

PRODUCT DATA SHEET

DESCRIPTION

Toray RS-3/RS-3C is a modified cyanate ester prepreg resin developed to provide a good balance between toughness and high temperature performance. RS-3/RS-3C has over three decades of outstanding performance in satellite, airframe/missile, and dielectric structures. RS-3 is available in several modified versions including: RS-3C, a controlled-flow vacuum-bag/oven-cure version; and RS-3M, a low-flow autoclave version. Furthermore, RS-3/RS-3C is also available as structural syntactic (see SF-5) and as a core splice adhesive (see EM-5A).

FEATURES

- ▶ Increased T_g and service temperature with post cure
- ▶ Large base of qualified applications
- ▶ Very low outgassing
- ▶ Simple 177°C (350°F) “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
- ▶ Proven cryogenic performance with little to no microcracking from -212°C (-350°F) to 177°C (350°F)
- ▶ Low modulus loss after radiation
- ▶ Low dielectric constant and loss tangent over wide thermal and electrical regions

PRODUCT TYPE

177°C (350°F) Cure Toughened Cyanate Ester

TYPICAL APPLICATIONS

- ▶ Satellite structures
- ▶ Airframe/missile structures
- ▶ Electromagnetic/dielectric structures

SHELF LIFE

Tack Life:	14 days tack life at 25°C (77°F)
Out Life:	30 days out life at 25°C (77°F)
Frozen Storage Life:	12 months at -18°C (< 0°F)

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.

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

TYPICAL NEAT RESIN PROPERTIES

Density	1.19 g/cc
Dry T_g (DMA) with 177°C (350°F) cure	191°C (375°F)
Dry T_g (DMA) with 232°C (450°F) post cure	254°C (490°F)
Wet T_g * (DMA) with 232°C (450°F) post cure	249°C (480°F)
Coefficient of Thermal Expansion	43 ppm/°C (24 ppm/°F)
Outgassing (TML)	0.22%
Outgassing (CVCN)	0.01%
Equilibrium Moisture Absorption	0.69%
Viscosity at:	70°C (58°F) 7370 cps 100°C (212°F) 300 cps 145°C (293°F) 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 GPa)
Fracture Toughness, G1C	2.1 in-lb/in ² (367.8 N/m)
Dielectric Constant (at 2-18 GHz)	2.67
Loss Tangent	0.005



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UNIDIRECTIONAL MECHANICAL PROPERTIES

Property	Symbol	Method	Units	RS-3C/T1100G-71E 135gsm, 35%RC
				Autoclave Cure w/ 232°C (450°F) Post Cure
				RTD
0° Tensile Strength	F _{1t}	ASTM D3039	Ksi (MPa)	483 (3330)
0° Tensile Modulus	E _{1t}	ASTM D3039	Msi (GPa)	23.30 (160.65)
0° Compressive Strength (Backed Out)	F _{1c}	ASTM D6641	Ksi (MPa)	246 (1696)
0° Compressive Modulus	E _{1c}	ASTM D6641	Msi (GPa)	24.40 (168.23)
0° Compressive Strength	F _{1c}	ASTM D6641	Ksi (MPa)	225 (1758)
0° Compressive Modulus	E _{1c}	ASTM D695*	Msi (GPa)	24.70 (170.30)
Interlaminar Shear Strength	SBS	ASTM D2344	Ksi (MPa)	15.80 (108.94)
Laminate T _g (onset, DMA, Dry)		DMA	°F (°C)	478 (248)

Notes

RTD: 72°F/22°C, as fabricated

All properties normalized to 60% fiber volume except ILSS

Compression Testing per D6641 used a cross ply laminate with a backout factor applied to obtain the 0 degree result.

Preliminary dataset based on limited lot data

MECHANICAL PROPERTIES CURE VS. POST CURE

Property	Symbol	Method	Units	RS-3C/M55J (6K)							
				Standard 176°C (350°F) Cure				176°C (350°F) Cure w/232°C (450°F) Post Cure			
				RTD	ETD1	ETD2	CTD	RTD	ETD1	ETD2	CTD
0° Compressive Strength (backed out)	F _{1c}	ASTM D6641	Ksi (MPa)	131 (903)	102 (703)	57 (393)	128 (883)	127 (876)	119 (820)	118 (814)	141 (972)
0° Compressive Modulus	E _{1c}	ASTM D6641	Msi (GPa)	45.00 (310.26)	38.00 (262.00)	-	-	46.00 (317.16)	42.00 (289.58)	-	-
Interlaminar Shear Strength	SBS	ASTM D2344	Ksi (MPa)	10.0 (69.9)	6.8 (46.9)	2.4 (16.5)	10.4 (71.4)	9.9 (68.3)	7.8 (53.8)	3.7 (25.5)	10.2 (70.3)
Laminate T _g (onset, DMA, Dry)		DMA	°F (°C)	378 (192)				464 (240)			

Notes

RTD: 72° F/22°C, as fabricated

ETD1: 302°F/150°C

ETD2: 450°F/232°C

CTD:-202°F/-130°C

All properties normalized to 60% fiber volume except ILSS

Compression strength testing per D6641 used a cross ply laminate with a backout factor applied to obtain the 0 degree result.

*Post Cure was performed in an oven in the original cure vacuum bag @ 450° F for 2 hours in N2

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RS-3C S2 GLASS FABRIC MECHANICAL PROPERTIES

Property	Symbol	Method	Units	RS-3C /6781
				RTD
0° Tensile Strength	F_{1t}	ASTM D3039	Ksi (MPa)	89.3 (616)
0° Tensile Modulus	E_{1t}	ASTM D3039	Msi (GPa)	4.6 (31.7)
0° Flexural Strength	σ_f	ASTM D7264	Ksi (MPa)	121 (834)
0° Flexural Modulus	E_f	ASTM D7264	Msi (MPa)	5.4 (37.2)
Interlaminar Shear Strength	SBS	ASTM D2344	Msi (MPa)	9.4 (65)

RTD 72°F/22°C, as fabricated
All properties normalized to 60% fiber volume except ILSS

RS-3 CARBON FABRIC MECHANICAL PROPERTIES

Property	Symbol	Method	Units	RS-3/T300 (1K) Plain Weave
				RTD
0° Tensile Strength	F_{1t}	ASTM D3039	ksi (MPa)	121 (834)
0° Tensile Modulus	E_{1t}	ASTM D3039	Msi (GPa)	9.7 (66.9)
0° Compressive Strength	F_{1c}	ASTM D695 Modified/SRM-1	ksi (MPa)	118 (814)
0° Compressive Modulus	E_{1c}	ASTM D695 Modified/SRM-1	Msi (GPa)	8.8 (60.7)
0° Flexural Strength	σ_f	ASTM D7264	ksi (MPa)	148 (1020)
0° Flexural Modulus	E_f	ASTM D7264	Msi (GPa)	9 (62.1)
Interlaminar Shear Strength	SBS	ASTM D2344	ksi (MPa)	11 (76)
Poisson's Ratio	ν			0.3

RTD 72°F /22°C, as fabricated
All properties normalized to 60% fiber volume except ILSS and Poisson's Ratio

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RS-3C CARBON FABRIC MECHANICAL PROPERTIES

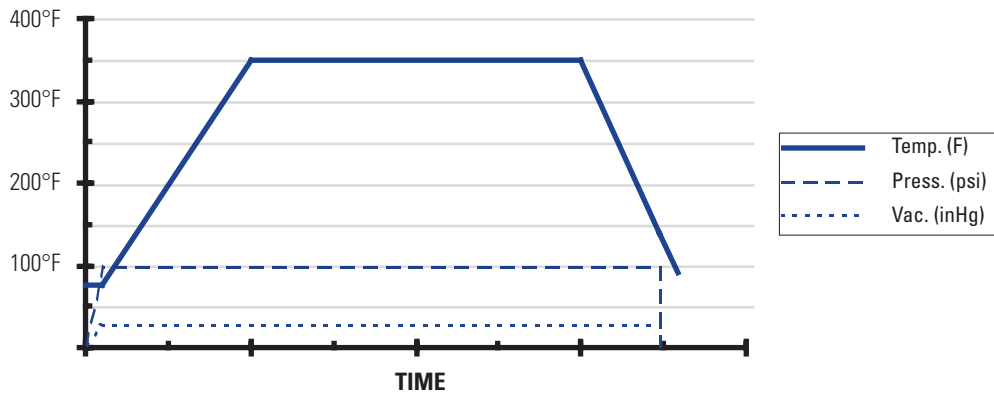
Property	Symbol	Method	Units	RS-3C/T300 (1K) 5 Harness Satin	RS-3C/T300 (3K) 8 Harness Satin
				RTD	RTD
0° Compressive Strength	F_{1c}	ASTM D695 Modified/SRM-1	ksi (MPa)	-	112 (772)
0° Compressive Modulus	E_{1c}	ASTM D695 Modified/SRM-1	Msi (GPa)	-	9.7 (66.9)
0° Flexural Strength	σ_f	ASTM D7264	ksi (MPa)	163 (1124)	156 (1076)
0° Flexural Modulus	E_f	ASTM D7264	Msi (GPa)	10.9 (75.2)	11 (75.8)
Interlaminar Shear Strength	SBS	ASTM D2344	ksi (MPa)	11 (76)	10.2 (70.3)

RTD 72°/22°C, as fabricated
All properties normalized to 60% fiber volume except ILSS.

TYPICAL CURE PARAMETERS

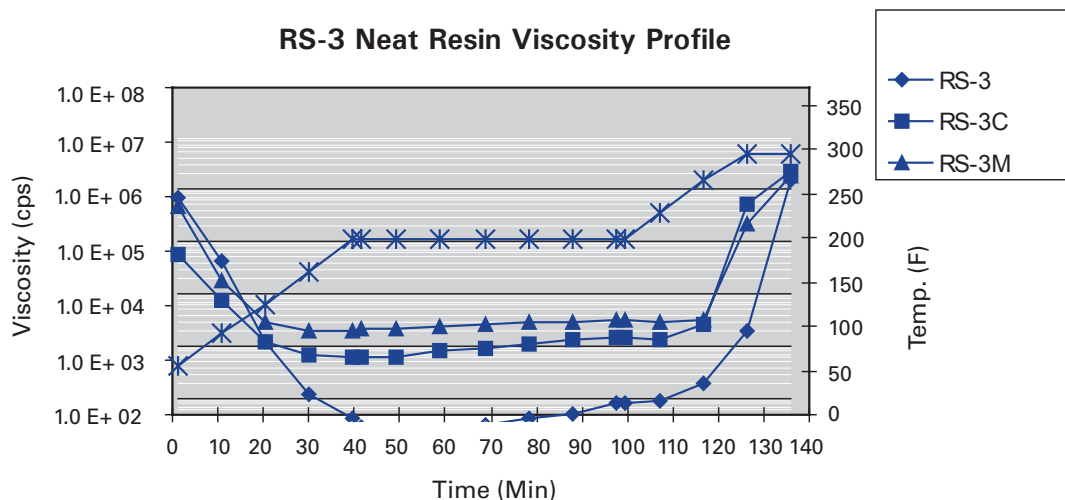
- ▶ Apply vacuum, pressurize to 45–100 psi.
- ▶ Heat to 177°C (350°F) (5°C/+10°F) at 2°C ± 1°C/min (5°F ± 3°F/min).
- ▶ Hold at 177°C (350°F) for 2 hours (+15 min/-0 min). Cool.
- ▶ May be post cured at 232°C (450°F) for 2 hours if higher temperature service is required.
- ▶ Optional dwell cure: Apply vacuum and heat to 110°C (230°F) hold for 60-70 minutes. Apply autoclave pressure. Heat to 177°C (350°F). Hold at 177°C (350°F) for 120-180 minutes.

Typical RS-3 Cure Profile



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RS-3 Neat Resin Viscosity Profile



TYPICAL 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
Lay-up part using standard debulking procedures
3. Silicone edge dams for cure – slightly 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 oz/yd² 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)
11. For more information, please refer to our Cyanate Ester Handling Guide.

Follow the provided Toray Advanced Composites cure cycle for the particular resin system.

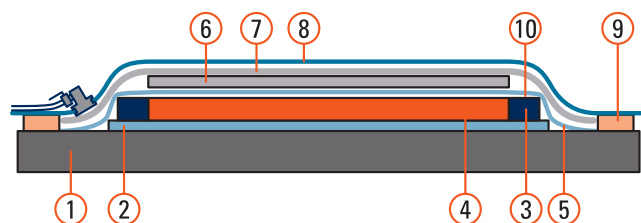


Figure 1

Revised 12/2025

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