

Material Data Sheet for Hot Pressed Silicon Nitride

1. Material

SN-HP

	Material Description			Hot Pressed Silicon Nitride (grey)
2.	General Properties Chemical Composition			Si ₃ N ₄ (wt%) RE ₂ O ₃ /Al ₂ O ₃ (wt%)	85 - 96 4 - 15
	Bulk Density Residual Porosity Open Porosity Grain Size (Longitudina	ρ al Direction)	[1]	(g/cm³) (%) (%) (μm)	3.18 - 3.30 < 0.5 0 1 - 10
3.	Mechanical Properties Hardness Compressive Strength Bendig Strength Weibull-Modulus Fracture Toughness Youngs Modulus Poisson Ratio	σ m K _{Ic} E	[2] [3] [4]	(GPa) (MPa) (MPa) (MPam ^{1/2}) (GPa)	15.0 3000 970 20 6.2 295 0.26
4.	Thermal Properties Max. Working Temperature - Inert Atmosphere - Air Specific Heat Capacity Thermal Conductivity λ (20°C) Coeff. of Thermal Expansion α RT-1000°C Coeff. of Thermal Expansion α RT \pm 20°C Thermal Shock Parameter \mathbf{R}_1 [5] Thermal Shock Parameter \mathbf{R}_2 [6]			(°C) (°C) (J/kgK) (W/mK) (10 ⁻⁶ K ⁻¹) (10 ⁻⁶ K ⁻¹) (K) (W/m)	1.400 1.200 620 22 3.2 1.4 760 16728
5.	Specific Properties Electrical Resistance (20 °C)		(Ωcm)	10 14

- Average value of 4-point bending strength at room temperature according to DIN EN 843-1 [2]
- Hardness according to DIN EN 843-4 [3]

[1]

- [4] Calculated from crack length derived from Vickers hardness indentation, according to Niihara $R_1 = \frac{\sigma(1-\nu)}{E\alpha}$
- Critical temperature difference for an infinite high heat transfer (quenching) [5]

Determination of density and porosity according to DIN 623-2

Thermal shock coefficient at finite constant heat transfer (slowly heating) [6]

 $R_2 = \frac{\sigma(1-\nu)}{E\alpha}\lambda$

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The material characterisitics listed above are measured at testing samples. They cannot be transferred 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.