

TR1111 TCR RESIN SYSTEM



Technical Data Sheet

TR1111 is a solvent-free, controlled flow, epoxy based prepreg resin. TR1111 is a toughened version of TCR's UF3369 resin. This prepreg resin system has excellent mechanical properties, long room temperature shelf life, and is suitable for use in a variety of applications.

Available Prepreg Product Formats

- Tow (roving)
- Woven form/fabric

Typical Applications

- High pressure COPV tanks
- Rocket motor cases
- Sporting goods

Shelf Life

- 6 months at 4°C (40°F)
- 3 months at 24°C (75°F)
- 1.5 months at 32°C (90°F)

Benefits/ Features

- Tailored flow and tack levels
- Good resin toughness

Cure Conditions

Curing cycle for composite parts <6.35 mm or 0.25 inches

- Ramp ≤ 2.78°C/min to 121°C (250°F)
- Hold for 4 hours at 121°C
- Ramp ≤ 2.78°C/min to ≤ 66°C (150°F)

Thick composite parts (>6.35 mm or 0.25 inches) will require a modified cure cycle. Please contact TCR Composites for more information.

Cured Neat Resin Physical Properties*

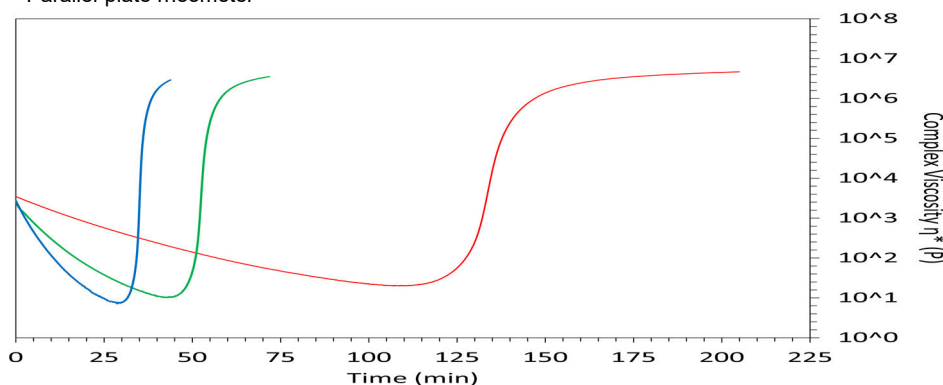
Properties	Metric	English	Test Method
Density	1.17 g/cc	0.0423 lbs/in ³	ASTM D 792
Tensile Strength	76.5 MPa	11.1 kpsi	ASTM D 638
Tensile Modulus	2.30 GPa	333 kpsi	ASTM D 638
Strain (% Elongation)	5.04%		ASTM D 638
Poisson's Ratio	0.33		ASTM D 638
Fracture Toughness – K _{IC}	1.475 MPa*m ^{1/2}	1342 psi*in ^{1/2}	ASTM D 5045
DMA – Dry Glass Transition			
Glass Transition – E" Peak	111°C	232°F	ASTM E 1640
Glass Transition – E' Onset	110°C	230°F	ASTM E 1640
Glass Transition – Tan δ	125°C	258°F	ASTM E 1640
DMA – Wet Glass Transition**			
Glass Transition – E" Peak	66°C	151°F	ASTM E 1640
Glass Transition – E' Onset	63°C	145°F	ASTM E 1640
Glass Transition – Tan δ	78°C	172°F	ASTM E 1640
Water Absorption**	4.6 %		ASTM D 570

*Cure cycle: 4 hours at 121°C

**DMA wet glass transition and water absorption measured after 24-hour water boil

Resin Cure Viscosity

Parallel-plate rheometer



0.56°C (1°F)/min—Min η*: 20.33 P, 98°C (208°F)

1.67°C (3°F)/min—Min η*: 10.23 P, 111°C (232°F)

2.78°C (5°F)/min—Min η*: 7.01 P, 120°C (248°F)

(η*) Time to Viscosity Minimum: {(Min η* Temperature (°C/°F) – (38°C/100°F)} ÷ {(°C/°F)/min}

TCR Composites

219 North 530 West, Ogden, Utah 84404 USA

1-800-827-3746

1-801-622-3800

sales@tcrcomposites.com | www.tcrcomposites.com

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Composite Properties

Reinforcement: Standard modulus 12K tow carbon fiber: T700SC-12K-50C.

Composite properties are normalized to 60% fiber volume and expressed to two significant figures.

Cure cycle: 4 hours at 121°C (250°F) via vacuum bag oven cure, tests conducted at 22°C (72°F)

Properties	Metric	English	Test Method
0° Tensile Strength	2.5 GPa	360 kpsi	ASTM D3039
0° Tensile Modulus	140 GPa	20 Mpsi	ASTM D3039
0° Tensile Percent Strain	1.8 %		ASTM D3039
90° Tensile Strength	41 MPa	6.0 kpsi	ASTM D3039
90° Tensile Modulus	7.6 GPa	1.1 Mpsi	ASTM D3039
0° Compressive Strength	1.0 GPa	150 kpsi	SACMA SRM 1R-94
0° Compression Modulus	130 GPa	19 Mpsi	SACMA SRM 1R-94
90° Compression Strength	150 MPa	22 kpsi	SACMA SRM 1R-94
90° Compression Modulus	8.3 GPa	1.2 Mpsi	SACMA SRM 1R-94
Short Beam Strength	62 MPa	9.0 kpsi	ASTM D2344
Flexural Strength	1.9 GPa	270 kpsi	ASTM D790

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Cure Profiles

Option	Ramp Up	Hold Temperature	Hold Time (hours)	Ramp Down
1	≤2.78°C/min (5°F/min)	121°C (250°F)	4	≤2.78°C/min (5°F/min) to 66°C (150°F) or less
3		110°C (230°F)	6	
4		99°C (210°F)	24	

All values presented within this technical data sheet are expected ranges based on actual test data. Since values are dependent on specimen preparation and test method, TCR Composites cannot guarantee that these properties will be obtained in all cases. Data should be used only as an indication, since part or component properties are highly dependent on user process and design. It is recommended that end users determine the suitability of this material for each application through their own testing and evaluation.