Black Flexible Epoxy, Encapsulating & Potting Compound

Description

832FX *potting and encapsulating compound* is a flexible, black, 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 minimizing the physical stress on components is critical. It is also good in low temperature and arctic environments, as well as applications that involve temperature cycling or rapid temperature changes. It provides the functionality of silicone, but with the durability and cost-effectiveness of epoxy.

Due to its very low mixed viscosity, it 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. 832FX can be cured at room temperature or higher.

Features and Benefits

- *Very flexible and low modulus*
- *Convenient 1A:1B volume mix ratio*
- *Very low mixed viscosity of 700 cP*
- *High elongation*
- *Good adhesion to a wide variety of substrates including metals, composites, glass, ceramics, and many plastics*
- *Excellent electrical insulating characteristics*
- *Extreme resistance to water and humidity (allows for submersion where needed)*
- *Solvent-free*

Usage Parameters

Properties	Value
Working life @22 °C [72 °F]	2.5 h
Shelf life	5 y
Full cure @22 °C [72 °F]	48 h
Full cure @45 °C [113 °F]	5 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

Note: After heat cure, let stand at room temperature for 30 minutes.

Temperature Ranges

Properties	Value
Constant service temperature	-40 to 140 °C [-40 to 284 °F]
Intermittent temperature limit [a)]	-50 to 150 °C [-58 to 302 °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	1.08 g/mL
Hardness	Shore A Durometer	88A
Tensile strength	ASTM D 638	9.6 N/mm^2 [1 400 lb/in^2]
Elongation %	ASTM D 638	160%
Electrical Properties	**Method**	**Value**
Breakdown voltage @2.3 mm	ASTM D 149	36 300 V [36.3 kV]
Dielectric strength @2.3 mm	ASTM D 149	400 V/mil [15.7 kV/mm]
Breakdown voltage @3.175 mm [1/8"]	Reference fit [b]	42 800 V [42.8 kV]
Dielectric strength @3.175 mm [1/8"]	Reference fit [b]	343 V/mil [13.5 kV/mm]
Volume resistivity @2.4 mm	ASTM D 257	5.8×10^{12} Ω·cm
Volume conductivity @2.4 mm	ASTM D 257	1.7×10^{-13} S/cm
Dielectric dissipation, D @1 MHz	ASTM D 150-11	0.050
Dielectric constant, k' @1 MHz	ASTM D 150-11	3.06

Note: Specifications are for epoxy samples cured at 65 °C for 2 hours and conditioned at ambient temperature and humidity.

a) N/mm^2 = mPa; lb/in^2 = psi
b) 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	8.8 °C [48 °F]
CTE [a] prior T_g after T_g	ASTM E 831 ASTM E 831	114 ppm/°C [237 ppm/°F] 218 ppm/°C [424 ppm/°F]
Thermal conductivity @25 °C [77 °F]	ASTM E 1461 92	0.26 W/(m·K)
Thermal diffusivity @25 °C [77 °F]	ASTM E 1461 92	0.09 mm^2/s
Specific heat capacity @25 °C [77 °F]	ASTM E 1269 01	2.7 J/(g·K)

Note: Specifications are for epoxy samples cured at 65 °C for 2 hours 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}

Uncured Properties

Physical Properties	Mixture (A:B)	
Color	Black	
Viscosity @25 °C [77 °F]	700 cP [0.700 Pa·s] [a]	
Density	1.06 g/mL	
Mix ratio by volume	1:1	
Mix ratio by weight	100:85	
Physical Properties	**Part A**	**Part B**
Color	Black	Clear, amber
Viscosity @25 °C [77 °F]	800 cP [0.800 Pa·s] [a]	165 cP [0.165 Pa·s] [b]
Density	1.13 g/mL	0.98 g/mL
Odor	Mild	Ammonia-like

a) Brookfield viscometer at 30 rpm with spindle LV S62
b) Brookfield viscometer at 30 rpm with spindle LV S61

Compatibility

Adhesion—As seen in the substrate adhesion table, 832FX 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 832FX 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 the contents until homogenous.
2. 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.
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 48 hours.

Heat cure:

- Put in oven at 45 °C [113 °F] for 5 hours.
  —OR—
- Put in oven at 65 °C [149 °F] for 2 hours.
  —OR—
- Put in oven at 80 °C [176 °F] for 1.5 hours.
  —OR—
- Put in oven at 100 °C [212 °F] for 50 minutes.

Note: After heat cure, let stand at room temperature 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	Packaged Weight
832FX-450ML	2 Bottle kit	450 mL [15.2 fl oz]	0.68 kg [1.5 lb]
832FX-1.7L	2 Can kit	1.7 L [57 fl oz]	2.23 kg [5 lb]
832FX-7.4L	2 Pail kit	7.4 L [1.9 gal]	N/A
832FX-40L	2 Pail kit	40 L [10 gal]	N/A

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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