

# COMBAT®

## Boron Nitride Industrial Powders

### Agglomerated Powders for Thermal, Electrical and Corrosive Applications

Commonly referred to as “white graphite”, hexagonal Boron Nitride (hBN) is an advanced synthetic ceramic produced at temperatures above 1600°C by reacting boric acid and nitrogen. The resulting product, having a lamellar crystal structure, is a slippery white powder that has excellent oxidation resistance and lubricating properties, even at elevated temperatures >600°C.

An excellent solid lubricant, hBN is white (clean appearance), non-toxic, electrically non-conductive and thermally conductive. This unique combination of properties makes it superior to other solid lubricants such as graphite, molybdenum disulfide, and PTFE.

Combat® Boron Nitride Industrial agglomerated powders are high purity, and coarse (-40 mesh) powders suitable for a variety of high and low temperature applications. Available in low-density and high-density grades, Combat agglomerated powders are comprised of many BN platelets held together in blocky shapes. Combat agglomerated powders appear and flow similarly to white sugar.

Some of the typical applications for Combat agglomerated grades are thermocouple insulators where Combat is swaged around thermocouple wires to provide high thermal conductivity and electrical insulation; and Sintering where Combat acts as a sintering bed for non-oxide ceramic components such as AlN or Si<sub>3</sub>N<sub>4</sub>.

## PRODUCT DATA SHEET



### Features/Benefits

- Non-wet by molten metals
- Chemically inert and corrosion resistant
- Lubricious at temperatures up to 1800°C in inert atmospheres
- Excellent high temperature stability and oxidation resistant in air up to 900°C
- High thermal conductivity for efficient heat dissipation from components
- Non-toxic, safe for human contact and the environment
- White, clean appearance

### Key Applications

- Thermocouple insulators
- Sintering or HIP'ing (hot isostatic pressing) media
- Brake pad additives
- Thermal spray, abrasible coatings

### Target Markets

- Ceramic manufacturing
- Industrial heating
- Automotive
- Aerospace

BORON NITRIDE

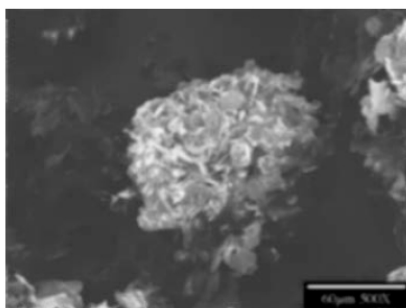
  
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### COMBAT® BORON NITRIDE INDUSTRIAL POWDERS – AGGLOMERATES: STANDARD GRADES AND TYPICAL PROPERTIES

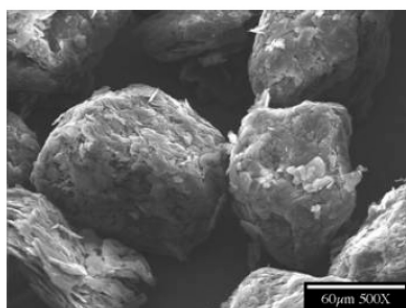
Combat Agglomerates	Chemistry, %			Particle Size Distribution, US Mesh			Other Physical	
	BN	O <sub>2</sub>	B <sub>2</sub> O <sub>3</sub>	+40	-40 / +140	-140	Tap Density, g/cc	Surface Area, m <sup>2</sup> /g
PSHP040 Low Density	99.5	0.4	0.1	1	97	2	0.4	3
PHDP40 High Density	99.5	0.4	0.1	1	97	2	0.9	3

#### General Properties

Appearance	White	
Crystal Structure	Hexagonal	
Apparent Density	gm/cc	2.2
Refractive Index	1.74	
Coefficient of Friction	< 0.3	
Dielectric Constant	3-4	
Thermal Conductivity*	W/mK	30-130



SEM - typical low density agglomerate



SEM - typical high density agglomerate

PSHP040 agglomerates are comprised of many BN platelets held together in a porous blocky shape. These low density BN agglomerates are soft and friable and are likely to break or crush under high shear mixing or compression. PHDP40 agglomerates are comprised of many BN platelets held together in a dense blocky shape. These high density agglomerates are “robust” and more likely to survive a variety of mixing environments. The key difference between these two powders is density and corresponding agglomerate strength.

Finer mesh size variations of these powders are available. See Idealube® BN powder datasheet for grades IDL1000, IDL2000 and IDL3000.

For further information, please visit us at [www.bn.saint-gobain.com](http://www.bn.saint-gobain.com), or contact your Combat product specialist at [bnsales@saint-gobain.com](mailto:bnsales@saint-gobain.com).



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