

TR1110 TCR RESIN SYSTEM



Technical Data Sheet

TR1110 is a halogen free, flame-retardant thermosetting epoxy matrix resin system that meets UL94-V1 at 3 mm thickness. This prepreg system has excellent mechanical properties and long room temperature shelf life.

Available Prepreg Product Formats

- Tow (roving)
- Woven form/fabric

Shelf Life

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

Benefits/ Features

- Long shelf life
- Tailored flow and tack levels
- Meets UL-94 V-1 at 3 mm thickness

Cure Conditions

Curing cycle for composite parts <6.35 mm or 0.25 inches in thickness

- Ramp ≤ 2.78°C/min to 177°C (350°F)
- Hold 1 hour at 177°C
- Ramp ≤ 2.78°C/min ≤ 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*

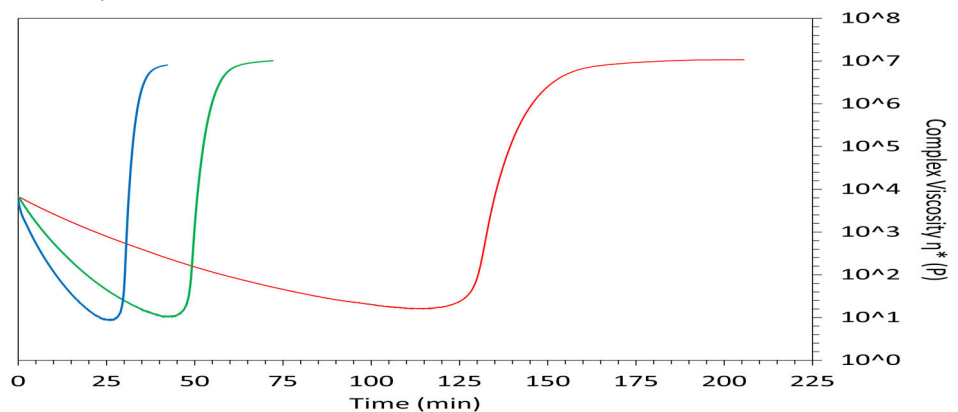
| Properties | Metric | English | Test Method |
|--------------------------------------|-----------------------------|-----------------------------|-------------|
| Density | 1.39 g/cc | 0.0502 lbs/in ³ | ASTM D 792 |
| Tensile Strength | 53 MPa | 7.7 kpsi | ASTM D 638 |
| Tensile Modulus | 4.20 GPa | 610 kpsi | ASTM D 638 |
| Strain (% Elongation) | 1.39% | | ASTM D 638 |
| Fracture Toughness – K _{IC} | 0.6190 MPa*m ^{1/2} | 562.6 psi*in ^{1/2} | ASTM D 5045 |
| DMA – Dry Glass Transition | | | |
| Glass Transition – E" Peak | 160°C | 320°F | ASTM E 1640 |
| Glass Transition – E' Onset | 155°C | 311°F | ASTM E 1640 |
| Glass Transition – Tan δ Peak | 175°C | 348°F | ASTM E 1640 |
| DMA – Wet Glass Transition** | | | |
| Glass Transition – E" Peak | 118°C | 244°F | ASTM E 1640 |
| Glass Transition – E' Onset | 112°C | 234°F | ASTM E 1640 |
| Glass Transition – Tan δ Peak | 124°C | 255°F | ASTM E 1640 |
| Water Absorption** | 3.3% | | ASTM D 570 |

*Cure cycle: 1 hour at 177°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^* : 15.72 P, 101°C (214°F)

1.67°C (3°F)/min—Min η^* : 10.15 P, 107°C (225°F)

2.78°C (5°F)/min—Min η^* : 8.17 P, 116°C (241°F)

(η^*) Time to Viscosity Minimum: $\{(\text{Min } \eta^* \text{ Temperature } (^{\circ}\text{C}/^{\circ}\text{F}) - (38^{\circ}\text{C}/100^{\circ}\text{F})) \div \{(^{\circ}\text{C}/^{\circ}\text{F})/\text{min}\}$

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Cure Profiles

| Option | Ramp Up | Hold Temperature | Hold Time (hours) | Ramp Down |
|--------|-----------------------|------------------|-------------------|--|
| 1 | ≤2.78°C/min (5°F/min) | 177°C (350°F) | 1 | ≤2.78°C/min (5°F/min) to 66°C (150°F) or less |
| 2 | | 166°C (330°F) | 2 | |
| 3 | | 154°C (310°F) | 4 | |

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.