

3M™ Silicon Carbide Material Platform

Formerly known as EKasic®

3M™ Silicon Carbide

Material properties	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		[μ m]	< 5	< 5	bimodal	< 5	bimodal	< 2
Grain size distribution		[μ m]			10–1,500		10–1,000	
Phase composition			α -SiC	α -SiC	α -SiC	α -SiC	α -SiC, graphite	α -SiC, YAG
Vickers hardness	DIN EN 843-4	HV 1 [GPa]	24.5	24.5	24.5	24.5	24.5	22.5
Knoop hardness	DIN EN 843-4	HK0.1 [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_c [MPa]	> 2,500	> 2,500	> 2,500	> 2,000	> 2,200	> 2,500
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	DIN EN 821-1							
25°C – 500°C		α [10 ⁻⁶ /K]	3.8	3.8	3.8	3.8	3.8	4.1
500°C – 1,000°C		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	calculated							
$R_1 = \sigma_b \cdot (1-\nu) / (\alpha \cdot E)$		R_1 [K]	203	259	203	152	143	306
$R_2 = R_1 \cdot \lambda$		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

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The management system has been
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Issued: 09/15

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