HIGH PERFORMANCE EPOXY SYSTEM

- Easy 2:1 mix ratio with a choice of slow, medium, or fast hardeners
- Low-viscosity, non-blushing epoxy is ideal for coating, laminating, hand layups, vacuum bagging applications, and more
- Combine with fillers or thickening agents for customized bonding, filleting, gluing, and fairing applications
- Compatible with wood, metals, fiberglass, carbon fiber, and more
- Can be used above or below the waterline
- Can be tinted or pigmented

TotalBoat High Performance Epoxy is a low-viscosity, non-blushing epoxy system that cures clear, and is slightly more flexible than a traditional epoxy system. It's ideal for clear coating, laminating, vacuum bagging, and wooden boat builds. Pair High Performance Epoxy Resin with any of three TotalBoat High Performance Hardeners in a simple 2:1 mix ratio (by volume) to control working and cure times.

CLEANER/SURFACE PREPARATION: Acetone, denatured alcohol, TotalBoat Eco Solvent

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

THINNER/REDUCER: Do not thin High Performance epoxy.

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 on ferrous steel applications.

APPLICATIONS: Lamination, clear coating, hand layups, vacuum bagging, bonding, structural epoxy adhesive, filleting & small gap filling

ACCEPTABLE SUBSTRATES: Fiberglass, epoxy, wood (not pressure treated wood), properly prepared metals, masonry, concrete, glass, stone, some plastics

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SAFETY AND PERSONAL PROTECTIVE EQUIPMENT:
Always use proper safety equipment, clothing, and PPE in accordance with the Safety Data Sheets for High Performance Epoxy. Please take this very seriously, as epoxy sensitization is a very serious matter.

EXOTHERMIC REACTION!
The cure of TotalBoat High Performance Epoxy is an exothermic reaction and will generate heat. It is not uncommon for a larger mass of mixed High Performance Epoxy to reach 300°F or higher during the cure cycle.

SURFACE PREPARATION:

Any surfaces that are to be bonded, coated, glued, or laminated with High Performance Epoxy need to be free of any forms of contamination. Surface contamination will reduce or completely compromise the epoxy's bond strength to any material. If any surfaces are to be abraded before applying High Performance Epoxy, always remove all surface contaminants prior to grinding or sanding the surface. Contaminants can include dust, dirt, grease, moisture/water, oil, or wax.

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 substrates (commonly composed of polyester resin saturated fiberglass) may have wax or amine blush on the surface, depending on the resin system with which they're constructed, 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 the surface, or abrade it with 80-grit (or coarser) sandpaper, remove all sanding residue, then wipe with a clean cotton rag dampened one of the specified surface preparation solvents.
- This will provide a rough surface for High Performance Epoxy to achieve the best mechanical bond.
- Allow the surface to dry completely before applying High Performance Epoxy.

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 the surface, or abrade it with 80-grit

(or coarser) sandpaper, 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 High Performance Epoxy to achieve the best mechanical bond.
- Allow the surface to dry completely before applying High Performance Epoxy.

WOOD:
- Remove all surface contamination by wiping the surface with a rag dampened with one of the surface preparation solvents.
- Oily hardwoods and white oak should be wiped with acetone, if possible, 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 (or coarser) sandpaper.
- Remove all sanding residue and wipe the surface clean using one of the specified solvent wipes.
- Allow the surface to dry completely before applying High Performance epoxy.

METALS:

Steel/Iron:
- Remove all surface contamination by wiping the surface with a clean cotton rag dampened with one of the recommended 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 High Performance Epoxy.

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.
- Sanding (with 80-grit or coarser sandpaper) or grinding the surface that will be bonded with High Performance Epoxy 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 High Performance Epoxy.

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 be abraded with either 80-grit sandpaper or a grinder immediately before bonding, or it should be 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 High Performance Epoxy.
- Apply High Performance Epoxy 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.**
- Remove all surface contamination by wiping the surface with a clean rag dampened with one of the recommended surface preparation solvents.
- Grind or sand the surface with 80-grit (or coarser) sandpaper, leaving it shiny and rough.
- Work quickly, and only in a small area at a time; lead oxidizes very quickly and will turn dull in just minutes, leaving a poor surface for bonding. Remove any sanding residue and wipe the surface clean again with the recommended surface prep solvent.
- Allow the solvent to evaporate, then apply High Performance Epoxy immediately. If High Performance Epoxy is not applied within a few minutes, repeat the surface preparation.

Other Metals:
- Remove all surface contamination by wiping the surface with a clean rag dampened with one of the recommended 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.
- Within 1 hour, apply High Performance Epoxy to the prepared surface.

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 High Performance Epoxy.

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MASONRY:

- Masonry is a compatible substrate for High Performance Epoxy, but for best adhesion, it is extremely important to ensure that the masonry has been left to dry for an extended period of time before applying the epoxy.
- Masonry can trap a lot of moisture, which can impact the bond strength of High Performance Epoxy during periods of dramatic pressure change, or enduring freezing-to-hot temperatures.
- 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 solvent to evaporate completely and apply High Performance Epoxy.

CONCRETE:

- Remove any loose chunks, dust, debris or other surface contamination from the surface that is to be bonded.
- Do not attempt to bond new concrete, or concrete that is sweating or emitting a lot of moisture.
- Sandblasting or otherwise abrading the surface where it is to be bonded will help provide a great base for a mechanical bond.
- Etching the concrete, as directed, with a concrete etch material 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 High Performance Epoxy.

GLASS:

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

PLASTICS:

VERY IMPORTANT WHEN APPLYING HIGH PERFORMANCE EPOXY TO ANY PLASTICS: High Performance epoxy can form a good bond to a limited variety of plastic materials.

- High Performance Epoxy does not bond to all plastics, and the bond strength will vary across plastics.
- The bond strength to plastics will be limited when compared with the substrates previously listed, and will still vary with each application.
- The specific surface preparation methods are listed below, and it is always very important to perform a small test sample to ensure that it achieves the desired bond.
- Unless specified, do not use acetone for surface preparation on any plastic materials.
- Do not attempt to bond any plastics that are not listed below.

PVC, Nylon, ABS: Clean the surface completely. There are three surface preparation methods (choose one):

- Use acetone as a quick surface wipe that will change the surface of the plastic; do not allow acetone to sit on the surface.
- Quickly flame/heat treat the surface — do not singe, burn, or melt the plastic.
- Sand the surface heavily with 80-grit (or coarser) sandpaper, then remove all sanding residue.

  Apply High Performance Epoxy immediately.

Acrylic, Plexiglass, Lexan, Polycarbonate, Polystyrene (NOT in the expanded form (foam) such as Styrofoam):

- Clean the surface completely, removing any surface contamination. DO NOT use acetone, it may permanently haze or degrade the plastic.
- To promote the best mechanical bond, where the epoxy will be applied, sand or grind the surface with 80-grit sandpaper.
- Remove any sanding residue and apply.

Vinyl

- Clean the surface, removing any surface contamination.
- Apply High Performance epoxy to the vinyl when the surface is completely dry.

Polyester

- Follow the directions for FIBERGLASS (page 1).

APPLICATIONS:

Laminating and Using with Reinforcement Fabrics:

- TotalBoat High Performance Epoxy provides an excellent adhesive when wetting out layers of reinforcement fabrics for repairs or the construction of new pieces.
- The low-viscosity nature of mixed High Performance Epoxy requires little effort to effectively saturate fiberglass, carbon fiber, Kevlar®, basalt, Spectra®, or Dyneema® cloth.
- Select the appropriate cloth and cloth weight based on the application stresses/loads, curves and corners, and overall stiffness of the final part.
- Wet out the desired cloth material with mixed epoxy to saturate the cloth evenly. Only apply enough epoxy to just saturate the cloth; do not apply extra epoxy, or allow it to pool.
- Once the cloth has been sufficiently saturated, work to remove any extra epoxy from the cloth material. Extra epoxy is wasteful, heavy, and can even detract from the overall strength of the finished part.
- A disposable chip brush, resin roller, or squeegee can help to evenly distribute the mixed epoxy resin, or remove any extra epoxy.
- Laminates should only be made with enough mixed epoxy to saturate the cloth, and any extra liquid epoxy should be removed.

- Extra epoxy on laminates creates brittle areas, adds weight and unnecessary thickness, and could potentially lead to an excessive exotherm during the cure process.

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 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.

Bonding:

- High Performance Epoxy can be used as an excellent adhesive for bonding applications. Thickeners and fillers can be added or blended to mixed High Performance Epoxy to achieve a desired working property or cured material property.
- 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.
- When bonding, do not over clamp items, as this can squeeze all of the epoxy out of the glue joint. Adhere to the posted clamp times for each hardener to allow for sufficient cure time.

Filleting: (Applying a converse, convex, or flat bead of thickened epoxy in a joint where two surfaces meet, which can be joined perpendicularly or at an angle).

- This bead usually requires epoxy thickened to the consistency of peanut butter, with good sag resistance.
- Apply appropriately thickened epoxy between the two items that are to be bonded. Then, when they are set in position, run an additional continuous bead, 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 bead of epoxy with the rounded profile, and make it uniform and aesthetically clean looking. This fillet adds extra rigidity and stability by increasing the surface area of the bond.

Fairing:

- TotalBoat High Performance Epoxy can be thickened to create an ideal fairing compound that's smooth to apply and easy to sand, once cured.
- This blend should only be used for fine fairing, and fairing applications of less than 1/8".
- Microballoons are the main thickener for fairing compounds; it may also be desirable to add silica to increase body and sag resistance.

Clear Coating:

- TotalBoat High Performance Epoxy can be used as a clear coat material on a wide variety of substrates.
- The Slow or Medium speed hardeners are more desirable for clear coat applications. The Fast hardener may impart a slightly amber color.
- The maximum application film thickness for each hardener are included in the Application Data chart (page 7).

Casting:

- TotalBoat High Performance Epoxy can be used for casting applications if it is poured in thin layers, allowing the epoxy to go through most of the cure cycle and firm up, before applying subsequent layers.
- When applying High Performance Epoxy in layers, a chemical bond can be established between layers if they are poured before the previous layer has fully cured, but after it has cooled back to ambient room temperature (after the reaction).
- Always use appropriate mold release waxes or aerosol products to ensure an easy demolding process, and preserve the mold for future use.

Adding tints, colorants, dyes, pigments:

- TotalBoat Epoxy can be tinted, colored, or given other special effects using a variety of products. It is imperative that any colorants, dyes, pigments, or tints are compatible with TotalBoat High Performance Epoxy.
- Incompatible substances, or excessive concentrations of substances such as colorants/tints/dyes/pigments that are added to High Performance Epoxy may compromise the physical properties or cured properties.

- Some compatible tints and colorants include TotalBoat Pigment Dispersions, TotalBoat Mixol Universal Tints (in the TotalTint Kit), mica powders, and alcohol inks.
- Always dispense the resin and hardener components at the specified ratio and mix them thoroughly prior to adding any colorants or tints.
- Pigments such as mica powders may settle due to gravity and their density; it may be desirable to add them just as the epoxy is starting to gel slightly, allowing them to appear suspended.
- Always test a small sample when using new tints or colorants. This will help establish a desired concentration of the tint/colorant, as well as help to ensure that it achieves the desired results, and cures properly.

DISPENSING & MIXING:

2-Part Epoxy System:

- High Performance Epoxy is a 2-part epoxy system, which requires blending both the resin and hardener components together at the specified ratio to create a usable epoxy material.
- The TotalBoat High Performance Epoxy system has three different hardeners (Slow, Medium, and Fast), each with different working times and cure rates that can be selected or blended for a specific application. Regardless of the hardener selected, the ratio of resin to hardener does not change.
- Thorough mixing and exact ratios of the two components is imperative for the chemical reaction that occurs, allowing the material to achieve the maximum cured physical properties.
- Adding more resin or hardener is NOT beneficial, and will not speed up the cure, and it will only have negative consequences on the cured physical properties.

Application Conditions:

- High Performance Epoxy should only be dispensed when the ambient temperature, temperature of the epoxy itself, and the temperature of the substrate are above 55°F.
- The relative humidity should not exceed 90% for the first 24 hours of the cure process.
- For clear coating applications, or when the cosmetic appearance of the finished material is of greater importance, the maximum relative humidity should be less than 60%.
- Curing High Performance Epoxy outside of these conditions may slow the rate of cure, or compromise some physical properties of the cured epoxy.

Warming or Cooling the Epoxy, Dissipating Heat, Influencing Working Times and Cure Rates:

- The curing of mixed epoxy is an exothermic reaction — it generates heat.
- Epoxy in a larger, deeper mass will react and generate heat and begin to cure significantly faster than if it is spread thin, or in a smaller mass.
- Promoting the best heat dissipation possible with mixed epoxy will promote the longest working time by slowing the cure process.
- In cooler ambient conditions below 65°F, it may be desirable to warm the epoxy to 70-80°F to maintain the desirably low viscosity, or to control the working time and cure rates.
- Conversely, in warmer conditions over 80°F, it may be desirable to cool the epoxy components before they are mixed to ensure sufficient working time and cure rates.

Mix Ratio:

- The mix ratio of the High Performance Epoxy system is 2A:1B (resin:hardener), by volume. The mix ratio by weight for each hardener is posted in the Application Data chart (page 7).
- Do not deviate from this mix ratio. Epoxy requires a precise mix ratio of resin to hardener in order to ensure the desired cured physical properties.

Pumps:

- High Performance Epoxy can be dispensed with calibrated pumps from TotalBoat. Follow the included instructions sheet for installing the pumps onto the respective bottles.
- Ensure that the pumps are primed before using any of the dispensed epoxy.
- **1 pump of resin, 1 pump of hardener:** When dispensing with TotalBoat 2:1 pumps, the pumps are pre-calibrated, so the user only needs 1 pump of resin to 1 pump of hardener.
- The resin pump dispenses 10mL of resin, while the hardener pump dispenses 5mL of hardener, ensuring a proper mix ratio.
- The pumps should remain installed in the bottles unless they will not be used for more than two weeks, in which case the pumps should be removed and cleaned out with denatured alcohol and stored. Be sure the original caps are tightly secured on the resin and hardener bottles.

CURING:

- Cure rates are dictated by the hardener that is selected, the ambient temperature, the temperature of the substrate, and the mass of epoxy that was dispensed.
- The working time and cure rate for each hardener are posted in the APPLICATION DATA chart (page 7). In general, warmer conditions will shorten these times, while cooler conditions will extend them.
- Larger masses of mixed epoxy than noted will also shorten the posted times, while smaller masses of mixed epoxy will extend the posted times.

Clamping:

- The recommended clamp time for bonding applications is also indicated by the hardener selected, and is posted below in the Application Data chart (page 7).
- 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 epoxy between all items being bonded.
- For porous substrates such as wood, it is recommended to thicken the epoxy to prevent it from being completely absorbed into the wood grain.

PRODUCT STORAGE:

- Before and after use, seal all High Performance Epoxy components tightly and store in a dry place between 60-90°F.
- Do not store High Performance Epoxy bottles on the floor or near windows/doors that may expose the product to cooler conditions.
- Storing High Performance Epoxy at cooler conditions, or exposing the epoxy in the cartridge to dust and humidity, can increase the risk of crystallization.
- If the respective pumps are being used with the High Performance Epoxy system, it is strongly recommended that they are removed from the bottles and cleaned out with denatured alcohol and stored if they will not be used for a minimum of two weeks. Tightly seal the bottles for storage using the original caps.

CRYSTALLIZED EPOXY:

- Crystallization can occur in the liquid resin or hardener components of epoxy, and can present itself as a gritty texture, cloudiness, or as being much thicker in consistency than it should be.
- 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 consistency it is supposed to have, making it ready to use again.
- The most common way to sufficiently warm any High Performance Epoxy components is to insert the closed bottle into a tub or basin of warm water (do not submerge up to the cap, and do not use boiling water, 130-160°F is sufficient). Agitate or stir the contents in the bottle to ensure that all of the material in the bottle reaches the necessary temperature.
- Change out the water, as needed. It may take 30-90 minutes until all contents of the bottle are at least 125°F.
- Following proper storage conditions is the best way to prevent crystallization.

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

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

- MORE HIGH PERFORMANCE EPOXY:
  - High Performance Epoxy 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, sanding with 80-220 grit sandpaper, and remove all sanding residue, before applying.
  - For casting 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 layer cools down to room temperature (70-80°F, in most instances), the next coat can be applied. No sanding is required for this method.
- APPLYING OTHER EPOXY PRODUCTS OR EPOXY-BASED PRIMERS:
  - Allow the previous layer of High Performance Epoxy 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 High Performance Epoxy 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.
- APPLYING GELCOAT:
  - Gelcoat cannot be applied directly to High Performance Epoxy. An approved epoxy-based primer is required when applying gelcoat over cured High Performance Epoxy. All products must be applied as directed, with no substitutions or deviation, or the gelcoat may not adhere or cure as it should.

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- TotalBoat TotalProtect epoxy barrier coat primer and TotalBoat 2-Part Epoxy Primer are approved epoxy primer products for gelcoat.
- Allow the High Performance Epoxy to cure for at least 48 hours, under normal curing conditions.
- Wash the High Performance Epoxy surface with warm water and a mild soap, and rinse thoroughly. Do not sand it until the surface has been washed thoroughly.
- Sand the epoxy thoroughly with 80-grit sandpaper, and apply TotalBoat TotalProtect or TotalBoat 2-Part Epoxy Primer.
- Allow the epoxy primer to cure for 5-7 days, under normal curing conditions.
- Wash the epoxy primer with warm water and a mild soap, then rinse thoroughly and dry the surface completely.
- Sand the surface with 80-grit sandpaper, and remove all sanding residue.
- Wipe the surface clean with a clean cotton rag dampened with acetone — DO NOT use any synthetic rags for this application.
- Apply the gelcoat, as directed.

APPLICATION DATA:

Hardener Selected:	Slow	Medium	Fast
Application Temperature/ Relative Humidity:	Minimum of 55°F, 0-90% RH	Minimum of 55°F, 0-90% RH	Minimum of 55°F, 0-90% RH
Application Film Thickness:	Thin film to 1/4" @ 75°F	Thin film to 1/8" @ 75°F	Thin film to 1/16" @ 75°F
Resin Density (@ 77°F) (ASTM D1475):	1.14 g/cm³	1.14 g/cm³	1.14 g/cm³
Hardener Density (@ 77°F) (ASTM D1475):	1.01 g/cm³	1.01 g/cm³	1.03 g/cm³
Resin Viscosity (@ 77°F) (ASTM D2196):	1000cP	1000cP	1000cP
Hardener Viscosity (@ 77°F) (ASTM D2196):	400cP	400cP	470cP
Mixed Viscosity (@ 77°F) (ASTM 2196):	600cP	600cP	650cP
Mix Ratio (By Weight):	100A:45B	100A:45B	100A:46B
Mix Ratio (By Volume):	2A:1B	2A:1B	2A:1B
Working Time (Varies by Mass of Mixed Epoxy):	20-45 minutes @ 77°F	10-30 minutes @ 77°F	5-15 minutes @ 77°F
Gel Time (150g mass @ 77°F) (ASTM 2471):	40 minutes	25 minutes	10 minutes
Tack-Free Time (Thin Film):	5 hours	3 hours	2 hours
Minimum Cure for Light Use (@ 77°F):	16 hours (thin film)	12 hours (thin film)	6 hours (thin film)
Clamp Time (Minimum, @ 77°F):	24 hours	16 hours	8 hours
Full Cure Time:	2-5 days @ 77°F	3-5 days @ 77°F	5-7 days @ 77°F
Shelf Life:	At least one year (under proper storage conditions)	At least one year (under proper storage conditions)	At least one year (under proper storage conditions)

PHYSICAL DATA:

Hardener Selected:	Slow	Medium	Fast
Cured Color/Finish:	Clear	Clear	Clear/Amber
Components:	Two (Resin and Hardener)	Two (Resin and Hardener)	Two (Resin and Hardener)
UV Stable:	No	No	No
Tensile Strength (ASTM D638:	7,300 psi	8,000 psi	7,700 psi
Tensile Modulus (ASTM D638):	360,000 psi	390,000 psi	380,000 psi
Tensile Elongation (ASTM D638):	6.7%	7.0%	7.5%
HDT (Post Cure) (ASTM D648):	126°F	126°F	126°F
Compressive Strength (ASTM D695):	8,900 psi	9,900 psi	9,500 psi
Flexural Strength (ASTM D792):	10,200 psi	11,600 psi	11,600 psi
Flexural Modulus (ASTM D790):	330,000 psi	360,000 psi	330,000 psi
Volumetric Shrinkage (ASTM D792/D1475):	3.1%	4.4%	4.4%
Cured Density:	1.13 g/cm³	1.13 g/cm³	1.14 g/cm³
Tg (Midpoint) (ASTM 3418):	132°F	133°F	133°F
Hardness (ASTM D2240):	83 Shore D	83 Shore D	84 Shore D

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Troubleshooting Guide

SYMPTOMS	POSSIBLE ISSUES	SOLUTION
• The epoxy did not cure • The epoxy is still sticky after a long duration • There are isolated areas of uncured epoxy • Three are striations in the cured epoxy	• Both components were not mixed together thoroughly • Improper mix ratio of the resin and hardener • A substance was mixed with the epoxy before the resin and hardener were mixed together thoroughly. • Need to wait longer for epoxy to cure. • Cooler conditions lead to longer than desired cure time. • Contamination • An overabundance of any substance mixed in with the epoxy, which is not the resin or hardener component, that may have diluted the epoxy too much, or reacted with it chemically	• Allow the epoxy another 24 hours to cure. If it does not cure to the desired hardness/tack-free state, mechanically remove the uncured epoxy and start over, taking extra care to follow all surface preparation, mixing, and application procedures with better care. • Take extra care to mix TotalBoat High Performance Epoxy at the specified 2A:1B mix ratio (by volume). • Only apply TotalBoat High Performance Epoxy when the environmental conditions are within the specified range to ensure a proper cure, within the desired timeframe. • Only use approved fillers, thickeners, pigments, colorants, or other additives. Do not add solvents to thin the epoxy. • Always mix the resin and hardener components prior to adding any fillers, thickeners, colorants, tints, or other substances. • Do not subject the curing epoxy to high humidity, dew, rain, or water spray until it has become tack-free. For cosmetic applications, wait a minimum of 24 hours after it has become tack-free before subjecting the epoxy to high humidity or any other contact with water. • Only use the specified solvents when working with High Performance Epoxy.
High Performance Epoxy cured properly but did not adhere to the substrate	• Incompatible substrate • Contamination • Improper surface preparation	• Only apply TotalBoat High Performance Epoxy to acceptable substrates. Substrates that are not listed as 'acceptable' may not allow for a sufficient bond. • Mechanically remove High Performance Epoxy from any areas that show poor adhesion or delamination. • Start all surface preparation over from the beginning, taking extra care and attention to detail. Do not cut corners or make substitutions.
Epoxy cured white, or with white spots	• Moisture is the most common source of white spots that are present when epoxy finishes curing.	• Take extra care to prevent moisture or water from coming in contact with the epoxy until it has finished curing. • When applying epoxy to wood or other potentially porous/damp substrates, verify that the moisture content is within the acceptable range. • Sufficient moisture can lead to premature delamination. If delamination is a concern, mechanically remove the epoxy and start over, taking extra care to ensure that moisture is not a factor.
Bubbles in the cured epoxy	• High Performance Epoxy was applied to a porous substrate. • Bubbles were whipped into the epoxy while mixing. • Contaminant/substance that reacted with the epoxy is not compatible	• Always mix epoxy products very thoroughly, ensuring that there are no resin-rich or hardener-rich areas, however, whipping the epoxy excessively can induce air bubbles that have to try and float to the surface. For cosmetic or thicker applications, take extra care not to whip air bubbles into the epoxy while mixing.

Epoxy turned yellow and/or has cracks that showed up during the cure process	• Excessive heat generated during the cure — this can also make the epoxy hard and brittle • Direct exposure to high levels of UV radiation while curing • The fast hardener may impart a slight yellow color — this is normal.	• For any applications where maximum clarity is desired, the Slow and Medium Hardeners are recommended. • Avoid dispensing and curing in extreme levels of UV exposure. • Dispense and cure smaller masses of epoxy to avoid creating an excessive exothermic reaction. • Follow the maximum pour depths posted on the Application Chart on the Technical Data Sheet. • Mechanically remove any undesirable looking yellowed epoxy, perform all surface preparation over again, and reapply High Performance Epoxy, taking more care to avoid generating excessive heat, or exposing it to excessive UV light (sunlight).
Epoxy turned yellow over time — not from the curing reaction	• Excessive temperature • Excessive exposure to moisture • UV exposure	• Epoxy is inherently not UV stable. A UV-stable coating should be applied to any High Performance Epoxy applications that require UV stability to ensure maximum clarity retention. • For cosmetic applications, avoid storing cured epoxy.
One epoxy component or the other seems very thick, lumpy, or has small crystals	• Ambient temperature is below the recommended application temperature, increasing the viscosity of the liquid epoxy component. • Crystallization has occurred in the liquid epoxy component.	• Always store epoxy components as directed on the product or on the Technical Data Sheet. • Dispensing and applying High Performance Epoxy at lower temperatures than recommended may lead to the epoxy components having a higher viscosity than desired. • Follow the crystallization remediation process outlined on the Technical Data Sheet if the viscosity and consistency do not resolve by bringing the liquid epoxy components back to the specified storage conditions.
Did not cure with a smooth, shiny surface	• Excessive exothermic reaction • Higher moisture content was present during the cure • An amine blush has formed on the surface. • Improper mix ratio, or poor mixing of the resin and hardener components	• If the epoxy has not cured completely, wait another 24 hours. Mechanically remove any epoxy that is uncured at that point and start over. • For all other scenarios: Wash the surface with warm water and a mild soap, then rinse thoroughly and dry the surface completely. Sand the surface until any undesirable epoxy has been removed. Remove all sanding residue and reapply High Performance Epoxy as desired, taking extra care when mixing and applying, as well as following all specified environmental conditions to ensure the best results.
Colorants/dyes/tints did not achieve the desired finish, or settled	• Test sample was not performed to observe the final product. • Tints, dyes, or pigments that do not go into solution with the liquid epoxy may float or sink depending on their density relative to that of the epoxy; High Performance Epoxy has a low viscosity when mixed. The low viscosity allows any added materials that do not go into solution, that have a different density than the epoxy, to settle up or down at a faster rate than viscous epoxies.	• Always perform a test sample of High Performance Epoxy with any tints or colorants prior to using them on the final project, to see if the desired results are achieved. • Pigments and special effects that do not mix into the epoxy in a liquid form, such as mica powder pigments, may settle or float to the surface of the epoxy if they are added too soon. These types of pigments or additives can be added as soon as the epoxy begins to warm from the reaction, but is still a flowing liquid. • Mechanically remove any epoxy that did not achieve the desired effect.
Paint, primer, or other form of topcoat did not adhere to High Performance Epoxy	• Improper surface preparation • Incompatible material was applied to High Performance Epoxy. • High Performance Epoxy was not sufficiently cured. • Gelcoat should not be applied directly to High Performance Epoxy without using one of the specified TotalBoat epoxy primer products first.	• Ensure product compatibility before applying any coatings or topcoats to High Performance Epoxy. • Ensure that High Performance Epoxy has cured for a sufficient amount of time before beginning any surface preparation. • Follow the surface preparation based upon the specific topcoat, as outlined in the Technical Data Sheet, and the product being applied. • Do not cut any corners when performing the surface preparation. • Remove any coatings that didn't adhere properly & start over. • Take extra with the surface preparation & application instructions.

Cracks appeared in the area of a fiberglass (or other reinforcement fabric) repair spot	• Excessive epoxy was applied, and insufficient reinforcement fabric was used. • Verify that the correct reinforcement fabric was used for the application.	• Do not use 'extra' epoxy when performing repairs. Only use enough to sufficiently wet out the fabric. The fabric is the strength of any repair. • Ensure that the proper laminate schedule was used for the repair. For serious or specific structural repairs, an engineer or specialist may need to be consulted. • Use sufficient reinforcement fabric for a repair. • Select the appropriate reinforcement fabric for a given application based upon its strength properties.
Delamination of a fiberglass (or other reinforcement fabric) repair spot	• Poor surface preparation • Repaired area was stressed prior to being sufficiently cured. • Incompatible substrate • The laminate was 'dry', or had insufficient epoxy saturation.	• Completely remove any partly delaminated repairs. • Ensure that the substrate is a compatible material for TotalBoat High Performance Epoxy. • Perform all surface preparation over again ensuring that extra care is taken. • Perform the laminate repair again, and ensure sufficient epoxy saturation and sufficient time for the repair to cure prior to use or stressing the repair.