

## **CHOOSING THE RIGHT RESIN – EPOXY RESIN**

Epoxy Resins are thermosetting resins, which cure by internally generated heat. Epoxy systems consist of two parts, resin and hardener. When mixed together, the resin and hardener activate, causing a chemical reaction, which cures (hardens) the material.

Epoxy resins generally have greater bonding and physical strength than do polyester resins. Most epoxies are slower in curing, and more unforgiving in relation to proportions of resins and hardener than polyesters. Superior adhesion is important in critical applications and when “glassing” or gluing surfaces – such as steel, redwood, cedar, oak and teak – as well as other non-porous surfaces.

Evercoat Epoxy resins are superior to polyester resins in that they impart exceptional strength in stress areas. Epoxies will adhere to surfaces where polyesters may ruin them. Examples of areas where epoxy resins products must be used are redwood, hardwoods, styrofoam, some plastic surfaces, and metal. They are generally higher in cost than polyester resins. Epoxy resins may be mixed with various fillers to thicken them for special applications.

**In working with epoxies, the resin to hardener ratio is very important and should never be adjusted in an attempt to slow down or speed up the curing process.**

### ***EPOXY RESIN IS IDEAL:***

- Where superior adhesion is necessary; Evercoat epoxies will bond permanently to wood, fiberglass, metal, concrete, glass, and many plastics
- As a tough coating for protection on window sills, concrete floors, stair treads, shower stalls, and down spouts.
- To protect metal from rusting.
- To repair gutters, drain pipes (metal or plastic), pools, roofs, boats, decks, and auto bodies.
- To repair blister problems on fiberglass surfaces, i.e. blistering on fiberglass boat hulls.
- To repair aluminum boats and equipment.

## **TYPES OF EVERCOAT EPOXY RESIN:**

**EVERFIX RESIN (100642, 100643)** – A 1:1 mixing ratio epoxy resin. Performs superior as a finish-coating on the repair projects. This resin is thicker than EVERSTAR resin. One application of EVERFIX is equal to 50 coats or varnish. Can be used as an adhesive, excellent in decoupage systems, in fiberglass boat repair, wood repair and many general repairs. Everfix resins are not listed under the code of Federal Regulations (21 CFR), and, therefore, cannot be used for food contact applications.

**WHEN AND WHERE TO USE****EVERCOAT'S EPOXY REPAIR MATERIALS**

Updated 11/00 TD

<b>PRODUCT</b>	<b>USE FOR</b>	<b>USE ON WHAT SURFACES</b>
Everfix Epoxy Resin	Coating, laminating and repairing where superior adhesion is required.	Wood, fiberglass, metal and most plastics.
Epoxy Repair Kit	Patching holes, filling dents, cracks on surfaces where polyester cannot be used.	Wood, fiberglass, metal and most plastics.

**POLYESTER RESIN VERSUS EPOXY RESIN**

<b>Characteristics</b>	<b>Polyester Resin</b>	<b>Epoxy Resin</b>
Flexural Strength	Good	Best
Tensile Strength	Good	Best
Elongation %	Good	Lowest
Water Absorption	Good	Lowest/Excellent
Hardness	Good	Best
Pot Life	4 – 7 Minutes	14 – 20 Minutes
Working Time	20 – 30 Minutes	½ - 6 Hours
Above Waterline	Yes	Yes
Below Waterline	Yes	Yes
Major Construction	Yes	Yes
General Repairs	Yes	Yes
Shelf Life	18 –24 Months	2 Year +
Catalyst	MEKP	2-Part System
Cure Time	6 – 8 Hours	5 –7 Days

## **EPOXY RESIN REPAIR PROCESS**

### **Preparing The Surface**

Wash the area with soap and water. Completely remove all paint, varnish or other surface coating down to the bare material. Scrape, sand or use a “water-rinse” paint remover. Other removers contain wax and oils, which are absorbed by wood and prevent a good bond. Remove oils with a non-residual solvent or detergent. Do not use gasoline, or any other petroleum-based products. Fill small cracks and holes with Epoxy Repair Kit #108075, or epoxy filler.

### **Mixing The Material**

- Carefully measure both Part A and Part B of the epoxy resin in the separate measuring containers. Combine both parts in a third container, making sure to scrape all sides thoroughly. The proper mixing ratio is critical to ensure complete and uniform cure. ). Please note that proportions of epoxies are “parts by volume” not by “weight”. Epoxy hardeners do not disperse and mix easily into the resin side. When mixing epoxies, the two-cup method should be used. Measure and stir vigorously. Be sure to stir into the corners of the container, scraping the sides, bringing it up from the bottom to be mixed. Never mix more than a quart at a time as it starts setting up in about ½ hour and should not be used after it starts to gel.
- Take care to mix in all directions, and scrape sides, and bottom of container. Note: Improperly mixed product will cause curing problems.
- If air is whipped into mixture it, it must be removed before curing. To remove large air bubbles at the surface simply prick them with any sharp object, such as a toothpick, or paper clip. Smaller clusters of air bubbles can be removed by passing a blow dryer or heat gun 6” to 10” above the surface from side-to-side in a sweeping motion. Taking care not to blow ripples into the epoxy.

**A test patch is recommended prior to glassing below 60°F. The temperature of the surface being coated is as critical as the surrounding air temperature.**

### **Application**

Application should only be made on a perfectly dry surface. Pre-cut the cloth to fit the surface to be patched. When using Epoxy Resin on wood, first apply a thin coat of resin over the surface. Then while resin is still in liquid stage, apply Sea-Glass Cloth. Make sure to work out all air bubbles and wrinkles as you go with a short nap disposable roller, squeegee, or resin roller.

Epoxies are generally more viscous (thicker) than polyester and tend to “wet-out” (penetrate) fiberglass reinforcements more slowly.

### **After the Resin Has Cured (Hardened)**

Epoxyes are not air-inhibited and therefore the surface cures without a surfacing agent (wax). Sand cured surface to remove all imperfections and excess cloth. A second coat may be applied for extra protection.

**Note:** Amine Blush: may form over the cured surface. This is a by-product of a fast cure and will appear at the surface as a slippery film. If present it must be removed prior to adding additional layers of epoxy or top coating. If an amine “blush” appears, this should be removed with water before sanding and recoating.

To prevent deterioration from the weather and the sun, paint the finished product. You can also add Evercoat Coloring Agent into the resin directly to tint it and increase resin’s UV resistance. Use pigment sparingly to prevent inhibition of cure. Do not exceed one ounce of pigment per quart of resin.

### **Clean Up**

Clean-up all tools and brushes with Evercoat Acetone or lacquer thinner as soon as you are through to prevent resin from hardening on them. Once the resin has hardened, it becomes insoluble.

## **TROUBLESHOOTING: EPOXY RESINS**

### **Common problems with epoxy resins:**

**PROBLEM #1:**      **Resin is still liquid and is dripping off project piece after the proper cure time has elapsed.**

**CAUSE:**              Check to see if proper components were mixed together (i.e. Part 1 and Part 2). If two resin components are mixed together the curing cycle will never occur. Thus, the same result would happen if two Part 2 hardener components were mixed together.

**CURE:**                Scrape off all liquid or wet product. Wipe off as much remaining residue with acetone or denatured alcohol on a clean rag or cloth. Do not leave any fibers from cloth or rags on the surface of the project. Allow adequate time for surface to dry from solvent (1 to 2 hours). Surface may still be slightly tacky. Proceed with new properly measured and thoroughly mixed batch of product.

**PROBLEM #2:**      **Resin is very sticky and gooey, like taffy in most areas of project:**

**CAUSE:**              Most likely a mixing error. Either the improper mixing ratio of resin to hardener was used, or the resin and hardener mixture was not thoroughly mixed. Epoxy resins are very unforgiving if the mixing ratio is not properly followed.

**CURE:**                This situation is the most difficult to remedy, so be prepared to work. You must remove the uncured product. This can be done manually by scraping uncured resin from the surface. Sanding equipment may be helpful, but is unlikely as the gooey surface will gum up the sandpaper and equipment. Chemical strippers

and solvents will offer little or no help as well. At this point whatever tool works best is the one to use. After as much product as possible has been removed, wipe project with acetone or denatured alcohol as outlined in Problem #1 above. Review proper mixing procedures and re-apply to project.

**PROBLEM #3: Project is hard in most places, but has soft spots throughout. Spots are not gooey, but appear to be somewhat tacky and soft.**

**CAUSE:** Improper mixing. Epoxy systems are designed to react in specific proportions to one another. Extreme care must be taken when measuring and mixing epoxy systems. You may have the correct ratio, but each component was not thoroughly mixed together or you may have them thoroughly mixed together, but your ratio may have been incorrect. Either situation will create Problem #3.

**CURE:** Wipe entire surface with acetone or alcohol lightly. Sand or scuff surface with fine sandpaper or scuff pad. Repeat solvent wipe. Review proper mixing procedures. Re-apply thoroughly measured and mixed product to project.

**PROBLEM: What if there are air bubbles in the cured repaired area?**

**CAUSE:** You did not squeegee them out or poked them with a sharp object before the resin cured.

**CURES:** Sand bubbles out and apply another coat of resin.

**COVERAGE, CURE TIMES, APPLICATION SUGGESTIONS.**

<b>Product (Product Number)</b>	<b>Coverage per gallon @ 10 mils</b>	<b>Working Time / Apply Second Coat</b>	<b>Fully cured</b>	<b>Important Notes</b>
<b>EVERFIX (#100642, 100643)</b>	25 sq. inches per ounce at 70 mils (thicknes s of a dime)	Working time: 15 min. Second coat in 30- 45 minutes	After 24 hours	<ul style="list-style-type: none"><li>• Do not use on high-heat surfaces such as ashtrays, cookware, ovens and fireplaces.</li><li>• If resin crystallizes in the can, remove lid and put can in hot water. Do not let water get in the can.</li><li>• Do not use ordinary paint remover to remove resin from surface. Use a water rinse paint remover.</li><li>• Protect from direct sunlight w/paint varnish or wax.</li></ul>