



# 3687A RESIN 4286B HARDENER

BIO-BASED EPOXY RESIN SYSTEM FOR INJECTION AND INFUSION  
PRELIMINARY TECHNICAL DATA BULLETIN

## SYSTEM BENEFITS:

CPD 3687A Resin with CPD 4286B Hardener is a high bio-based content, clear, low viscosity, general purpose epoxy compound that may be used for many diverse applications such as bonding, casting, laminating, RTM and vacuum infusion CPD 3687A/4286B has a bio-based carbon content of 32%.

- High bio-based content
- RTM and vacuum infusion
- Long gel time
- Low mixed viscosity

## HIGH PERFORMING RESIN FROM RENEWABLE RESOURCES:

You can create composite parts with a better impact on the environment. While it is difficult to get the performance needed from a different process, now you can utilize a more environmentally friendly material to create the same composite part. Whereas traditional epoxy products are derived from crude oil, this product is derived from agricultural byproducts to result in a bio-based product. Performance is the most important objective for any CPD product, so we ensured this formulation meets those high standards. Special care was taken to maintain the chemical backbone of this material to maintain the physical properties of this product.

## HOW WE GET A BIO-BASED EPOXY RESIN

Liquid bisphenol-A epoxy resin is a reaction product of bisphenol-A and epichlorohydrin. Epoxy reactive diluents are also produced by reacting epichlorohydrin with various alcohols. Epichlorohydrin can be produced using bio-based materials or through conventional petroleum-based products. The key to creating a bio-based system that utilizes the same chemistry as non-bio-based systems is producing epichlorohydrin from renewable resources.

### BIO-BASED EPICHLOROHYDRIN PRODUCTION

Bio-based epichlorohydrin production starts from byproducts of biodiesel and oleo chemicals, glycerol, and is manufactured through the transformation of vegetable oil.



### TRADITIONAL EPICHLOROHYDRIN PRODUCTION

Traditional epichlorohydrin production starts from crude oil and results in a petroleum-based epichlorohydrin.



## HOW THIS PRODUCT IMPACTS THE ENVIRONMENT

CPD 3687A/4286B contains 32% bio-based carbon. This different manufacturing process reduces the impact of your production on the environment, while still providing the strength and endurance expected from a composite part. You can continue to manufacture your composite components while protecting non-renewable resources.

### ENVIRONMENTAL PERFORMANCE:

- Utilizes 100% Renewable Carbon Epichlorohydrin
- Less Energy Consumption
- Less water chlorine consumption
- Minimum water effluents

## PRODUCT PROPERTIES

### HANDLING PROPERTIES

	CPD 4286B	Test Method
Resin Density at 25°C, lbs/gal	9.4	ASTM D1475
Hardener Density at 25°C, lbs/gal	8.3	ASTM D1475
Resin Viscosity at 25°C, cP	1,500	ASTM D2196
Hardener Viscosity at 25°C, cP	12	ASTM D2196
Mix Ratio by Weight	100A : 20B	Calculated
Mix Ratio by Volume	100A : 22B	Calculated
Initial Mixed Viscosity 25°C, cP	300	ASTM D2196
Gel Time at 25°C, 150g mass, minutes	75	ASTM D2471
Gel Time at 38°C, 150g mass, minutes	20	ASTM D2471

### PHYSICAL PROPERTIES

	CPD 4286B	Test Method
Color	Clear-Amber	Visual
Izod Impact, Notched, ft-lb/in	1.24	ASTM D256
Tensile Strength, psi	11,600	ASTM D638
Tensile Modulus, psi	490,000	ASTM D638
Tensile Elongation, %	4.6	ASTM D638
HDT, Room Temp Cure, °F	130	ASTM D648
HDT, Post Cure, °F	194	ASTM D648
Compressive Strength, psi	14,600	ASTM D695
Compressive Modulus, psi	512,000	ASTM D695
Flexural Strength, psi	19,000	ASTM D790
Flexural Modulus, psi	421,000	ASTM D790
Hardness, Shore D	83	ASTM D2240
Fracture Toughness, $K_{IC}$ , $MPa \cdot m^{1/2}$	1.01	ASTM D5045
Strain Energy Release Rate, $G_{IC}$ , $KH/m^2$	0.52	ASTM D5045

## SYSTEM POST CURE OPTIONS:

Select one of the following cure schedules depending on the available time, the physical properties of the mold and the desired physical properties of the final part. Post cure the part to obtain maximum physical and thermal properties of the system. The recommended post cure temperature ramp rate between stages is up 5°F per minute for heating and down 1-2°F per minute for cooling. Heating and cooling ramp rates can vary based on size and thickness of the part. For larger thicker parts use a more conservative ramp. If you need to deviate from the recommended post cure schedule, please contact our technical service department.

### CURE INCREMENTS:

CPD 4286B	24 Hours at 77°F (25°C)	7 Days at 77°F (25°C)	24 Hours at 104°F (40°C)	8 Hours at 180°F (82°C)
Room Temperature Cure	Supported	Unsupported		
Post Cure 1	Supported		Unsupported	
Post Cure 2	Supported			Unsupported

### MIXING AND SURFACE PREP:

Always use the recommended mix ratio for the system. Do not deviate in an attempt to speed up or slow down gel time. Mix together thoroughly, scraping sides and bottom of mixing container, until no streaks or striations are visible, then use immediately. Use only clean dry tools for mixing and applying. Do not mix or apply below 60°F. All surfaces must be clean, dry, and free of any surface contamination. Molds and patterns should be treated with release or parting agents.

### STORAGE AND CRYSTALLIZATION:

Store between 60-90°F in a dry place. After use, tightly reseal all containers and store products on a raised surface during cold weather and avoid storing near outside walls or doors. If available, Purge with dry nitrogen to preserve color and minimize moisture contamination. Do not allow to freeze during winter storage. Do not use material with any signs of crystallization such as solid chunks, grainy texture or white color. Crystallization can be reversed by heating the material to 125-140°F, and stirring occasionally, until all crystals dissolve.

### SAFETY HANDLING:

Wear protective gloves, clothing, and eye/face protection. Use only outdoors or in a well-ventilated area. Avoid contact to the skin and eyes. Avoid breathing dust, fumes, gas mist, vapors and spray. Wash hands thoroughly after handling. Take off contaminated clothing and wash before reuse. These products may cause skin and respiratory allergic reactions. Consult product Safety Data Sheets for complete precautions for use of this product.

Endurance Technologies, Inc. has experience only in the compounding of resins and hardeners and not in the actual manufacture of tools or parts. Each piece is different. The user should run tests to assure the suitability of the system for use in a particular application. The test data and results set forth herein are based on laboratory work and do not necessarily indicate the results that the buyer or user will attain.

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