

MATERIAL DATA SHEET · HIGH-TEMPERATURE CERAMICS

Ceramics & Special Materials

Boron Nitride (hBN / cBN) | AlN | Al₂O₃ | Metal-Ceramic Composites

High-temperature ceramic materials extend the Refracore portfolio where metals reach their limits: electrical insulation under extreme heat, chemical inertness against aggressive media, or where wetting by molten metal cannot be tolerated. Boron nitride (hBN) is our most important ceramic material – followed by AlN substrates for power electronics and metal-ceramic composites.

insulating Elec. Cond. hBN	>1,000 °C Use in Air	>1,800 °C Use in Vacuum	CNC-machinable hBN
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Thermal Conductivity of Electrical Insulators Compared

Thermal conductivity in W/(m·K) — AlN and hBN are electrically insulating AND thermally conductive, a rare combination of advantages.

FR4 / Epoxy Resin	0.3 W/(m·K)
Al ₂ O ₃ Ceramic (96%)	28 W/(m·K)
hBN (perpendicular)	60 W/(m·K)
AlN	200 W/(m·K)

Physical & Mechanical Properties

Service Temp. hBN (air)	1,000 °C	Service Temp. hBN (vacuum)	1,800 °C
Service Temp. AlN (air)	700 °C	Thermal Cond. hBN (perpendicular)	60 W/(m·K)
Thermal Cond. AlN	170–230 W/(m·K)	Dielectric Strength hBN	20–35 kV/mm
Dielectric Strength AlN	15–20 kV/mm	Thermal Expansion hBN	1.0 µm/m·K
Thermal Expansion AlN	4.5 µm/m·K	Flexural Strength hBN	40–80 MPa
Wetting by Molten Metal	none (hBN) —	Machinability hBN	very good (CNC) —

Standards & Specifications: Customer-specific / on request. AlN substrates: IEC 60672-3.

Available Alloys & Variants

DESIGNATION	COMPOSITION	SPECIAL FEATURE / ADVANTAGE
hBN (hexagonal)	Boron nitride, hexagonal	"White graphite" – insulating, machinable, no wetting
cBN (cubic)	Boron nitride, cubic	Second-hardest substance after diamond, cutting tools
AlN	Aluminium nitride	High thermal conductivity 170–230 W/(m·K) + electrically insulating
Al ₂ O ₃ (96%)	Aluminium oxide	Highly temperature-resistant up to 1,600 °C (air)
HTCC Packages	Al ₂ O ₃ / W or Mo	Hermetic packages for microelectronics (MIL-grade)
BN Powder / Dispersion	hBN powder	Release agent, high-temperature lubricant, up to 900 °C

Delivery Forms & Dimensions

DELIVERY FORM	DIMENSIONS / DETAILS
hBN Mouldings / Discs	Custom geometry made to drawing, CNC-machinable
hBN Plates / Substrates	0.5–10 mm thickness, up to 200 x 200 mm
hBN Crucibles / Melting Crucibles	For metal and semiconductor melts, custom geometry
AlN Substrates	0.25–1.0 mm thickness, up to 138 x 190 mm
Metal-Ceramic Packages	HTCC / LTCC, hermetic, MIL standard
BN Powder	0.5–45 µm particle size, powder or aqueous dispersion

Applications & Industries

INDUSTRY / APPLICATION	TYPICAL COMPONENTS / PRODUCTS
Metal Casting / Foundries	hBN crucibles and moulds – no sticking of Al, Cu, Zn
Power Electronics	AlN substrates as heat spreaders under GaN / SiC chips
Crystal Growth	hBN crucibles for sapphire, GaN, SiC crystal growth
High-Frequency Electronics	AlN and HTCC packages for RF and microwave ICs
High-Temperature Insulation	hBN as an insulator in furnaces, heating conductors, vacuum systems
Lubricant / Release Agent	BN dispersion up to 900 °C, extrusion, forging

Note: Ceramic materials are brittle – avoid mechanical loading from bending or impact. hBN can be machined like graphite (without coolant). For applications with fluctuating temperatures: note the thermal shock resistance of hBN.

Quality & Certificates

ISO 9001

3.1 Mill Certificate to EN 10204

RoHS-Compliant

REACH-Compliant

Consultation in German & English

Inquiry & Consultation

Material, alloy, dimensions, tolerances and certificates – we advise free of charge and prepare your quote within 1–2 business days.

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