

Description

834FX is a two-part epoxy system that provides extreme environmental protection to printed circuit boards and electronic assemblies by embedding them in a thick durable polymer that is flexible, thermally conductive, and flame retardant.

Unlike most epoxy compounds, 834FX has a very low Tg of 0.7 °C (33 °F). High Tg potting compounds may break solder bonds as they harden and shrink at low temperatures. However, the 834FX puts minimal strain on components during temperature cycling and low temperatures. It effectively provides the functionality of silicone, but with the durability and cost effectiveness of epoxy.

It has a convenient 1:1 mix ratio and the unmixed parts have nearly equivalent viscosities and densities, enabling easy dispensing.

Applications & Usages

834FX is used for potting or encapsulating electronic components and assemblies. It is especially suited for use on surface mount assemblies and other applications where minimizing the physical stress on components is critical. It is also good for low temperature and arctic environments, as well as applications involving temperature cycling or rapid temperature changes.

Benefits and Features

- **Meets UL 94V-0 standard—flame retardant**
- **High thermal conductivity of 0.61 W/(m·K)**
- **Low Tg of 0.7 °C (33 °F)**
- **Mix ratio 1A:1B** compatible with most dispensing equipment
- **Protects electronics from** moisture, corrosion, fungus, thermal shock, and static discharges
- **Broad service temperature range -50 to 150 °C (-58 to 302 °F)**
- **Halogen free**

ENVIRONMENT

- ✓ RoHS
- ✓ REACH compliant

Usage Parameters

Properties	Value
Working Time @22 °C [72 °F] ^{a)}	2.5 h
Shelf Life	1 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

a) Working life and full cure assumes room temperature and 100 g. A 10 °C increase can decrease the pot life by half.

Temperature Ranges

Properties	Value
Constant Service Temperature	-50 to 150 °C [-58 to 302 °F]
Intermittent Temperature Limits ^{b)}	-55 to 165 °C [-67 to 329 °F]
Storage Temperature of Unmixed Parts	16 to 27 °C [61 to 81 °F]

b) Temperature limit for short-term exposure tolerances—not recommended as a sustained or repeated operation condition.

Properties of Cured 834FX

Physical Properties	Method	Value ^{a)}
Color	Visual	Black
Density @25 °C [77 °F]	ASTM D 1475	1.64 g/mL
Hardness	Shore A	88A
Tensile Strength	ASTM D 638	2.5 N/mm ² [360 lb/in ²]
Elongation %	"	21%
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)	"	2.7 N/mm ² [390 lb/in ²]
Lap Shear Strength (Copper)	"	2.1 N/mm ² [310 lb/in ²]
Lap Shear Strength (Brass)	"	2.1 N/mm ² [305 lb/in ²]
Lap Shear Strength (Polycarbonate)	"	1.6 N/mm ² [230 lb/in ²]
Flammability	UL 94	94 V-0
Electrical Properties	Method	Value
Breakdown Voltage @2.6 mm	ASTM D 149	36 300 V
Dielectric Strength @2.6 mm	"	365 V/mil 14.3 kV/mm
Breakdown Voltage @3.175 mm [1/8"]	Reference fit ^{a)}	41 400 V
Dielectric Strength @3.175 mm [1/8"]	"	330 V/mil 13.1 kV/mm
Volume Resistivity	ASTM D 257	7.5 x 10 ¹¹ Ω·cm
Volume Conductivity	"	1.3 x 10 ⁻¹² S/cm
Dielectric Dissipation, D @1 MHz	ASTM D 150-11	0.044
Dielectric Constant, k' @1 MHz	"	4.50
Thermal Properties	Method	Value
Glass Transition Temperature (T _g)	ASTM D 3418	0.7 °C [33 °F]
CTE ^{c)} prior T _g	ASTM E 831	71 ppm/°C
after T _g	"	137 ppm/°C
Thermal Conductivity @25 °C [77 °F]	ASTM E 1461 92	0.61 W/(m·K)
@50 °C [122 °F]	"	0.59 W/(m·K)
@100 °C [212 °F]	"	0.60 W/(m·K)
Thermal Diffusivity @25 °C [77 °F]	"	0.26 mm ² /s
Specific Heat Capacity @25 °C [77 °F]	ASTM E 1269 01	1.44 J/(g·K)

Note: Specifications are for epoxy samples cured at 80 °C for 1 hour, with additional curing time at room temperature for optimal results. For most tests, samples were conditioned at 23 °C and 50% RH.

a) N/mm² = mPa; lb/in² = psi

b) To allow comparison between products, the Tautscher equation was fitted to 5 experimental dielectric strengths and extrapolated to a standard reference thickness of 1/8" (3.175 mm).

c) Coefficient of Thermal Expansion (CTE) units are in ppm/°C = in/in/°C × 10⁻⁶ = unit/unit/°C × 10⁻⁶

Properties of Uncured 834FX

<i>Physical Properties</i>	<i>Mixture</i>	
Color	Black	
Viscosity @25 °C [77 °F]	10 800 cP [10.8 Pa·s] ^{a)}	
Density	1.60 g/mL	
Mix Ratio by weight (A:B)	1:1	
Mix Ratio by volume (A:B)	1:1	
<i>Physical Properties</i>	<i>Part A</i>	<i>Part B</i>
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

a) Brookfield viscometer at 60 RPM with spindle RV S06

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, 834HTC epoxy adheres to most materials found on printed circuit assemblies; however, it is not compatible with contaminants like water, oil, or greasy flux residues which may affect adhesion. If contamination is present, clean the printed circuit assembly with an electronic cleaner such as MG Chemicals 824 Isopropyl Alcohol.

Substrate Adhesion in Decreasing Order

<i>Physical Properties</i>	<i>Adhesion</i>
Steel	Stronger ↓ Weaker
Aluminum	
Copper/Bronze	
Fiberglass	
Wood	
Paper, Fiber	
Glass	
Rubber	
Acrylic	
Polycarbonate	
Polypropylene ^{a)}	
Teflon ^{a)}	

a) Does not bond to polypropylene or Teflon

Storage

Store between 16 and 27 °C [60 and 80 °F] in a dry area away from sunlight. Prolonged storage, or storage at or near freezing temperatures, can result in crystallization.

If crystallization occurs, reconstitute the component to its original state by temporarily warming it to 50 to 60 °C [122 to 140 °F]. To ensure full homogeneity, stir the warm component thoroughly, reincorporating all settled material. Re-secure container lid and let cool before use.

Health and Safety

Please see the 834FX **Safety Data Sheet** (SDS) parts A and B for more details on transportation, storage, handling and other security guidelines.

Wear safety glasses or goggles and disposable polyvinyl chloride, neoprene, or nitrile gloves while handling liquids. Part B in particular causes skin burns, eye damage, and may cause sensitization if exposed over a long period of time. The epoxy is black and will not wash off once cured: wear protective work clothing. Wash hands thoroughly after use or if skin contact occurs. Do not ingest.

Use in well-ventilated area since vapors may cause irritation of the respiratory tract and cause respiratory sensitization to susceptible individuals.

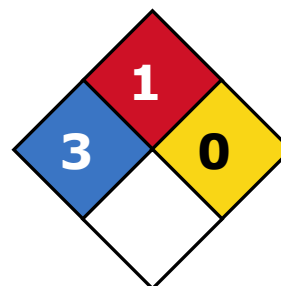
The cured epoxy resin presents no known hazard.

Part A

HMIS® RATING

HEALTH:	* 3
FLAMMABILITY:	1
PHYSICAL HAZARD:	0
PERSONAL PROTECTION:	

NFPA® 704 CODES

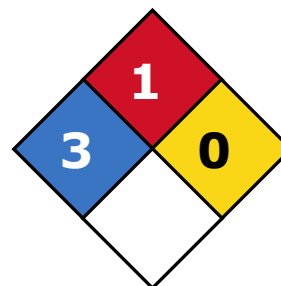


Part B

HMIS® RATING

HEALTH:	* 3
FLAMMABILITY:	1
PHYSICAL HAZARD:	0
PERSONAL PROTECTION:	

NFPA® 704 CODES



Approximate HMIS and NFPA Risk Ratings Legend:

0 (Low or none); 1 (Slight); 2 (Moderate); 3 (Serious); 4 (Severe)

Application Instructions

Follow the procedure below for best results. If you have little or no experience with the 834FX epoxy, please follow the long instructions instead. The short instructions provided here are not suitable for first time users.

To prepare 1:1 (A:B) epoxy mixture

- Scrape any settled material in the **Part A** container; and stir and fold material until homogenous.
- Scrape any settled material in the **Part B** container; and stir and fold material until homogenous.
- Measure **one** part by volume of the pre-stirred **A**, and pour in the mixing container.
- Measure **one** part by volume of the pre-stirred **B**, and slowly pour in the mixing container while stirring.
- Let sit for 15 minutes to de-air.
—OR—
Put in a vacuum chamber, bring to 25 inHg pressure, and wait for 2 minutes to de-air.
- If bubbles are present at top, use the mixing paddle to gently break them.
- Pour mixture into the mold or container containing the components to be encapsulated.

ATTENTION! If the parts have clumped (crystallized), pre-heat at 50 °C [122 °F] until fully re-liquefied. Let cool to room temperature before use.

ATTENTION! Mixing >500 g [0.4 L] of Part B at a time into A decreases working time and promotes flash curing. Use of epoxy mixing machines with static stirrers recommended for large volumes. Limit size of hand-mixed batches.

TIP! Close container tightly between uses to prevent skinning.

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 tolerated by the most fragile PCB component. For larger potting blocks, reduce heat cure temperature by greater margins.



834FX Technical Data Sheet

Black Flexible Epoxy

ISO 9001:2008 Registered Quality System. Burlington, Ontario, CANADA SAI Global File: 004008

834FX

Packaging and Supporting Products

<i>Cat. No.</i>	<i>Packaging</i>	<i>Net Volume</i>		<i>Net Weight</i>		<i>Packaging Weight</i>	
834FX-450ML	Bottle	450 mL	15.2 fl oz	728 g	1.6 lb	TBD	TBD
834FX-1.7L	Can	1.7 L	1.79 qt	2.75 kg	6.06 lb	"	"

TBD=to be determined

Technical Support

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

Warranty

M.G. Chemicals Ltd. warrants this product for 12 months from the date of purchase by the end user. *M.G. Chemicals Ltd.* makes no claims as to shelf life of this product for the warranty. The liability of *M.G. Chemicals Ltd.* whether based on its warranty, contracts, or otherwise, shall in no case include incidental or consequential damage.

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