



# TR1110 TCR™ Flame-Retardant Resin

February 2014, Revision 2

TCR Composites offers a **flame-retardant** thermosetting epoxy matrix resin system, featuring a **6-month shelf life without refrigeration**. This resin is currently used for tow/roving and fabric, and is available for carbon, glass, aramid, and other fibers. Resin content, resin flow during cure, and tack levels can be tailored to suit your process requirements.

## Neat Resin Properties and Applications

| Density (g/cc) | Tg (°F/°C) (from E'' DMA curve) | Tensile Modulus (ksi/GPa) | Tensile Strength (ksi/MPa) | Elongation at Break (%) | Tg after 24-Hr Water-Boil (°F/°C) | Water Absorption (%) | Available Fiber Form |
|----------------|---------------------------------|---------------------------|----------------------------|-------------------------|-----------------------------------|----------------------|----------------------|
| 1.36           | 297 / 147                       | 664 / 4.6                 | 9.4 / 62.0                 | 1.4                     | 235 / 113                         | 2.2                  | Tow/Roving, Fabric   |

## Typical Use

Applications where **bromine-free** and **antimony-free**, fire-retardant capabilities are required.

## Cure

There are three recommended cure cycles for TR1110 resin. All three will produce similar properties.

1.  $\leq 5^\circ\text{F-per-minute}$  ramp up to  $350^\circ\text{F}$  ( $177^\circ\text{C}$ ), hold for 1 hour,  $< 5^\circ\text{F-per-minute}$  ramp down to at least  $150^\circ\text{F}$  ( $66^\circ\text{C}$ ) before removing from oven.
2.  $\leq 5^\circ\text{F-per-minute}$  ramp up to  $330^\circ\text{F}$  ( $166^\circ\text{C}$ ), hold for 2 hours,  $< 5^\circ\text{F-per-minute}$  ramp down to at least  $150^\circ\text{F}$  ( $66^\circ\text{C}$ ) before removing from oven.
3.  $\leq 5^\circ\text{F-per-minute}$  ramp up to  $310^\circ\text{F}$  ( $154^\circ\text{C}$ ), hold for 4 hours,  $< 5^\circ\text{F-per-minute}$  ramp down to at least  $150^\circ\text{F}$  ( $66^\circ\text{C}$ ) before removing from oven.

## Storage Requirements

The prepregged materials manufactured from this resin shall remain sealed and stored in the original package. The material is to be stored indoors, out of the weather.

The shelf life is 6 months from the date of manufacture when the maximum storage temperature shall not exceed  $75^\circ\text{F}$  ( $24^\circ\text{C}$ ).

The shelf life is 3 months from the date of manufacture when the maximum storage temperature shall not exceed  $90^\circ\text{F}$  ( $32^\circ\text{C}$ ).

The values here represent expected ranges based on actual test data. Since the values are specimen-preparation- and test-method-dependent, TCR Composites cannot guarantee that these properties will be obtained in all cases. The data should be used as an indication only, since part or component properties are highly equipment- and process-dependent. It is recommended that end users determine the suitability of this material for each application through their own testing and evaluation. TCR™ is a trademark of TCR Composites, Inc.

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