X-FOAM

Silicon Oxycarbide Foam

Semplastics

Silicon oxycarbide is a broadly useful material for extreme-heat applications, but until now its high thermal conductivity and high density have limited its use.

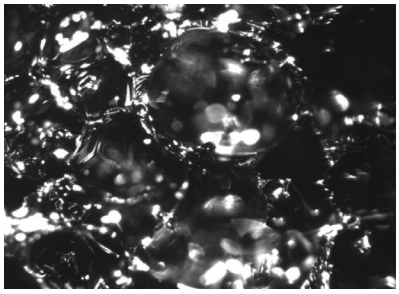
Semplastics introduces a lightweight, highly insulating silicon oxycarbide foam, X-Foam, with low relative density and small pore size. It remains stable in air at up to 1300°C for long-term use in many applications.

X-Foam has remarkably low thermal conductivity — as low as 0.034 W/m·K (0.019 BTU/h·ft·°F), depending on the average pore size.

Pore sizes are consistent within each piece, but are tunable between 80-1200µm (30 to 250 PPI), and are typically half open-cell.

A surprising feature of this ceramic foam product is its easy machinability. It can be machined in its final state on lathes, CNCs, drills, or even hand tools. It maintains sharp edges well and resists vibration damage.







Parameter	Semplastics X-Foam (SI)	Semplastics X-Foam (Imperial)
Density	0.15 g/cc	9.4 lb/cu.ft.
Max Operational Temp. (in air)	1300°C	2370°F
Thermal Conductivity	0.034-0.075 W/m·K	0.019-0.043 BTU/h· ft· °F
Specific Heat Capacity (25°C)	850 J/kg·°C	0.20 BTU/lb·°F
Heat Capacity per Volume	0.13 MJ/m³·K	1.9 BTU/ft³·°F
Coefficient of Thermal Expansion	3.2 x 10^{-6} /°C	1.8 x 10^{-6} /°F
Compressive Strength	2-14 MPa	300-2000 PSI
Pore Size (tunable)	80-1200µm	80-1200µm
Pores Per Inch (PPI, tunable)	30-250	40-250
Machinability	Easy	Easy

Applications: · Aerospace Insulation · Furnace Insulation · Stealth Applications · Molten Metal Filtering

For further information visit
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While the values and application information in this datasheet are typical, they are given for guidance only. The values and the information given are subject to normal manufacturing variation.

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X-FOAM

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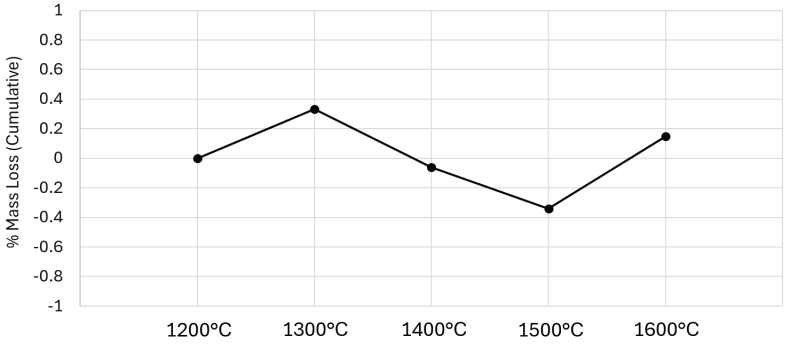
X-Foam is available in a range of densities. Unless otherwise noted, all data shown below is for the 0.15g/cc version.

Density (g/cc)	Pores Per Inch (PPI)	Compressive Strength (PSI)	Flexural Strength (PSI)
0.15	30-120	300	150
0.22	60-150	740	270
0.28	100-200	1330	360
0.35	140-250	2000	500

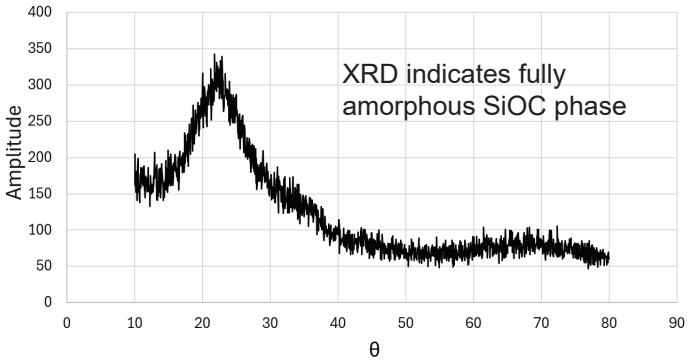
Semplastics can grow a thin, 100µm bonded layer of alumina on the surface of X-Foam pieces upon request. It is resistant to cracking and delamination, even under temperature shocks of 1000°C per second.



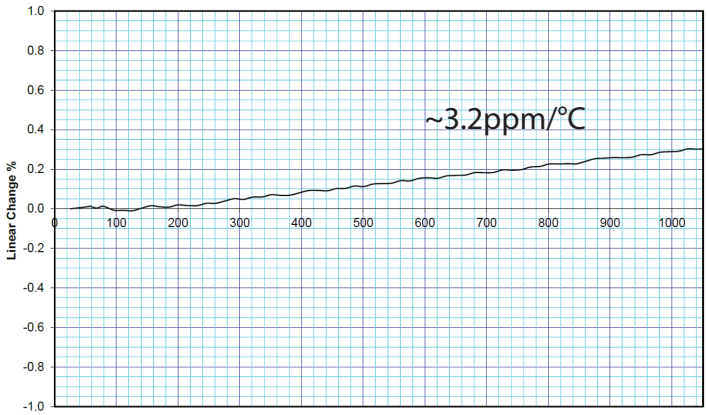
Cumulative Mass Loss %
After Successive 4-Hour Dwells At Temperature



2-θ X-Ray Diffraction Measurement
After 4-Hour Dwell at 1300°C



Thermal Expansion Test Data (% change vs °C)



Thermal Conductivity and Effusivity Test Data

#	k (W/mK)	Effusivity (Ws½/m²K)	R²	1/m	Temperature (°C)
1	0.0376	70.6	0.9997	50.8	24.5
2	0.0374	69.0	0.9997	50.7	24.5
3	0.0376	70.6	0.9997	50.8	24.5
4	0.0376	70.9	0.9997	50.8	24.5
5	0.0377	71.1	0.9997	50.8	24.5

ASTM E595 Vacuum Outgas Test Data

SN	%TML	Average % TML	%CVCM	Average %CVCM
Replicate #1	0.01		0.00	
Replicate #2	0.01	**0.01**	0.00	**0.00**
Replicate #3	0.01	Pass	0.00	Pass

Application notes on machining (guidance only)

Machine using standard wood-shaping tools. Standard band saw, CNC, and drilling leaves very well-defined edges. Recommend carbide edges and tips for longer tool durability. Does not require lubrication or cooling. Typical machining produces chemically-inert glass-like grains approximately 50-200 microns in size. Use proper dust protection for the nose, mouth, and eyes.

Contact Us Today!
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