

Black Flexible Epoxy, Encapsulating & Potting Compound

Description

834FX *potting and encapsulating compound* is a black, flexible, flame retardant, thermally conductive 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.

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. 834FX can be cured at room temperature or higher.

Features and Benefits

- *Flexible and high modulus*
- *Meets UL 94V-0—flame retardant*
- *Convenient 1A:1B volume mix ratio*
- *Low exotherm*
- *Low Tg of 0.7 °C (33 °F)*
- *Thermal conductivity of 0.61 W/(m·K)*
- *Good adhesion to a wide variety of substrates including metals, composites, glass, ceramics, and many plastics*
- *Excellent electrical insulating characteristics*
- *Broad service temperature range -50 to 150 °C (-58 to 302 °F)*
- *Contains non-halogenated flame-retardant fillers*
- *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 @65 °C [149 °F]	3 h
Full cure @80 °C [176 °F]	1 h
Full cure @100 °C [212 °F]	30 min

Temperature Ranges

Properties	Value
Constant service temperature	-50 to 150 °C [-58 to 302 °F]
Intermittent temperature limit ^{a)}	-55 to 165 °C [-67 to 329 °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	1.64 g/mL
Hardness	Shore A Durometer	88A
Tensile strength	ASTM D 638	5.3 N/mm ² [770 lb/in ²]
Elongation %	ASTM D 638	35%
Compressive strength	ASTM D 695	14 N/mm ² [1 990 lb/in ²]
Lap shear strength (stainless steel)	ASTM D 1002	3.7 N/mm ² [540 lb/in ²]
Lap shear strength (aluminum)	ASTM D 1002	2.7 N/mm ² [390 lb/in ²]
Lap shear strength (copper)	ASTM D 1002	2.1 N/mm ² [310 lb/in ²]
Lap shear strength (brass)	ASTM D 1002	2.1 N/mm ² [310 lb/in ²]
Lap shear strength (polycarbonate)	ASTM D 1002	1.6 N/mm ² [230 lb/in ²]
Flammability	UL 94	Meets 94 V-0

Note: Specifications are for epoxy samples cured at 80 °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 @2.6 mm	ASTM D 149	36 300 V [36.3 kV]
Dielectric strength @2.6 mm	ASTM D 149	365 V/mil [14.3 kV/mm]
Breakdown voltage @3.175 mm [1/8"]	Reference fit ^{a)}	41 400 V [41.4 kV]
Dielectric strength @3.175 mm [1/8"]	Reference fit ^{a)}	330 V/mil [13.1 kV/mm]
Volume resistivity	ASTM D 257	$7.5 \times 10^{11} \Omega \cdot \text{cm}$
Volume conductivity	ASTM D 257	$1.3 \times 10^{-12} \text{ S/cm}$
Dielectric dissipation, D @1 MHz	ASTM D 150-11	0.044
Dielectric constant, k' @1 MHz	ASTM D 150-11	4.50
Thermal Properties	Method	Value
Glass transition temperature (T _g)	ASTM D 3418	0.7 °C [33 °F]
CTE ^{b)} prior T _g after T _g	ASTM E 831 ASTM E 831	71 ppm/°C [160 ppm/°F] 137 ppm/°C [279 ppm/°F]
Thermal conductivity @25 °C [77 °F] @50 °C [122 °F] @100 °C [212 °F]	ASTM E 1461 92 ASTM E 1461 92 ASTM E 1461 92	0.61 W/(m·K) 0.59 W/(m·K) 0.60 W/(m·K)
Thermal diffusivity @25 °C [77 °F]	ASTM E 1461 92	0.26 mm ² /s
Specific heat capacity @25 °C [77 °F]	ASTM E 1269 01	1.4 J/(g·K)

Note: Specifications are for epoxy samples cured at 80 °C for 1 hour 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	Black
Viscosity @25 °C [77 °F]	10 800 cP [10.8 Pa·s] ^{a)}
Density	1.60 g/mL
Mix ratio by volume	1:1
Mix ratio by weight	1:1

a) Brookfield viscometer at 60 rpm with spindle RV S06

Physical Properties	Part A	Part B
Color	Black	Black
Viscosity @25 °C [77 °F]	4 560 cP [4.56 Pa·s] ^{b)}	4 670 cP [4.67 Pa·s] ^{c)}
Density	1.62 g/mL	1.62 g/mL
Odor	Mild	Mild

b) Brookfield viscometer at 100 rpm with spindle LV S64

c) Brookfield viscometer at 60 rpm with spindle RV S05

Compatibility

Adhesion—As seen in the substrate adhesion table, 834FX 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 834FX 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 >1 kg 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 65 °C [149 °F] for 3 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	Packaged Weights
834FX-450ML	2 Bottle kit	450 mL [15.2 fl oz]	0.94 kg [2 lb]
834FX-1.7L	2 Can kit	1.7 L [1.79 qt]	3.33 kg [7.34 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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