# High Temperature Epoxy, Encapsulating & Potting Compound

## Description

832HT potting and encapsulating compound is a general purpose, hard, black, 2-part epoxy that offers extreme environmental, mechanical and physical protection for printed circuit boards and electronic assemblies.

This product is designed for high temperature applications and is especially useful when extreme physical strength and chemical resistance are required. It also provides excellent electrical insulation and protects components from static discharges, vibration, abrasion, thermal shock, environmental humidity, salt water, fungus, and many harsh chemicals.

832HT can be cured at room temperature or higher.

## Features and Benefits

- *Suitable for very high temperature applications*
- *1.6A:1B volume mix ratio*
- *Extreme chemical resistance*
- *Extremely high compressive and tensile strength*
- *Excellent adhesion to a wide variety of substrates including metals, composites, glass, ceramics, and many plastics*
- *Excellent electrical insulating characteristics*
- *Very broad service temperature range -40 to 225 °C (-40 to 437 °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] | 24 h |
| Full cure @65 °C [149 °F] | 1 h |
| Full cure @80 °C [176 °F] | 30 min |
| Full cure @100 °C [212 °F] | 15 min |

## Temperature Ranges

| Properties | Value |
|---|---|
| Constant service temperature | -40 to 225 °C [-40 to 437 °F] |
| Maximum intermittent temperature [a)] | 250 °C [482 °F] |
| Storage temperature of unmixed parts | 16 to 27 °C [61 to 81 °F] |

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

## Cured Properties

| Physical Properties | Method | Value [a)] |
|---|---|---|
| Color | Visual | Black |
| Density @22 °C [72 °F] | ASTM D 792 | 1.10 g/mL |
| Hardness | Shore D Durometer | 87D |
| Tensile strength | ASTM D 638 | 48 $N/mm^2$ [7 000 $lb/in^2$] |
| Compressive strength | ASTM D 695 | 130 $N/mm^2$ [19 100 $lb/in^2$] |
| Lap shear strength (aluminum) | ASTM D 1002 | 8.3 $N/mm^2$ [1 200 $lb/in^2$] |
| Lap shear strength (brass) | ASTM D 1002 | 13 $N/mm^2$ [1 900 $lb/in^2$] |
| Lap shear strength (copper) | ASTM D 1002 | 15 $N/mm^2$ [2 100 $lb/in^2$] |
| Lap shear strength (stainless steel) | ASTM D 1002 | 15 $N/mm^2$ [2 100 $lb/in^2$] |
| Flexural strength | ASTM D 790 | 101 $N/mm^2$ [14 600 $lb/in^2$] |
| Flexural modulus | ASTM D 790 | 2 750 $N/mm^2$ [399 000 $lb/in^2$] |

*Note: Specifications are for epoxy samples cured at 65 °C for 1 h and conditioned at ambient temperature and humidity.*

**a)** $N/mm^2$ = mPa; $lb/in^2$ = psi

## Cured Properties

| Electrical Properties | Method | Value |
|---|---|---|
| Breakdown voltage @2.7 mm | ASTM D 149 | >50 000 V [>50 kV] |
| Dielectric strength @2.7 mm | ASTM D 149 | >470 V/mil [>18 kV/mm] |
| Breakdown voltage @3.175 mm [1/8"] | Reference fit [a)] | >54 000 [>54 kV] |
| Dielectric strength @3.175 mm [1/8"] | Reference fit [a)] | >430 V/mil [>17 kV/mm] |
| Resistivity | ASTM D 257 | 1 x $10^{13}$ Ω·cm |
| Conductivity | ASTM D 257 | 1 x $10^{-13}$ S/cm |
| Dielectric dissipation, D @1 kHz<br>@10 kHz<br>@1 MHz | ASTM D 150-98<br>ASTM D 150-98<br>ASTM D 150-98 | 0.007<br>0.011<br>0.014 |
| Dielectric constant, k' @1 kHz<br>@10 kHz<br>@1 MHz | ASTM D 150-98<br>ASTM D 150-98<br>ASTM D 150-98 | 2.96<br>2.81<br>2.83 |
| Insulating | — | Yes |
| Conductive | — | No |

*Note: Specifications are for epoxy samples cured at 65 °C for 1 h and conditioned at ambient temperature and humidity.*

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

| Thermal Properties | Method | Value |
|---|---|---|
| Glass transition temperature ($T_g$) | ASTM D 3418 | 89 °C [192 °F] |
| CTE [a] prior $T_g$<br>after $T_g$ | ASTM E 831<br>ASTM E 831 | 86 ppm/°C [187 ppm/°F]<br>152 ppm/°C [306 ppm/°F] |
| Thermal conductivity @25 °C [77 °F] | ASTM E 1461 | 0.27 W/(m·K) |
| Specific heat @25 °C [77 °F] | ASTM E 1461 | 1.6 J/(g·K) |
| Thermal diffusivity @25 °C [77 °F] | ASTM E 1461 | 0.14 $mm^2/s$ |
| Heat Deflection Temperature (HDT) [b] | ASTM D 648 | 54 °C [129 °F] |

*Note: Specifications are for epoxy samples cured at 65 °C for 1 h and conditioned at ambient temperature and humidity.*

**a)** Coefficient of Thermal Expansion (CTE) units are in ppm/°C = in/in/°C × $10^{-6}$ = unit/unit/°C × $10^{-6}$
**b)** HDT of plastic under load of 264 $lb/in^2$

## Uncured Properties

| Physical Properties | Mixture (A:B) |
|---|---|
| Color | Black |
| Viscosity @25 °C [77 °F] | 21 900 cP [21.9 Pa·s] [c] |
| Density | 1.1 g/mL |
| Mix ratio by volume | 1.6:1 |
| Mix ratio by weight | 2:1 |

**c)** Brookfield viscometer at 100 rpm with spindle RV S07

| Physical Properties | Part A | Part B |
|---|---|---|
| Color | Black | Clear, amber tint |
| Viscosity @25 °C [77 °F] | 46 400 cP [46.4 Pa·s] [d] | 6 600 cP [6.6 Pa·s] [d] |
| Density | 1.19 g/mL | 0.96 g/mL |
| Odor | Mild | Musty |

**d)** Brookfield viscometer at 12 rpm with spindle LV S64

## Compatibility

**Adhesion**—As seen in the substrate adhesion table, 832HT 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 or solidification occurs, reconstitute the product by warming to between 55 and 65 °C [131 and 149 °F] until it becomes fully re-liquified. Let the material cool to room temperature before mixing, to prevent flash cure.

## Health and Safety

Please see the 832HT 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. Scrape settled material free from the bottom and sides of the part A container; stir contents until homogenous.
2. Measure 1.7 parts by volume of the pre-stirred part A, and pour into the mixing container. Ensure all contents are transferred by scraping the container.
3. Measure 1 part by volume of the part B, and pour slowly into the mixing container while stirring. Ensure all contents are transferred by scraping the container.
4. Thoroughly mix parts A and B together.
5. Let sit for 15 minutes to de-air.
   *—OR—*
   Put in a vacuum chamber at 25 inHg for 2 minutes to de-air.
6. If bubbles are present at the top, break and stir them gently with the mixing paddle.
7. Pour the mixture into a container holding the components to be protected.
8. 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 24 h.

**Heat cure:**

- Put in oven at 65 °C [149 °F] for 1 h.
  *—OR—*
- Put in oven at 80 °C [176 °F] for 30 min.
  *—OR—*
- Put in oven at 100 °C [212 °F] for 15 min.

**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 | Packaged Weight |
|---|---|---|---|---|
| 832HT-375ML | 2 Bottle kit | 340 mL [11.5 fl oz] | 376 g [12.1 oz] | 526 g [1.16 lb] |
| 832HT-3L | 3 Can kit | 2.3 L [2.43 qt] | 2.54 kg [5.61 lb] | 3.1 kg [6.83 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.

**Email:** support@mgchemicals.com

**Phone:** +(1) 800-340-0772 (Canada, Mexico & USA)
+(1) 905-331-1396 (International)
+(44) 1663 362888 (UK & Europe)
**Fax:** +(1) 905-331-2862 or +(1) 800-340-0773

**Mailing address:**
**Manufacturing & Support**
1210 Corporate Drive
Burlington, Ontario, Canada
L7L 5R6

**Head Office**
9347–193rd Street
Surrey, British Columbia, Canada
V4N 4E7

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