

High purity + high corrosion resistance = Combat Grade AX05.

Grade AX05 boron nitride is one of the highest purity hexagonal boron nitride solids available. It is a diffusion bonded ceramic and does not depend on a B₂O₃ binder for mechanical integrity. This high purity advantage allows for applications and uses not provided by other hot-pressed boron nitride solids. The end result is that Combat Boron Nitride Solid Grade AX05 is a unique advanced ceramic material that provides a host of exceptional properties.

CHEMICALLY: Grade AX05 is extremely inert and non-wet by many molten materials such as metals, glasses, halide salts and other reagents. The chemical stability allows Grade AX05 to provide a stable, non-reactive material for nozzles, feed-throughs, crucibles and supports.

THERMALLY: Grade AX05 has minimal thermal expansion, high thermal conductivity and use temperature in certain inert atmospheres over 2000°C. Thermal shock stability is excellent over a wide range of use temperatures.

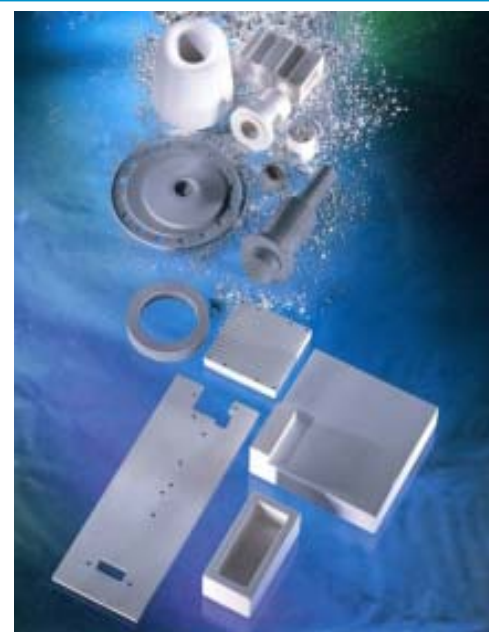
MECHANICALLY: Grade AX05 yields increasing relative strength vs. temperature. This important feature provides higher temperature performance to applications previously unattainable with B₂O₃ bonded boron nitrides.

ELECTRICALLY: Grade AX05 is transparent to microwave energy. It also provides high resistivity and dielectric strength with a low loss tangent and dielectric constant. These characteristics make AX05 an excellent material for high power, low loss insulators, containers and fixtures.

MACHINABILITY: Grade AX05 can be machined to extremely close tolerances using standard high speed "tool steel" equipment. Machining by grinding may be used if preferred or stringent tolerances are required. Threads can be machined using taps and dies. Cutting oils and coolants should not be used for any reason.


Typical Physical Properties of Combat Solid Boron Nitride Grade AX05	
Binder:	None
Binder Melting Point:	None
Maximum Use Temperature:	
Oxidizing:	850°C
Inert:	>2000°C
Specific Heat J/g°C:	0.35
Dielectric Strength:	2000 volts/mil
Pressing Direction: Para (Perp)	
Resistivity Ohm-cm RT:	>10 ¹⁴ (10 ¹⁵)
Loss Tangent @ 8.8 GHz:	.0012 (.0003)
Dielectric Constant @ RT:	4.0 (4.0)
Thermal Conductivity	
(W/m/L) @ 25°C:	70 (130)
Thermal Expansion Coefficient	
(RT to 1500°C) (in/in/°C x 10 ⁻⁶):	1.0 (0.3)
Flexural Strength (psi)*	
@ 25°C	2600 (3100)
@ 1500	6200 (11000)
Density (g/cc minimum):	1.85
% Open Porosity:	12.57%
Oxygen – max.:	1%
Carbon – max.:	0.02%
Calcium – max.:	0.04%
Other Impurities – max.:	0.05%


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





Grade AX05 Applications


Some common applications are listed below:


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High temperature electrical insulators and vacuum furnace supports which require electrical resistivity, high temperature strength, thermal shock resistance and low chemical resistivity.
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Crucibles and containers for high purity molten metals
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Insulators and source fixtures for ion implantation systems which require high temperature purity and electrical insulation.
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Radar components and antenna windows which require exacting electrical and thermal properties.
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Setterplates for the processing of other advanced materials which require stable, inert surfaces.
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Nozzles for powdered metal spraying.



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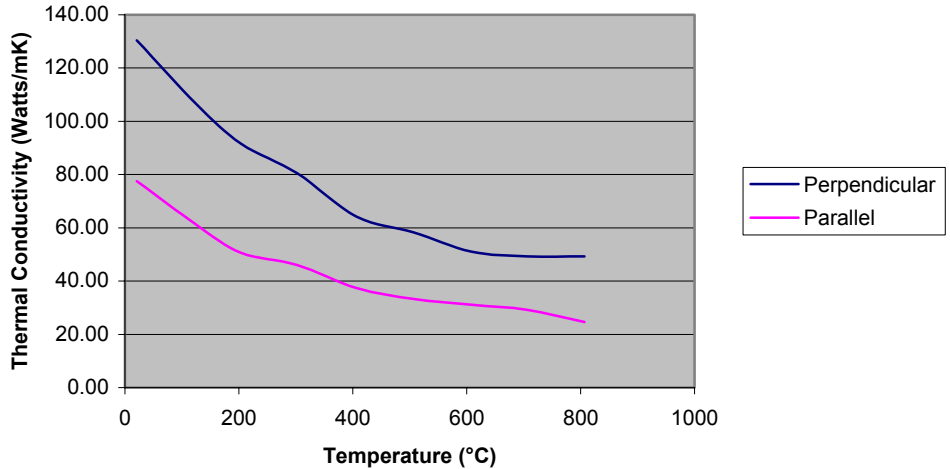
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Combat Solid Boron Nitride Grade AX05
Thermal Conductivity as a Function of Pressing Direction



NOTE: When using Combat Solid Boron Nitride Grade AX05 in vacuum applications, care must be taken to inhibit oxidation. Above 1700°C, 100 microns of vacuum should not be exceeded unless accompanied by a slight over pressure of Nitrogen. This over- pressure (greater than or equal to 10" of water) will inhibit oxidation of the material and allow for use temperatures greater than 2000°C.

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.

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