FCT Ingenieurkeramik GmbH

FCT SiC Standard Materials

FCT-Denotation			SC-S	SC-N	SC-R	SC-Cf
Material			Sintered SiC	Nitride-Bonded SiC ("NSiC", Open Porosity)	Recrystallized SiC ("RSiC", Open Porosity)	C-Longfibre Reinforced SiC ("C/C-SiC")
Process			Pressureless Sintered / Hot Pressed	Gas Pressure Nitridation	Sintered-Recrystallized	Pyrolysis / Liquid Silicon Infiltration
Color			**Black**	Grey	**Black**	CFK-Greyish Black
Geometry			Three-Dimensional / Planar Components	Three-Dimensional Components	Three-Dimensional Components	Planar Structures
Maximum size			Ø 700 mm, Length 1900 mm / Ø 400 mm, Thickness 75 mm	Ø 700 mm, Length 1900 mm / Ø 400 mm, Thickness 75 mm	Ø 700 mm, Length 1900 mm / Ø 400 mm, Thickness 75 mm	1000 x 1000 x 15 mm
Application			Mechanical Engineering, Solar and Semiconductor Technology, Chemical Plant Engineering and Construction, Air and Space Applications	Mechanical Engineering, Foundry Technology, Chemical Plant Engineering and Construction, Kiln Technology	Mechanical Engineering, Chemical Plant Engineering and Construction, Kiln Technology	Mechanical Engineering, Tribology and Brake Components
General Properties						
Chemical Composition			SiC	Si_3N_4 / SiC	SiC	SiC / Si / C
Sinter Additives / Fibre Content			C / B_4C	Y_2O_3 / Al_2O_3	SiO_2	C-Fibre (0/90°)
Density ρ	[1]	(%)	3.08 - 3.17	2.77 - 2.82	2.50 - 2.60	1.90 - 2.30
Residual Porosity		(%)	< 3	10 - 12	18 - 20	< 5
Open Porosity Thereof		(%)	0	10 - 12	18 - 20	< 0,5
Grain Size (Length)		(µm)	1 - 5	1 - 150	1 -150	-
Mechanical Properties						
Compressive Strength		(MPa)	> 2500	600 - 700	-	-
Bending Strength σ RT	[2]	(MPa)	460	180	80	70 - 200
Weibull-Modulus m			12	20	20	-
Youngs Modulus E		(GPa)	420	240	240	15 - 30
Hardness HV	[3]	(GPa)	26.0	-	-	-
Fracture Toughness K_{Ic}	[4]	($MPam^{1/2}$)	3.5	(3.0 - 3.2)	-	9,5
Poissons Ratio ν			0.15	0.2	0.2	-
Thermal Properties						
Maximum Working Temperatures						
- Inert Atmosphere		(°C)	1900	1500	1800	1600
- Oxidising Atmosphere		(°C)	1650	1500	1600	600
Specific Heat Capacitiy		(J/kgK)	672	-	-	-
Thermal Conductivity λ (20°C)		(W/mK)	140	23	23	11
Coefficient of Thermal Expansion	RT-1000 °C	($10^{-6}K^{-1}$)	4.5	4.0	4.8	-
	RT- 250 °C	($10^{-6}K^{-1}$)	3.2	-	-	2.5
	RT ± 20 °C	($10^{-6}K^{-1}$)	2.5	-	-	-
Thermal Shock Parameter R_1	[5]	(K)	189	150	56	-
Thermal Shock Parameter R_2	[6]	(W/m)	18889	3450	1278	-
Electrical Properties						
Electrical Resistivity (RT)		Ωcm	10^{-1} - 10^{8}	-	-	-
Dielectric Constant (1 MHz)		-	-	-	-	-

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)

Date: March 2015

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.

Further special SiC grades are available on demand. We also tailor your specific material solution !

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