PRODUCT DATA SHEET

TENCATE ADVANCED COMPOSITES

RS-36 Resin System

PRODUCT TYPE

350°F (177°F) Cure Epoxy Resin System

TYPICAL APPLICATIONS

- Satellite Structure
- Dimensionally stable structure

CURE SCHEDULE

90 minutes at 350°F (177°C), 3-5°F per minute ramp rate. Cool at 5°F minute until below 140°F (60°C)

Autoclave or Vacuum bag processable

*See alternate cure schedule on page 5.

SHELF LIFE

Tack Life

14 days at 77°F (25°C)

Out Life

30 days at 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-36 is an advanced modified epoxy system for structural composite applications. RS-36 offers an excellent balance of mechanical properties, low moisture absorption, high glass transition temperatures and a range of processing options. A higher Tg version, RS-36-1 with similar mechanical properties is available.

PRODUCT FEATURES/BENEFITS

- Excellent balance of Tg, toughness, modulus and mechanical properties
- Low moisture absorption and low outgassing
- Vacuum bag and autoclave processible
- Qualified for satellite and high modulus fiber applications

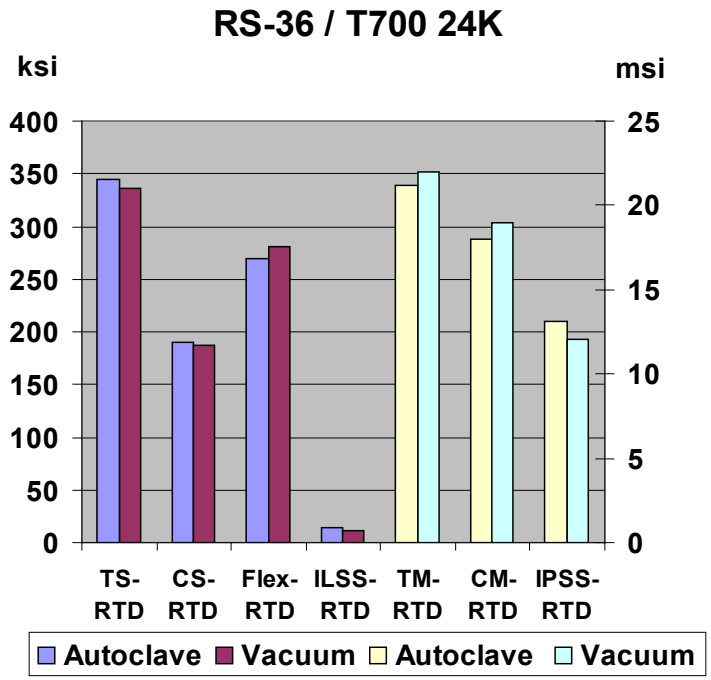
TYPICAL NEAT RESIN PROPERTIES

Density	1.24 g/cc
Dry Tg by RDA (RS-36)	358°F (181°C)
Dry Tg by RDA (RS-36-1)	374°F (190°C)[1]
Gel Time	15-25 minutes at 350°F (177°C) per ASTM D 3532
Moisture Absorption after 30 days at 180°F/82°C	3.0%
Outgassing (ASTM E 595) TML	0.4 %
CVCM	0.01%
WVR	0.17 %
TML-WVR	0.12 %

(1) Cure used for RS-36-1: 2-5°C (3-9°F) ramp to 123°C (275°F). Hold for 20 minutes under vacuum pressure. Apply 80-100 psi autoclave pressure, and hold for 120 minutes at 123°C (275°F). Then ramp to 190°C (375°F) and hold for120 minutes.

TENCATE ADVANCED COMPOSITES

RS-36 Resin System



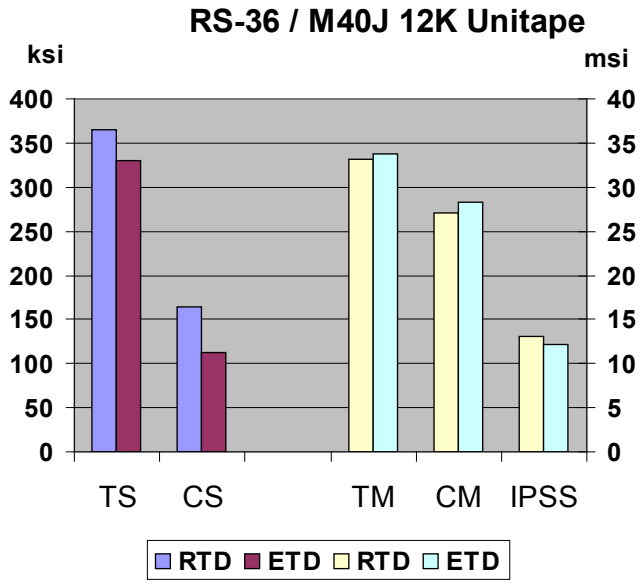
LAMINATE TYPE: TORAY T700 24K FIBER, UNIDIRECTIONAL LAMINATE

Property	Condition	Test Method	Autoclave	Vacuum
Tensile Strength (0°)	RTD	ASTM D 3039	345 ksi (2,380 MPa)	336 ksi (2,320 MPa)
Tensile Modulus (0°)	RTD	ASTM D 3039	21.2 Msi (146 GPa)	22.0 Msi (152 GPa)
Compressive Strength (0°)	RTD	ASTM D 3410	190 ksi (1,310 MPa)	187 ksi (1,290 MPa)
Compressive Modulus (0°)	RTD	ASTM D 3410	18.0 Msi (124 GPa)	19 Msi (131 GPa)
Flexural Strength	RTD	ASTM D 790	270 ksi (1,860 MPa)	281 ksi (1,940 MPa)
Flexural Modulus	RTD	ASTM D 790	18 Msi (124 GPa)	16 Msi (110 GPa)
In Plane Shear Strength	RTD	ASTM D 3518	18.0 ksi (124 MPa)	16.0 ksi (110 MPa)
In Plane Shear Modulus	RTD	ASTM D 3518	0.64 Msi (4.4 GPa)	0.69 Msi (4.8 GPa)
Interlaminar Shear Strength (SBS)	RTD	ASTM D 2344	14.5 ksi (100 MPa)	11.0 ksi (75 MPa)
Interlaminar Shear Strength (SBS)	ETW [1]	ASTM D 2344	10.6 ksi (73 MPa)	N/A

Data normalized to 60% fiber volume with exception of In-Plane Shear and ILSS.
[1] Condition 180°F/90°C, 98% RH, 14 days (Avg wt gain 0.64%)

TENCATE ADVANCED COMPOSITES

RS-36 Resin System



M40J (12K) / RS-36 UDPP LAMINATE (140 GSM) 0/90 DEGREE UNIDIRECTIONAL AMBIENT & 250°F MECHANICAL PROPERTIES

Property	Condition	Test Method	Value
Tensile Strength 0°	RTD	ASTM D 3039	365 ksi (2,517 MPa)
Tensile Modulus 0°	RTD	ASTM D 3039	33.1 Msi (228 GPa)
Tensile Strength 90°	RTD	ASTM D 3039	7.2 ksi (50 MPa)
Tensile Modulus 90°	RTD	ASTM D 3039	1.05 Msi (7 GPa)
Tensile Strength, 0°	ETD	ASTM D 3039	330 ksi (2,275 GPa)
Tensile Modulus, 0°	ETD	ASTM D 3039	33.8 Msi (233 GPa)
Tensile Strength, 90°	ETD	ASTM D 3039	6.0 ksi (42 GPa)
Tensile Modulus, 90°	ETD	ASTM D 3039	1.0 ksi (6.6 GPa)
Compression Strength, 0°	RTD	SACMA SRM 1	165 ksi (1,138 MPa)
Compression Modulus, 0°	RTD	SACMA SRM 1	27.0 Msi (186 GPa)
Compression Strength, 0°	ETD	SACMA SRM 1	113 ksi (779 MPa)
Compression Modulus, 0°	ETD	SACMA SRM 1	28.3 Msi (195 GPa)
In-Plane Shear Strength, 0°	RTD	ASTM D 3518	13.1 ksi (90 MPa)
In-Plane Shear Modulus, 0°	RTD	ASTM D 3518	0.7 Msi (4.8 GPa)
In-Plane Shear Strength, 0°	ETD	ASTM D 3518	12.1 ksi (83 MPa)
In-Plane Shear Modulus, 0°	ETD	ASTM D 3518	0.6 Msi (4.1 GPa)
ILSS, 0°	RTD	ASTM D 2344	13.4 ksi (92 MPa)
ILSS, 0°	ETD	ASTM D 2344	9.2 ksi (63 MPa)
Outgassing (ASTM E 595) • TML • CVCM • WVR		ASTM E 595	0.17 0.01 0.10

0° tensile and compression properties normalized to 60% fiber volume.
ETD is done at 250°F/121°C.

RS-36 Resin System

MATERIAL: M55JB 6K UNIDIRECTIONAL TAPE

Property	Condition	Method	RS-36 Results		RS-36-1 Results	
Tensile Strength 0°	RTD	ASTM D 3039	296 ksi	2041 MPa	293 ksi	2021 MPa
Tensile Modulus 0°	RTD	ASTM D 3039	45.4 Msi	313 GPa	45.0 Msi	310 GPa
Compression Strength 0°	RTD	ASTM D 695 Mod.	144 ksi	993 MPa	140 ksi	966 MPa
Compression Modulus 0°	RTD	ASTM D 695 Mod.	42.7 Msi	294 GPa	43 Msi	297 GPa
Interlaminar Shear Strength 0°	RTD	ASTM D 2344	10.9 ksi	75 MPa	9.9 ksi	68 MPa

Data normalized to 60% Fiber Volume except for ILSS.
Nominal CPT 0.004 inches

MATERIAL: T300 1K PW FABRIC PREPREG

Property	Condition	Method	RS-36 Results		RS-36-1 Results	
Tensile Strength 0°	RTD	ASTM D 3039	112 ksi	772 MPa	106 ksi	731 MPa
Tensile Modulus 0°	RTD	ASTM D 3039	9.8 Msi	68 GPa	9.9 Msi	68 GPa
Compression Strength 0°	RTD	ASTM D 695 Mod.	127 ksi	876 MPa	96 ksi	662 MPa
Compression Modulus 0°	RTD	ASTM D 695 Mod.	9.8 Msi	68 GPa	9 Msi	62 GPa
Interlaminar Shear Strength 0°	RTD	ASTM D 2344	12.7 ksi	88 MPa	11.8 ksi	81 MPa

Data normalized to 60% Fiber Volume except for ILSS.
Nominal CPT 0.005 inches

MATERIAL: T300 3K PW FABRIC PREPREG

Property	Condition	Method	RS-36 Results		RS-36-1 Results	
Tensile Strength 0°	RTD	ASTM D 3039	134 ksi	924 MPa	113 ksi	779 MPa
Tensile Modulus 0°	RTD	ASTM D 3039	10.1 Msi	70 GPa	10.2 Msi	70 GPa
Compression Strength 0°	RTD	ASTM D 695 Mod.	107 ksi	738 MPa	143 ksi	986 MPa
Compression Modulus 0°	RTD	ASTM D 695 Mod.	8.9 Msi	61 GPa	9.8 Msi	68 GPa
Interlaminar Shear Strength 0°	RTD	ASTM D 2344	11.4 ksi	79 MPa	13.2 ksi	91 MPa

Data normalized to 60% Fiber Volume except for ILSS.
Nominal CPT 0.008 inches for RS-36 & 0.005 inches for RS-36-1 (Spread 3K)

RS-36 Resin System

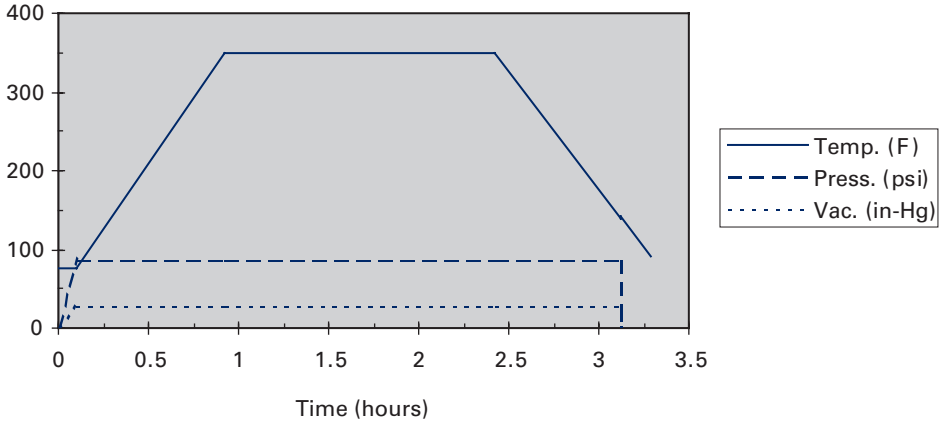
PROCESSING RS-36 CURE CYCLES

Recommended processing for RS-36 is described below. Special moisture control procedures and bleed bagging materials required for cyanate ester resin systems are not necessary for RS-36.

TYPICAL RS-36 CURE PARAMETERS

- Apply vacuum and leak check. For autoclave or press cycles apply pressure of 45-85 psi.
- Heat to 350°F (177°C) (+10°F/5°C) at 5°F/2°C per minute ± 3°F/1.5°C per minute.
- Hold at 350°F (177°C) for 90 minutes (+15 min/-0 min).
- For autoclave cures at 40-85 psig, vent to atmosphere at 20 psig or maintain dynamic vacuum, depending on structural application.
- Cool at 5°F/min to below 140°F (60°C). Release vacuum and autoclave pressure.

Typical RS-36 Cure Profile



*ALTERNATE CURE SCHEDULE FOR HIGHER TG.

Apply full vacuum and do not vent (optional) throughout the cure

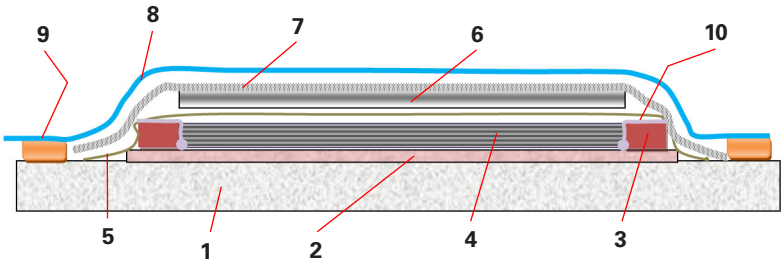
- Autoclave ramp rate target 3°F / (~1.5°C) minute throughout cure (1-5°F/min OK)
- Ramp autoclave from ambient to 230+/-10°F (110°C)
- Hold at 230+/-10°F for 30-35 minutes
- Ramp to 285+/-10°F (140°C)
- Hold at 285+/-10°F for 60-65 minutes
- Ramp to 365+/-5°F (185°C)
- Hold at 365+/-5°F for 120-130 minutes
- Cool at 1-5°F/min to <150°F (66°C) release pressure and remove

RS-36 Resin System

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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