

High thermal shock + high thermal conductivity = Combat Grade HP.

When higher thermal shock, more spall resistance and lower permanent expansion upon heating is required, Combat Solid Boron Nitride Grade HP is a superior solid grade for formulations of <1000°C. Additionally, Grade HP has 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. Commonly used for many light metal applications such as Al, Ti, Mg and Zn.

CHEMICALLY: 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.

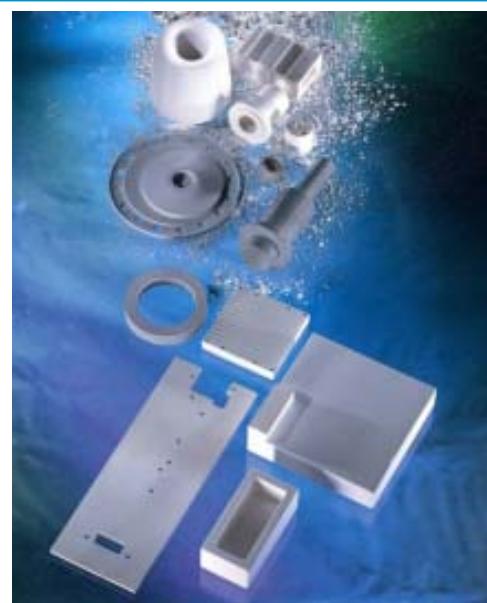
THERMALLY: Excellent thermal shock resistance and conductivity—commonly used in many light metal applications such as Al, Ti, Mg, and Zn.

ELECTRICALLY: Low dielectric constant material—also commonly used in many high temperature insulators.

MACHINABILITY: Like other grades of Combat 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.

Typical Properties of Combat Solid Boron Nitride Grade HP	
Binder:	Boric Acid
Binder Melting Point:	550°C
Maximum Use Temperature:	
Oxidizing vs. (Inert):	850°C(1150°C*)
Specific Heat @ 700°C (J/g°C):	1.468
Dielectric Strength (V/mil):	1700
Hardness-Knoop (kg/mm ²):	13.79- 18.95
Pressing Direction: Para (Perp)	
Resistivity Ohm-cm RT:	>10 ¹⁴ (>10 ¹⁵)
Loss Tangent @ 8.8 GHz:	.0014 (.0007)
Dielectric Constant @ RT:	4.30 (4.02)
Thermal Conductivity	
(W/m/K) @ 25°C:	27.37 (30.97)
Thermal Expansion Coefficient	
(RT to 1500°C) (in/in/°C x 10 ⁻⁶):	2.95 (0.87)
Flexural Strength (psi)*	
@ 25°C :	6430 (8730)
@ 1500°C:	1710 (2470)
Compressive Strength	
@ 25°C:	4370 (6460)
Density (g/cc minimum):	1.90
% Open Porosity:	15.26%
Oxygen – max.:	4.0%
B ₂ O ₃ – max.:	0.4%
Calcium – max.:	2.0%
Other Impurities – max.:	0.2%

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



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 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.

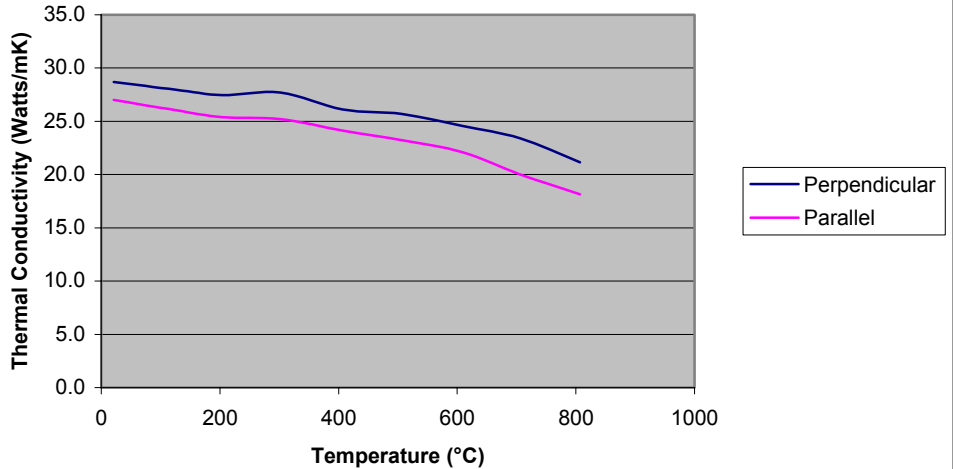


Setterplates for the processing of other advanced materials which require stable, inert surfaces.



Nozzles for powdered metal spraying.

Combat Solid Boron Nitride Grade HP
Thermal Conductivity as a Function of Pressing Direction



Available as Finished Parts or Machinable Blanks

Saint-Gobain Ceramics can provide custom machining of Combat Solid Boron Nitride for complex shapes based on customer specifications. Solid bars, rods and plates are also available for customers who desire to fabricate their own custom shapes using conventional machine shop tools.

European Contact Information

Ralf Damasch
Pruehler Muehle 1
Oberscheinfeld D-91483
Germany
Tel. (49) 9167 96 68 24
Fax. (49) 9167 96 68 25



**Saint-Gobain Ceramics
Boron Nitride Products**
168 Creekside Drive
Amherst, NY 14228-2027
Telephone: (716) 691-2000
Fax: (716) 691-2090

www.carbobn.com

The information, recommendations and opinions set forth herein are offered solely for your consideration, inquiry and verification and are not, in part or total, to be construed as constituting a warranty or representation for which we assume legal responsibility. Nothing contained herein is to be interpreted as authorization to practice a patented invention without a license.

Combat® is a registered trademark of Saint-Gobain Advanced Ceramics Corporation.

© 2003 Saint-Gobain Ceramics
All Rights Reserved
Effective 6/03 Printed in the USA.

Document# bnsolidstechdoc05 Rev. A