

FCT Si₃N₄ Standard Materials

<i>FCT-Denotation</i>	SN-GP	SN-HP	SN-HIP
Process	Gas Pressure Sintered	Hot Pressed	Hot Isostatic Pressed
Color	Grey / Black	Grey / Black	Grey / Black
Geometry	Three-Dimensional Components	Planar Structures	Three-Dimensional Components, Non-Porous
Maximum size	Ø 610 mm, length 1500 mm	Ø 400 mm, thickness 75 mm	Ø 280 mm, length 680 mm
Application	Mechanical Engineering, Bearing Applications, Foundry Technology, Chemical Plant Engineering and Construction, Air and Space Applications	Mechanical Engineering, Foundry Technology, Chemical Plant Engineering and Construction, Air and Space Applications	Mechanical Engineering, Bearing Applications, Foundry Technology, Chemical Plant Engineering and Construction, Air and Space Applications
General Properties			
Chemical Composition	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄
Sinter Additives	RE ₂ O ₃ / Al ₂ O ₃	RE ₂ O ₃ / Al ₂ O ₃	RE ₂ O ₃ / Al ₂ O ₃
Density ρ [1] (%)	3.18 – 3.30	3.18 – 3.30	3.18 – 3.26
Residual Porosity (%)	< 1	< 0.5	< 0.2
Open Porosity Thereof (%)	0	0	0
Grain Size (Length) (µm)	1 – 15	1 – 10	1 – 15
Mechanical Properties			
Compressive Strength (MPa)	3000	3000	3000
Bending Strength σ RT [2] (MPa)	670	990	760 – 880
Weibull-Modulus m	20	20	20 – 10
Youngs Modulus E (GPa)	290	295	300 – 310
Hardness HV [3] (GPa)	14.5	14.3 – 15.0	15.3 – 15.6
Fracture Toughness K _{IC} [4] (MPam ^{1/2})	6.2	6.0 – 6.2	6.5 – 6.2
Poissons Ratio ν	0.26	0.26	0.26
Thermal Properties			
Maximum Working Temperatures			
– Inert Atmosphere (°C)	1400	1400	1400
– Oxidising Atmosphere (°C)	1200	1200	1200
Specific Heat Capacity (J/kgK)	620	620	600
Thermal Conductivity λ (20°C) (W/mK)	24	22	21
Coefficient of Thermal Expansion	RT-1000 °C (10 ⁻⁶ K ⁻¹)	3.2	3.2
	RT- 250 °C (10 ⁻⁶ K ⁻¹)	1.9	1.9
	RT ± 20 °C (10 ⁻⁶ K ⁻¹)	1.4	1.4
Thermal Shock Parameter R ₁ [5] (K)	534	approx. 770	590 – 660
Thermal Shock Parameter R ₂ [6] (W/m)	12822	approx. 17000	12390 – 13860
Electrical Properties			
Electrical Resistivity (RT) Ωcm	10 ¹⁴	10 ¹⁴	10 ¹⁴
Dielectric Constant (1 MHz)	8	8	8

RT = Room Temperature

Date: October 2019

[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 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.