Description

832TC *potting and encapsulating compound* is a thermally conductive, black, two-part epoxy that offers extreme environmental, mechanical and physical protection for printed circuit boards and electronic assemblies.

832TC is designed for applications where thermal management is a concern. Due to its high thermal conductivity, it protects circuits, by reducing the risk of heat buildup. 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. 832TC can be cured at room temperature or higher.

Benefits and Features

- **Thermal conductivity of 0.68 W/(m·K)**
- **Low exotherm**
- **Convenient 1A:1B volume mix ratio**
- **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**
- **Extreme resistance to water and humidity (allows for submersion where needed)**
- **Solvent-free**

Usage Parameters

Properties	*Value*
Working Time [a)]	2 h
Shelf Life	≥3 y
Full Cure @22 °C [72 °F]	96 h
Full Cure @45 °C [113 °F]	8 h
Full Cure @55 °C [131 °F]	4 h
Full Cure @65 °C [149 °F]	2 h
Full Cure @100 °C [212 °F]	20 min
Full Cure @120 °C [248 °F]	10 min

Working time and full cure assumes room temperature and 100 g. A 10 °C increase can decrease the working time by half.

Temperature Ranges

Properties	*Value*
Constant Service Temperature	-30 to 175 °C [-22 to 347 °F]
Maximum Intermittent Temperature [b)]	200 °C [392 °F]
Storage Temperature of Unmixed Parts	16 to 27 °C [60 to 80 °F]

a) Temperature that components can withstand for short periods without sustaining damage.

Principal Components

Name	CAS Number
Part A: Bis-F Epoxide Resin	*28064-14-4*
Aluminum Oxides	*1344-28-1*
Part B: Curing Polyamide	*68071-65-8*
Triethylene tetramine	*112-24-3*
Aluminum Oxides	*1344-28-1*

Properties of Cured 832TC

Physical Properties	***Method***	***Value*** [a]	
Color	Visual	Black	
Density @26 °C [79 °F]	ASTM D 1475	1.83 g/cm^3	
Hardness	Shore D Durometer	82D	
Tensile Strength	ASTM D 638	18 N/mm^2	[2 700 lb/in^2]
Elongation	ASTM D 638	1.9%	
Shear Strength	ASTM D 732	22 N/mm^2	[3 200 lb/in^2]
Lap Shear Strength (Stainless Steel)	ASTM D 1002	12.6 N/mm^2	[1 830 lb/in^2]
Lap Shear Strength (Aluminum)	ASTM D 1002	16.4 N/mm^2	[2 380 lb/in^2]
Lap Shear Strength (Copper)	ASTM D 1002	12.1 N/mm^2	[1 750 lb/in^2]
Lap Shear Strength (Brass)	ASTM D 1002	14.6 N/mm^2	[2 120 lb/in^2]
Lap Shear Strength (ABS)	ASTM D 1002	1.8 N/mm^2	[260 lb/in^2]
Lap Shear Strength (Polycarbonate)	ASTM D 1002	1.8 N/mm^2	[255 lb/in^2]
Izod Impact [b]	ASTM D 256	1.7 kJ/m^2	[0.80 ft·lb/in]
Compressive Strength	ASTM D 695	29 N/mm^2	[4 100 lb/in^2]
Flexural Strength	ASTM D 790	37 N/mm^2	[5 300 lb/in^2]

Electrical Properties	***Method***	***Value***	
Breakdown Voltage @3.118 mm	ASTM D 149	45.7 kV	
Dielectric Strength @3.118 mm	ASTM D 149	14.7 kV/mm [373 V/mil]	
Breakdown Voltage @3.175 mm [1/8”]	Reference fit [c]	46.2 kV	
Dielectric Strength @3.175 mm [1/8”]	Reference fit [c]	14.6 kV/mm [370 V/mil]	
Volume Resistivity	ASTM D 257	2.6 x 10^{15} Ω·cm	
Surface Resistivity [d]	ASTM D 257	3.2 x 10^{16} Ω	
Comparative Tracking Index	ASTM D 3628	Not established	
Dielectric Dissipation & Constant	—	*dissipation, D*	*constant, k’*
@1 MHz	ASTM D 150-98	0.011	4.41

Note: Specifications are for epoxy samples cured at 65 °C for 2 hours, with additional curing time at room temperature for optimal results. For most tests, samples were conditioned at 23 °C and 50% RH.

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

b) Cantilever beam impact

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

d) The surface (sheet) resistivity unit is commonly referred to as “Ohm per square”

Thermal Properties	Method	Value
Thermal Conductivity	—	0.68 W/(m·K)
Thermal Diffusivity	—	0.38 mm^2/s
Volumetric Specific Heat	—	1.9 $MJ/(m^3·K)$
CTE prior T_g e)	ASTM E 831	66 ppm/°C
after T_g e)	ASTM E 831	167 ppm/°C
Glass Transition Temperature (T_g)	ASTM D 3418	25 °C [77 °F]
Heat Deflection Temperature	ASTM D 648	35.4 °C [95.6 °F]

e) Coefficient of Thermal Expansion (CTE) units are in ppm/°C = in/in/°C × 10^{-6} = unit/unit/°C × 10^{-6}

Properties of Uncured 832TC

Physical Properties	Mixture
Color	Black
Viscosity @20 °C [68 °F]	18 000 cP [18 Pa·s] a)
Density	1.67 g/mL
Mix Ratio by volume (A:B)	1.0:1.0
Mix Ratio by weight (A:B)	1.1:1.0
Solids Content (w/w)	~100%

Physical Properties	Part A	Part B
Color	Black	Black
Viscosity @24 °C [75 °F]	36 000 cP [36 Pa·s] a)	14 000 cP [14 Pa·s] a)
Density	1.73 g/mL	1.61 g/mL
Flash Point	190 °C [374 °F]	93 °C [199 °F]
Odor	Slight Odor	Slight Odor

a) Brookfield viscometer at 100 RPM for Part A and Part B with spindle RV7

Compatibility

Adhesion—As seen in the substrate adhesion table, 832TC 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, which may affect adhesion. In case of contamination, first clean the surface to be coated with MG Chemicals 824 Isopropyl Alcohol.

Substrate Adhesion in Decreasing Order

Physical Properties	*Adhesion*
Aluminum Steel Fiberglass Wood Glass Polycarbonate Acrylic Polypropylene [a)]	Stronger ↓ Weaker

a) Does not bond to polypropylene

Chemical Resistance—The chemical solvent resistance table presents the percent weight change over the indicated period. The results show low water absorption and a high chemical resistance to water and most ionic species. Softening and swelling occurs for aggressive organic solvents.

Chemical Solvent Resistance

Physical Properties	*Weight Change 3 days*
Water	~0 %
Isopropyl alcohol	~0%
Mineral spirits	~0 %
Iso hexanes	~0 %
Hydrochloric Acid	0.5 %
Ethyl Lactate	1 %
Xylene	2 %
Acetone	3 %

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 between 50 and 60 °C [122 and 140 °F]. To ensure full homogeneity, stir the warm component thoroughly, reincorporating all settled material, then re-secure container lid and let cool before use.

Health and Safety

Please see the 832TC **Safety Data Sheet** (SDS) parts A and B for further details on transportation, storage, handling, safety guidelines, and regulatory compliance.

Application Instructions

For best results, follow the procedure below.

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

- Scrape settled material free from the bottom and sides of ***Part A*** container; stir material until homogenous.
- Scrape settled material free from the bottom and sides of ***Part B*** container; stir material until homogenous.
- Measure ***one*** part by volume of the pre-stirred ***A,*** and pour into the mixing container.
- Measure ***one*** part by volume of the pre-stirred ***B***, and pour slowly into 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 the top, break them gently with the mixing paddle.
- Pour mixture into the mold or container holding the components to be encapsulated.
- Close container tightly between uses to prevent skinning.

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

Room temperature cure:

- Let cure at room temperature for 96 hours.

Heat cure:

- Put in oven at 45 °C [113 °F] for 8 hours.
  –OR–
- Put in oven at 55 °C [131 °F] for 4 hours.
  –OR–
- Put in oven at 65 °C [149 °F] for 2 hours.
  –OR–
- Put in oven at 100 °C [212 °F] for 20 minutes.
  –OR–
- Put in oven at 120 °C [149 °F] for 10 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*		*Net Weight*		*Packaged Weight*	
832TC-450ML	Bottle	450 mL	15.2 fl oz	752 g	1.66 lb	910 g	2.01 lb
832TC-2L	Can	1.7 L	0.45 gal	2.84 kg	6.26 lb	3.60 kg	8.00 lb
832TC-8L	Can	7.2 L	1.92 gal	12.0 kg	26.5 lb	14.0 kg	31.0 lb
832TC-40L	Pail	40 L	10.7 gal	66.8 kg	147 lb	70.0 kg	154 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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