



TegraCore™ PPSU Foam

Formable Foam for Insulative and Structural Applications

Introduction

TegraCore™ R-1050 is a high-performance foam based on Radel® polyphenylsulfone (PPSU), a versatile, super-tough thermoplastic with a long history of success in structural and decorative aircraft interior components. TegraCore™ R-1050 foam exhibits exceptionally high damage tolerance and withstands prolonged exposure to water, chemicals and temperatures ranging from -40°C to 204°C (-40°F to 400°F).

Figure 1: PPSU chemical structure

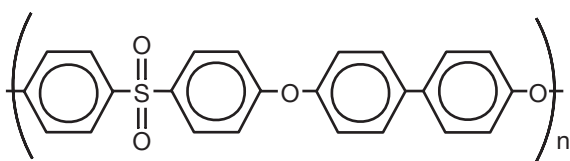
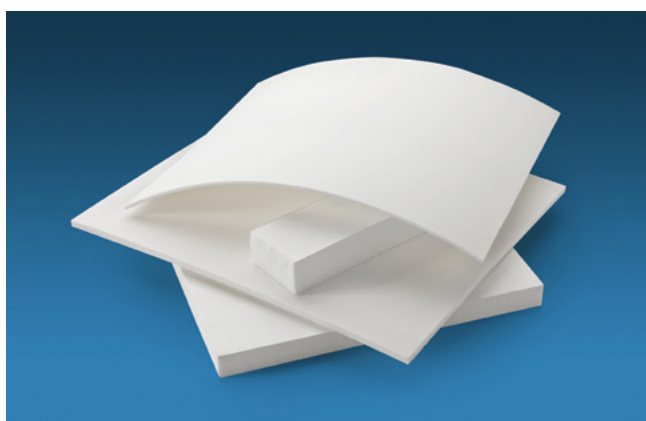


Figure 2: TegraCore™ R-1050 PPSU foam is available in a range of sizes and thicknesses



New Proprietary Technology

TegraCore™ PPSU foam is a lightweight core material made using a proprietary extrusion technology to produce a wide range of densities. TegraCore™ R-1050 is a commercially available grade that offers a density of 50 kg/m^3 (3.1 lb/ft^3).

Unlike other high-performance structural foams, TegraCore™ R-1050 is based on a polymeric structure known to prevent uncontrolled crack propagation upon impact. The material also exhibits excellent thermal and acoustic insulative properties.

Simplified Fabrication

Because TegraCore™ R-1050 foam is fully thermoplastic, it can be repaired and recycled. The material can be cut, bonded and formed with conventional equipment, and no edge filling is required. TegraCore™ R-1050 foam can also be thermoformed into 3-dimensional structures without suffering from excessive spring-back or shrink.

Key Properties

- Exceptional damage tolerance
- Exceeds FAR 25.853 requirements for flammability and OEM standards for toxic gas generation
- Exceeds the HL3 requirements for R1 applications according to EN45545
- Dimensional stability in flight conditions
- Very stable mechanical properties to 180°C (356°F)
- Compatible with commercial adhesives and substrates including sandwich skins
- Resistance to Skydrol® and other aerospace fluids
- Low moisture and resin absorption
- Closed micro-cell structures

Table 1: Typical properties

Property	Units	TegraCore™ R-1050 Foam	Test Method
Density	kg/m ³ lb/ft ³	53 3.3	ASTM D1622
Shear strength ⁽¹⁾	N/mm ² psi	0.75 110	ASTM C273
Shear modulus ⁽¹⁾	N/mm ² psi	9.3 1,300	ASTM C273
Tensile strength	N/mm ² psi	1.1 160	ASTM C297
Compressive strength	N/mm ² psi	0.65 94	ASTM D1621
Compressive modulus	N/mm ² psi	23 3,330	ASTM D1621

⁽¹⁾ Tested in tension mode

Table 2: Typical fire, smoke and toxicity properties

Property	Units	TegraCore™ R-1050 Foam	Test Standard
OSU 2 minute HRR ⁽¹⁾	kW/min-m ²	<30	FAR 25.853
OSU max HRR	kW/m ²	<35	FAR 25.853
12-second vertical burn ⁽²⁾			FAR 25.853
Burning time	seconds	4	
Burning length	cm (inch)	0.6 (0.2)	
Longest burn particle	seconds	0	
NBS smoke density ⁽³⁾			FAR 25.853
Ds at 4.0 minutes	–	2	
Ds max	–	2	
Toxic gas emissions			BSS 7239 / ATS 1000 / ABD0031
HCN	ppm	<1	
CO	ppm	<10	
NO + NO ₂	ppm	<2	
SO ₂	ppm	<1	
HF	ppm	<1	
HCl	ppm	<1	

⁽¹⁾ OSU = Ohio State University, HRR = Heat Release Rate. Test sample thickness 12.7 mm (0.5 in.)

⁽²⁾ Test sample thickness 12.7 mm (0.5 in.)

⁽³⁾ NBS = National Bureau of Standards, flaming mode

Table 3: Typical thermal properties

Property	Units	TegraCore™ R-1050 Foam	Test Method
CLTE from –65°C to 175°C (–85°F to 347°F) ⁽¹⁾			
Flow	ppm/°C (ppm/°F)	42 (23)	ASTM E831
Transverse	ppm/°C (ppm/°F)	44 (24)	ASTM E831
Z-direction	ppm/°C (ppm/°F)	55 (30)	ASTM E831
Thermal conductivity at 20°C (68°F)	W/m·K (Btu/ft·h·°F)	0.038 (0.021)	ISO 8301
R-value for 2.54-cm (1.0-inch) foam	m ² ·K/W (ft ² ·°F·h/Btu-in)	0.64 (3.6)	–

⁽¹⁾ Coefficient of linear thermal expansion

Table 4: Chemical resistance

	Test Conditions ⁽¹⁾	TegraCore™ PPSU Resin
Hydraulic fluid Skydrol® 500B ⁽²⁾	23 °C (73 °F), ≤27.6 MPa (4,000 psi), 24 hours	Resistant
Jet fuel A	23 °C (73 °F), ≤27.6 MPa (4,000 psi), 24 hours	Resistant
Aircraft deicer	23 °C (73 °F), ≤27.6 MPa (4,000 psi), 24 hours	Resistant
Isopropanol	23 °C (73 °F), ≤27.6 MPa (4,000 psi), 24 hours	Resistant
Methanol	23 °C (73 °F), ≤27.6 MPa (4,000 psi), 24 hours	Resistant
Trichloroethane 1,1,1	23 °C (73 °F), ≤27.6 MPa (4,000 psi), 24 hours	Resistant
Toluene	23 °C (73 °F), ≤27.6 MPa (4,000 psi), 24 hours	Limited resistance
Acetone	23 °C (73 °F), ≤27.6 MPa (4,000 psi), 24 hours	Not resistant
Methylethylketone	23 °C (73 °F), ≤27.6 MPa (4,000 psi), 24 hours	Not resistant

⁽¹⁾ Tested on solid injection molded parts

⁽²⁾ Contact your Solvay representative for information specific to TegraCore™ R-1050 Foam

Table 5: Electrical properties

Property	TegraCore™ R-1050 Foam	Test Method
Dielectric constant		
1 MHz	1.018	ASTM D150
1 GHz	1.016	ASTM D2520
10 GHz	1.015	ASTM D2520
40 GHz	1.014	ASTM D2520
Loss tangent		
1 MHz	0.0061	ASTM D150
1 GHz	0.0086	ASTM D2520
10 GHz	0.0095	ASTM D2520
40 GHz	0.0103	ASTM D2520
Dielectric strength		
kVAC/mm	3.54	ASTM D149

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