Thermoset® EP-20 Epoxy Resin

Handling/Application Notes

Thermoset® EP-20 epoxy resin is a general purpose, unfilled epoxy resin formulated for use with several Thermoset hardeners to obtain a variety of handling and cured properties. Thermoset EP-20 epoxy resin can be used in many applications including adhesive, laminating and electrical/electronic insulation.

Handling Recommendations:

Thermoset EP-20 resin requires mixing after sitting for long periods of time. Settling occurs during storage and shipment, thus it is critical to mix the resin side prior to dispensing or transferring into a meter/mix/dispense unit.

Typical mechanical agitation would include:

- Utilizing a pail or drum roller to gently re-suspend the settled material without incorporating air. Typical rolling time for material container is 30-90 minutes. Check for sufficient mixing by scraping the bottom of the drum or pail after rolling with a clean, dry spatula.
- A closed chamber, gyroscopic mixer can be utilized to mix Thermoset EP-20 resin. Common industrial paint shakers work well and help mitigate air entrapment. Typically 4-5 minutes on the paint shaker is enough time to help re-suspend the settled material.

Application Recommendations:

Mixing – Transfer amount of resin needed to a clean container and add proper amount of hardener by weight. Thoroughly mix resin and hardener together. Automatic meter/mix/dispense equipment may be used for high volume production. Unless a closed-chamber mechanical mixer is used, air may be introduced when catalyzing the mixture. Electrical properties of the epoxy are best when air bubbles and voids are minimized. Therefore, in extremely high voltage or other critical applications, vacuuming may be appropriate.

Dispense Equipment Recommendations – Due to the low viscosity of Thermoset EP-20 epoxy system, it is recommended to have agitation in the holding tanks of the MMD unit. Recirculation is also recommended so that material does not settle in the lines during down time. The colorant within Thermoset EP-20 resin is prone to settling quickly without agitation. The materials, coatings, seal, and type of metering should be selected after the material is identified. Using existing equipment is possible, but only through communication with the MMD supplier.

Hoses – The hoses for the MMD unit should be chosen to help balance pressure between the higher viscosity resin and lower viscosity hardener. Hoses should also balance volume with respect to the mix ratio.

Dispense Speed and Pressure – MMD equipment varies widely, as each manufacture's design is different. The dispense speed and pressure settings will be unique for the MMD set up and production speed. Parker Lord cannot make specific recommendations regarding dispense speed and pressure. It is recommend to work with the MMD supplier to dial in the correct settings.

Curing – Cure time will vary depending on hardener used. Refer to the associated cure schedule based on the Parker Lord technical data sheet for Thermoset EP-20 resin. This time-at temperature profile refers to the time the material should be allowed to cure once it reaches the target temperature. Allowance should be made for oven ramp rates, parts with large thermal mass and other circumstances that may delay material reaching the target temperature.

Quality Control Recommendations:

Mix Ratio Checks – At least once a day (preferably at the start of each shift); perform a mix ratio check on each MMD unit dispensing Thermoset EP-20 epoxy system. Simultaneously dispense the resin and hardener into separate cups, and then record the weight of each. The weights should be within ± 5% of the targeted weight ratio of resin to hardener. It is advised to keep a running chart of the mix ratio checks. This can help identify when normal maintenance of the MMD unit needs to be performed.

Switching Materials – When transitioning from one product to another, it is important to clean the MMD unit. The standard process is a complete tear down, including replacing hoses. Working with the equipment supplier and a Parker Lord Application Engineer is suggested when switching materials.

Troubleshooting Recommendations:

Uncured Material – If dispensed material does not cure fully, a few things can be checked:

- Verify there is not a material issue – circumvent the dispensing unit by pulling material directly from the pail/drum/holding tank. Mix material by hand using the appropriate ratio, according to what hardener is used. If this cures, there is an issue with the dispense equipment. If it does not cure, contact Parker Lord.
- Dispense a bead or length of material from the MMD unit onto a disposable piece of plastic or aluminum foil – avoid paper products that can absorb the liquid resin. Monitor for cure. If there is a cure issue at the start of the bead, but not at the end, this can indicate lead/lag issue with the MMD unit. Unequalized pressure between the resin and hardener can cause a quick surge or burst at initial trigger that causes a momentary off-ratio condition.
- Dispense a shot of material into a cup and cure. Cross-section the cup and look at the appearance:
  - » Evenly distributed, thin striations indicate material is not properly mixed.
  - » Thick areas of uncured material between fully cured sections can indicate a few things: a flow or pressure disruption, air pockets in the line or displacement area, or a blockage in the line.

Improper Mixing – If thin striations are present, improper mixing is causing the incomplete cure. First, ensure both the resin and hardener are properly re-dispersed prior to using on the dispense equipment. Second, use a mix tip with more elements to increase mixing of the resin and hardener.

Flow Disruptions – Monitor system pressures to identify flow disruptions early on. If there are noticeable flow disruptions during dispensing, check the lines for blockages. Ensure the material is recirculated to prevent settling. Ensure air is not being pulled into the MMD lines, either at the pistons or at other line connections. Ensure the material has adequate time to refill displacement volumes upon dispensing.

Lead/Lag – Lead/lag may have significant effects on the final cured product. If lead/lag is noticed, work with the MMD supplier to mitigate. This may be a setting in the software or a physical adjustment to the unit.

Cautionary Information:

Before using this or any Parker Lord product, refer to the Safety Data Sheet (SDS) and label for safe use and handling instructions.

For industrial/commercial use only. Must be applied by trained personnel only. Not to be used in household applications. Not for consumer use.

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