Silicon Nitride - Material Data Sheet

Typical properties, sintering routes and quality assurance

Typical properties of gas-pressure-sintered silicon nitride (GPS, GPS+HIP). Values are typical ranges for grade selection, not a guarantee; certified data is provided with each shipment.

Property	Typical value	Test method
Density	>= 3.20 g/cm3	Archimedes
Flexural strength (4-pt)	600 - 1000 MPa	ISO 14704
Hardness (HV10)	1500 - 1800	Vickers
Fracture toughness K1C	5 - 8 MPa*m^0.5	SEPB / Indentation
Thermal expansion (RT-1000 C)	~3.0 - 3.3 x10^-6/K	Dilatometry
Thermal conductivity (RT)	15 - 80 W/m*K	Laser flash
Max service temperature (air)	~1000 - 1200 C	-

Why silicon nitride

High strength and toughness combined with low density (~3.2 g/cm3, about 40% lighter than steel), excellent thermal-shock resistance, electrical insulation, non-magnetic behaviour and corrosion resistance in acids, alkalis and molten aluminium. These make Si3N4 the leading ceramic for bearings, metal forming, molten-metal handling, semiconductor tooling and power-module substrates.

Product forms and sintering routes

Route	Best for
GPS (gas-pressure sintering)	Structural parts, wear components, bearing balls
GPS + HIP	Highest density and reliability - bearing balls (G5), substrates, critical parts
HP (hot-press sintering)	Plates and blocks with fine anisotropic grain; flatness-critical tool blanks

Quality and testing (in-house)

ISO 9001 quality management system. In-house density, phase (XRD), microstructure (SEM), strength, thermal and reliability testing. Material certificate naming grade, sintering route and measured density (>99% of theoretical) available on request; dye-penetrant or ultrasonic NDT for critical parts.

Standard products: Si3N4 powder - sintered structural parts - bearing balls (G5-G10) - AMB substrates (up to ~140 x 190 mm) - cutting tools and Sialon inserts - molten-aluminium handling parts - semiconductor and probe-card tooling.