High Thermal Conductivity Epoxy, Encapsulating & Potting Compound

Description

834HTC *potting and encapsulating compound* is a black, 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 thermal management and self-extinguishing are critical. 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.

834HTC can be cured at room temperature or higher.

Features and Benefits

- *Certified UL 746A (File# E334302)*
- *Thermal conductivity of 0.94 W/(m·K)*
- *Low CTE*
- *Low exotherm*
- *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 -50 to 150 °C (-58 to 302 °F)*
- *Low shrinkage and high dimensional stability*
- *5A:1B volume mix ratio*
- *Contains non-halogenated flame-retardant fillers*
- *Solvent-free*

Usage Parameters

Properties	Value
Working life @22 °C [72 °F]	1.5 h
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]	30 min

Temperature Ranges

Properties	Value
Constant service temperature	-50–150 °C [-58–302 °F]
Intermittent temperature limit [a)]	-55–165 °C [-67–329 °F]
Storage temperature of unmixed parts	16–27 °C [61–81 °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	1.69 g/mL
Hardness	Shore D Durometer	91D
Tensile strength	ASTM D 638	22 N/mm^2 [3 200 lb/in^2]
Compressive strength	ASTM D 695	123 N/mm^2 [17 800 lb/in^2]
Lap shear strength (stainless steel)	ASTM D 1002	6.7 N/mm^2 [970 lb/in^2]
Lap shear strength (aluminum)	ASTM D 1002	4.7 N/mm^2 [690 lb/in^2]
Lap shear strength (copper)	ASTM D 1002	8.4 N/mm^2 [1 200 lb/in^2]
Lap shear strength (brass)	ASTM D 1002	5.0 N/mm^2 [720 lb/in^2]
Lap shear strength (polycarbonate)	ASTM D 1002	1.2 N/mm^2 [170 lb/in^2]
Lap shear strength (ABS)	ASTM D 1002	1.9 N/mm^2 [280 lb/in^2]
Flammability (3 mm thickness)	UL 94	94 V-0

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

a) N/mm^2 = mPa; lb/in^2 = psi

Cured Properties

Electrical Properties	Method	Value
Breakdown voltage @2.4 mm	ASTM D 149	37 500 V [37.5 kV]
Dielectric strength @2.4 mm	ASTM D 149	395 V/mil [15.5 kV/mm]
Breakdown voltage @3.175 mm [1/8"]	Reference fit [a)]	43 100 V [43.1 kV]
Dielectric strength @3.175 mm [1/8"]	Reference fit [a)]	345 V/mil [13.6 kV/mm]
Resistivity	ASTM D 257	3.0 x 10^{13} Ω·cm
Conductivity	ASTM D 257	3.3 x 10^{-14} S/cm
Dielectric dissipation, D @1 MHz	ASTM D 150-11	0.019
Dielectric constant, k´ @1 MHz	ASTM D 150-11	3.91
Thermal Properties	**Method**	**Value**
Glass transition temperature (T_g) [b)]	ASTM D 3418	117 °C [243 °F]
CTE [c)] prior T_g after T_g	ASTM E 831 ASTM E 831	34 ppm/°C [93 ppm/°F] 116 ppm/°C [241 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	0.94 W/(m·K) 0.99 W/(m·K) 0.89 W/(m·K)
Thermal diffusivity @25 °C [77 °F]	ASTM E 1461 92	0.42 mm^2/s
Specific heat capacity @25 °C [77 °F]	ASTM E 1269 01	1.3 J/(g·K)

Note: Specifications are for epoxy samples cured at 65 °C for 2 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) Samples cured at 100 °C for 4 h.
c) 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]	10 500 cP [10.5 Pa·s] a)
Density	1.70 g/mL
Mix ratio by volume	5:1
Mix ratio by weight	10:1

a) Brookfield viscometer at 50 rpm with spindle RV S64

Physical Properties	Part A	Part B
Color	Black	Clear
Viscosity @25 °C [77 °F]	55 900 cP [55.9 Pa·s] b)	24 cP [2.4 Pa·s] c)
Density	1.86 g/mL	0.94 g/mL
Odor	Mild	Mild

b) Brookfield viscometer at 12 rpm with spindle RV S63
c) Brookfield viscometer at 100 rpm with spindle RV S61

Compatibility

Adhesion—As seen in the substrate adhesion table, 834HTC 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 834HTC 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
Copper	Stronger
Steel	
Brass	
Aluminum	
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 5 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 >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 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 30 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.

Packaging and Supporting Products

Cat. No.	Packaging	Net Volume	Net Weight
834HTC-900ML	2 Can kit	900 mL [1.9 pt]	1.53 kg [3.38 lb]
834HTC-4.25L	2 Can kit	4.25 L [4.49 qt]	7.25 kg [15.9 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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