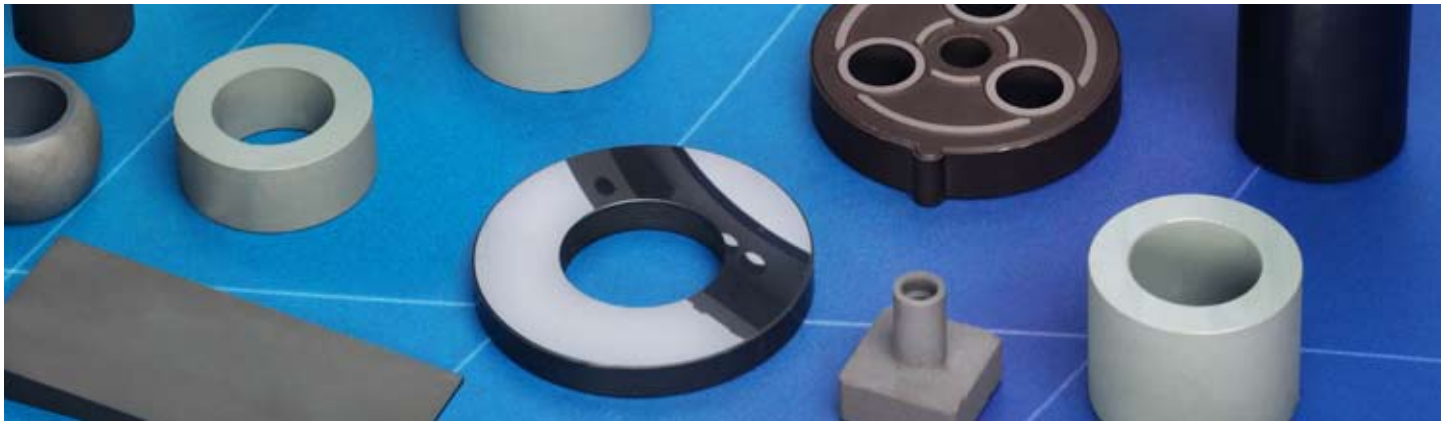

PRECISION PCSN 4000 Silicon Nitride

Silicon Nitride PCSN4000

General Properties

Silicon Nitride is a lightweight and tough material with good thermal shock properties and high hardness values. It is particularly suitable for any application needing a fracture tough, hard and light material that can be used at elevated temperatures.

Like most technical ceramics, silicon nitride shrinks when sintered and in most applications needs to be ground to remove the outer skin, but as most uses are for tight tolerance components, diamond grinding is usually required in any case.

Silicon Nitride is seen as part of a group of materials with good fracture toughness. Other materials such as Zirconia don't have the high temperature characteristics of silicon nitride.

See our interactive material comparison table for more information – www.precision-ceramics.com

Typical Applications

- Aerospace Applications
- Bearing Applications
- Chemical Plant Engineering & Construction
- Engine Wear Parts
- Foundry Applications
- Mechanical Engineering
- Medical Components

RT = Room Temperature
[1] Determination of density and porosity according to DIN 623-2
[2] Average value of 4-point bending strength at room temperature according to DIN EN 843-1
[3] Hardness according to DIN EN 843-4
[4] Calculated from crack length derived from Vickers hardness indentation, according to Niihara
[5] Critical temperature difference for an infinite high heat transfer (quenching)
[6] Thermal shock coefficient at finite constant heat transfer (slowly heating)

The material characteristics listed above are measured with testing samples. They cannot be transfered to components with different size, shape or surface properties. We reserve the right to alter properties within the scope of technical progress or new developments.

Typical Properties

			PCSN4000
Process			Extruded Gas Over-Pressure Sintered
Color			Black
Geometry			High Aspect Ratio Components
General Properties			
Chemical Composition			Si_3N_4
Sinter Additives			RE_2O_3 / Al_2O_3
Density ρ	[1]	g/cm³	3.23
Residual Porosity		(%)	<1
Open Porosity		(%)	0
Grain Size (Diameter)		(µm)	1 - 15
Mechanical Properties			
Compressive Strength		(MPa)	3000
Bending Strength σ RT	[2]	(MPa)	850
Weibull-Modulus m			18
Youngs Modulus E		(GPa)	>20
Hardness HV	[3]	(GPa)	16
Fracture Toughness K_{Ic}	[4]	($MPam^{1/2}$)	8.5
Poissons Ratio ν			0.28
Thermal Properties			
Maximum Working Temperatures			
- Inert Atmosphere		(°C)	1400
- Oxidizing Atmosphere		(°C)	1200
Specific Heat Capacity		(J/kgK)	700
Thermal Conductivity λ (20°C)		(W/mK)	28
Coefficient of Thermal Expansion	RT-1000°C	($10^{-6}K^{-1}$)	3.2
	RT- 250°C	($10^{-6}K^{-1}$)	1.9
	RT ± 20°C	($10^{-6}K^{-1}$)	1.3
Thermal Shock Parameter R_1	[5]	(K)	700
Thermal Shock Parameter R_2	[6]	(W/mm)	19
Electrical Properties			
Electrical Resistivity (RT)		Ωcm	10^{12}
Dielectric Constant (1 MHz)		-	7

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PRECISION CERAMICS USA, INC.
9843 18th St North, Suite 120, St. Petersburg, FL 33716
Tel: (727) 388 5060 Fax: (813) 435 2020
Email: info@precision-ceramics.com
www.precision-ceramics.com