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3M™ Matrix Resin 3831

Technical Data Sheet

Product Description

3M™ Matrix Resin 3831 is a high performance epoxy matrix resin for use in fabricating carbon fiber composites using a prepreg manufacturing process.

Composite Properties

- Increased modulus
- Increased compression strength
- Increased hardness
- Increased fracture toughness
- Reduced shrinkage
- Reduced CTE

Benefits for Composite Parts

- Reduced resin and fiber
- Increased load carrying capability
- Improved fatigue life
- Reduced micro-cracking
- Increased abrasion resistance

Design Flexibility

- Lighter weight composites for structures optimized for increased compression strength
- Composite parts with increased fatigue resistance and optimized stiffness and fracture toughness properties

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Typical Cured Neat Resin Properties (Not for specification purposes.)

Property	Test Method	3M™ Matrix Resin 3831	Typical Epoxy*
Density (g/cc)	ASTM D792	1.48	1.25
Linear Shrinkage (%) (Cured 2 hours at 90°C, 2 hours at 150°C)	ASTM D2566	0.58	1.00
Mechanical Properties			
Fracture Toughness K_{IC} (MPa • √m)	ASTM D5045 (Compact tension geometry)	0.98	0.67
Tensile Modulus (ksi) Strain to failure (%) Strength (ksi)	ASTM D638	 893 1.57 11.1	 529 2.81 11.2
3-point Flexure Modulus (ksi) Strain to failure (%) Strength (ksi)	ASTM D790	 849 2.4 18.1	 510 4.1 17.7
Barcol Hardness (H_B)	ASTM D2583	67	45
Thermal Properties			
Coefficient of Thermal Expansion (µm/m • °C) (2nd heat, 25-75°C)	ASTM E831	44.6	59.5
Thermal Conductivity (W/m • °K) Bulk Thermal Conductivity - 5°C/min ramp	ASTM D5470	1.0	0.6
Exotherm During Cure ΔH @ 10°C/min (J/g) Peak Temperature (°C)	ASTM D3418	267.2 151	448.4 145
Glass Transition Temperature (°C) (Tan Delta Peak)	ASTM D150 (DMA dual cantilever beam)	180	178
Electrical Properties			
Dielectric Constant @ ambient temperature 1 MHz 1 Hz	ASTM D150	 4.16 4.55	 4.17 4.86
Dissipation Factor 1 MHz 1 Hz	ASTM D150	 0.022 0.007	 0.029 0.007

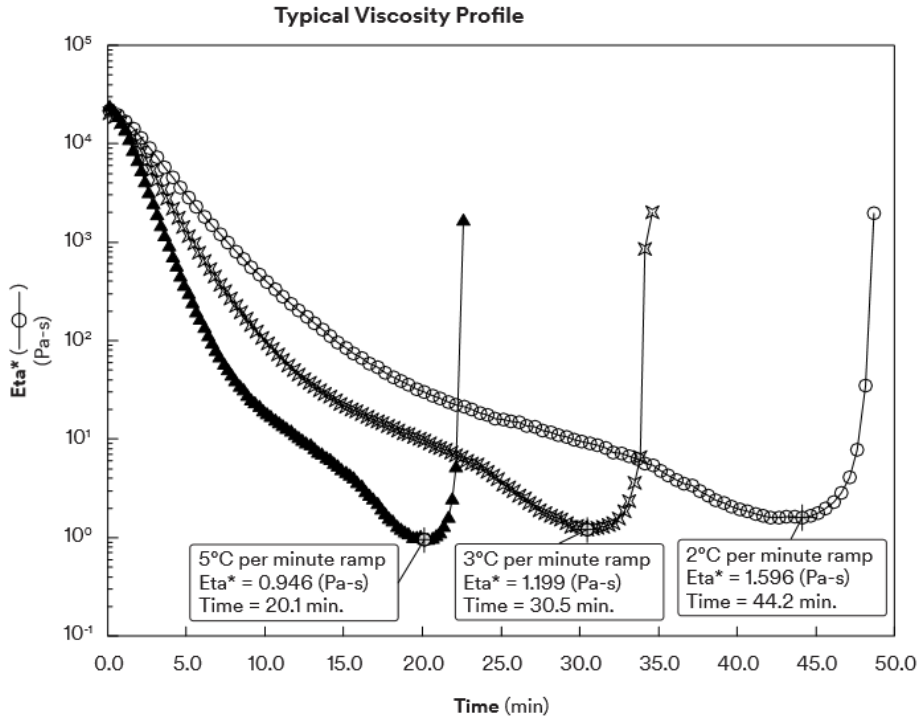
*A DICY cured epoxy formulation typical for use in carbon fiber pre-pregs was used for the control sample.

Typical Laminate Properties (Not for specification purposes.)

Property	Test Method	3M™ Matrix Resin 3831		
		T700 Carbon Fiber	T800 Carbon Fiber	TR50S Carbon Fiber
0° Compression Strength Strength (ksi)	SACMA SRM1R-94	280	278	277
0° 3-point Flexure Modulus (Mpsi) Strain to failure (%) Strength (ksi)	ASTM D790	 18.4 1.3 247	 20.9 1.1 244	 19.0 1.3 244
In-plane Shear Modulus (Mpsi)	ASTM D3518	1.05	0.95	0.83
90° Tensile Modulus (Mpsi) Strain to failure (%) Strength (ksi) Poisson's ratio	ASTM D3039	 1.68 0.47 .8 0.02	 1.56 0.55 8.5 0.02	 1.61 0.51 8.1 0.02
Interlaminar Shear Strength (ksi)	ASTM D2344	14.4	16.5	17.1

Note: Representative laminate properties made from unidirectional tape prepreg made with 3M™ Matrix Resin 3831.

Typical Viscosity Profile



Handling/Cure Information

The use of dicyandiamide (DICY) curatives with 3M™ Matrix Resin 3831 is recommended for pre-preg formulations. For such systems, typical cure temperatures are in the range of 121°C to 149°C depending on the service requirements. Specific recommendations for the production of pre-preg with 3M Matrix Resin 3831 are available by contacting 3M Customer Service at 3M Customer Service at 1-800-235-2376.

Shipping and Storage

Shelf life is six months under proper storage conditions. The product should be stored indoors at 70-80°F (21-27°C) or lower. Higher temperatures shorten normal shelf life. The product should not be placed near any heating equipment. Refrigeration or freezer storage can extend shelf life. The product should be used as soon as possible after the package is opened and any unused product should be properly sealed with original or similar package.

Precautionary Information

Refer to Product Label and Safety Data Sheet (SDS) for health and safety information before using this product. For additional health and safety information, please visit https://www.3m.com/3M/en_US/company-us/SDS-search/ or call 1-800-364-3577 or (651) 737-6501

**These products were manufacture under a 3M Quality Management System registered to the AS9100 standard*

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