

PRODUCT DATA SHEET



TENCATE ADVANCED COMPOSITES

RS-3

PRODUCT TYPE

350°F (177°C) Service
Toughened Cyanate Ester Resin

TYPICAL APPLICATIONS

- Satellite Structures
- Airframe/Missile Structures
- Electromagnetic/Dielectric Structures

SHELF LIFE

Tack Life

14 days tack life at 77°F (25°C)

Out Life

30 days out life 77°F (25°C)

Frozen Storage Life

12 months storage life at <0°F (-18°C)

Tack life is the time during which the prepreg retains enough tack, drape and handling for easy component lay-up.

Out life is the maximum time allowed at room temperature before cure.

PRODUCT DESCRIPTION

RS-3 is a modified cyanate ester resin developed to provide a good balance between toughness and high temperature/wet performance. RS-3 has been evaluated and qualified in the areas of satellite, airframe/missile, and dielectric structures. RS-3 is also available in several modified formulations including: RS-3C, a controlled flow vacuum bag/oven cure version; and RS-3M, an extremely low-flow autoclave version.

PRODUCT BENEFITS/FEATURES

- True 350°F (177°C) service
- Large base of qualified applications
- Very low outgassing
- Simple 350°F (177°C) "epoxy-like" processing
- Low shrinkage during cure
- Autoclave and compression moldable
- Excellent balance of mechanical properties
- Low moisture absorption performance and good hot/wet performance
- Low microcracking from -350°F (-212°C) to 350°F (177°C)
- Low modulus loss after radiation
- Low dielectric constant and loss tangent exposure over wide thermal and electrical regions

NEAT RESIN PHYSICAL PROPERTIES

Density	1.19 g/cc
Dry Tg	375°F (191°C) cured at 350°F (177°C)
Dry Tg	490°F (254°C) post cured at 450°F (232°C)
Wet Tg*	480°F (249°C) post cured at 450°F (232°C)
Coefficient of Thermal Expansion	24 ppm/°F (43 ppm/°C)
Outgassing (TML)	0.22%
Outgassing (CVCM)	0.01%
Equilibrium Moisture Absorption	0.69%
Viscosity at:	
158°F (70°C)	7370 cps
212°F (100°C)	300 cps
293°F (145°C)	200 cps
Tensile Strength	11.6 ksi (80 MPa)
Tensile Modulus	0.43 Msi (3 GPa)
Tensile Strain	4.9%
Flexural Strength	18.4 ksi (126.9 MPa)
Flexural Modulus	0.48 Msi (3.3)
Fracture Toughness, G _{1c}	2.1 in-lb/in ²
Dielectric Constant (at 2-18 GHz)	2.67
Loss Tangent	0.005

* Wet properties determined after specimens exposed to 95% R.H. at 160°F (71°C) for 20 days.

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LAMINATE DATA USED M55J (6K)/RS-3 UDPP LAMINATE.

Properties	Condition (RTD, ETD, ETW)	Method	Results	
Tensile Strength 0°	RTD	ASTM D3039	290 ksi	1999 MPa
Tensile Modulus 0°	RTD	ASTM D3039	46.2 Msi	318.5 GPa
Compressive Strength 0°	RTD	ASTM D6641	129 ksi	889 MPa
Compressive Modulus 0°	RTD	ASTM D6641	43.4 Msi	299.2 GPa
Compressive Strength 90°	RTD	ASTM D6641	14.9 ksi	103 MPa
Compressive Modulus 90°	RTD	ASTM D6641	0.82 Msi	5.7 GPa
Flexural Strength 0°	RTD	ASTM D7264	175 ksi	1207 MPa
Flexural Modulus 0°	RTD	ASTM D7264	42 Msi	289.6 GPa
Interlaminar Shear Strength	RTD	ASTM D2344	10.9 ksi	75.2 MPa
In-Plane Shear Strength	RTD	ASTM D3518	13 ksi	90 MPa
In-Plane Shear Modulus	RTD	ASTM D3518	0.7 Msi	4.8 GPa

- All properties normalized to 60% fiber volume except ILSS.

LAMINATE DATA USED S-2 GLASS 6781/RS-3C FABRIC LAMINATE.

Properties	Condition (RTD, ETD, ETW)	Method	Results	
Tensile Strength 0°	RTD	ASTM D3039	89.3 ksi	616 MPa
Tensile Modulus 0°	RTD	ASTM D3039	4.6 Msi	31.7 GPa
Flexural Strength 0°	RTD	ASTM D7264	121 ksi	834 MPa
Flexural Modulus 0°	RTD	ASTM D7264	5.4 Msi	37.2 GPa
Interlaminar Shear Strength	RTD	ASTM D2344	9.4 ksi	65 MPa

- All properties normalized to 60% fiber volume except ILSS.

LAMINATE DATA USED T-300 (1K)/RS-3 PLAIN WEAVE FABRIC LAMINATE.

Properties	Condition (RTD, ETD, ETW)	Method	Results	
Tensile Strength 0°	RTD	ASTM D3039	121 ksi	834 MPa
Tensile Modulus 0°	RTD	ASTM D3039	9.7 Msi	66.9 GPa
Compressive Strength 0°	RTD	ASTM D6641	118 ksi	814 MPa
Compressive Modulus 0°	RTD	ASTM D6641	8.8 Msi	60.7 GPa
Flexural Strength 0°	RTD	ASTM D7264	148 ksi	1020 MPa
Flexural Modulus 0°	RTD	ASTM D7264	9 Msi	62.1 GPa
Interlaminar Shear Strength	RTD	ASTM D2344	11 ksi	76 MPa
In-Plane Shear Strength	RTD	ASTM D3518	20.2 ksi	139 MPa
In-Plane Shear Modulus	RTD	ASTM D3518	0.7 Msi	4.8 GPa
Poisson's Ratio	RTD		0.3	

- All properties normalized to 60% fiber volume except ILSS and Poisson's Ratio.

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TENCATE ADVANCED COMPOSITES

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LAMINATE DATA USED T300 (1K)/RS-3C 5HS WEAVE FABRIC LAMINATE.

Properties	Condition (RTD, ETD, ETW)	Method	Results	
Flexural Strength 0°	RTD	ASTM D7264	163 ksi	1124 MPa
Flexural Modulus 0°	RTD	ASTM D7264	10.9 Msi	75 GPa
Interlaminar Shear Strength	RTD	ASTM D2344	11 ksi	75.8 MPa

- All properties normalized to 60% fiber volume except ILSS.

LAMINATE DATA USED T-300 (3K)/RS-3C 8HS WEAVE FABRIC LAMINATE.

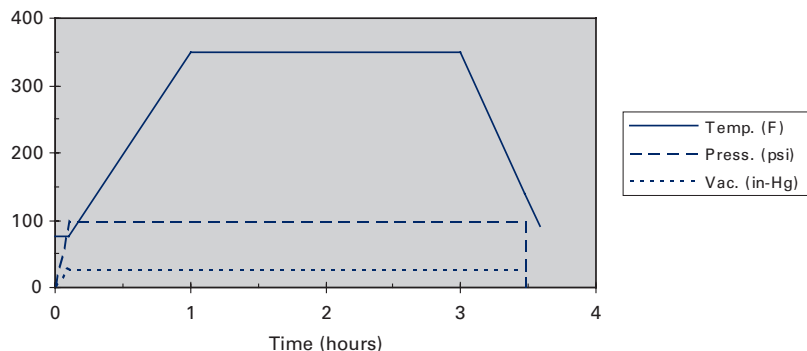
Properties	Condition (RTD, ETD, ETW)	Method	Results	
Compressive Strength 0°	RTD	ASTM D6641	112 ksi	772 MPa
Compressive Modulus 0°	RTD	ASTM D6641	9.7 Msi	66.9 GPa
Flexural Strength 0°	RTD	ASTM D7264	156 ksi	1076 MPa
Flexural Modulus 0°	RTD	ASTM D7264	11 Msi	75.8 GPa
Interlaminar Shear Strength	RTD	ASTM D2344	10.2 ksi	70 MPa
In-Plane Shear Strength	RTD	ASTM D3518	7.8 ksi	53.8 MPa

- All properties normalized to 60% fiber volume except ILSS.

TYPICAL CURE PARAMETERS

- Apply vacuum, pressurize to 45-100 psi.
- Heat to 350°F (177°C) (+10°F/5°C) at 5°F ± 3°F/min (2°C ± 1°C/min)
- Hold at 350°F (177°C) for 120 minutes (+15 min/-0 min). Cool.
- May be post cured at 450°F (232°C) for 2 hours if higher temperature service is required.

Typical RS-3 Cure Profile

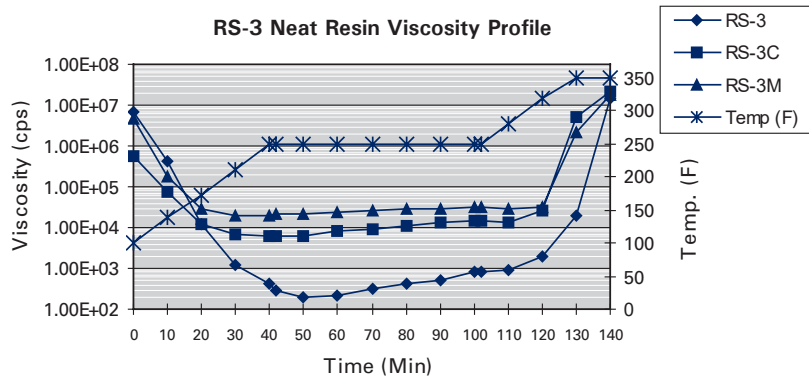


PRODUCT DATA SHEET



TENCATE ADVANCED COMPOSITES

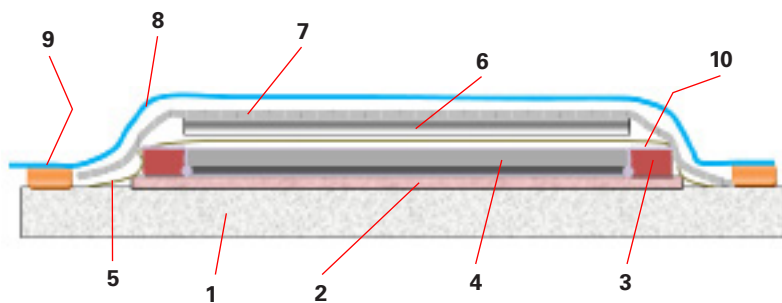
RS-3



COMPOSITE LAMINATE STACKING SEQUENCE

LIST OF MATERIALS

1. Tool – aluminum, steel, Invar, composite (tool plates must be release coated or film covered)
2. Release coat or film – Frekote 700NC or 770NC, FEP, TEDLAR
3. Silicone Edge Dams – Thicker than laminate
4. Laminate
5. Release coat or film – Frekote 700NC or 770NC, FEP, TEDLAR
6. Caul plate – aluminum, steel, Invar, silicone rubber sheet (metal caul plates must be release coated or wrapped)
7. 2.2 osy polyester breather – 1 or more
8. Vacuum bag
9. Vacuum sealant
10. Glass yarn string - (alternatively or additionally breather may wrap over top of dam to contact edge)



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All data given is based on representative samples of the materials in question. Since the method and circumstances under which these materials are processed and tested are key to their performance, and TenCate Advanced Composites has no assurance of how its customers will use the material, the corporation cannot guarantee these properties.

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