X-FOAM™

PATENTED & PATENT-PENDING TECHNOLOGY

Designed and manufactured in the USA

Semplastics

Reusable Reentry Thermal Protection Tiles

Low-density SiOC ceramic foam for faster, lower-cost TPS reuse



The TPS bottleneck: inspection-heavy refurbishment

- X-FOAM is a stiff, machinable amorphous SiOC ceramic foam tile candidate.
- Designed to combine low thermal conductivity, low density, higher mechanical durability, and high emissivity.
- Same-material sealed skin options aim to reduce coating mismatch, water intrusion, and re-waterproofing work.

0.034	0.15	1400°C	1000°C/s	E595
W/m-K	g/cc	+ 1650°C+ variants	shock test	PASS
room-temp thermal k	baseline density	high-temp air stability	zero shedding/cracking/deformation	vacuum outgas tested

Why aerospace teams care

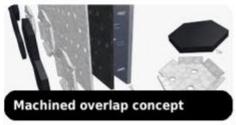
- Same-material waterproofable skin: very low coating/core CTE mismatch vs. glass-coated systems.
- Final-state machinability: saw, drill, lathe, or CNC; holds sharp edges and enables overlap/gap-filler concepts.
- Lower refurbishment path: durable surface treatment targets less water intrusion and handling.
- Lower cost path: scalable resin / foaming / furnace processing; potential >50% material savings.
- Lightweight but stiff: more robust handling, fitting, bonding, and installation options than friable silica tiles.



Skinned tile variants



Waterproofable surface



Machined overlap concept

Semi-technical snapshot

Typical values; verify for mission-specific design

Material	Amorphous silicon oxycarbide (SiOC) ceramic foam
Thermal k	0.034 W/m-K @ RT; 0.11-0.13 W/m-K @ 1000°C
Density	0.15 g/cc baseline; tunable 0.13-0.35 g/cc
Temperature	1400°C baseline in air; X-FOAM Extreme 1650°C+ variants
Strength	300-2000 PSI compressive range; stiffness scales with density
Machining	Final-fired CNC / drill / saw; sharp edges, no cooling/lube
Vacuum	ASTM E595 Pass; low outgassing
Pores	80-1200 µm / 30-250 PPI, tunable

Qualification focus

Arc-jet survivability, catalyticity, erosion/recession, coating stability, high-temp k, and thermal-response modeling.

Best-fit use cases for evaluation

Entire tile

monolithic non-ablative TPS where reusability and handling matter

Tile core/backer

lower-k backing layer or stiff insulating core behind hot-face systems

Shoulder / backside insulation

secondary TPS zones, base heat shield, and complex interfaces

Sensor / avionics isolation

vacuum-stable thermal isolation around protected hardware



Evaluate X-FOAM in your next TPS coupon test.

Promising material candidate - flight qualification requires customer-specific test matrix.

Data and imagery adapted from Semplastics X-FOAM data sheet, thermal tile white paper, and TPS presentation. Typical values; verify for mission-specific design.

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