TENCATE ADVANCED COMPOSITES

BT250E-6 Resin System

PRODUCT TYPE

250°F - 260°F (121°C - 127°C)
Cure Epoxy Resin System

TYPICAL APPLICATIONS

- Secondary Aircraft Structures
- Rotorcraft & Blades
- Propellers
- Radomes with Spectra®, Glass, Quartz & Kevlar®

SERVICE TEMPERATURE

180°F (82°C) (Continuous)

200°F (93°C) (Continuous)

SHELF LIFE

Tack Life

30 days tack life at 77°F (25°C)

Out Life

30 days out life 77°F (25°C)

Frozen Storage Life

12 months storage life at <32°F (0°C)

Tack life is the time during which the prepreg retains enough tack, drape and handling for easy component lay-up.

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

PRODUCT DESCRIPTION

The BT250E-6 resin system is a 250°F (121°C) cure epoxy with excellent strength and stiffness. It provides an outstanding surface finish with vacuum bag/oven cure only. TenCate's BT250E-6 has an FAA conformed database on carbon Im-7 unitape, 7781Fg, S-2 glass and AS-4C plain weave.

BT250E-6 PRODUCT BENEFITS/FEATURES

- Excellent System for Out of Autoclave Cure & Low Pressure cure
- Good for high fatigue cycle applications
- Ideal for Low to Medium Service Temperature Applications
- Comparable to other supplier 250°F/121°C cure resin systems
- FAA conformed database on several fibers and fabrics including Fg, S-2 and carbon fiber

TYPICAL NEAT RESIN PROPERTIES

Density ..... 1.20 g/cc
Tg ..... 268°F (131°C)
Dielectric Constant ..... 3.06 at 10 GHz
Loss Tangent ..... 0.011 at 10 GHz
Coefficient of Thermal Expansion (CTE) ..... 59.6 ppm/°C

LAMINATE DATA FOR 7781 "E" FIBERGLASS REINFORCEMENT, 300 gsm FAW.

Properties*	Condition	Method	Cured at 260°F (127°C)	
Tensile Strength 0°	RTD	ASTM D3039	69.9 ksi	481.9 MPa
Tensile Modulus 0°	RTD	ASTM D3039	3.7 Msi	25.2 GPa
Tensile Poisson Ratio	RTD	ASTM D3039	0.15	-
Tensile Strength 0°	CTD	ASTM D3039	80.5 ksi	555.0 MPa
Tensile Modulus 0°	CTD	ASTM D3039	3.9 Msi	26.8 GPa
Tensile Strength 90°	RTD	ASTM D3039	58.4 ksi	402.7 MPa
Tensile Modulus 90°	RTD	ASTM D3039	3.5 Msi	23.9 GPa
Tensile Strength 90°	CTD	ASTM D3039	65.6 ksi	452.3 MPa
Tensile Modulus 90°	CTD	ASTM D3039	3.6 Msi	25.0 GPa
Compressive Strength 90°	RTD	ASTM D6641	70.1 ksi	483.3 MPa
Compressive Modulus 90°	RTD	ASTM D6641	3.6 Msi	24.5 GPa
Compressive Strength 90°	CTD	ASTM D6641	83.0 ksi	572.3 MPa
Compressive Modulus 90°	CTD	ASTM D6641	3.8 Msi	26.0 GPa
Compressive Strength 90°	ETD	ASTM D6641	58.1 ksi	400.6 MPa
Compressive Modulus 90°	ETD	ASTM D6641	3.4 Msi	23.5 GPa
Tg by DMA	-	ASTM D7028	278.6 °F	137 °C
Interlaminar Shear Strength	RTD	ASTM D2344	10.3 ksi	71.0 MPa

** All properties raw test data. CTD= -65°F, ETD=180°F, ETW= Test @ 180°F after 160°F 85% RH saturation. Additional 3rd party testing pending.*

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LAMINATE DATA FOR 3K PW AS4C GRAPHITE FABRIC REINFORCEMENT, 195 gsm FAW.

Properties*	Condition	Method	Cured at 260°F (127°C)	
Tensile Strength 0°	RTD	ASTM D3039	129.8 ksi	894.9 MPa
Tensile Modulus 0°	RTD	ASTM D3039	9.4 Msi	64.8 GPa
Tensile Strength 90°	RTD	ASTM D3039	125.0 ksi	861.9 MPa
Tensile Modulus 90°	RTD	ASTM D3039	8.6 Msi	59.1 GPa
Tensile Strength 90°	CTD	ASTM D3039	120.0 ksi	827.4 MPa
Tensile Modulus 90°	CTD	ASTM D3039	8.6 Msi	59.4 GPa
Compressive Strength 90°	RTD	ASTM D6641	85.2 ksi	587.4 MPa
Compressive Modulus 90°	RTD	ASTM D6641	7.9 Msi	54.3 GPa
Compressive Strength 90°	CTD	ASTM D6641	93.2 ksi	642.6 MPa
Compressive Modulus 90°	CTD	ASTM D6641	8.1 Msi	55.9 GPa
Interlaminar Shear Strength	RTD	ASTM D2344	11.9 ksi	82.0 MPa
Tg by DMA	-	ASTM D7028	286.5 °F	141.4 °C

** All properties raw test data. CTD= -65°F, ETD=180°F, ETW= Test @ 180°F after 160°F 85% RH saturation. Additional 3rd party testing pending.*

LAMINATE DATA FOR 12K IM7 GRAPHITE UNITAPE REINFORCEMENT, 148 gsm FAW.

Properties*	Condition	Method	Cured at 260°F (127°C)	
Tensile Strength 0°	RTD	ASTM D3039	356 ksi	2454.5 MPa
Tensile Modulus 0°	RTD	ASTM D3039	22.6 Msi	155.8 GPa
Tensile Poissons Ratio	RTD	ASTM D3039	0.31	-
Tensile Strength 0°	CTD	ASTM D 3039	359 ksi	2475.2 MPa
Tensile Modulus 0°	CTD	ASTM D3039	22.6 Msi	155.8 GPa
Tensile Poissons Ratio	CTD	ASTM D3039	0.32	-
Tensile Strength 0°	ETW	ASTM D3039	330 ksi	2275.3 MPa
Tensile Modulus 0°	ETW	ASTM D3039	23.1 Msi	159.3 GPa
Tensile Poissons Ratio	ETW	ASTM D3039	0.33	-
Interlaminar Shear Strength	RTD	ASTM D2344	11.9 ksi	82.0 MPa
Tg by DMA	-	ASTM D7028	273.6 °F	134.2 °C

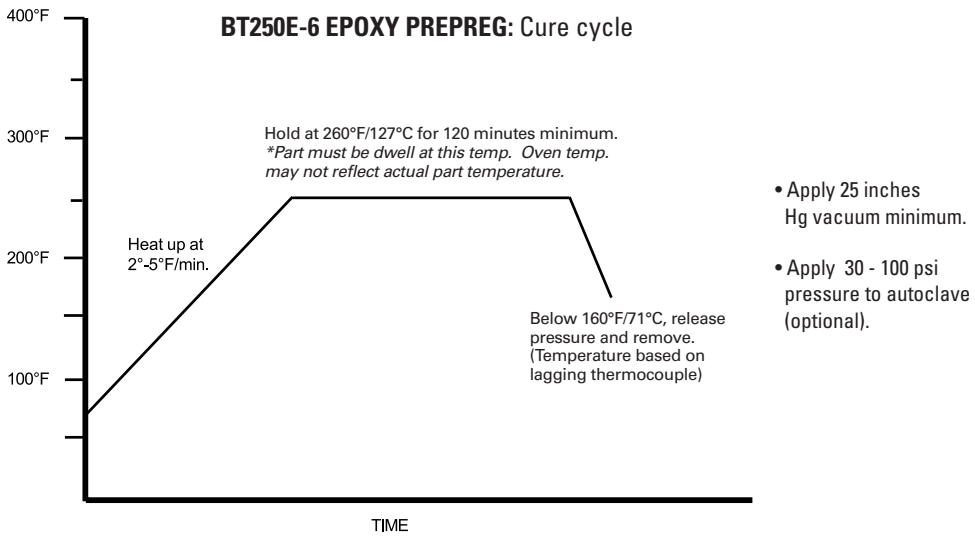
**All properties raw test data. CTD= -65°F, ETD=180°F, ETW= Test @ 180°F after 160°F 85% RH saturation. Additional 3rd party testing pending.*

LAMINATE DATA FOR S2 FIBERGLASS UNITAPE REINFORCEMENT, 284 gsm FAW.

Properties*	Condition	Method	Cured at 260°F (127°C)	
Tensile Strength 0°	RTD	ASTM D3039	235 ksi	1622.3 MPa
Tensile Modulus 0°	RTD	ASTM D3039	6.7 Msi	46.1 GPa
Tensile Strength 0°	CTD	ASTM D3039	230 ksi	1585.8 MPa
Tensile Modulus 0°	CTD	ASTM D3039	6.5 Msi	44.5 GPa
Tensile Strength 0°	ETW	ASTM D3039	113 ksi	779.1 MPa
Tensile Modulus 0°	ETW	ASTM D3039	6.3 Msi	43.6 GPa
Tensile Strength 90°	RTD	ASTM D3039	3.3 ksi	22.8 MPa
Tensile Modulus 90°	RTD	ASTM D3039	0.9 Msi	6.0 GPa
Interlaminar Shear Strength	RTD	ASTM D2344	7.4 ksi	50.7 MPa
Tg by DMA	-	ASTM D7028	282.9 °F	139.4 °C

** All properties raw test data. CTD= -65°F, ETD=180°F, ETW= Test @ 180°F after 160°F 85% RH saturation. Additional 3rd party testing pending.*

BT250E-6 Resin System



EPOXY PREPREG, ADHESIVE AND RESIN GUIDELINES AND HANDLING PROCEDURES

The following guidelines are provided to our customer to assure that all customers are aware of the procedures to attain the best possible results from TenCate Advanced Composites (TCAC) epoxy products. These resin systems will provide sound composite hardware and structures if some simple procedures are followed.

Keep in mind that these procedures are good practice for all composite prepreg and adhesive materials and should be used whenever possible.

FREEZER STORAGE

Epoxy resin materials have good shelf life at room temperature, however the life and performance of the material is best preserved with the following basic guidelines. Refer to the shelf life included in the product certificates. The epoxy material should be sealed in an airtight bag and kept frozen below 10°F when not being used for longest life and most consistent performance. A good safety measure is to have a bag of desiccant (Silica Moisture Absorber) in the core of the prepreg roll just in case a pin-hole in the bag or other problem occurs..

MOISTURE ABSORPTION AND SENSITIVITY

While very resistant to moisture absorption after cure, Epoxies can be adversely affected by moisture uptake prior to cure. For this reason, all materials must be “Thoroughly Thawed” to room temperature prior to opening the sealed bag to avoid condensation on the material. Also, it is good practice to keep prepreg and in process hardware in a sealed bag or vacuum bag if to be exposed to atmosphere for long periods of time.

HANDLING OF MATERIALS

When handling any prepreg materials, one should always be wearing clean, powder free latex gloves. This will assure that no hand oils are transferred to the prepreg and/or composite during processing. The presence of oils in the part could lead to problems in both mechanical and electrical performance of the part. This also guards against any dermatitis that could occur with certain users.

NON-METALLIC HONEYCOMB AND FOAM CORE USE

When using Non-Metallic honeycomb and foam core materials for sandwich structures, the materials should always be dried in an oven prior to layup to drive off any moisture that may be in the core. The material should then be cooled in the presence of a desiccant, to avoid any moisture uptake. Following this procedure it is always a good idea to use the material as soon as possible to avoid re-hydration.

Recommended Core Dry Time/Temp: 250°F (121°C) for 3-4 Hours

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SELF ADHESIVE PROPERTIES AND FILM ADHESIVE USE

TCAC Epoxy resins have been formulated to have good self-adhesive properties to core materials. However, this should not be taken as a green light to eliminate a film adhesive from a cored, structural piece of hardware. This option has been given by TCAC for customers who are looking for the best electrical properties available by not using a film adhesive. TCAC recommends that the structural integrity be verified your specification prior to end item usage and takes no responsibility otherwise. If this option is exercised, the following modified cure cycle has been found to work well.

1. Ramp the part to 150°F – 160°F (66°C– 71°C) (Keep Pressure <15 Psi)
2. Dwell for approximately 1 hour
3. Ramp the part to the dictated cure temperature for the resin and cure per the provided standard cure cycle.

PROCESSING METHODOLOGY

Epoxy resins can be processed using an Autoclave, Press, Pressclave, or Oven Cure/Vacuum Bag. For any application where the optimum properties are needed, TCAC recommends the use of an autoclave.

LAY-UP AREA ENVIRONMENTAL CONTROLS

TCAC recommends that any composite or adhesive lay-up be performed in a clean area visibly free from dust. Any work surfaces should likewise be free of residue, dust or debris. No eating or smoking shall be allowed in the shop area. For radome materials, conductive materials shall not be allowed in the process area. The processing shop area should be maintained between 60°F to 90°F (16°C to 32°C) with a relative humidity of no greater than 70% RH.

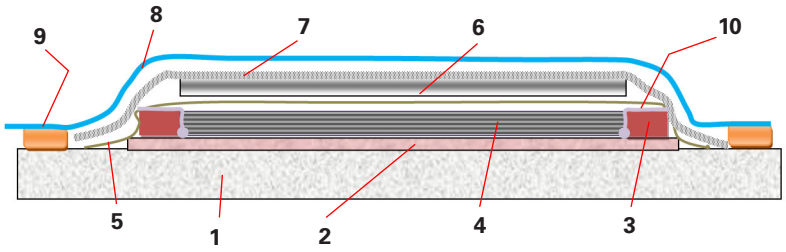
BAGGING FOR CURE

TCAC recommends that CE composite parts bagged for cure should be performed as follows.

1. Release the tool surface
2. Layup part using standard debulking procedures
3. Dam the edges of the part for cure
4. Place one ply of porous Teflon® or perforated Teflon® onto the bag surface of the part
5. Place bleeder layers over porous Teflon® material and trim to the part periphery
6. Place a non-porous layer of Teflon® over the part
7. Utilize a breather cloth to facilitate vacuum draw
8. Install vacuum bag on the tool for cure
9. Follow the provided TCAC cure cycle for the particular resin system

COMPOSITE LAMINATE STACKING SEQUENCE: LIST OF MATERIALS

1. Tool – aluminum, steel, Invar, composite (tool plates must be release coated or film covered)
2. Release coat or film – Frekote 700NC or 770NC, FEP, TEDLAR
3. Silicone Edge Dams – Thicker than laminate
4. Laminate
5. Release coat or film – Frekote 700NC or 770NC, FEP, TEDLAR
6. Caul plate – aluminum, steel, Invar, silicone rubber sheet (metal caul plates must be release coated or wrapped)
7. 2.2 osy polyester breather – 1 or more
8. Vacuum bag
9. Vacuum sealant
10. Glass yarn string - (alternatively or additionally breather may wrap over top of dam to contact edge)



Revised 01/2015

All data given is based on representative samples of the materials in question. Since the method and circumstances under which these materials are processed and tested are key to their performance, and TenCate Advanced Composites has no assurance of how its customers will use the material, the corporation cannot guarantee these properties.

TENCATE ADVANCED COMPOSITES

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