

TYPICAL MATERIAL PROPERTIES FOR MOLY-D AND STARBARS

Typical material properties for silicon carbide and MoSi₂ heating elements.

01 TYPICAL MATERIAL PROPERTIES

PROPERTY	UNITS	R-SiC		RB-SiC (Spirals & TW)	Si-SiC (Cold Ends)	N-SiC (ESNT)	MoSi ₂ (Moly-D)
		(RR, U, RA)	(HDS)				
Density	g/cc	2.52	2.65	2.88	2.68	2.2	5.62
Porosity	%	21%	17%	8%	6%	31%	~ 5%
Gas Permeability		Permeable		Impervious	Impervious	Permeable	Impervious
Electrical Resistivity @ RT	ohm-cm	9.77×10^{-2}		3.30×10^{-2}	3.74×10^{-3}	N/A	3.32×10^{-5}
Electrical Resistivity @ 1100°C	ohm-cm	6.51×10^{-2}		SE: 2.20×10^{-2} TW: 3.90×10^{-2}	2.49×10^{-3}	N/A	1.85×10^{-4}
Electrical Resistivity @ 1700°C	ohm-cm					N/A	3.34×10^{-4}
*Thermal Expansion Coefficient	$\times 10^{-6} / ^\circ\text{C}$	4.4 (20-1375°C)		4.14 (200°C) 5.27 (800°C) 5.36 (1350°C)	4.5 (20-700°C)	4.8 (30-600°C)	7.5
*Thermal Conductivity	W / m - °K	90 (RT) 20 (1200°C)		100 (RT) 68 (250°C) 25 (1200°C)	112.4 (RT) 72 (400°C)	30-35 (RT) 15 (1200°C)	30 (RT-600C) 15 (1200°C)
* Specific Heat Capacity @ 20°C	J / kg - °K	650	650	650	800	-	420
Flexural Strength @ 20°C	MPa	60	90	80	150	30	400

* Values are based on literature sources for similar materials.

The above values are not manufacturing specifications. The actual measured values may vary from the above.

REFERENCE & CONVERSIONS

Reference information and unit conversions for the material properties table.

02 REFERENCE & CONVERSIONS

Conversions

Thermal Conductivity	$(W / m \cdot K) \times 6.93579 = BTU / ft^2 \cdot hr \cdot ^\circ F/in$
	$(W / m \cdot K) \times 0.577983 = BTU / ft \cdot hr \cdot ^\circ F$
	$(W / m \cdot K) \times 0.860421 = Kcal / hr \cdot m \cdot ^\circ C$
Specific Heat	$(J / kg \cdot K) \times 2.38846 \times 10^{-4} = Kcal / kg \cdot ^\circ C$
	or $BTU / lb \cdot ^\circ F$
CTE	$(\times 10^{-6} / ^\circ C) \times 0.55556 = (\times 10^{-6} / ^\circ F)$
Flexural Strength	$MPa \times 145.0377 = lb/in^2$
	$MPa = N/mm^2$
	$MPa \times 10.19711 = kg/cm^2$

Material abbreviations

- R-SiC = Recrystallized Silicon Carbide
- RB-SiC = Reaction Bonded Silicon Carbide
- Si-SiC = Silicon Infiltrated Silicon Carbide
- N-SiC = Nitride Bonded Silicon Carbide