FCT Ingenieurkeramik GmbH

FCT Si_3N_4 Standard Materials

FCT-Denotation			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_3N_4	Si_3N_4	Si_3N_4
Sinter Additives			RE_2O_3 / Al_2O_3	RE_2O_3 / Al_2O_3	RE_2O_3 / Al_2O_3
Density ρ	[1]	(%)	3.18 – 3.40	3.18 – 3.41	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)	730	970	760 – 830
Weibull-Modulus m			18	20	12
Youngs Modulus E		(GPa)	300	300	300 – 310
Hardness HV	[3]	(GPa)	15.0	15.0	15.3 – 15.6
Fracture Toughness K_{Ic}	[4]	($MPam^{1/2}$)	7.0	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 Capacitiy		(J/kgK)	700	700	700
Thermal Conductivity λ (20°C)		(W/mK)	25	24	25
Coefficient of Thermal Expansion	RT-1000 °C	($10^{-6}K^{-1}$)	3.2	3.2	3.2
	RT- 250 °C	($10^{-6}K^{-1}$)	1.9	1.9	1.9
	RT ± 20 °C	($10^{-6}K^{-1}$)	1.4	1.4	1.3
Thermal Shock Parameter R_1	[5]	(K)	558	748	590 – 620
Thermal Shock Parameter R_2	[6]	(W/m)	13955	17945	14650 – 15480
Electrical Properties					
Electrical Resistivity (RT)		Ωcm	10^{14}	10^{14}	10^{14}
Dielectric Constant (1 MHz)		–	8	8	8

RT = Room Temperature

Date: December 2016

[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 characterisitics listed above are measured at 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.

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