Toray RS-17B

Toray Advanced Composites

PRODUCT DATA SHEET

DESCRIPTION

Toray RS-17B is a modified epoxy resin that delivers extremely low moisture absorption while providing excellent mechanical properties, toughness, and modulus. RS-17B is a flexible cure system that may be cured from 135°C to 177°C (275°F to 350°F). RS-17B has a long spaceflight heritage.

FEATURES

- **Ambient out life of 4 weeks**
- **Excellent tack and drape**
- **Cures in 3 hours at 135°C (275°F) or 2 hours at 177°C (350°F)**
- **Flexible, robust range of process cycles**
- **Extremely low moisture absorption**
- **Excellent balance of mechanical properties and toughness**
- **Autoclave and press consolidation**

PRODUCT TYPE

135°C–177°C (275°F–350°F) Cure Epoxy

TYPICAL APPLICATIONS

- Satellite Structures
- Aerospace Structures

SHELF LIFE

Out Life*:	30 days at ≤ 21°C (70°F) and ≤ 60% RH
Frozen Storage Life:	12 months at -18°C (< 0°F)

Out life is the maximum time allowed at 21°C (70°F) or below and 60% or less RH before cure, after a single frozen storage cycle in the original unopened packaging at -18°C (0°F) or below for a period not exceeding the frozen storage life noted above.

*Out life tested by SBS on a 15 x 15 cm (6"x 6") laminate, cured in an autoclave. Users may need to evaluate out life limits for their own applications due to differing thickness, configuration, and complexity.

TYPICAL NEAT RESIN PROPERTIES

Density	1.19 g/cc
T_g, dry, DMA (after 135°C/275°F)	158°C (316°F)**
T_g, dry, DMA (after 135°C/275°F + 163°C/325°F)	171°C (340°F)**
T_g, dry, DMA (after 135°C/275°F + 177°C/350°F)	178°C (352°F)^
Equilibrium moisture absorption*	2.7%
Outgassing (TML, CVCM, WVR) laminate	0.14 %, 0.02 %, 0.34%

* Determined after 30 days 82°C (180°F) water immersion
**Based on RS-17B/K13916 laminate
^Based on RS-17B/M55J (6K) laminate

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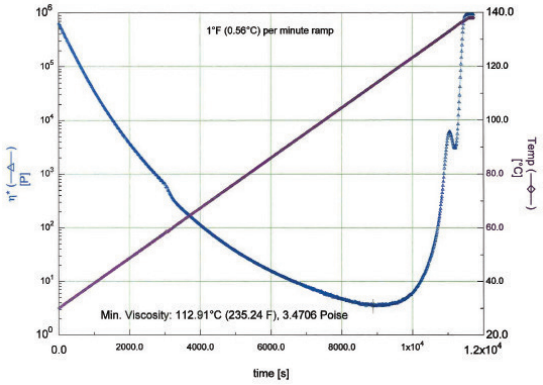
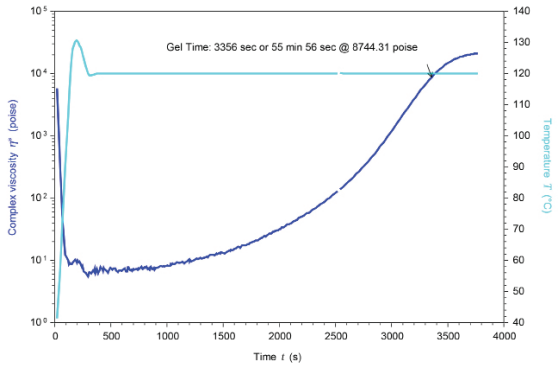
RS-17B NEAT RESIN MECHANICAL PROPERTIES

Property	Results	
Flexural Strength	25 ksi	172 MPa
Flexural Modulus	527 ksi	3630 MPa

RS-17B TYPICAL DYNAMIC VISCOSITY PROFILE



RS-17B TYPICAL ISOTHERMAL VISCOSITY AT 120°C (248°F)



RS-17B M46J (6K) UD TAPE LAMINATE* AMBIENT MECHANICAL PROPERTIES

Property**	Results	
Tensile Strength	300 ksi	2068 MPa
Tensile Modulus	36.5 Msi	251.6 GPa
Compressive Strength	154 ksi	1062 MPa
Compressive Modulus	32.5 Msi	224.1 GPa
Open-Hole Compression Strength***	36 ksi	251.6 GPa
Open-Hole Compression Modulus***	11.3 Msi	77.9 GPa
Interlaminar Shear Strength	10.9 ksi	75 MPa

* FAW: 85gsm nom., Resin Content: 30.5% nom., CPT: 0.003" nom.
** All properties normalized to 60% fiber volume except Interlaminar Shear Strength
*** [45,0,-45,90] 2S lay-up

RS-17B M55J (6K) UD TAPE LAMINATE AMBIENT MECHANICAL PROPERTIES

Property*	Cure Cyle					
	121°C (275°F) 3 hrs		149°C (300°F) 2 hrs		177°C (350°F) 2 hrs	
Tensile Strength, 0°	260 ksi	1792 MPa	250 ksi	1724 MPa	300 ksi	2068 MPa
Tensile Modulus, 0°	47.7 Msi	328.8 GPa	45.6 Msi	314.4 GPa	46.5 Msi	320.6 GPa
Tensile Strength, 90°	6.4 ksi	44 MPa	7.1 ksi	49 MPa	6.3 ksi	43 MPa
Tensile Modulus, 90°	0.82 Msi	5.7 GPa	0.74 Msi	5.1 GPa	0.74 Msi	5.1 GPa
Compressive Strength, 0°	125 ksi	861 MPa	126 ksi	869 MPa	112 ksi	772 MPa
Compressive Modulus, 0°	42.5 Msi	293.0 GPa	47.2 Msi	325.4 GPa	44.6 Msi	307.5 GPa
Interlaminar Shear Strength (ksi/MPa)	9.0 ksi	62 MPa	9.1 ksi	63 MPa	10.5 ksi	72.4 MPa

* All properties normalized to 60% fiber volume except Interlaminar Shear Strength.

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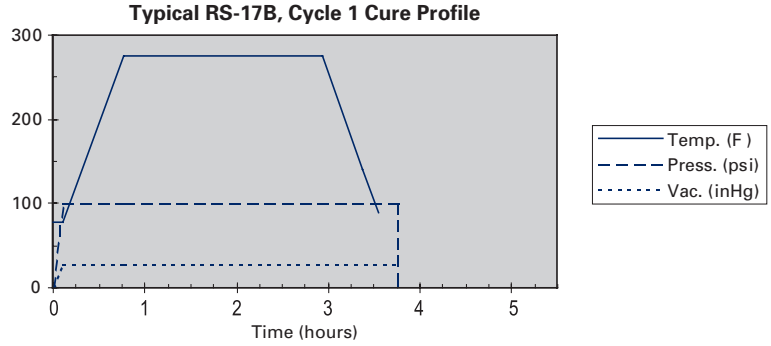
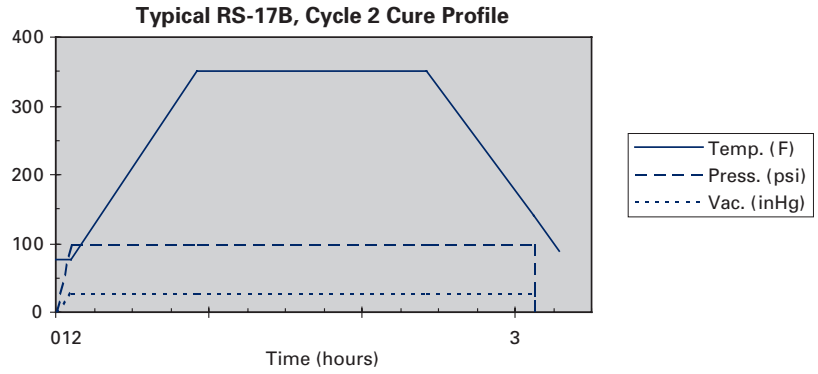
TYPICAL RS-17B CURE PARAMETERS – CYCLE 1

- Heat to 135°C (+6°C/-2°C) [275°F (+10°F/-4°F)] at 3°C ± 2°C/min (5°F ± 3°F/min)
- Hold at 135°C (275°F) (nom.) for 180 -0/+30 minutes. Optional post cure at 163°–177°C (325°–350°F) for 120 +15/-0 minutes for higher T_g
- Cool at 3°C (5°F) per minute (nom.) to below 60°C (140°F). Release vacuum and autoclave pressure



TYPICAL RS-17B CURE PARAMETERS – CYCLE 2

- Heat to 177°C (+6°C/-0°C) [350°F (+10°F/-0°F)] at 3°C ± 2°C/min (5°F ± 3°F/min)
- Hold at 177°C (350°F) for 120 +15/-0 minutes
- Cool at 3°C (5°F) per minute to below 60°C (140°F). Release vacuum and autoclave pressure



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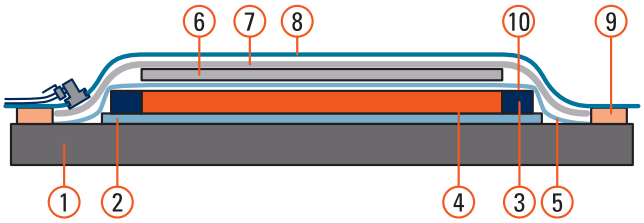
TYPICAL COMPOSITE LAMINATE STACKING SEQUENCE

List of Materials

1. Tool–aluminum, steel, Invar, composite (tool plates must be release coated or film covered and composite tools must be thoroughly dried).
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/yd^2 polyester breather, 1 or more
8. Vacuum bag
9. Vacuum sealant
10. Glass yarn string–must extend to contact breather (alternatively breather may wrap over top of dam to contact laminate edge)

Figure 1



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