

VITRIMAX

Versatile Hot Melt Resin

VHM

PROVISIONAL TECHNICAL DATA SHEET

Description

Mallinda's vitrimer resins enable circularly recyclable composite structures, and the option of post-cure processing provides unprecedented manufacturing flexibility. Like traditional thermoset prepreg resins, **VITRIMAX** resins come in 2 parts which can be mixed and applied using standard prepreg practices. Once cured, these materials produce highly crosslinked network polymers for structural stability. However, unlike traditional thermoset prepreg, **VITRIMAX** resins enable post-cure processing to change shape. After impregnation, the prepreg can be partially or fully cured for extended shelf life at room temperature and reduced in-mold time during production. **VITRIMAX** relies on T_g -dependent covalent chemical bond welding at the surface of laminates that creates a fully crosslinked thermoset and resultant stability. Akin to thermoplastic prepreg, **VITRIMAX** enables fast and reliable heat welding, via compression molding, of prepreg laminates, while the covalent bonds yield the strength of the thermoset network. Unlike thermoplastic prepreg, **VITRIMAX** does not require long melting and cooling periods for part production, simply heat to the defined T_g range to activate bonding. The resin system is fully recyclable at any stage of the life cycle. For more information on scrap recycling, please contact info@mallinda.com.

Applications and Use

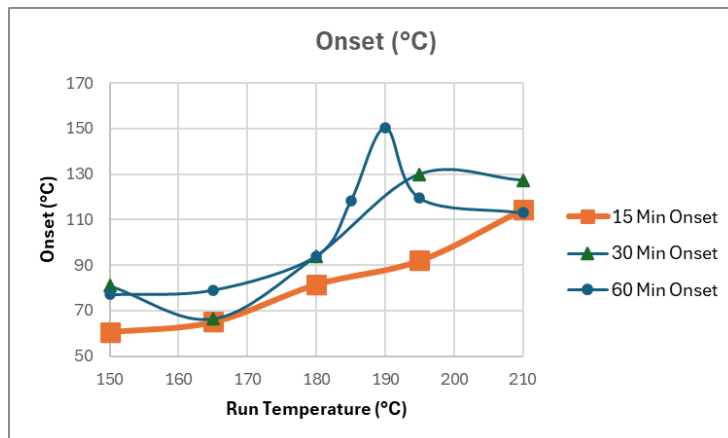
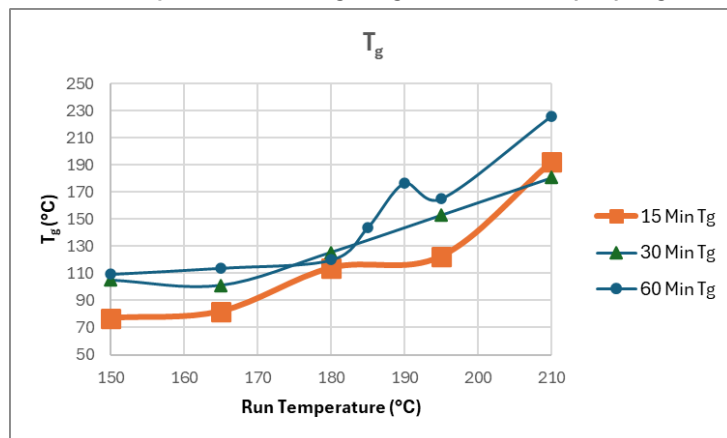
VITRIMAX VHM can be cured to a range of useful T_g 's and as such, is appropriate for use in various applications including automotive, sporting goods, and marine applications. For sporting applications, the material can be cured to a T_g of 80–100 °C, enabling facile moldability for customized fit applications while retaining excellent mechanical properties having the added benefit of full end of life recyclability. For automotive and marine applications, the material can be cured to a T_g of 130–180 °C for optimal mechanical properties.

Benefits and Features

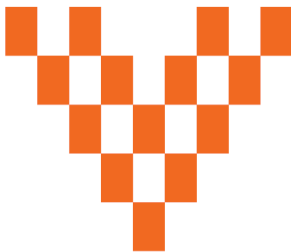
- Reshapability above T_g (end user customizable)
- Pre-cured prepreg exhibits indefinite ambient shelf-life
- Rapid and high throughput, out-of-autoclave, compression molding
- Complete end-of-life recyclability of resin and fiber

Cure and Handling

Cure study of oven curing single sheet of CF prepreg (T_g by DMA Peak Tan Delta):



Panel curing example: out of autoclave cure of 10 ply panel: vacuum bag, in oven, 135 °C 40 min, 180 °C 2h. After cure press: 30psi 190 °C, 30 minutes, cool to 60 °C remaining at 30psi. *result:* T_g 128 °C, Onset 105 °C.

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Resin Physical Properties			
Physical Properties	Value	Unit	Test
Color	yellow to red	-	-
Mix Ratio	1.5:1	imine:epoxy	-
Initial Viscosity at 60 °C	6,300	cP	ASTM D2196
Pot life at 60 °C	150	minutes	-
Cured Resin Density	1.15	g/cm³	ASTM D792-20
Moisture Uptake	<1	Weight %	ASTM D570
Cured Resin T _g	80-180	°C	ASTM 7028
Cured Carbon Fiber prepreg Properties			
Physical Properties	Value	Unit	Test
Fiber	HTS40	-	-
Weave	Unidirectional	-	-
Fiber Aerial Weight	130	g/m²	-
Nominal Cured Ply Thickness	0.1	mm	-
Nominal Resin content by weight	40	%	-
Fiber Density	1.77	g/cm³	-
Glass Transition Temperature	128	°C	ASTM D7028
90° Tensile Strength	64	MPa	ASTM D3039
90° Tensile Modulus	5.8	GPa	
Flexural Strength	1027	MPa	ASTM D7264
Flexural Modulus	80.7	GPa	
ILSS	76	MPa	ASTM D2344
Storage and handling RESIN Shelf Life: Mallinda's VITRIMAX VHM resin has a shelf life of 1 year if left unopened. The resin should be stored in dry storage temperature of 5-60 °C. <i>B-Staged</i> PREPREG Shelf Life: @ -18 °C: 6-12 months shelf life. @ RT: 5-10 days shelf life (with RT tack). <i>Pre-cured</i> PREPREG (not tacky) Shelf life: unlimited when stored below 60 °C Disposal of any unused materials should be in accordance with state and federal regulations. VITRIMAX VHM offers full end of life recyclability for reuse of all materials.			
Precautions for use Typical preventative measures should be taken when handling vitrimer resins and fibrous materials. Airborne fibers as a result of sawing, grinding, etc. can present health hazards. It is advised that the user, prior to interaction with the materials, observes the guidelines set forth in the Material Safety Data Sheet available upon request for this product. Users of the product are advised to wear clean, disposable nitrile gloves which provide protection as well as reduce the possibility of contamination of the material.			
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