# Toray 8020

Toray Advanced Composites

PRODUCT DATA SHEET

## DESCRIPTION

Toray 8020 is a new generation of toughened epoxy resin systems offering a balance of mechanical properties and excellent surface finish. The resin system has been developed to offer a long out life and flexible cure schedules and can be applied to a wide range of high performance fibers. Toray 8020 is compatible for co-cure with Toray's resin film, Toray 8020, and Toray's syntactic core, Toray MicroPly™ SC8020A.

## FEATURES

- **Flexible low to medium cure schedules 70°C (158°F) to 130°C (266°F)**
- **Suitable for autoclave, vacuum only processing and press molding**
- **Excellent handling and processing characteristics out level; easily laminated onto mold surfaces**
- **Free-standing post cure capability—$T_g$ steps ahead of cure temperature**
- **$T_g$ (DMTA – peak tan δ) 143°C (290°F) after 30 minutes at 120°C (248°F)**
- **30 days shelf life at ambient temperature**

## PRODUCT TYPE

| |
|---|
| 70°C (158°F) to 130°C (266°F) Cure |
| Structural Epoxy Component Prepreg |

## TYPICAL APPLICATIONS

- Suitable for structural applications in automotive, marine and industrial market sectors

## SHELF LIFE

| | |
|---|---|
| **Out Life:** | 30 days at 20°C (68°F) |
| **Storage Life:** | 12 months at -18°C (0°F) |

Out life is the maximum time allowed at room temperature before cure.

**To avoid moisture condensation:**
Following removal from cold storage, allow the prepreg to reach room temperature before opening the polythene bag. Typically, the thaw time for a full roll of material will be 4 to 6 hours.

## TYPICAL NEAT RESIN PROPERTIES

| | |
|---|---|
| Density | 1.2 g/cm$^3$ (75.5 lbs/ft$^3$) at 23°C (73.4°F) |
| $T_g$ (DMTA) after 30 mins at 120°C (248°F) | Onset: 121°C (250°F); Peak tan δ: 143°C (290°F) |

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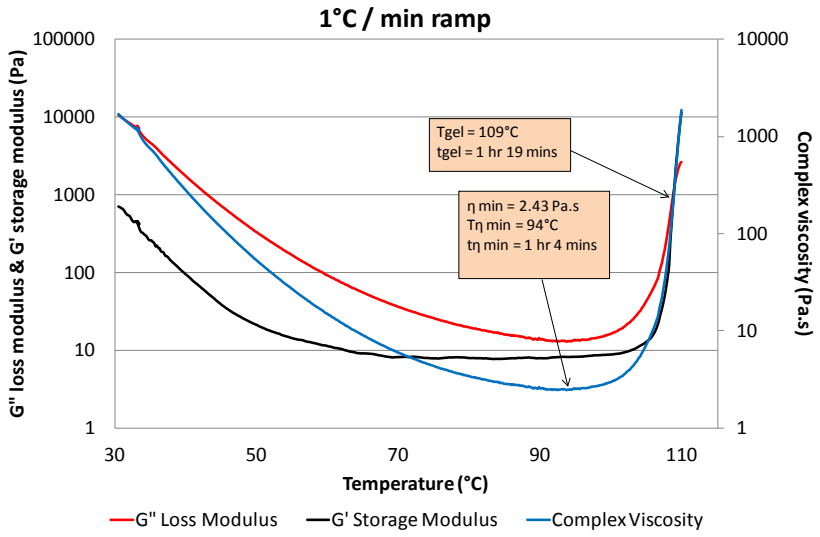
## TYPICAL LAMINATE PROPERTIES

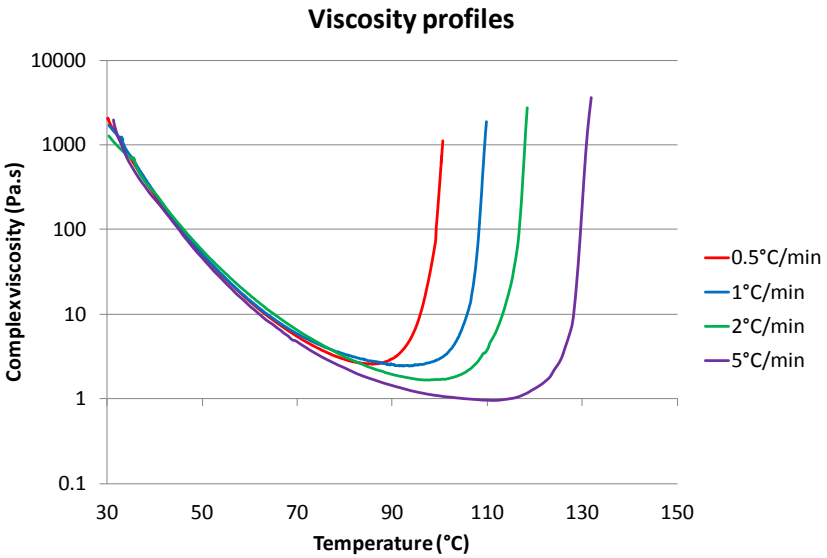
| HS0838 – Carbon 205 gsm 2x2 Twill TR30S T 3k - 0/90° Configuration Woven Laminates | | | | |
|---|---|---|---|---|
| **Property** | **Condition** | **Method** | **Results** | |
| Tensile Strength 0° | RTD | ISO 527-4 | 935 MPa | 136 ksi |
| Tensile Modulus 0° | RTD | ISO 527-4 | 68.6 GPa | 9.9 Msi |
| Tensile Strength 90° | RTD | ISO 527-4 | 876 MPa | 127 ksi |
| Tensile Modulus 90° | RTD | ISO 527-4 | 67.4 GPa | 9.8 Msi |
| Poisson's Ratio | RTD | | 0.04 | |
| Compression Strength 0° | RTD | EN 2580 | 674 MPa | 98 ksi |
| Compression Modulus 0° | RTD | EN 2580 | 62.5 GPa | 9.1 Msi |
| Compression Strength 90° | RTD | EN 2580 | 636 MPa | 92 ksi |
| Compression Modulus 90° | RTD | EN 2580 | 60.3 GPa | 8.7 Msi |
| In-Plane Shear Strength | RTD | ISO 14129 | 80 MPa | 12 ksi |
| In-Plane Shear Modulus | RTD | ISO 14129 | 3.9 GPa | 0.6 Msi |
| Interlaminar Shear Strength 0° | RTD | ISO 14130 | 63 MPa | 9 ksi |
| Interlaminar Shear Strength 90° | RTD | ISO 14130 | 62 MPa | 9 ksi |

Cured 5½ hours at 80°C (176°F)
Actual 48.3% Vf
*Results normalized to 55% Vf

## RHEOLOGY



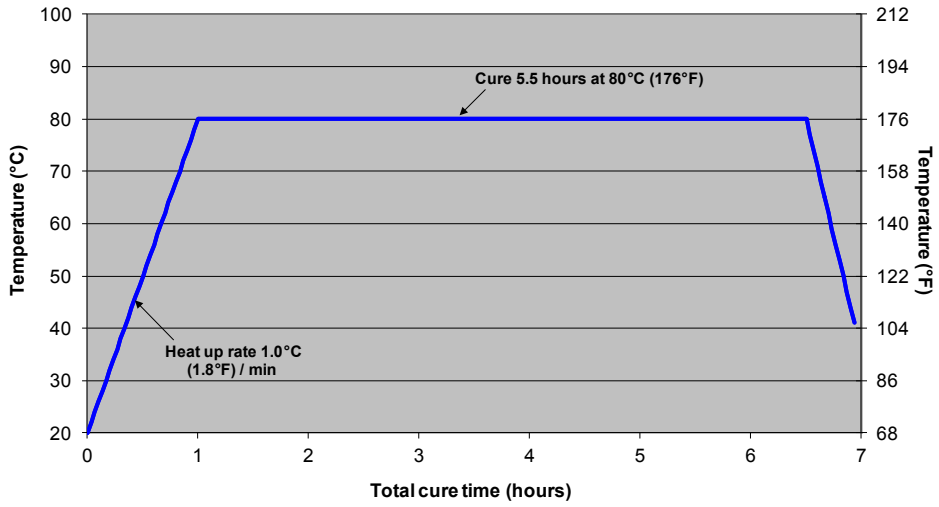
## VISCOSITY




## CURE PROPERTIES: VISCOSITY PROFILE (30°C TO 135°C OR 86°F TO 275°F)

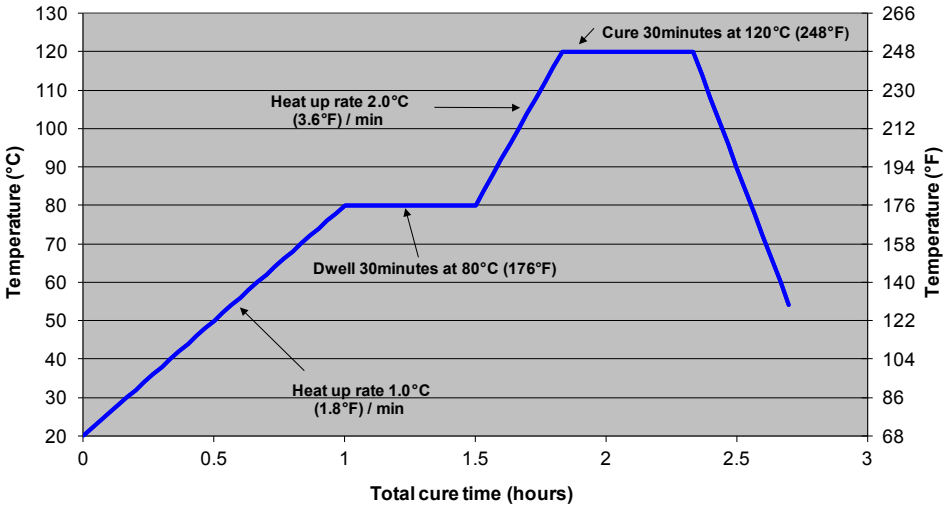
| Ramp rate [°C(°F)/min] | Minimum Viscosity (Pa.s) | Temperature at Minimum Viscosity |
|---|---|---|
| 0.5 (1.0) | 2.53 | 86°C (187°F) |
| 1.0 (1.8) | 2.43 | 94°C (201°F) |
| 2.0 (3.6) | 1.68 | 98°C (208°F) |
| 5.0 (9.0) | 0.95 | 111°C (232°F) |

## INITIAL MINIMUM 80°C CURE SCHEDULE




**80°C (176°F) Cure Temperature** Total Time: 6.5 hours

## INITIAL MINIMUM 120°C CURE SCHEDULE




**120°C (248°F) Cure Temperature** Total Time: 2.5 hours

## POST CURE

- In applications demanding maximum temperature or environmental resistance, it is essential to develop the glass transition temperature to the maximum level by a suitable post cure
- Ramp from initial cure temperature to 120°C (248°F) at 20°C (36°F)/hour and hold for 30 minutes minimum, this post cure will result in a $T_g$ (Peak tan δ) of approximately 143°C (289°F)
- Laminates may be post cured unsupported unless the size, shape and laminate thickness would allow excessive distortion under self-weight

## EXOTHERM

In certain circumstances, such as the production of thick section laminates, rapid heat-up rates or highly insulating masters, Toray 8020 prepreg can undergo exothermic heating leading to rapid temperature rise and component degradation in extreme cases. The risk of exotherm increases with lay-up thickness and increasing cure temperature.

It is strongly recommended that trials, representative of all the relevant circumstances, are carried out by the user to allow a safe cure cycle to be specified.

## HANDLING SAFETY

Observe established precautions for handling epoxy resins and fibrous materials—wear gloves. For further information, refer to Safety Data Sheet.

## PROCESSING

Cut patterns to size and lay-up the laminate in line with design instructions taking care not to distort the prepreg. If necessary, the tack of the prepreg may be increased by gentle warming with hot air. The lay-up should be vacuum debulked at regular intervals using a P3 (pin pricked) release film on the prepreg surface; vacuum of 980 mbar (29 in Hg) is applied for 20 minutes.

For autoclave cures, use of a non perforated release film on the prepreg surface trimmed to within 25–30 mm of the prepreg edge is recommended for the cure cycle and a vacuum bag should be installed using standard techniques.

Note: It has been shown to be beneficial to place dry glass tows at approx 0.5m intervals around the edge of the laminate, to provide air paths under the release film into the breather.





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