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PRODUCT BULLETIN 3

RESINS POLYESTER • EPOXY

Use It To…

• Build • Strengthen • Repair • Convert • Beautify • Waterproof • Protect • Adhere

Use It On…

• Cars • Boats • Industrial Surfaces • Athletic Equipment • Decorative Surfaces • Ponds • Tanks • Tools • Surfboards • Sailboards • Structures • Appliances

Use It For…

• New Projects • Saving Repairs • Things You Can't Do Any Other Way

You Can Fiberglass-It-Yourself!

Why Fiberglass?

The term fiberglass means, for our purposes, to combine man-made fibers and liquid resins to form tough, durable parts. The fibers can be made from glass, carbon, or aramid, which are woven in various forms to allow you to select the right fiber for your project.

Polyesters and epoxies offer a variety of physical properties to select from as well. The key to success is selecting the right combination of resin and fiber.

RESIN SELECTION

Polyester Resins

The majority of fiberglass projects are done with polyester. There are two reasons for this. One is that polyester is considerably more economical than epoxy. Second, and more importantly, polyester resin cure time can be controlled to match temperature conditions and user speed. By adjusting the amount of catalyst, the user can accurately control the resin working time and rate of cure.

Another advantage of polyester is that it does not fully cure at the surface, which allows successive layers to be added over time without having to sand between layers. If your project is going to extend over a day or so, polyester will eliminate surface preparation between layers. For a final surface cure , TAP Surface Curing Agent can be added to any of the polyester resins.

TAP carries four polyester resins. The proper resin for your project will depend on the final properties important to you. Below are brief descriptions. See our website, tapplastics.com or visit one of our stores for more technical information.

TAP Bond Coat Polyester Resin is a quality economical resin with a relatively long pot life (the length of time before the resin hardens in the cup). It is a good general-purpose resin that cures to a tacky finish for maximum adhesion between layers. It is a low viscosity, thixotropic resin, with a catalyst indicator dye. The blue resin turns neutral with the addition of catalyst.

TAP High Strength Isophthalic Resin is a low viscosity, thixotropic (ideal for vertical surfaces) resin that offers high strength, and excellent corrosion and chemical resistance. The low viscosity provides for maximum penetration into porous surfaces. It is the only resin available that is FDA approvable for food applications.

TAP Marine Vinyl Ester Resin is the top of the line polyester with outstanding chemical, corrosion, water, and heat resistance. Besides being a low viscosity thixotropic resin, it offers many of the superior properties found in epoxy resins.

TAP Waterclear Surfboard Resin is a low viscosity, fast curing resin, with UV inhibitors which protect its clear appearance over time in a marine environment. Ideal for any fiberglass application where maximum transparency is important. Surfboard resin also has good impact resistance and resists cracking or crazing when flexed, which is ideal for surfboards.

TAP Surface Curing Agent

Add Surface Curing Agent to resin and MEKP to improve sanding properties in polyester resin. Add to TAP Bond Coat, Surfboard, or Isophthalic resins, and Vinyl Ester to achieve a full surface cure. Without surface curing agent (sometimes called "wax") polyester resins will not fully surface cure even though the surface may not seem tacky.

Epoxy Resins

Epoxy resins have better mechanical strength, better adhesion, and generally better water resistance than most polyester resins. For repair work epoxy is recommended because of its ability to adhere to almost anything. Epoxy has virtually no odor or flammability.

Unlike polyester, the ratio between resin and hardener must be carefully measured and not varied from in order to produce good results. Therefore, working time is dependent on the resin, not the mixing ratio as in polyester. Because of its adhesive properties, it is always recommended when bonding or glassing redwood, oak, teak, and mahogany. Epoxy fully surface cures without wax (unlike polyester), so sanding must be done if more than 24 hours transpires between layers.

TAP carries five resin/hardener combinations.

TAP General Purpose One-to-One Epoxy is a medium viscosity system with good adhesion and mechanical properties for general repair. The one-to-one mix ratio makes it ideal for around the house repairs, or where multiple batches need to be mixed with minimum time spent on measuring. Use where high strength and flexibility are needed.

TAP Super Hard Epoxy is a medium viscosity system with excellent chemical and water resistance. It is relatively fast curing with a four-to-one mix ratio, and superior surface hardness.

TAP Premium Marine Epoxy consists of Resin 314 and your choice of three hardeners: Fast 102, Medium 109, and Slow 143. This two-component system contains 100% solids, no solvents, or VOC's. It has excellent wet out capabilities and high strength, provides a superior moisture barrier, and has easy mix ratios. It has virtually no odor, is DOT noncorrosive, and can be used in cold weather (102, and 143). See product bulletin #12 for more details.

FABRIC SELECTION

Fiberglass fabrics are measured by their weight per square yard (cloth and roving) or square foot (mat). The heavier the glass weight, the stronger the product. Proper fabric selection is a balance between the required strength and the least possible weight.

For example, a radio controlled model airplane needs to be as light as possible, so one might use 1.4 oz. cloth. However, a wheel chair ramp has no weight restrictions, and needs maximum strength, so one might use 18-oz. roving. The builder must decide what properties are most important when making a fabric selection.

TAP carries many fabric types and weaves, including E-glass, S-glass, Graphite, and Kevlar. More information on these fabrics is available in a TAP store or on our website: www.tapplastics.com.

How to Fiberglass

Fiberglassing is done either in a mold (to create a 100% fiberglass product), or over a substrate like wood or foam. The description below will describe fiberglassing over a substrate. See a TAP sales person for information on lay-up in a mold. Whether you are fiberglassing a boat, a surfboard, or your deck, the process is pretty much the same. The instructions below are intentionally general. For specific issues on your project, speak to a TAP sales person.

Beginning the Project

- Wear gloves, safety glasses, coveralls and respirator (if there is not adequate ventilation.)
- Vacuum the surface to be glassed. All wax, oils, grease, etc. must be removed by sanding and acetone wipe in order for resin to stick.
- Lay fiberglass fabric on the surface to be glassed and trim to size. If the area is wider than your fabric, overlap the fabric seams at least 2". Never 'butt joint' the edges of fabric. This will produce a weak seam.
- To help hold the fabric in place while trimming, push pins through the fabric into the substrate (if it is soft like wood or foam).
- If the surface is curved, you may need to cut v-shaped notches so that the fabric can lie flat.
- If more that one layer of fabric is to be used, repeat the process with the next layers trying not to allow seams to stack on top of each other. This would create a bulge due to the double layers of fabric at the seams.
- Once the fabric is cut and trimmed, you are ready for the lay-up.

Lay-up over a Substrate

There are a couple of lay-up methods you can follow. First we will describe the 'dry method', which works well for small projects with lightweight cloth. Then we will describe the 'wet method'.

- For small projects with light fabric and not too many layers, leave the dry trimmed fabric in place, ready for the resin.
- It is best to try to determine how much resin you will need before you start. Running out of resin in the middle of a project is frustrating, and can damage the end result. So it is always best to buy extra since you can return unopened, clean containers of resin (within 30 days). For ballpark calculations, use the following numbers per layer of fabric:
- One gallon of resin will cover about:
  - 20 square feet of 29 oz. Knytex
  - 40 square feet of 1.5 oz. mat
  - 50 square feet of 9 oz. 'A' cloth
  - 100 square feet of Deck Cloth
- Coverage on wood depends on the porosity of the wood. Edges of plywood absorb a lot more resin than the surface. Remember, do not use polyester resin on redwood, oak, teak or mahogany.
- Mix the amount of resin you can use within the cure time available. Experiment with small batches first. Thorough mixing is essential!
- To maximize your working time, immediately pour the mixed resin onto the fabric surface. Use a brush (disposable) or squeegee to move the resin around the fabric and to make sure the resin saturates the cloth all the way to the substrate.
- Use a squeegee to remove excess resin, taking care not to create dry spots in the fabric. Dry spots will appear white, rather than transparent. Excess resin adds weight and is subject to cracking. Use of the squeegee will also help press the fabric tightly onto the substrate for a good bond.

- When using fiberglass mat, use resin rollers which TAP carries. These specially designed tools have grooves and ridges which push mat down into the resin and remove air bubbles.
- Once the fabric is saturated, pressed down tight, and excess resin is removed, allow it to gel. This will take anywhere from 30 minutes to 6 or 7 hours depending on the resin, the thickness, and working conditions.
- Once the resin has gelled, a final top coat of resin can be added to cover the weave of the fabric and create a smooth surface. If you have been using polyester; add Surface Curing Agent to the resin for the final coat.
- Once the surface coat has cured you can sand and paint to create the finish you desire.
- If you have a larger project, or several layers of fabric, the 'wet method' would be more appropriate.
- Once the pieces of fabric are trimmed, mark each one as you remove it and set it aside. Crumpled fabric looks all alike, so some marking system as to direction and location is essential.
- Mix a small amount of resin and immediately apply to the dry surface to be glassed. Thorough mixing is essential!
- Lay the first piece of fabric on the wet resin and saturate it with more resin.
- Continue to add layers of fabric and resin, forcing each layer down tight to the prior layer with a squeegee or roller (described above). The key is to get the fabric tight against the substrate and the resin on top where the excess can be squeegeed away.
- Watch your working time! Once the resin gels, it is no longer workable. If this happens in the middle of a lay-up and you have excess resin or a wrinkle in the fabric, you will have to stop, let it fully cure, and grind back down to the surface you desire. Never try to squeegee or roll gelled resin. It will just create a bigger mess.
- One of the advantages of polyester is that when one layer is completed, the next layer can be done at any time, even days later, without sanding between layers. When working with epoxy, each layer must be added before the prior layer cures (usually within 24 hours) in order to avoid sanding between layers.
- Once all the fabric is applied and the resin has gelled, add a final layer of resin to fill up the fabric weave. If you are working with polyester resin, add Surface Curing Agent to the resin for the final coat.
- Once that layer cures, sand and paint with the appropriate finish.

Each project, resin, and fabric has its own idiosyncrasies. Experiment to become an expert on your specific situation. TAP also has numerous books describing most fiberglassing operations.

Read CAUTIONS on all product labels before beginning your glassing project.

TAP Plastics • the fantastic plastic place
Visit or shop online: **tapplastics.com**

TAP Plastics

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