temperatures up to 1400°C, and is unparalleled in resistance to thermal shock.

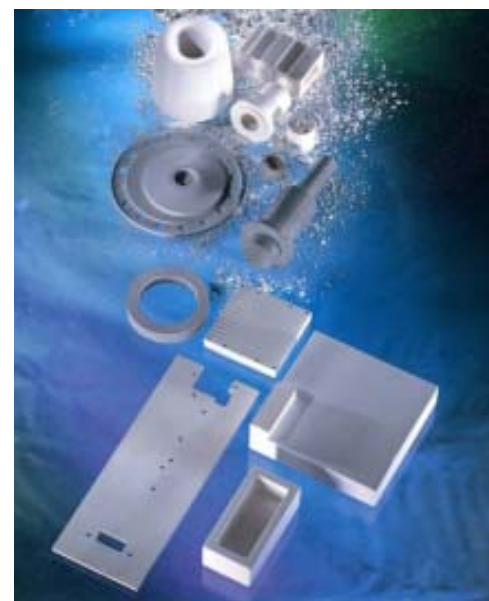
### High thermal conductivity + moisture resistance = Grade M26.

Combat Solid Boron Nitride Grade M26 has many of the properties of Grade M. It is an excellent refractory material at temperatures up to 1400°C and is resistant to extreme thermal shock and moisture. It contains more boron nitride than Grade M, giving it higher thermal conductivity properties. A comparison of composition can be found directly below:

Typical Chemical Analysis	Grade M	Grade M26
Boron <sup>1</sup>	18- 20.25%	26.5- 28.7%
Nitrogen <sup>1</sup>	22.5- 25.5%	32.8- 35%
Oxygen <sup>2</sup>	-	-
Calcium <sup>1</sup>	.01% <sup>3</sup>	.01% <sup>3</sup>
Silica (SiO <sub>2</sub> ) <sup>1</sup>	60% <sup>1</sup>	40% <sup>1</sup>
Other Inorganic <sup>1</sup>	.02%	.02%
Trace Metals <sup>1</sup>	.05%	.05%
	<b>100%</b>	<b>100%</b>
B <sub>2</sub> O <sub>3</sub> *	.2%	.2%

\*B<sub>2</sub>O<sub>3</sub> is given for clarification and is not part of the elemental analysis.

Typical Physical Properties	Grade M		Grade M26	
Percent BN:	40		60	
Percent SiO <sub>2</sub> :	60		40	
	Parallel	Perpendicular	Parallel	Perpendicular
Volume Resistivity (ohm-cm) @ RT:	1.7 x 10 <sup>15</sup>	5.1 x 10 <sup>15</sup>	6.4 x 10 <sup>14</sup>	2.9 x 10 <sup>15</sup>
@ 150°C:	2.4 x 10 <sup>13</sup>	3.3 x 10 <sup>13</sup>	2.4 x 10 <sup>13</sup>	8.5 x 10 <sup>13</sup>
Dielectric Constant (at 1MHz) @ RT:	4.21	3.87	4.48	3.80
microwave frequency: @ RT, 8.8 GHz:	3.86	4.08	3.89	4.28
<b>Dielectric Strength: volts/mil &amp; (volts/mm)</b>				
Sample Thickness: 10 mil.	1670 (65748)		1690 (66535)	
(tested up to 25kV) 25 mil.	>1000 (>39370)		>1000 (>39370)	
<b>Dissipation Factor (Loss Tangent)</b>				
@ RT @ 1MHz	.0016	.0035	.0017	.0061
@ 150°C @ 1MHz	.0017	.0055	.0094	.0062
@ RT @ 8.8 GHz	.0011	.0005	.0039	.0006
<b>Loss Factor @ RT @ 1MHz</b>	.0067	.0140	.0076	.0230
@ 150°C @ 1MHz	.0077	.0230	.0440	.0250
@ RT @ 8.8 GHz	.0042	.0020	.0150	.0260
<b>Surface Resistivity (ohms/□) @ RT</b>	8.5 x 10 <sup>16</sup>		4.2 x 10 <sup>16</sup>	
@ 150°C	1.4 x 10 <sup>15</sup>		1.5 x 10 <sup>15</sup>	



### Applications:

Some common applications are listed below:



High temperature electrical insulators and vacuum furnace supports which require electrical resistivity, high temperature strength, thermal shock resistance and low chemical resistivity.



Crucibles and containers for high purity molten metals



Tools and refractories for glass forming which provide non-wetting, non-B<sub>2</sub>O<sub>3</sub> containing contacts.



Radar components and antenna windows which require exacting electrical and thermal properties.



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