Flame Retardant Epoxy, Encapsulating & Potting Compound

Description

834ATH *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 to offer self-extinguishing and moderate thermal conductivity at an economical price. 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 2:1 volume mix ratio, making it compatible with most dispensing equipment. 834ATH can be cured at room temperature or higher.

Features and Benefits

- *Certified UL 94V-0 (File # E334302)*
- *Compliant with UL 746A*
- *Cost effective*
- *Convenient 2A:1B volume mix ratio*
- *Low exotherm*
- *High compressive and tensile strength*
- *Excellent adhesion to a wide variety of substrates including metals, composites, glass, ceramics, and many plastics*
- *Excellent Comparative Tracking Index (400 to 599 V, PLC=1)*
- *Excellent electrical insulating characteristics*
- *Broad service temperature range of -40 to 175 °C (-40 to 347 °F)*
- *Solvent-free*

Usage Parameters

Properties	Value
Working life @22 °C [72 °F]	2 h
Shelf life	5 y
Full cure @22 °C [72 °F]	24 h
Full cure @80 °C [176 °F]	1 h
Full cure @100 °C [212 °F]	To be determined

Temperature Ranges

Properties	Value
Constant service temperature	-40 to 175 °C [-40 to 347 °F]
Maximum intermittent temperature [a)]	200 °C [392 °F]
Storage temperature of unmixed parts	16 to 27 °C [61 to 81 °F]

a) Temperature 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 792	1.40 g/mL
Hardness	Shore D Durometer	85D
Elongation %	ASTM D 638	6.2%
Tensile strength	ASTM D 638	28 N/mm^2 [4 100 lb/in^2]
Compressive strength	ASTM D 695	100 N/mm^2 [14 500 lb/in^2]
Tensile impact	ASTM D 1822	8.4 kJ/m^2 [4.0 ft·lb/in^2]
Izod impact	ASTM D 256	20 J/m
Lap shear strength (Al alloy 5052)	ASTM D 1002	15 N/mm^2 [2 000 lb/in^2]
Flexural strength	ASTM D 790	51 N/mm^2 [7 400 lb/in^2]
Water absorption (WAB)	ASTM D 570	0.15%
Linear dimension change after 168 h in water	ASTM D 1042	0.0037%

Note: Specifications are for epoxy samples cured at 65 °C for 1 hour and conditioned at ambient temperature and humidity.

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

Cured Properties

Electrical Properties	Method	Value
Breakdown voltage @1.5 mm	ASTM D 149	33 000 V [33 kV]
Dielectric strength @1.5 mm	ASTM D 149	550 V/mil [22 kV/mm]
Breakdown voltage @3.175 mm [1/8"]	Reference fit [a)]	47 000 V [47 kV]
Dielectric strength @3.175 mm [1/8"]	Reference fit [a)]	380 V/mil [15 kV/mm]
Volume resistivity @23 °C [73 °F], 50% RH	ASTM D 257	7×10^{14} Ω·cm
Volume conductivity @23 °C [73 °F], 50% RH	ASTM D 257	1×10^{-15} S/cm
Volume resistivity @35 °C [95 °F], 90% RH	ASTM D 257	2×10^{14} Ω·cm
Volume conductivity @35 °C [95 °F], 90% RH	ASTM D 257	5×10^{-15} S/cm
Dielectric dissipation, D @1 MHz	ASTM D 150-11	0.016
Dielectric constant, k´ @1 MHz	ASTM D 150-11	3.07
Comparative Tracking Index (CTI) Performance Level Class (PLC) = 1	ASTM D 3628	400 to 599 V

Note: Specifications are for epoxy samples cured at 65 °C for 1 hour 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).

Cured Properties

Electrical Properties	Method	Value
Hot Wire Ignition (HWI)	ASTM D 3874, IEC 60695-11-10	120 s
High Voltage Arc Tracking Rate (HVTR)	UL 746A	121 mm/min
High Voltage Arc Resistance to Ignition (HVAR)	UL 746A	300 s
High Voltage, Low Current, Dry Arc Resistance	ASTM D 495	127 s
High-Current Arc Ignition (HAI)	UL 746A	+150 arc
Thermal Properties	**Method**	**Value**
Glass transition temperature (T_g)	ASTM D 3418	51 °C [124 °F]
CTE [a] prior T_g after T_g	ASTM E 831 ASTM E 831	84 ppm/°C [183 ppm/°F] 178 ppm/°C [352ppm/°F]
Thermal conductivity @25 °C [77 °F] @50 °C [122 °F] @100 °C [212 °F]	ASTM E 1461 ASTM E 1461 ASTM E 1461	0.37 W/(m·K) 0.40 W/(m·K) 0.36 W/(m·K)
Thermal diffusivity @25 °C [77 °F]	ASTM E 1461	2.1 x 10^{-7} m^2/s
Specific heat capacity @25 °C [77 °F]	ASTM E 1269 01	1.2 J/(kg·K)
Heat deflection temperature	ASTM D 648	54 °C [129 °F]

Note: Specifications are for epoxy samples cured at 65 °C for 1 hour 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 @20 °C [73 °F]	5 900 cP [5.9 Pa·s] a)
Density	1.38 g/mL
Mix ratio by volume	2:1
Mix ratio by weight	2.3:1

Physical Properties	Part A	Part B
Color	Black	Black
Viscosity @24 °C [73 °F]	4 600 cP [4.6 Pa·s]	12 900 cP [12.9 Pa·s]
Density	1.44 g/mL	1.26 g/mL
Flash Point	150 °C [302 °F]	185 °C [365 °F]
% Solids	~98%	100%
Odor	Mild	Ammonia-like

a) Brookfield viscometer at 50 rpm with spindle LV S64

Compatibility

Adhesion—As seen in the substrate adhesion table, 834ATH 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 834ATH 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
Aluminum	Stronger
Steel	
Fiberglass	
Wood	
Paper, Fiber	
Glass	
Rubber	
Polycarbonate	
Acrylic	
Polypropylene	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 2 parts 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 >2 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 hours.

Heat cure:

- Put in oven at 80 °C [176 °F] for 1 hour.

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
834ATH-375ML	2 Bottle kit	375 mL [12.6 fl oz]	0.66 kg [1.46 lb]
834ATH-3L	3 Can kit	2.55 L [2.69 qt]	4.52 kg [10 lb]
834ATH-60L	3 Pail kit	60 L [16 gal]	85 kg [187 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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834ATH-3L 834ATH-375ML