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Electrical Insulation

**Technical Information**
**Electronic and Engineering Materials & Secondary Insulation**

# TI - 4001
# Unsaturated Polyester Monomer Resin (UPE) Maintenance

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## Single Component Unsaturated Polyester Monomer Resin

Single component Unsaturated Polyester Monomer Resin (UPE) for dip or VPI applications are supplied with the necessary latent hardener added to minimize customer handling.

Single component UPE resins normal cure cycle is 2 hours @ 149°C(300°F) or 1 hour @ 177°C (350°F), dependent upon the latent hardener used. UPE resins are radical cure mechanisms that require the use of inhibitors to insure stability in storage and processing tanks.

## Plural Component Unsaturated Polyester Monomer Resin

Plural Component UPE systems require addition of hardener prior to use, but also need to be stored properly to minimize shelf life reduction. Plural component UPE resins are typically used for trickle and roll through applications. Plural component UPE resins typically have longer shelf lives than single component UPE.

Plural component UPE resins have a variety of cure schedules. These schedules range from room temperature cure of 15 minutes to 24 hours at 25°C(77°F) or oven cures of 20 minutes @ 120°C (250°F) to 1hour @ 150°C(302°F). See the technical data sheet for the specifics cure schedule.

## Temperature and Unsaturated Polyester Monomer Resin

Exposure to heat is a major cause of UPE resin instability. In the summer months, temperature is not only a problem in the processing area, but in transportation and storage. Many tanks do not have chillers, so when hot parts are processed in a non-cooled tank, the addition of monomer and inhibitor is critical. Heat will cause the viscosity to increase and gel time to decrease. Regular agitation of the tank will help provide a constant temperature throughout the resin and eliminate potential hot spots in the area where parts are dipped. For VPI tanks it is advisable, to break the vacuum with nitrogen, and then, pressurize with dry air. After the material is returned to the holding tank it is recommended to mix for 15 minutes to distribute the heat and oxygen throughout the resin. Field history has shown that UPE resins in tanks maintained at around 20–25°C (70-77°F) or lower have much better stability than tanks allowed to drift up to 32 – 38°C (90-100ºF) and higher. Keeping UPE resin cool minimizes monomer loss and reduction of active inhibitor. Storage at lower temperatures 5-10°C (40 – 50°F) can improve shelf life where as higher temperatures 32 – 38°C (90-100ºF) reduces shelf life.

## Oxygen and Filled/Unfilled Unsaturated Polyester Monomer Resin

A tip for insuring the quality of the material, especially ones with inorganic fillers, is to rotate the containers from top to bottom periodically to allow oxygen to be continually mixed into the resin. This has two benefits: it minimizes settling of the inorganic filler and allows inhibitors to come in contact with oxygen. Always properly mix before using, which insures a homogenous material and allows oxygen into the system. Most inhibitors need oxygen, so mixing allows oxygen to be distributed throughout the resin system.

## Tank Sample Program

To keep a tank of UPE resin as stable as possible; it should be monitored as the outside temperature changes. In the warmer part of the year, it is advisable to adjust your tank to the lowest viscosity and longest acceptable gel time. In the cooler part of the year, allow the tank to adjust to an acceptable viscosity and gel time while maintaining your specifications.

The key to good product stewardship is proper maintenance, replenishment, viscosity, filtration and gel time adjustment. Good product stewardship is to utilize ELANTAS PDG, Inc.'s free tank sample maintenance program. ELANTAS PDG, Inc. will review and advise of any necessary adjustments based on the tested sample to keep your tank in proper working order.

## Tank Preparation/Maintenance

Tank maintenance is critical to long term stability. The following recommendations will aide in maintaining the UPE resin for long term usage:

-Coat the tank with an epoxy coating prior to filling to minimize contact with steel surfaces; especially for new tanks (See www.smstank.com). The steel tank surface can cause premature gelation of the monomer by negatively affecting the inhibitors.

-Filter the material regularly to minimize contaminates and gel particles in the resin system.

-If the tank is not coated, clean the tank and filter the material at least once a year.

-Replenishment of 10% per month is recommended to keep the resin fresh and stable.

## Tanks, Couplings and Transfer Lines

Active metals; brass, copper, Zinc (galvanized) should not be used because these metals or alloys will react with the UPE creating compounds that will affect cure, color or shelf life. Cast iron or stainless steel is satisfactory for use if designed for end use.

## Conclusion

Review of Unsaturated Polyester Monomer Resin (UPE) handling and storage temperature, filtration, tank maintenance with the ELANTAS PDG, Inc. tank sample maintenance program the UPE resin will provide you quality, extend product life and protect your investment. Please do not hesitate to contact ELANTAS PDG, Inc. Technical Service if you have any questions:

Phone number 1.314.621.5700 Extension 717 or 1.800.325.7492 Extension 717

The above properties are typical values and are not intended for specification use.