

PRODUCT DATA SHEET

DESCRIPTION

Toray EX-1541 cyanate ester syntactic foam is extremely unique in the industry due to its coupling of extremely low density and good structural properties. If packed well, the material does not require pressing during cure to achieve its mechanical properties and is easily machined to shape if required. EX-1541 is simply packed or injected into tooling cavities and can also be extruded with the proper tooling.

EX-1541's inherently low dielectric/low loss performance makes it ideal for radomes, antennae, and radar transparent structures, while its cyanate ester backbone chemistry assures low moisture absorption and low outgassing. These latter two features coupled with EX-1541's low isotropic CTE make it ideal for spacecraft and other dimensionally stable structures and tooling. EX-1541 can be accurately machined and hand-finished. Sanding and fairing is easily performed on cured EX-1541 and is similar to working with balsa wood. Variants from 176–384 kg/m³ (11–24 lb/ft³) (pcf) are available.

FEATURES

- ▶ Post curable for higher T_g (please see cure guidelines)
- ▶ Available in multiple density versions
- ▶ Low dielectric properties

PRODUCT TYPE

149°C (300°F) to 177°C (350°F)
Curing Cyanate Ester Syntactic Foam

TYPICAL APPLICATIONS

- ▶ Low dielectric/low loss core for radomes, antennae, and structures
- ▶ Low moisture pickup and low outgassing foam core for space structures
- ▶ Aircraft interiors
- ▶ Net molded foam parts
- ▶ High temperature potting
- ▶ Ablatives
- ▶ High temperature tooling masters
- ▶ High temperature tooling backup structures

SHELF LIFE

Out Life ^{*(1)} :	14 days at 24°C (75°F)
Frozen Storage Life:	6 months at < -18°C (0°F)

*Out Life is limit for packing of foam when decrystallized.
See notes below.

⁽¹⁾ **Important Product Instructions:** Resin may crystallize in freezer storage or after several days of room temperature storage at 24°C (75°F). To remove crystals, heat resin to 52°C (125°F) and gently stir until crystals return to solution before using. This step will also make the system more pliable for core fill applications.

TYPICAL NEAT RESIN PROPERTIES

Density	176–384 kg/m ³ (11–24 lbs/Ft ³)	
Cure Temperature	177°C (350°F) 232°C (450°F) (with optional post cure)	
Dielectric Constant	11 & 13 pcf	1.32
Loss Tangent	@ 10 GHz	0.0093
CTE	24 pcf	13.2 x 10 ⁻⁶ cm/cm/°C (7.4 x 10 ⁻⁶ in/in/°F) Isotropic in x, y, and z planes

TYPICAL NEAT RESIN MECHANICAL PROPERTIES

Compression Strength vs. Temperature (11 pcf/nom.)	
25°C (77°F)	2.1–3.4 MPa (300–500 psi)
60°C (140°F)	2.1–3.4 MPa (300–500 psi)
177°C (350°F)	1 MPa (150 psi)



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TYPICAL MECHANICAL PROPERTIES OF CURED EX-1541 AS A FUNCTION OF DENSITY ^{(1) (2) (3)}

Property ^{(1) (2) (3)}	Condition	Method	Results	
Compression Strength - 11 pcf (0.18 g/cc)	RTD	ASTM C 297	2.1–3.4 MPa	300–500 psi
Compression Strength - 13 pcf (0.21 g/cc)	RTD	ASTM C 297	3.4–4.8 MPa	500–700 psi
Compression Strength - 17.5 pcf (0.28 g/cc)	RTD	ASTM C 297	6.1–6.3 MPa	850–900 psi
Compression Strength - 20 pcf (0.32 g/cc)	RTD	ASTM C 297	6.2 MPa	900 psi
Compression Strength - 20 pcf (0.32 g/cc)	ETD	ASTM C 297	5.9 MPa	850 psi
Flatwise Tensile Strength - 11 pcf (0.18 g/cc)	RTD	ASTM C 365	2.1–3.4 MPa	300–500 psi
Flatwise Tensile Strength - 13 pcf (0.21 g/cc)	RTD	ASTM C 365	3.4–5.5 MPa	500–700 psi
Flatwise Tensile Strength - 17.5 pcf (0.28 g/cc)	RTD	ASTM C 365	4.5–5.5 MPa	650–800 psi

⁽¹⁾ Compression Specimen: 50.8 mm (2") diameter puck, 25.4 mm (1") thick

⁽²⁾ Cure: 0.6°C/min (1°F/min) to 177°C (350°F). Hold for 2 hours. Cool at < 5.5°C/min (10°F/min).

⁽³⁾ All densities are nominal. Property ranges listed are typical for expected range of densities about the nominal values noted. Contact Toray regarding specification values for density, mechanical properties, and tolerances.

TYPICAL CURE PARAMETERS

- ▶ 0.6°C/min (1°F/min) to 177°C (350°F)
- ▶ Hold for 2 hours
- ▶ Cool at < 5.5°C/min (10°F/min)
- ▶ For post curing, use 0.3°C/min (0.5°F/min) to prevent exotherm from 177°C (350°F) to 249°C (480°F). Plus a dwell for 1 hour at 204°C (400°F) and another 1 hour dwell at 232°C (450°F) is advisable for thick parts, > 12 mm thick (1/2").

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