

Optically Clear Epoxy, Encapsulating & Potting Compound

Description

832WC *potting and encapsulating compound* is a general purpose, water-clear, hard, two-part epoxy that offers extreme environmental, mechanical and physical protection for printed circuit boards and electronic assemblies.

This product is designed for applications where high clarity is required. It does not yellow when exposed to UV light; it maintains clarity in applications with service temperatures up to 65 °C (149 °F) and intermittent exposures up to 100 °C (212 °F). It also provides excellent electrical insulation and protects circuit board and other electronic devices from static discharges, vibration, abrasion, thermal shock, environmental humidity, salt water, fungus, and many harsh chemicals.

This epoxy has a convenient 2:1 volume mix ratio, making it compatible with most dispensing equipment. 832WC can be cured at room temperature or higher.

Features and Benefits

- *Optically clear color (allows visual inspection)*
- *UV light stable (minimal yellowing)*
- *Very low mixed viscosity of 980 cP*
- *Convenient 2A:1B volume mix ratio*
- *Excellent electrical insulating characteristics*
- *Extremely high compressive and tensile strength*
- *Good adhesion to a wide variety of substrates including metals, composites, glass, ceramics, and many plastics*
- *Broad service temperature range -40 to 140 °C (-40 to 284 °F)*
- *Extreme resistance to water and humidity (allows for submersion where needed)*
- *Solvent-free*

Usage Parameters

| Properties | Value |
|-----------------------------|--------|
| Working life @22 °C [72 °F] | 1 h |
| Shelf life | 5 y |
| Full cure @22 °C [72 °F] | 72 h |
| Full Cure @65 °C [149 °F] | 2 h |
| Full cure @80 °C [176 °F] | 1 h |
| Full Cure @100 °C [212 °F] | 30 min |

Temperature Ranges

| Properties | Value |
|--|-------------------------------|
| Constant service temperature | -40 to 140 °C [-40 to 284 °F] |
| Intermittent temperature limit ^{a)} | -50 to 155 °C [-58 to 311 °F] |
| Storage temperature of unmixed parts | 16 to 27 °C [61 to 81 °F] |

a) Temperature range that can be withstood for short periods without sustaining damage.

Cured Properties

| Physical Properties | Method | Value ^{a)} |
|--------------------------------------|-------------------|--|
| Color | Visual | Optically clear |
| Density @22 °C [72 °F] | ASTM D 792 | 1.06 g/mL |
| Hardness | Shore D Durometer | 82D |
| Tensile strength | ASTM D 638 | 10 N/mm ² [1 500 lb/in ²] |
| Compressive strength | ASTM D 695 | 160 N/mm ² [22 800 lb/in ²] |
| Lap shear strength (aluminum) | ASTM D 1002 | 6.8 N/mm ² [980 lb/in ²] |
| Lap shear strength (brass) | ASTM D 1002 | 3.8 N/mm ² [560 lb/in ²] |
| Lap shear strength (copper) | ASTM D 1002 | 2.9 N/mm ² [420 lb/in ²] |
| Lap shear strength (stainless steel) | ASTM D 1002 | 3.3 N/mm ² [480 lb/in ²] |
| Lap shear strength (ABS) | ASTM D 1002 | 1.5 N/mm ² [220 lb/in ²] |
| Lap shear strength (polycarbonate) | ASTM D 1002 | 2.1 N/mm ² [300 lb/in ²] |
| Refractive index | ASTM D 1218 | 1.53 |

Note: Specifications are for epoxy samples cured at 80 °C for 1 h and conditioned at ambient temperature and humidity.

a) N/mm² = mPa; lb/in² = psi

Cured Properties

| Electrical Properties ^{a)} | Method | Value |
|--|-----------------------------|---|
| Breakdown voltage @2.3 mm | ASTM D 149 | 41 000 V [41 kV] |
| Dielectric strength @2.3 mm | ASTM D 149 | 465 V/mil [18 kV/mm] |
| Breakdown voltage @3.175 mm [1/8"] | Reference fit ^{a)} | 49 000 V [49 kV] |
| Dielectric strength @3.175 mm [1/8"] | Reference fit ^{a)} | 394 V/mil [16 kV/mm] |
| Volume resistivity | ASTM D 257 | $1.6 \times 10^{17} \Omega \cdot \text{cm}$ |
| Volume conductivity | ASTM D 257 | $6.3 \times 10^{-18} \text{ S/cm}$ |
| Dielectric dissipation, D @1 MHz | ASTM D 150-11 | 0.028 |
| Dielectric constant, k' @1 MHz | ASTM D 150-11 | 3.23 |
| Thermal Properties | Method | Value |
| Glass transition temperature (T_g) | ASTM E 831 | 33 °C [91 °F] |
| CTE ^{b)} prior T_g after T_g | ASTM E 831 ASTM E 831 | 80 ppm/°C [176 ppm/°F] 192 ppm/°C [378 ppm/°F] |

Note: Specifications are for epoxy samples cured at 80 °C for 1 h and conditioned at ambient temperature and humidity.

a) To allow comparison between products, the dielectric strength was recalculated with the Tauscher equation fitted to 5 experimental values and extrapolated to a standard thickness of 1/8" (3.175 mm).

b) Coefficient of Thermal Expansion (CTE) units are in ppm/°C = in/in/°C × 10⁻⁶ = unit/unit/°C × 10⁻⁶

Uncured Properties

| Physical Properties | Mixture (A:B) |
|--------------------------|----------------------------------|
| Color | Clear |
| Viscosity @25 °C [77 °F] | 980 cP [0.98 Pa·s] ^{a)} |
| Density | 1.06 g/mL |
| Mix ratio by volume | 2:1 |
| Mix ratio by weight | 2:1 |

a) Brookfield viscometer at 100 rpm with spindle LV S63

| Physical Properties | Part A | Part B |
|--------------------------|------------------------------------|----------------------------------|
| Color | Clear | Clear |
| Viscosity @25 °C [77 °F] | 2 860 cP [2.86 Pa·s] ^{b)} | 340 cP [0.34 Pa·s] ^{c)} |
| Density | 1.09 g/mL | 1.03 g/mL |
| Odor | Mild | Ammonia-like |

b) Brookfield viscometer at 100 rpm with spindle LV S64

c) Brookfield viscometer at 60 rpm with spindle LV S62

Compatibility

Adhesion—As seen in the substrate adhesion table, 832WC epoxy adheres to most plastics and metals used to house printed circuit assemblies; however, it is not compatible with contaminants like water, oil, or greasy flux residues that may affect adhesion. If contamination is present, first clean the surface to be coated with MG Chemicals 824 Isopropyl Alcohol.

Storage

Store between 16 and 27 °C [61 and 81 °F] in a dry area, away from sunlight. Storage below 16 °C [61 °F] can result in crystallization.

If crystallization occurs, reconstitute the product to its original state by temporarily warming it to between 50 and 60 °C [122 and 140 °F]. To ensure full homogeneity, stir the warm product thoroughly. Make sure to reincorporate all settled material, close the lid, and then let cool before use.

Health and Safety

Please see the 832WC Safety Data Sheet (SDS) parts A and B for further details on transportation, storage, handling, safety guidelines, and regulatory compliance.

Substrate Adhesion (In Decreasing Order)

| Physical Properties | Adhesion | |
|---------------------|----------|---------------|
| Aluminum | Stronger | |
| Steel | ↓ | |
| Fiberglass | | |
| Wood | | |
| Paper, Fiber | | |
| Glass | | |
| Rubber | | |
| Polycarbonate | | |
| Acrylic | | Weaker |
| Polypropylene | | Does not bond |

Application Instructions

For best results, follow the procedure below.

Manual mixing:

1. Measure 2 parts by volume of part A, and pour into the mixing container. Ensure all contents are transferred by scraping the container.
2. Measure 1 part by volume of part B, and pour slowly into the mixing container while stirring. Ensure all contents are transferred by scraping the container.
3. Thoroughly mix parts A and B together.
4. Let sit for 15 minutes to de-air.
—OR—
Put in a vacuum chamber at 25 inHg for 2 minutes to de-air.
7. If bubbles are present at the top, break and stir them gently with the mixing paddle.
8. Pour the mixture into a container holding the components to be protected.
9. Close the part A and B containers tightly between uses to prevent skinning.

Attention!

Mixing > 500 g at a time decreases working life and can lead to a flash cure. Limit the size of hand-mixed batches. For large production volumes, contact MG Chemicals Technical Support for assistance.

Cure Instructions

Room temperature cure:

- Let cure at room temperature for 72 hours.

Heat cure:

- Put in oven at 65 °C [149 °F] for 2 hours.
—OR—
- Put in oven at 80 °C [176 °F] for 1 hour.
—OR—
- Put in oven at 100 °C [212 °F] for 30 minutes.

Attention!

Due to exothermic reaction, heat cure temperatures should be at least 25% below the maximum temperature the most fragile PCB component can tolerate. For larger potting blocks, reduce heat cure temperature by greater margins.

Packaging and Supporting Products

| Cat. No. | Packaging | Net Volume | Net Weight | Packaging Weight |
|-------------|--------------|---------------------|-------------------|-------------------|
| 832WC-375ML | 2 Bottle kit | 375 mL [12.6 fl oz] | 401 g [14.1 oz] | 452 g [1.00 lb] |
| 832WC-3L | 3 Can kit | 2.7 L [2.85 qt] | 2.89 kg [6.37 lb] | 3.25 kg [7.17 lb] |
| 832WC-12L | 3 Can kit | 10.8 L [2.88 gal] | 11.5 kg [25.5 lb] | — |
| 832WC-60L | 3 Pail kit | 60 L [16 gal] | 64.2 kg [141 lb] | — |

Technical Support

Please contact us regarding any questions, suggestions for improvements, or problems with this product. Application notes, instructions and FAQs are located at www.mgchemicals.com.

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