

Silicon Carbide Material Platform

Typical Material Properties

(Not for specification purposes)

Property	Standard	Symbol/Unit	Grade F	Grade F Plus	Grade C	Grade P	Grade G	Grade T Plus
Density	DIN EN 623-2	ρ (g / cm ³)	>3.15	>3.18	>3.15	2.76 – 2.89	>3.10	>3.24
Porosity	DIN EN 623-2	P (%)	<2.0	<1.0	<2.0	10 – 14	<2.0	<1.0
Mean Grain Size		μm	<5	<5	Bimodal	<5	Bimodal	<2
Grain Size Distribution		μm			10 – 1500		10 – 1000	
Phase Composition			α - SiC	α - SiC	α - SiC	α - SiC	α - SiC, Graphite	α - SiC, YAG
Vickers Hardness	DIN EN 843-4	HV1 (GPa)	24.5	24.5	24.5	24.5	24.5	22.5
Knoop Hardness	DIN EN 843-4	HK 0.1 (GPa)	24.5	24.5	24.5	24.0	24.0	22.5
Young's Modulus	DIN EN 843-2	E (GPa)	430	430	430	340	390	430
Weibull Modulus	DIN EN 843-5	m	10	10	10	15	15	15
Flexural Strength, 4-pt bending	DIN EN 843-1	σ_b (MPa)	400	510	400	225	250	650
Compressive Strength	DIN 51104	σ_d (MPa)	>2500	>2500	>2500	>2000	>2200	>2500
Poisson Ratio	DIN EN 843-2	ν	0.17	0.17	0.17	0.13	0.15	0.17
Fracture Toughness (SENB)		K_{Ic} (MPa·m ^{0.5})	4	4	4	3	3.5	6
Coefficient of Thermal Expansion								
25 – 500 °C	DIN EN 821-1	α (10 ⁻⁶ /K)	3.8	3.8	3.8	3.8	3.8	4.1
500 – 1000 °C	DIN EN 821-1	α (10 ⁻⁶ /K)	5.1	5.1	5.1	5.1	5.1	5.3
Specific Heat at 25°C	DIN EN 821-3	c_p (J/g K)	0.69	0.69	0.69	0.69	0.69	0.71
Thermal Conductivity at 25°C	DIN EN 821-2	λ (W/m K)	130	130	130	110	130	87
Thermal Stress Parameters								
$R1 = \sigma_b \cdot (1 - \nu) / (\alpha \cdot E)$	Calculated	R_1 (K)	203	259	203	152	143	306
$R2 = R1 \cdot \lambda$	Calculated	R_2 (W/mm)	26	34	26	17	19	27
Specific Electrical Resistance at 25°C	DIN EN 50359	ρ (Ω cm)	>10 ⁸	>10 ⁸	10 ⁴ – 10 ⁵	>10 ⁸	10 ⁴ – 10 ⁵	10 ³ – 10 ⁵