TOTALBOAT FLEXEPOX

- Flexible 2-part epoxy adhesive
- Extra tolerant to dynamic stresses from contraction, expansion, vibration, and shock
- Tenaciously bonds to a wide variety of substrates
- Extended working time
- Can be used above or below the waterline

TotalBoat FlexEpox is a tough, flexible epoxy adhesive that adheres aggressively to fiberglass, metal, plastic, and wood. It creates permanent, structural bonds that absorb stresses and tolerate flexing better than traditional 2-part epoxy resins.

CLEANER/SURFACE PREPARATION: Acetone, denatured alcohol

CLEANUP: Denatured alcohol or acetone. Once cured it must be removed mechanically.

THINNER/REDUCER: Do not thin FlexEpox.

MOLD RELEASE AGENTS: Mold release paste wax, aerosol mold release agents.

PRIMER: No primers are necessary. Etching with TotalBoat Aluminum Boat Etch Wash is highly recommended on bare aluminum substrates, and TotalBoat Rust Primer is recommended for ferrous steel applications.

APPLICATIONS: Bonding, structural epoxy adhesive, bonding dissimilar substrate materials, bonds where dynamic stresses are present, adhesive for substrates that are generally tough to bond.

ACCEPTABLE SUBSTRATES: Fiberglass, wood, properly prepared metals, block, brick, concrete, glass, slate, tile, stone

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SAFETY & PERSONAL PROTECTIVE EQUIPMENT:

Always use proper safety equipment, clothing, and PPE in accordance with the Safety Data Sheet when handling or applying TotalBoat FlexEpox.

EXOTHERMIC REACTION!

The cure of TotalBoat FlexEpox is an exothermic reaction and will generate heat. Though FlexEpox is generally applied in thin films or smaller applications, it is not uncommon for a larger mass of mixed FlexEpox to reach 200°F or higher during the cure cycle.

SURFACE PREPARATION:

All surfaces need to be free of any potential contaminants. Surface contamination will reduce or compromise FlexEpox's bond strength to any substrate. If any surfaces are to be sanded before applying FlexEpox, always remove all surface contaminants prior to sanding or abrading the surface. Contaminants can include dust, dirt, grease, moisture/water, oil, or wax. Though FlexEpox will bond under high humidity conditions and to damp materials, the strongest bonds occur when the humidity level is low and all substrates are dry, with low moisture contents.

- **IMPORTANT!** Only use clean cotton rags for surface preparation. Synthetic rags can leave a film of contamination if they come in contact with some solvents.

FIBERGLASS:

- Fiberglass (commonly comprised of polyester resin saturated fiberglass) substrates may have wax or amine blush on the surface, depending on the resin system it was constructed with and application methods.
- Any amine blush needs to be removed with fresh, warm water and a mild soap.
- Dry the surface completely. Any waxes need to be completely removed with a dewaxing product.
- After the surface has been cleaned of all potential surface contamination, grind or abrade the surface with 80-grit sandpaper (or coarser) and remove all sanding residue. Wipe with a clean cotton rag dampened with one of the specified surface preparation solvents. This will provide a rough surface for FlexEpox to achieve the best mechanical bond.

EPOXY:

- The cure of epoxy materials can create an amine blush on the surface of the cured material, even if the epoxy being used is considered 'non-blushing'.
- Remove any potential amine blush by washing the surface with fresh, warm water and a mild soap. Dry the surface completely.
- Wipe the surface with a clean, dry cotton rag dampened with one of the specified surface preparation solvents.
- After the surface has been cleaned of all potential surface contamination, grind or abrade the surface with 80-grit sandpaper (or coarser) and remove all sanding residue, then wipe with a clean cotton rag dampened with one of the specified surface preparation solvents. This will provide a rough surface for FlexEpox to achieve the best mechanical bond.

WOOD:

- Remove all surface contamination by wiping the surface with a rag dampened with one of the surface preparation solvents.
- If possible, oily hardwoods and white oak should be wiped with acetone during the surface preparation steps.

- Allow any solvents to evaporate completely.
- Abrade the area of the wood that is to be bonded with 80-grit sandpaper (or coarser).
- Remove all sanding residue and wipe the surface clean using one of the specified solvent wipes.

METALS:

Steel/Iron:

- Remove all surface contamination by wiping the surface with a rag dampened with one of the surface preparation solvents.
- Grind or sand the surface with 80-grit or coarser sandpaper, leaving it shiny and rough. Remove all sanding residue and wipe the surface again with a clean, cotton rag dampened with the surface preparation solvent.
- Applying TotalBoat Rust Primer as directed is recommended, but not required. It will help to prevent further development of rust and optimize the bond.
- Allow the surface to dry completely before applying FlexEpox.

Stainless Steel:

- Remove all surface contamination by wiping the surface with a clean, cotton rag dampened with one of the surface preparation solvents. Allow the surface to dry completely.
- Grinding or sanding the surface that will be bonded with FlexEpox (with 80-grit or coarser) can help maximize the bond strength. If the surface is abraded, remove all sanding residue and wipe the surface with a clean cotton rag dampened with the surface preparation solvent.
- Allow the surface to dry completely before applying FlexEpox.

Aluminum:

- Remove all surface contamination by wiping the surface with a clean cotton rag dampened with one of the surface preparation solvents. Allow the surface to dry completely.
- The aluminum surface should either be abraded with 80-grit sandpaper or a grinder immediately before bonding, or etched with TotalBoat Aluminum Boat Etch Wash as directed.
- If the surface is abraded, remove all sanding residue and wipe the surface clean with one of the specified solvent wipes, then allow to dry before bonding.
- If the surface is to be etched, ensure that the surface has dried completely before applying FlexEpox.
- Apply FlexEpox within 1 hour of the surface preparation.

Lead: SAFETY ALERT! Always take extreme care and use the required Personal Protective Equipment when working with lead.

- IMPORTANT! The most important aspect of prepping lead is to work quickly, and only do a small area at a time because lead oxidizes very quickly and will turn dull in just minutes, leaving a very poor surface for bonding.
- Remove all surface contamination by wiping the surface with a rag dampened with one of the surface preparation solvents.
- Grind or sand the surface with 80-grit or coarser sandpaper, leaving it shiny and rough.
- Remove any sanding residue and wipe the surface clean with one of the surface prep solvents.
- Allow the solvent to evaporate and apply FlexEpox immediately. If FlexEpox is not applied within a few minutes, repeat the surface preparation.

Other Metals:

- Remove all surface contamination by wiping the surface with a rag dampened with one of the surface preparation solvents.
- Grind or sand the surface with 80-grit or coarser sandpaper, leaving it shiny and rough. Remove all sanding residue and wipe the surface again with a clean, cotton rag dampened with the surface preparation solvent.
- Allow the surface to dry completely.
- Apply FlexEpox to the prepared surface within 1 hour.

STONE:

- Stone materials should always be dry, and free of any dirt, dust, or other residue.
- If possible, do not attempt to bond stone that has recently been submerged in water for a long duration.
- Clean the stone by wiping with one of the appropriate surface prep solvents.
- Allow the stone to dry completely before applying FlexEpox.

MASONRY:

- Masonry can be bonded with FlexEpox, but it is extremely important to ensure that it has been left to dry for an extended period before applying epoxy.
- Masonry can trap a lot of moisture, which can impact the bond strength of FlexEpox during periods of dramatic pressure changes or fluctuations in temperature.
- Clean the surface of any dust, debris, or loose material.
- Sand or abrade the surface where the masonry is to be bonded. Remove any sanding residue and wipe with one of the recommended surface preparation solvents.
- Allow the solvents to evaporate completely and apply FlexEpox as directed below.

CONCRETE:

- Remove any loose dust or debris from the surface that is to be bonded, as well as any other surface contamination.
- Do not attempt to bond new concrete or concrete that is sweating or emitting a lot of moisture.
- Sandblasting or heavily abrading the surface where it is to be bonded will help give a great base for a mechanical bond.

- Etching the concrete with a concrete etch material (as directed) will also prepare the surface to accept the epoxy, helping to generate a very strong bond.
- If the surface was etched, ensure that the surface is completely dry before applying FlexEpox.

GLASS:

- Remove all surface contamination by wiping the surface with a rag dampened with one of the surface preparation solvents — denatured alcohol is preferred for glass surfaces.
- Allow the surface to dry completely before applying FlexEpox.

PLASTIC:

- **PVC, Nylon, Polystyrene:** Clean the surface of any dust, debris, grease, oils, waxes, moisture, or other contaminants. Heat treat or heavily abrade the surface by grinding or sanding with a coarse grit sandpaper. Heat treating generally entails quickly heating the surface with a torch for about .5-3 seconds. Do not singe or burn the surface. This changes the surface energy of the plastic, allowing it to bond. Wiping the surface with acetone can also help to change the surface energy, but use moderation, as too much contact with acetone will permanently damage the plastic. Apply FlexEpox im-mediately after treating the surface.
- **Styrofoam:** Always perform a small test for compatibility in an inconspicuous spot before attempting the main project.
- **ABS, Lexan, Acrylic, Polycarbonate, Plexiglass:** Clean the surface of any dust, debris, grease, oils, waxes, moisture, or other contaminants. Abrade the surface that is to be bonded with 80-grit sandpaper and remove any sanding residue. DO NOT wipe the surface with acetone or heat treat the surface. Apply FlexEpox to the prepared surface.
- **LDPE, HDPE, Polyethylene, Polypropylene:** FlexEpox will not bond to these materials. Do not use FlexEpox on these materials. Vinyl surfaces may not allow FlexEpox to achieve a good bond.

APPLICATIONS:

Bonding: FlexEpox's strength, flexibility, and tenacious bond properties makes it an extremely dynamic adhesive for a wide variety of bonding applications and substrates. FlexEpox is safe to use below the waterline or for structural applications (when the cured physical properties of FlexEpox are adequate). Carefully follow the surface preparation steps that are specific to the substrate materials above. If the bonded materials are being clamped together, use minimal pressure to avoid squeezing the epoxy out of the glue joint.

HINT! When bonding porous substrates such as wood, it is recommended to add TotalBoat silica thickener to prevent the epoxy from being completely absorbed in the substrates before it cures.

Filleting: When bonding 2 items that are perpendicular or at an angle with FlexEpox, apply the epoxy between the two items that are to be bonded. Then when they are set in position, run an additional continuous bead of FlexEpox, thickened to a peanut butter consistency with TotalBoat Silica Thickener, roughly 1/8"-1/4" thick, in the corner of the joint. A rounded tool, such as a wooden tongue depressor, can be run along this bead to evenly spread the thickened epoxy fillet with the rounded profile to make it uniform and aesthetically clean-looking. This fillet adds extra rigidity, and stability by increasing the surface area of the bond.

Gap Filling: FlexEpox can be used as an epoxy gap filling material for gaps up to ½" in thickness when thickened with TotalBoat thickeners such as Silica Thickener. For any gaps wider than ½", apply FlexEpox in layers, allowing the epoxy to become firm but slightly tacky with each coat before applying the next one or allow it to cure completely, sand the surface and apply the next layer.

Adding Fillers and Thickeners:

- Fillers and thickeners can be added, as needed for any application. Some applications may not require much thickener or filler, while others may need the epoxy to be thick like peanut butter, or beyond that.
- Only add thickening agents or filler materials once the resin and hardener components have been blended thoroughly.
- Thickeners or fillers can be added to achieve a sense of sag resistance, to resist being absorbed into a porous substrate, to increase structural bond properties, or to promote easier sanding after it has cured.
- **Silica** (Includes colloidal silica, fumed silica)**:** Acts as an adhesive thickener, adds sag resistance, is white in color, and will impart a milky color. Silica is also commonly used to prevent porous substrates from absorbing epoxy.
- **Milled Glass Fibers**: For structural applications, chopped fiberglass strands add strength, but do not add any sag resistance.
- **Microballoons**: These can be phenolic or glass in composition and help to thicken and improve the sanding qualities of the cured epoxy. Microballoons will add body, bulk, and some sag resistance, but will not prevent dripping or sagging.
- **Wood Flour**: Wood flour can be used when sag resistance and imparting a wood-tone color are desired; it can also be used for structural adhesive applications.
- **Other Additives**: Non-skid media, graphite, and barrier coat additives are just a few examples of other acceptable additives. Always test a small sample to ensure the desired results when working with these materials.

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DISPENSING & MIXING:

Application Conditions: FlexEpox should only be dispensed when the ambient temperature, temperature of the epoxy itself, and the temperature of the substrate being bonded are above 40°F. For optimal bond strength, the relative humidity should not exceed 90% for the first 24 hours of the cure process. Curing FlexEpox outside of these conditions may slow the rate of cure or compromise some physical properties of the cured epoxy.

Warming the Product for Cold Weather Applications:

In cooler ambient conditions below 65°F, it is recommended to warm the product to 75-90°F before use, as the liquid components can become very thick and difficult to dispense.

Mix Ratio:

The mix ratio of FlexEpox is 1:1 (resin:hardener) by volume, or 1.2:1 by weight. Only dispense the amount of epoxy that can be used in a 20-minute period and mix multiple small batches to avoid wasting product.

MIXING:

- Mix the 2 components together very thoroughly, scraping the bottom and the side of the mixing cup to ensure that there are no resin-rich or hardener-rich areas of epoxy.
- Once mixed, any fillers or thickeners can be added, if desired.
- Apply FlexEpox as soon as it has been mixed to maximize the product's working time.

CURING:

Cure rates are dictated by the ambient temperature, the temperature of the substrate, and the mass of epoxy that was applied. The working time of FlexEpox in a thin bead or film is roughly 75 minutes at 72°F, and can be sanded or used for light duty applications in roughly 10 hours. Full cure is roughly 5-7 days. Warmer conditions will shorten these cure times, while cooler conditions will extend them.

Clamping: The recommended clamp time for FlexEpox is at least 3-4 hours at 72°F (or warmer). The natural tendency is to clamp with a lot of pressure, but this method squeezes all of the epoxy out of the glue joint, making the joint weak. Take extra care not to over-clamp items and ensure that there is a thin film of FlexEpox between all items being bonded.

Priming, Painting, or Applying More Epoxy or Other Coatings on top of FlexEpox:

TotalBoat FlexEpox can be coated by a variety of paints, primers, or other epoxy materials.

- APPLYING MORE FLEXEPOX OVER ITSELF:
  - FlexEpox can be applied once the previous coat has cured completely by washing the surface with warm water and a mild soap, allowing it to dry completely and sanding with 80-grit sandpaper. Remove all sanding residue before applying.
  - For certain applications, it can be desirable to 'hot coat' more epoxy onto a previous layer. Wait for the previous coat to go through the cure cycle and the exothermic reaction. When the previous application of FlexEpox is firming up but is still tacky, apply more FlexEpox as needed. No sanding is required for this method.
- APPLYING OTHER EPOXY PRODUCTS OR EPOXY-BASED PRIMERS:
  - Allow the previous layer of FlexEpox to cure completely for at least 48-hours. Sand the surface with 80-grit sandpaper or follow the specific directions on the product being applied.
  - Remove any sanding residue and apply the product as directed.
- APPLYING OTHER PAINTS, PRIMERS, VARNISHES, CLEAR COATS, URETHANES, OR OTHER COATINGS:
  - Allow the FlexEpox to cure for at least 5-7 days under normal curing conditions.
  - Wash the epoxy surface with warm water and a mild soap, then rinse well and dry the surface completely.
  - Sand the surface with the sandpaper grit specified on the paint or primer's instructions. If no grit is specified, 180-grit or 220-grit sandpaper are commonly used for this purpose.
  - Remove all sanding residue, and apply the desired paint or primer as directed on the product's instructions.

PRODUCT STORAGE:

- Store FlexEpox in a dry place between 60-90°F. Always keep FlexEpox sealed tightly when not in use.
- Do not store FlexEpox on the floor or near windows/doors that may expose the product to cooler conditions.
- Storing FlexEpox at cooler conditions or exposing the epoxy to dust and humidity can increase the risk of crystallization.

CRYSTALLIZED EPOXY:

- Crystallization can occur in the liquid resin or hardener components of epoxy, and can present itself as a gritty texture, cloudiness, or appearing to be a solidified material.
- Epoxy that has crystallized should not be used until the crystallization has been resolved.
- Warming the liquid epoxy to 125-150°F will rectify the crystallization in the epoxy, turning it back to the correct consistency, making it ready to use again.
- The most common way to warm epoxy products is to insert the bottles into a sealable plastic bag, remove all extra air from the bag, and insert the bag into a bowl or basin of

warm water (not boiling). Change out the water as needed. This may take 30-90 minutes, until all contents of the cartridge are at least 125°F.

- Following proper storage conditions is the best way to prevent crystallization.

APPLICATION DATA:	
Application /Epoxy Type:	Adhesive, bonding
Components:	Two — Resin (Part A), Hardener (Part B)
Application Film Thickness:	Thin film (for most applications), can be thickened and applied up to 1/2" for fillets and glue joints
Application Temperature/RH:	Minimum of 40°F, 0-90% Relative humidity
Working Time	75 Minutes (Thin Film) @ 72°F
Gel Time (ASTM 2471):	40 Minutes @72°F (100g mass)
Clamp Time:	3-4 Hours (Minimum) @ 72°F
Minimum Cure for Use (@ 77°F):	7-10 Hours (Low loads), 24 Hours (High loads)
Full Cure Time:	5-7 Days
Mix Ratio (By Volume):	1A:1B (Calculated)
Mix Ratio (By Weight):	1.2A:1B (Calculated)
Resin Viscosity (ASTM 2196):	9,500 cP
Hardener Viscosity (ASTM 2196):	22,800 cP
Initial Mixed Viscosity (ASTM 2196):	14,100 cP
Resin Density (ASTM D1475):	1.17 g/cm³
Hardener Density (ASTM D1475):	0.97 g/cm³
Units:	8 oz. Kit, 32 oz. Kit
Shelf Life:	At least 1 year (under proper storage conditions)

PHYSICAL DATA:	
Resin Color:	Clear
Hardener Color:	Caramel/amber
Cured Color/Finish:	Buff/caramel
UV Stable:	No
Cured Density (ASTM D792):	1.11 g/cm³
Volumetric Shrinkage (ASTM D792/D1475):	3.50% (ASTM D792/D1475)
Volumetric Yield (ASTM D792):	24.8 in.³/lb.
Tensile Strength (ASTM D638):	5,610 psi
Tensile Modulus (ASTM D638):	178,000 psi
Tensile Elongation (ASTM D638):	25.10%
HDT (Room temperature Cure):	134°F (ASTM 648)
HDT (Post Cure) (ASTM D648:	189°F (ASTM D648)
Compressive Strength:	6,800 psi
Flexural Strength:	9,050 psi
Flexural Modulus:	193,000 psi (ASTM D790)
Onset of Tg:	195°F (by DSC) (ASTM 3418)
Ultimate Tg:	213°F (by DSC) (ASTM 3418)
Hardness:	77 Shore D (ASTM D2240)