

Black 1:1 Epoxy, Encapsulating & Potting Compound

Description

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

Due to its low mixed viscosity, 832HD 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 1:1 volume mix ratio, making it compatible with most dispensing equipment. 832HD can be cured at room temperature or higher.

Features and Benefits

- *Convenient 1A:1B volume mix ratio*
- *Low mixed viscosity of 4 100 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 150 °C (-40 to 302 °F)*
- *Extreme resistance to water and humidity (allows for submersion where needed)*
- *Solvent-free*

Usage Parameters

Properties	Value
Working life @22 °C [72 °F]	45 min
Shelf life	5 y
Full cure @22 °C [72 °F]	24 h
Full cure @65 °C [149 °F]	2 h
Full cure @80 °C [176 °F]	1 h
Full cure @100 °C [212 °F]	20 min

Temperature Ranges

Properties	Value
Constant service temperature	-40 to 150 °C [-40 to 302 °F]
Intermittent temperature limit ^{a)}	-50 to 175 °C [-58 to 347 °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	Black
Density @25 °C [77 °F]	ASTM D 1475	1.07 g/mL
Hardness	Shore D Durometer	80D
Tensile strength	ASTM D 638	32 N/mm ² [4 600 lb/in ²]
Young's Modulus	ASTM D 638	2 100 N/mm ² [300 000 lb/in ²]
Compressive strength	ASTM D 695	75 N/mm ² [11 000 lb/in ²]
Lap shear strength (stainless steel)	ASTM D 1002	21 N/mm ² [3 100 lb/in ²]
Lap shear strength (aluminum)	ASTM D 1002	14 N/mm ² [2 000 lb/in ²]
Lap shear strength (copper)	ASTM D 1002	15 N/mm ² [2 200 lb/in ²]
Lap shear strength (brass)	ASTM D 1002	11 N/mm ² [1 600 lb/in ²]
Lap shear strength (ABS)	ASTM D 1002	3.9 N/mm ² [560 lb/in ²]
Lap shear strength (polycarbonate)	ASTM D 1002	2.1 N/mm ² [300 lb/in ²]

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	Method	Value
Breakdown voltage @2.5 mm	ASTM D 149	41 700 V [41.7 kV]
Dielectric strength @2.5 mm	ASTM D 149	400 V/mil [15.8 kV/mm]
Breakdown voltage @3.175 mm [1/8"]	Reference fit ^{a)}	45 700 V [45.7 kV]
Dielectric strength @3.175 mm [1/8"]	Reference fit ^{a)}	365 V/mil [14.4 kV/mm]
Resistivity	ASTM D 257	1.4 x 10 ¹³ Ω·cm
Conductivity	ASTM D 257	7.1 x 10 ⁻¹⁴ S/cm
Dielectric dissipation, D @1 MHz	ASTM D 150-11	0.041
Dielectric constant, k' @1 MHz	ASTM D 150-11	2.53
Thermal Properties	Method	Value
Glass transition temperature (T _g)	ASTM D 3418	41 °C [106 °F]
CTE ^{b)} prior T _g after T _g	ASTM E 831 ASTM E 831	73 ppm/°C [41 ppm/°F] 207 ppm/°C [115 ppm/°F]
Thermal conductivity @25 °C [77 °F]	ASTM E 1461 92	0.27 W/(m·K)
Thermal diffusivity @25 °C [77 °F]	ASTM E 1461 92	0.12 mm ² /s
Specific heat capacity @25 °C [77 °F]	ASTM E 1269 01	2.0 J/(g·K)

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 Tautscher 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	Black
Viscosity @25 °C [77 °F]	4 100 cP [4.1 Pa·s] ^{a)}
Density	1.04 g/mL
Mix ratio by volume	1:1
Mix ratio by weight	1.22:1

Physical Properties	Part A	Part B
Color	Black	Clear, amber
Viscosity @25 °C [77 °F]	5 900 cP [5.9 Pa·s] ^{a)}	2 300 cP [2.3 Pa·s] ^{b)}
Density	1.15 g/mL	0.95 g/mL
Odor	Mild	Ammonia-like

a) Brookfield viscometer at 100 rpm with spindle LV S64

b) Brookfield viscometer at 50 rpm with spindle LV S63

Compatibility

Adhesion—As seen in the substrate adhesion table, 832HD 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 832HD 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	
Steel	Stronger	
Aluminum		
Copper/Bronze		
Fiberglass		
Wood		
Paper, Fiber		
Glass		
Rubber		
Acrylic		
Polycarbonate		Weaker
Polypropylene		Does not bond
Teflon™	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. Scrape settled material free from the bottom and sides of the part B container; stir contents until homogenous.
3. Measure 1 part by volume of the pre-stirred part A, and pour into the mixing container. Ensure all contents are transferred by scraping the container.
4. Measure 1 part by volume of the pre-stirred part B, and pour slowly into the mixing container while stirring. Ensure all contents are transferred by scraping the container.
5. Thoroughly mix parts A and B together.
6. 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.

Syringe or 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 or syringe. 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 5 to 10 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 2 h.
—OR—
- Put in oven at 80 °C [176 °F] for 1 h.
—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
832HD-25ML	N/A	8MT-25, 8MT-50
832HD-50ML	8DG-50-1-1	8MT-25, 8MT-50
832HD-400ML	8DG-400-1-1	8MT-450
832HD-7.4L	N/A	N/A
832HD-40L	N/A	N/A

Packaging and Supporting Products

Cat. No.	Packaging	Net Volume	Packaged Weight
832HD-25ML	Dual syringe	25 mL [0.8 fl oz]	0.08 kg [0.18 lb]
832HD-50ML	Dual cartridge	50 mL [1.6 fl oz]	0.1 kg [0.23 lb]
832HD-400ML	Dual cartridge	400 mL [13.5 fl oz]	0.62 kg [1.37 lb]
832HD-7.4L	2 Can kit	7.4 L [1.9 gal]	8.5 kg [18.7 lb]
832HD-40L	2 Pail kit	40 L [10 gal]	46.2 kg [102 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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