

Material Data Sheet for High Strength Pressureless Sintered Silicon Carbide

1. Material

FCT Denotation	SC-HS
Material Description	Pressureless Sintered Silicon Carbide, high mechanical strength

2. General Properties

Chemical Composition	SiC (wt.-%)	97.5	
	C / B ₄ C (wt.-%)	2.5	
Bulk Density	ρ	[1] (g/cm ³)	> 3.12
Residual Porosity		(%)	< 3
Open Porosity		(%)	0
Grain Size		(μ m)	1 - 10

3. Mechanical Properties

Hardness (HK 5)		[2]	(GPa)	22.0
Compressive Strength			(MPa)	> 3000
Bending Strength	σ	(20 °C) [3]	(MPa)	500 \pm 30
		(1000 °C)		500 \pm 30
		(1350 °C)		450 \pm 30
Weibull-Modulus	m			13
Fracture Toughness	K_{Ic}	[4]	(MPam ^{1/2})	3.0
Youngs Modulus	E		(GPa)	395
Poisson Ratio	ν			0.16

4. Thermal Properties

Max. Working Temperature				
- Inert Atmosphere			(°C)	1900
- Air			(°C)	1600
Thermal Conductivity	λ	(20°C)	(W/mK)	120
Coeff. of Thermal Expansion	α	RT-1000°C	(10 ⁻⁶ K ⁻¹)	4.6
Coeff. of Thermal Expansion	α	RT \pm 20°C	(10 ⁻⁶ K ⁻¹)	3.3
Thermal Shock Parameter	R_1	[5]	(K)	230
Thermal Shock Parameter	R_2	[6]	(W/m)	27600

5. Specific Properties

Electrical Resistance (20 °C)		(Ω cm)	10 ⁵
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[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 by Knoop indentation according to DIN EN 843-4

[4] Determined by SEVNB method

$$R_1 = \frac{\sigma(1-\nu)}{E\alpha}$$

[5] Critical temperature difference for an infinite high heat transfer (quenching)

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

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

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.