

Black Epoxy, Encapsulating & Potting Compound

Description

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

Due to its low mixed viscosity, 832B can easily penetrate small gaps and cavities. 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.

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

Features and Benefits

- *Convenient 2A:1B volume mix ratio*
- *Low mixed viscosity of 3 300 cP*
- *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*
- *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]	24 h
Full cure @65 °C [149 °F]	1 h
Full cure @80 °C [176 °F]	30 min
Full cure @100 °C [212 °F]	20 min

Temperature Ranges

Properties	Value
Constant service temperature	-40 to 140 °C [-40 to 284 °F]
Maximum intermittent temperature ^{a)}	175 °C [347 °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 @26 °C [79 °F]	ASTM D 792	1.11 g/mL
Hardness	Shore D Durometer	80D
Tensile strength	ASTM D 638	57 N/mm ² [8 250 lb/in ²]
Elongation %	ASTM D 638	3.3%
Lap shear strength (SS 304)	ASTM D 1002	4.2 N/mm ² [606 lb/in ²]
Izod Impact @0.259"	ASTM D 256	0.93 kJ/m ² [0.44 ft·lb/in ²]
Compressive strength	ASTM D 695	155 N/mm ² [22 400 lb/in ²]
Flexural strength	ASTM D 790	114 N/mm ² [16 500 lb/in ²]
Lap shear strength (stainless steel)	ASTM D 1002	17 N/mm ² [2 500 lb/in ²]
Lap shear strength (aluminum)	ASTM D 1002	16 N/mm ² [2 400 lb/in ²]
Lap shear strength (copper)	ASTM D 1002	17 N/mm ² [2 500 lb/in ²]
Lap shear strength (brass)	ASTM D 1002	13 N/mm ² [1 900 lb/in ²]
Lap shear strength (ABS)	ASTM D 1002	3.5 N/mm ² [510 lb/in ²]
Lap shear strength (polycarbonate)	ASTM D 1002	2.3 N/mm ² [330 lb/in ²]

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

a) N/mm² = mPa; lb/in² = psi

Cured Properties

Electrical Properties	Method	Value
Breakdown voltage @2.8 mm	ASTM D 149	51 900 V [51.9 kV]
Dielectric strength @2.8 mm	ASTM D 149	472 V/mil [18.6 kV/mm]
Breakdown voltage @3.175 mm [1/8"]	Reference fit ^{a)}	55 300 V [55.3 kV]
Dielectric strength @3.175 mm [1/8"]	Reference fit ^{a)}	442 V/mil [17.4 kV/mm]
Resistivity	ASTM D 257	$5.3 \times 10^{12} \Omega \cdot \text{cm}$
Conductivity	ASTM D 257	$1.9 \times 10^{-13} \text{ S/cm}$
Dielectric dissipation, D @1 kHz	ASTM D 150-98	0.008
@10 kHz	ASTM D 150-98	0.013
@100 kHz	ASTM D 150-98	0.018
@1 MHz	ASTM D 150-98	0.017
Dielectric constant, k' @1 kHz	ASTM D 150-98	2.95
@10 kHz	ASTM D 150-98	2.89
@100 kHz	ASTM D 150-98	2.83
@1 MHz	ASTM D 150-98	2.77

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).

Cured Properties

Thermal Properties	Method	Value
Glass transition temperature (T _g)	ASTM D 3418	49 °C [120 °F]
CTE ^{a)} prior T _g after T _g	ASTM E 831 ASTM E 831	79 ppm/°C [174 ppm/°F] 196 ppm/°C [385 ppm/°F]
Thermal conductivity @25 °C [77 °F] @50 °C [122 °F] @100 °C [212 °F]	ASTM E 1461 ASTM E 1461 ASTM E 1461	0.26 W/(m·K) 0.26 W/(m·K) 0.30 W/(m·K)
Thermal diffusivity @25 °C [77 °F]	ASTM E 1461	0.11 mm ² /s
Specific heat capacity @25 °C [77 °F]	ASTM E 1461	2.2 J/(g·K)
Heat Deflection Temperature (HDT) ^{b)}	ASTM D 648	47 °C [116 °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 under 1820 kPa [264 lb/in²] load

Uncured Properties

Physical Properties	Mixture (A:B)
Color	Black
Viscosity @20 °C [73 °F]	3 300 cP [3.3 Pa·s] ^{a)}
Density	1.08 g/mL
Mix ratio by volume	2:1
Mix ratio by weight	2.3:1
Solids content (w/w)	99%

a) Brookfield viscometer at 50 rpm with spindle LV S64

Physical Properties	Part A	Part B
Color	Black	Clear, amber
Viscosity @25 °C [77 °F]	2 200 cP [2.2 Pa·s]	5 800 cP [5.8 Pa·s]
Density	1.13 g/mL	0.96 g/mL
Odor	Mild	Musty

Compatibility

Adhesion—As seen in the substrate adhesion table, 832B 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, which may affect adhesion. In case of contamination, first clean the surface to be coated with MG Chemicals 824 Isopropyl Alcohol.

Chemical Resistance— The chemical solvent resistance table presents the percent weight change over the indicated period. The results show low water absorption and a high chemical resistance to water and most ionic species. Softening and swelling occurs for aggressive organic solvents.

Substrate Adhesion (In Decreasing Order)

Physical Properties	Adhesion
Steel	Stronger
Aluminum	
Fiberglass	
Wood	
Glass	
Polycarbonate	
Acrylic	
Polypropylene	Weaker

Chemical Solvent Resistance

Physical Properties	Weight change 3 days	Weight change 45 days
Water	<0.0%	<1%
Hydrochloric acid	<0.0%	<1%
Isopropyl alcohol	0.3%	<1%
Mineral spirits	0.3%	0.3%
Xylene	2%	9%
Ethyl lactate	3%	7%
Iso hexanes	5%	8%
Acetone	7%	a)

a) Destroyed

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

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 the contents until homogenous.
2. Measure 2 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.

Cartridge:

To insert the cartridge in the gun, see the Application Guide section for dispensing accessories.

1. Twist and remove the cap from the cartridge. Do not discard cap.
2. Dispense a small amount to ensure even flow of both parts.
3. (Optional) Attach a static mixer.
 - a. Dispense and discard 20 to 30 mL of the product to ensure a homogeneous mixture.
 - b. After use, dispose of static mixer.
4. Without a static mixer, dispense material on a mixing surface or container, and thoroughly mix parts A and B together.
5. To stop the flow, pull back on the plunger.
6. Clean nozzle to prevent contamination and material buildup.
7. Replace the cap on the cartridge or syringe.

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 20 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.

Dispensing Accessories

Consult the table below for appropriate accessory selection. See the [Application Guide](#) for instructions on using the dispensing accessories.

Cat. No.	Dispensing Gun	Static Mixer
832B-450ML	8DG-450-2-1	8MT-450

Packaging and Supporting Products

Cat. No.	Packaging	Net Volume	Net Weight	Packaged Weight
832B-375ML	2 Bottle kit	375 mL [12.6 fl oz]	403 g [14.2 oz]	0.7 kg [1.5 lb]
832B-450ML	Dual cartridge	450 mL [15.2 fl oz]	484 g [17 oz]	N/A
832B-3L	3 Can kit	2.55 L [0.68 gal]	2.74 kg [1.06 lb]	2.6 kg [5.8 lb]
832B-12L	3 Can kit	10.8 L [2.88 gal]	11.6 kg [25.6 lb]	14 kg [31 lb]
832B-60L	3 Pail kit	60 L [16 gal]	64.6 kg [142 lb]	70 kg [155 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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