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XTR-311 EPOXY INFORMATION SHEET

XTR-311 is an optically clear, low viscosity, high impact epoxy adhesive developed for bonding and small volume potting of plastic and glass optical fibers, lenses and prisms, LED displays, and other optical components.

Recommended for laminating, bonding and sealing applications where excellent wetting, good pot life and improved impact strength properties are required. This two part adhesive is easily mixed and cured at room temperatures, and develops strong, tough bonds to glass and glass fibers, ceramics, and many metals. XTR-311 bonds offer resistance to mechanical impact and thermal shock, and are also resistant to weather, water, gasses and vapors, petroleum, salt solutions, and mild acids and alkalis.

XTR-311 is supplied in two liquid parts, both of low viscosity. XTR epoxy should be weighed out accurately, (ten parts by weight of Part *A* plus three parts by weight of Part *B*). This assures the maximum utilization of all the adhesive purchased.

After the two parts have been weighed into a mixing jar, mix it thoroughly with a glass stirring rod.

Freshly mixed XTR has a very thin viscosity. Due to this fact it does not perform well for gap filling. XTR is mainly formulated for flat glass to flat glass bonding and will not perform well on pieces that do not match well. The XTR will tend to want to flow out of the spaces between the pieces instead of sticking into the cavities. You can allow XTR to sit after mixing to thicken up, but with the faster cure time, you must pay very careful attention to the thickening of the epoxy so you are still able to work with the material before it thickens too much for adequate bonding.

Thin XTR will penetrate cracks for some repair applications, making them virtually disappear from view. The best results are obtained when the glass is warmed to about 120°F (a hair dryer or some other heat source is reasonable if the object is not heated too much or too quickly). Then apply a drop of the freshly mixed XTR onto the crack. If the crack absorbs sufficient glue the crack will virtually disappear and the remaining XTR should be wiped off the surface only with a clean cloth or paper towel.



XTR-311 EPOXY ADHESIVE

XTR-311 is available in sizes ranging from 1/4lb kit (roughly 114g of mixed epoxy) all the way up to a 1 gallon kit (roughly one gallon of mixed epoxy).



A-1100 AMINO SILANE

A-1100 is used as a glass pre-treatment for XTR. After cleaning your glass thoroughly, the A-1100 mixture is applied and allowed to dry. It will help promote the bonding of the XTR to the silica in the glass. Available in 1/2 liter and 1 liter bottles. Pre-mixed.



DIGITAL SCALE

XTR is very particular about its mixture ratios. The density of Part A and Part B are different so measuring out by volume is very inexact. We highly recommend investing in a digital scale such as the DW100AX.

XTR sets slowly — at 75°F, it requires about 36 hours to achieve most of the final bond strength, (*see* Physical Properties). XTR will set well enough for your piece to be moved inside of 24 hours. This is an excellent time to clean up any overage by wiping with a clean cloth and using a razor or X-acto blade to scrape the overage off the piece. We don't recommend the use of any solvents to clean up at this stage because the solvents can migrate into the glue joint and can weaken the bond with the glass. The damage may not be evident until much later and will appear to be small bubbles at the edge of the joint. After 36 hours it will be extremely difficult to remove any excess glue from the object and grinding and polishing will be the next best way to remove it.

Many glass artists use XTR epoxy adhesive to glue pieces of various glass together to form art. Often, in the process, glued assemblies of blocks are cut or sliced with diamond or other abrasive saws and then more blocks are glued onto the assembly. In cases where these abrasive cuts are made across XTR glued joints, we recommend treating all surfaces to be bonded with XTR epoxy with an A-1100 amino silane solution in reagent grade isopropanol. We have learned from our glass artist customers that pre-treatment with the A-1100 solution eliminates tiny micro bubbles that seem to form, often much later, in the glue line along the sawn edge.

Treatment with the A-1100 solution is simplicity itself. When the glass surfaces are totally clean and ready for gluing, simply apply the A-1100 solution over the entire surface to be glued. Apply with lintless rag, brush, etc., and allow the solvent to evaporate leaving an extremely thin film of the A-1100 coating the surface of the glass. Immediately bond with XTR in your usual way.

Because we have found that the purity of the isopropanol is important, we are making this solution ourselves in the reagent grade of isopropanol. We are reasonably sure that impure grades of isopropanol interfere with the bonding of the A-1100 to the glass surface. If you are planning on gluing very large, heavy pieces together, we advise looking into using HXTAL epoxy instead of the XTR. The XTR epoxy will not have adequate viscosity to prevent the adhesive from being pressed out of the joint. HXTAL will be your best choice for these types of bonds. The same is true when bonding disparate materials with different coefficients of thermal expansion such as glass to metal or glass to stone. XTR is inadequate for this type of bond and HXTAL is the best choice.

Even though XTR cures in a rather speedy 36 hours, you may be tempted to decrease that cure time by various methods. Attempts to speed up the set of XTR must be approached with great caution! *NEVER, NEVER* attempt to heat freshly mixed XTR with an open flame, a heat lamp, a hot plate, a hair dryer or similar heating devices. Because of their high temperatures, XTR will begin to cure unevenly at the surface of the container and, despite your confidence in your stirring means, the XTR will frequently overheat and may even take fire! Even if you do not see evidence of overheating, you will create an uneven mixture of XTR where part of the mixture is more fully cured than other parts where the curing reaction may not have even started. Such is the route to trouble!

It is possible to reduce total curing time by placing the artifact in a warm 90°–100°F area (most often used is a wooden cabinet with a light bulb or two installed plus a dial style thermometer poked in from outside) for a 12 hour period. Once the piece has been in the box for 12 hours, remove it and let it cool to room temperature for 8 hours. This will successfully give you a 90% bond cure in 20 hours.

Tips for typical usage process on XTR-311

Our experiences with XTR-311 epoxy as with other adhesives have shown us that the process of cleaning the glass, and method of curing the glue is a significant source of success or problems. We have found this technique to be the best method to clean, prepare and glue the glass surfaces:

1. Wash the glass with warm soapy water (don't use window cleaners as they contain surfactants which will contaminate the glass surface).
2. Immediately after washing, rub the glass surface with wet whiting to remove any soap residues. This will not scratch the glass surface. (Whiting is calcium carbonate, also called talc, and is usually available from a ceramic supply company). Rinse well and dry well, of course!

3. Lastly, clean the glass surface with a lint free towel and pure isopropyl alcohol (IPA). An acceptable IPA is available from drug stores @ 70% IPA concentration, or they can probably order 99% IPA that would be the best cleaner (Don't use rubbing alcohol as they generally have oils the mixture which will also contaminate the glass surface!).
4. A-1100 pre-treatment is a necessary step for maximum bond strength between the XTR-311 and the glass. Simply hand rub the glass surface with a lint-free wipe that has been wetted with the a-1100 aminosilane. The A-1100 is in a 99.99% pure IPA solution that will leave an "oily" looking film on the surface of the glass as the IPA evaporates. That film is the A-1100 and it must stay on the glass! It will "disappear" in the glue joint as it makes the XTR-311 truly bond to the glass with the most strength possible! The glass should then be bonded as soon as possible after applying the A-1100 (not recommended to wait more than 15–20 minutes).
5. Curing—Epoxies begin to cure the instant the resin and the hardener is mixed, that's chemistry for you. XTR-311 cures (or sets) slowly. XTR-311 takes 36 hours to cure but we suggest allowing about 2 days at room temperature, or about 1 day if the temperature is raised to about 90°–100°F. (We place the glass to be cured on a shelf in a wooden box with 1 light bulb beneath the shelf. This provides sufficiently gentle heat to accelerate the cure time of XTR-311). Be sure it does not get too hot! After 18–24 hours in the "warm-box" let it stand until thoroughly cooled to room temperature (over night is good!) before the grinding and polishing of glue joints. These "warm temperature" cures do not alter the glue quality, although excessive temperature can cause the glue to turn slightly yellow in color.

We are always ready to help customers with XTR problems. XTR is a hi-tech glue and cannot be handled casually if serious results are required. Never hesitate to call us!

PHYSICAL PROPERTIES	
SPECIFIC GRAVITY	1.15
VISCOSITY, CPS MIXED	500
MIX RATIO	10:3
INDEX OF REFRACTION	1.51
SHORE D. HARDNESS	82

This information is provided without warranty regarding the results to be obtained from the use of HXTAL by the end user. User must determine suitability of this product for the intended application and assume all risk and liability in connection therewith

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