ecopoxy®

TDS
TECHNICAL DATA SHEET

BioPoxy® 36

DESCRIPTION

BioPoxy 36 is a two-component epoxy system developed for open mold lamination. The system cures at room temperature and is suitable for manufacturing composite parts and non-critical structures using a wet layup fabrication method.

BioPoxy 36 will wet out and bond to fiberglass, carbon fiber, and natural fiber reinforcements. Used as directed with EcoPoxy's Gelcoat, BioPoxy 36 is part of a complete system for composites fabrication.

EcoPoxy is committed to creating 100% solids epoxy systems made with high bio-based carbon content materials that deliver exceptional results.

KEY FEATURES

- Significant bio-based carbon content
- Designed for wet layup
- Room temperature cure
- Inherent chemical resistance
- Easy mix ratio
- Designed for use with EcoPoxy's GelCoat
- Compatible with fiberglass, carbon fiber, and natural fibers
- Low odor
- High adhesion

PRODUCT TECHNICAL DATA

PHYSICAL PROPERTIES

The table below summarizes physical properties of liquid BioPoxy 36 such as appearance, bio-based carbon content, and specific gravity.

PHYSICAL PROPERTIES (LIQUID)		
Appearance: Part A	Visual observation	Slightly yellow
Appearance: Part B	Visual observation	Amber/orange
System Bio-based Carbon Content	ASTM D6866	32%
Specific Gravity: Part A at 22°C (72°F)	ASTM D1475	1.126
Specific Gravity: Part B at 22°C (72°F)	ASTM D1475	1.050

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WORKING TEMPERATURE

For best results, follow working temperature recommendations. BioPoxy 36 will take longer to cure at lower temperatures and will react faster with greater exotherm under warmer conditions.

WORKING TEMPERATURE	
Ideal Working Temperature	22°C (72°F)
Recommended Working Temperature	20-25°C (68-77°F)

RECOMMENDED LAMINATE THICKNESS

For best results, follow recommendations for laminate thickness. Laminates made with BioPoxy 36 will take longer to cure at lower thicknesses. When used to fabricate thicker laminates BioPoxy 36 will react faster.

LAMINATE THICKNESS	
Recommended Laminate Thickness	3.2mm (1/8”)

MIX RATIO

BioPoxy 36 is formulated to have a 4:1 mix ratio by volume. Deviation from the mix ratio can result in lower mechanical properties or incomplete cure.

MIX RATIO	
Mix Ratio by Volume (A:B)	4:1
Mix Ratio by Mass (A:B)	4.3:1

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VISCOSITY

Viscosity indicates the material's resistance to flow. Viscosity measurements of resin systems vary during the curing process, first decreasing as the mixture heats up, then increasing as the mixture approaches gelation. Reported **Initial Mixed Viscosity** can be dependent on the temperature of the resin components, and the temperature of the environment.

VISCOSITY		
Viscosity: Part A at 22°C (72°F)	ASTM D2196	1,440 cP
Viscosity: Part B at 22°C (72°F)	ASTM D2196	530 cP
Initial Mixed Viscosity at 22°C (72°F)	ASTM D2196	1,030 cP

REACTIVITY

BioPoxy 36 is a thermosetting resin and will generate heat as it cures. **Reactivity Level** is a qualitative indicator of the rate of reaction and temperature of the resin system's cure. **Gel Time** is the point at which the mixed resin gels or becomes so viscous that it can no longer be worked. **Peak Exotherm** is the maximum temperature observed during cure, and **Time to Peak Exotherm** is the length of time between initial mixing and observation of the peak exotherm temperature. The reactivity of the resin system can be affected by factors such as part thickness, the temperature of resin and hardener before mixing, ambient conditions, and the ability of the mold to release heat.

REACTIVITY	
Reactivity Level	Moderate
Gel Time (100 g)	20 min
Peak Exotherm Temperature	188°C (370°F)
Time to Peak Exotherm	23 min

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PROCESSING CHARACTERISTICS

Working Time begins when Part A and Part B are first mixed together and continues until the epoxy begins to thicken. Specified working times are based on application immediately after mixing is complete. Working times can be significantly shorter if the resin is left in the mixing container for too long. Up until the working time limit is reached, the epoxy can be manipulated with a brush or roller.

Tacky to Touch is the period where an additional laminate schedule can be applied without the need to abrade the surface of the previous layer. After lightly touching the surface of the laminate, a glove print remains; resin does not stick to the glove and the surface does not significantly deform.

Set to Touch is the point in time immediately after the tacky to touch period, where the surface of the laminate is tack-free. Using the same method as tacky to touch, no glove print should remain after lightly touching the surface of the laminate. Laminating an additional schedule is not recommended without abrading the surface of the previous layer.

Demolding Time is the point in time at which the laminate has cured sufficiently such that the mold is no longer required to hold the part's shape. Laminates can be demolded when a wedge can be inserted under one corner of the laminate with no observable deformation once the wedge is removed.

Time to Finishing is the point in time at which the laminate has cured and has achieved sufficient hardness that subsequent finishing and handling can occur without resulting in damage.

Full Cure is the point in time when the laminate achieves full mechanical properties.

The table below shows processing characteristics for a 279mm x 279mm x 3.2mm (11" x 11" x 1/8") thick laminate. Processing characteristics will vary depending on factors such as part thickness, part geometry, ambient conditions, and mold materials.

PROCESSING CHARACTERISTICS	
Working Time Limit	30-40 min
Tacky to Touch Period	1.5-3 hours
Set to Touch	3 hours
Demolding Time	4 hours
Time to Finishing	4 hours
Full Cure	7 days

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CURED RESIN PROPERTIES

Density is a measure of the degree of compactness of a substance. It is expressed as a mass per unit of volume.

Tensile Strength, Tensile Modulus and **Elongation at Break** are properties of the cured resin when subjected to a tensile or pulling force. Expressed as a force per unit area, **Tensile Modulus** is the resin's resistance to deformation (or elongation) when pulled. For a given applied force, a higher modulus material will stretch less relative to a lower modulus material. The maximum force per unit area tolerated by the cured resin is **Tensile Strength**, and the **Elongation at Break** is the percent increase in length relative to the original length at the time the test specimen fails.

Flexural Strength and **Flexural Modulus** are properties of the cured resin when subjected to a bending force. **Flexural Modulus** refers to the cured resin's resistance to bending when a force is applied. For a given applied force, a higher modulus material will bend less relative to a lower modulus material. **Flexural Strength** is the maximum force per unit area tolerated by the cured resin.

Compressive Strength is the maximum compressive force per unit area tolerated by the cured resin system.

Notched Impact Strength is the impact energy per unit area required to cleave a notched test specimen. **Notched Impact Resistance** is the impact energy per unit length required to cleave a notched test specimen of a normalized width. Parts made of resins with high impact properties show increased toughness relative to resins with lower impact properties.

Shore D Hardness is a measure of the cured resin's resistance to deformation via indentation. Resins with higher hardness will be more resistant to scratches.

Glass Transition Temperature is the temperature at which the cured resin changes from a rigid, glassy material to a soft, non-melted material. Above the glass transition temperature, the resin may permanently deform when force is applied.

Cured resin properties were obtained for a 3.2mm (1/8") thick cast panel, cured under ambient conditions. Tests were performed according to applicable ASTM standards. These are typical values and are provided for reference only.

CURED RESIN PROPERTIES		
Density	Theoretical	1.11 g/cm^3 (0.040 lb/in^3)
Tensile Strength	ASTM D638	57.9 MPa (8.4 ksi)
Tensile Modulus	ASTM D638	2.83 GPa (411 ksi)
Elongation at Break	ASTM D638	2.80%
Flexural Strength	ASTM D790	97.1 MPa (14.1 ksi)
Flexural Modulus	ASTM D790	2.94 GPa (426 ksi)
Compressive Strength	ASTM D695	TBD
Notched Impact Strength	ASTM D256	5.1 kJ/m^2 (2.43 ft-lb/in^2)
Notched Impact Resistance	ASTM D256	51.7 J/m (0.97 ft-lb/in)
Shore D Hardness	ASTM D2240	70
Glass Transition Temperature (Tg) by DSC	ASTM E1356	54°C (129°F)

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STORAGE

Store in a cool, dry, well-ventilated location out of direct sunlight. Protect from freezing and physical damage. Do not store in a location subject to frequent temperature changes as the product may crystallize. Use the product as soon as possible after opening. If storing the remainder of the product for another project, keep the container tightly closed.

STORAGE	
Recommended storage temperature	15-25°C (59-77°F)
Shelf Life	2 years; unopened

SAFETY AND PRECAUTIONS

Consult Safety Data Sheet (SDS) before use. Wear protective gloves, clothing and eye/face protection. Use only in well-ventilated areas. Avoid contact with the skin and eyes. Take off contaminated clothing and wash before reuse. Keep containers tightly sealed when not in use. Avoid breathing vapors and fumes. Wash hands thoroughly after handling. During finishing operations wear proper PPE and avoid dust. When fully cured, BioPoxy 36 is an inert plastic.

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