

Thermoset 311 Epoxy Encapsulant

Description

LORD Thermoset 311 epoxy encapsulant is a two-component, filled epoxy system designed for electrical and electronic applications requiring high operating temperatures. Thermoset 311 encapsulant provides a semi-rigid epoxy system for use in applications where high thermal shock is expected. With preheating, encapsulant can be used for vacuum impregnation applications.

Features and Benefits

High Temperature Electrical Performance – exhibits excellent electrical properties at operating temperatures from -55°C to 155°C.

Environmentally Resistant – provides excellent resistance to thermal shock; provides protection of electrical devices exposed to harsh environmental conditions.

Durable – exhibits very low weight loss over extended periods at elevated temperatures.

Application

Mixing – Thoroughly mix each component prior to combining resin and hardener. Thermoset 311 resin may be preheated to facilitate mixing. Preheating will shorten working life of material.

Mix Thermoset 311 resin with Thermoset 311 hardener at a 100:100 ratio, by weight (100:115 ratio, by volume). Automatic meter/mix/dispense equipment may be used for high volume production.

Unless a closed-chamber mechanical mixer is used, air may be introduced into the encapsulant system either during mixing or when catalyzing the mixture. Electrical properties of the epoxy encapsulant are best when air bubbles and voids are minimized. Therefore, in high voltage or other critical applications, vacuuming may be appropriate.

Applying – Apply encapsulant using handheld cartridges or automatic meter/mix/dispense equipment.

If vacuuming is necessary for the application, mixed encapsulant should be deaired in a container large enough to allow for expansion from two to five times the original volume. A vacuum of 2mm Hg for two to five minutes is generally adequate for small (one quart or less) batches. Larger batches may require longer vacuuming, lower pressures (<2mm Hg), or introduction of the encapsulant into the chamber in thin streams. Once the encapsulant has been adequately deaired, the vacuum should be slowly released.

Typical Properties*

	311 Resin	311 Hardener	Mixed
Appearance	Black Liquid	Tan Liquid	Black Liquid
Viscosity, cps @ 25°C	29,500	15,000	20,000
Specific Gravity @ 25°C	1.5	1.34	1.41
Gel Time, min @ 121°C	–	–	35
Working Life, days @ 25°C	–	–	2-3

*Data is typical and not to be used for specification purposes.

LORD TECHNICAL DATA

Curing – Allow encapsulant to cure for 16-24 hours at 75°C, or for 6-8 hours at 95°C, or for 2-3 hours at 120°C. 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.

Typical Cured Properties**

Volume Resistivity, ohm-cm @ 25°C ASTM D 257	8.0 x 10 ¹⁵
Coefficient of Linear Thermal Expansion, ppm/°C	68
Hardness Shore D, ASTM D 2240	77
Tensile Strength, psi ASTM D 638	2300
Elongation at Break, % ASTM D 638	65
Moisture Absorption @ 25°C 24 hours, ASTM D 570	0.26
Dielectric Strength, V/mil ASTM D 149	380
Dielectric Constant @ 25°C 1 MHz, ASTM D 150	3.4
Dissipation Factor @ 25°C 1 MHz, ASTM D 150	0.017

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Cure schedule of 2 hours at 120°C.

Values stated in this technical data sheet represent typical values as not all tests are run on each lot of material produced. For formalized product specifications for specific product end uses, contact the Customer Support Center.

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Cleanup – Disposable containers and utensils are recommended when working with epoxies. However, when disposable materials are impractical, uncured encapsulant can be removed by cleaning equipment with solvent. Solvent-cleaned utensils should be thoroughly dried before reuse; any remaining solvent can contaminate the next mixture.

Shelf Life/Storage

Shelf life of each component is six months from date of manufacture when stored at 25°C in original, unopened container. Each component must be periodically rotated within its container to minimize settling.

Cautionary Information

Before using this or any 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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