Water Clear Epoxy, Encapsulating & Potting Compound

Description

832WC *potting and encapsulating compound* is a general purpose, water-clear, hard, 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 high clarity is required. It does not yellow when exposed to UV light or elevated temperatures; it maintains clarity in applications with service temperatures up to 65 °C (149 °F) and intermittent exposures up to 100 °C (212 °F). It also provides excellent electrical insulation and protects circuit board and other electronic devices 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. 832WC can be cured at room temperature or higher.

Features and Benefits

- *Optically clear color (allows visual inspection)*
- *UV light stable (non-yellowing)*
- *Very low mixed viscosity of 980 cP*
- *Convenient 2A:1B volume mix ratio*
- *Excellent electrical insulating characteristics*
- *Extremely high compressive and tensile strength*
- *Good adhesion to a wide variety of substrates including metals, composites, glass, ceramics, and many plastics*
- *Broad service temperature range -40 to 140 °C (-40 to 284 °F)*
- *Extreme resistance to water and humidity (allows for submersion where needed)*
- *Solvent-free*

Usage Parameters

Properties	Value
Working life @22 °C [72 °F]	1 h
Shelf life	5 y
Full cure @22 °C [72 °F]	72 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	-40 to 140 °C [-40 to 284 °F]
Intermittent temperature limit [a)]	-50 to 155 °C [-58 to 311 °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	Optically clear
Density @22 °C [72 °F]	ASTM D 792	1.06 g/mL
Hardness	Shore D Durometer	82D
Tensile strength	ASTM D 638	10 N/mm^2 [1 500 lb/in^2]
Compressive strength	ASTM D 695	160 N/mm^2 [22 800 lb/in^2]
Lap shear strength (aluminum)	ASTM D 1002	6.8 N/mm^2 [980 lb/in^2]
Lap shear strength (brass)	ASTM D 1002	3.8 N/mm^2 [560 lb/in^2]
Lap shear strength (copper)	ASTM D 1002	2.9 N/mm^2 [420 lb/in^2]
Lap shear strength (stainless steel)	ASTM D 1002	3.3 N/mm^2 [480 lb/in^2]
Lap shear strength (ABS)	ASTM D 1002	1.5 N/mm^2 [220 lb/in^2]
Lap shear strength (polycarbonate)	ASTM D 1002	2.1 N/mm^2 [300 lb/in^2]

Note: Specifications are for epoxy samples cured at 80 °C for 1 hour and conditioned at ambient temperature and humidity.

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

Cured Properties

Electrical Properties [a]	Method	Value
Breakdown voltage @2.3 mm	ASTM D 149	41 000 V [41 kV]
Dielectric strength @2.3 mm	ASTM D 149	465 V/mil [18 kV/mm]
Breakdown voltage @3.175 mm [1/8"]	Reference fit [a]	49 000 V [49 kV]
Dielectric strength @3.175 mm [1/8"]	Reference fit [a]	394 V/mil [16 kV/mm]
Volume resistivity	ASTM D 257	1.6×10^{17} Ω·cm
Volume conductivity	ASTM D 257	6.3×10^{-18} S/cm
Dielectric dissipation, D @1 MHz	ASTM D 150-11	0.028
Dielectric constant, k' @1 MHz	ASTM D 150-11	3.23
Thermal Properties	**Method**	**Value**
Glass transition temperature (T_g)	ASTM E 831	33 °C [91 °F]
CTE [b] prior T_g after T_g	ASTM E 831 ASTM E 831	80 ppm/°C [176 ppm/°F] 192 ppm/°C [378 ppm/°F]

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 Tautscher 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	Clear
Viscosity @25 °C [77 °F]	980 cP [0.98 Pa·s] a)
Density	1.06 g/mL
Mix ratio by volume	2:1
Mix ratio by weight	2:1

a) Brookfield viscometer at 100 rpm with spindle LV S63

Physical Properties	Part A	Part B
Color	Clear	Clear
Viscosity @25 °C [77 °F]	2 860 cP [2.86 Pa·s] b)	340 cP [0.34 Pa·s] c)
Density	1.09 g/mL	1.03 g/mL
Odor	Mild	Ammonia-like

b) Brookfield viscometer at 100 rpm with spindle LV S64
c) Brookfield viscometer at 60 rpm with spindle LV S62

Compatibility

Adhesion—As seen in the substrate adhesion table, 832WC 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 832WC 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	Weaker
Polypropylene	Does not bond

Application Instructions

For best results, follow the procedure below.

Manual mixing:

1. Measure 2 parts by volume of part A, and pour into the mixing container. Ensure all contents are transferred by scraping the container.
2. Measure 1 part by volume of part B, and pour slowly into the mixing container while stirring. Ensure all contents are transferred by scraping the container.
3. Thoroughly mix parts A and B together.
4. 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 > 500 g 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 72 hours.

Heat cure:

- Put in oven at 65 °C [149 °F] for 2 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
832WC-375ML	2 Bottle kit	375 mL [12.6 fl oz]
832WC-3L	3 Can kit	2.7 L [2.85 qt]
832WC-12L	3 Can kit	10.8 L [2.88 gal]
832WC-60L	3 Pail kit	60 L [16 gal]

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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