



# Optically Clear Epoxy Encapsulating & Potting Compound 8321C Technical Data Sheet

## Description

The 8321C Optically Clear Epoxy, Encapsulating and Potting Compound, is an electronic grade, optically clear epoxy. It cures at room temperature or by heat curing.

It provides very strong electrical insulation and protects against static discharges, shocks, vibrations, mechanical impacts, environmental humidity, salt water, and many harsh chemicals.

## Applications & Usages

The 8321C epoxy is used predominantly to pot or encapsulate, optical devices, light emitting diodes (LED), and other light emitters or sensors that require maximum light transmissions. As well, it is often used to allow easy visual inspection of components in potted electronic assemblies. The cured epoxy improves reliability, operational range, and lengthens the life of electrical and electronic parts.

Its primary applications are in the automobile; marine; aerospace and aviation; communication, instrumentation; medical equipment and devices; and industrial control equipment industries.

## Benefits

- **Water clear transparency**
- **Strong water and chemical resistance** to brine, acids, bases, and aliphatic hydrocarbons
- **3A:1B mix ratio**
- **Long 2 to 3 hour working time** suitable for large production runs
- **Good protection of electronics against** corrosion, fungus, thermal shock, physical impact, and static

## Curing & Work Schedule<sup>a</sup>

<i>Properties</i>	<i>Value</i>
Working Life <sup>b</sup>	2 to 3 hour
Shelf Life	≥3 year
Full Cure (at 25 °C [77 °F])	4 day
Full Cure (at 80 °C [176 °F])	2 hour
Storage Temperature of Unmixed Parts	16 to 27 °C [60 to 80 °F]

- a) Cure and life values 100 g and room temperature unless stated otherwise.  
 b) A 10 °C increase can decrease the pot life by half.

## Temperature Service Range

<i>Properties</i>	<i>Value</i>
Constant Service Temp.	-30 °C to 140 °C [-22 to 284 °F]
Maximum Withstand Temperature <sup>c</sup>	200 °C [392 °F]

- c) The maximum withstand or service temperature can be maintained for short periods of time only.



ISO 9001 Registered Quality System.  
Burlington, Ontario, Canada QMI File # 004008

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## Principal Components

Name	CAS Number
Part A: Bis-A Epoxide Resin	25068-38-6
Dibutyl Phthalate	84-74-2
Oxirane, [(2-methylphenoxy)methyl]-	2210-79-9
Part B: Curing Polyamide	9046-10-0

## Properties of Cured 8321C

<i>Physical Properties</i>	<i>Method</i>	<i>Value<sup>a</sup></i>
Color	Visual	Optically Clear
Density (at 26 °C)		1.153 g/cm <sup>3</sup>
Hardness	(Shore D durometer)	76D to 78D
Lap Shear Strength	ASTM D 1002	4.1 N/mm <sup>2</sup> [590 lb/in <sup>2</sup> ]
Compression Strength	ASTM D 695	91.6 N/mm <sup>2</sup> [13,300 lb/in <sup>2</sup> ]
Flexural Strength	ASTM D 790	85.3 N/mm <sup>2</sup> [871 lb/in <sup>2</sup> ]
Outgassing (Total Mass Loss)	ASTM E 595	7.62%
Total Reflectance for 350–700 nm & 0.25" thick sample	ASTM E 595	10%
<i>Electric Properties</i>	<i>Method</i>	<i>Value</i>
Breakdown Voltage @ 3.53 mm	ASTM D 149	60.6 kV
Dielectric Strength	"	436 V/mil [17.2 kV/mm]
Breakdown Voltage @3.175 mm [1/8"]	Reference fit <sup>c</sup>	57.5 kV
Dielectric Strength	"	460 V/mil [18.1 kV/mm]
Volume Resistivity	ASTM D 257	2 x 10 <sup>16</sup> Ω·cm
Surface Resistivity <sup>b</sup>	"	>1 x 10 <sup>17</sup> Ω
Dielectric Dissipation & Constant		<i>dissipation, D</i> <i>constant, k'</i>
@60 Hz	ASTM D 150-98	0.012    3.37
@1 kHz	ASTM D 150-98	0.011    3.33
@10 kHz	ASTM D 150-98	0.014    3.27
@100 kHz	ASTM D 150-98	0.017    3.19
@1 MHz	ASTM D 150-98	0.019    3.13
<i>Thermal Properties</i>	<i>Method</i>	<i>Value</i>
CTE <sup>c</sup> prior T <sub>g</sub>	ASTM E 831	83.0 ppm/°C
CTE <sup>c</sup> after T <sub>g</sub>	ASTM E 831	236 ppm/°C
Glass Transition Temperature (T <sub>g</sub> )	ASTM D 3418	41 °C [106 °F]

Note: Specifications are for epoxy samples cured at 80 °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<sup>2</sup> = mPa; lb/in<sup>2</sup> = psi;

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).

b) The surface (sheet) resistivity unit is commonly referred to as "Ohm per square"

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

## Properties of Uncured 8321C

<i>Physical Property</i>	<i>Mixture (3A:1B)</i>	
Color	Optically Clear	
Viscosity at 25 °C [77 °F] <sup>a</sup>	260 cP [0.260 Pa·s]	
Density	1.09 g/mL	
Mix Ratio by volume (A:B)	3.0:1.0	
Mix Ratio by weight (A:B)	3.6:1.0	
Solids Content (w/w)	~92%	
<i>Physical Property</i>	<i>Part A</i>	<i>Part B</i>
Color	Optically Clear	Optically Clear
Viscosity at 25°C [77 °F] <sup>a</sup>	900 cP [0.900 Pa·s]	10 cP [0.010 Pa·s]
Density	1.140 g/mL	0.946 g/mL
Flash Point	95 °C [203 °F]	124 °C [255 °F]
Odor	Mild	Amine like

a) Brookfield viscometer at 30 RPM with spindle LV4 for Part A and LV1 for Part B

## Compatibility

**Adhesion**—As seen in the substrate adhesion table, the 8321C epoxy adheres to most materials found on printed circuit assemblies; however, it is not compatible with contaminants like water, oil, and greasy flux residues that may affect adhesion. If contamination is present, clean the printed circuit assembly with electronic cleaner such as MG Chemicals 4050 Safety Wash, 406B Superwash, or 824 Isopropyl Alcohol.

## Substrate Adhesion in Decreasing Order

<i>Physical Properties</i>	<i>Adhesion</i>
Aluminum	Stronger
Steel	
Fiberglass	
Wood	
Glass	
Polycarbonate	
Acrylic	
Polypropylene <sup>a</sup>	

a) Does not bond to polypropylene

## Storage

Store between 16 and 27 °C [60 and 80 °F] in 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 thoroughly the warm component, reincorporating all settled material. Re-secure container lid and let cool down before use.

## Health and Safety

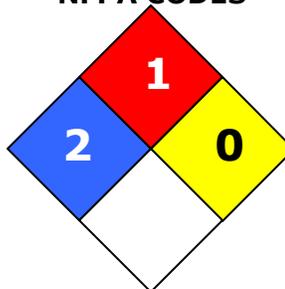
Please see the 8321C **Material Safety Data Sheet** (MSDS) parts A and B for more details on transportation, storage, handling and other security guidelines.

### Part A

#### HMIS RATING

<b>HEALTH:</b>	<b>2</b>
<b>FLAMMABILITY:</b>	<b>1</b>
<b>PHYSICAL HAZARD:</b>	<b>0</b>
<b>PERSONAL PROTECTION:</b>	

#### NFPA CODES

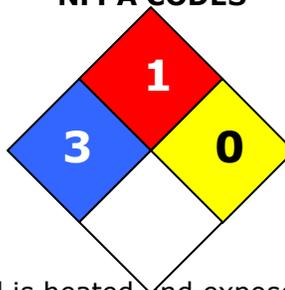


### Part B

#### HMIS RATING

<b>HEALTH:</b>	<b>3</b>
<b>FLAMMABILITY:</b>	<b>1</b>
<b>PHYSICAL HAZARD:</b>	<b>0</b>
<b>PERSONAL PROTECTION:</b>	

#### NFPA CODES



**Health and Safety:** The 8321C parts can ignite if the liquid is heated and exposed to flames or sparks.

Wear safety glasses or goggles and disposable polyvinyl chloride, neoprene, or nitrile gloves while handling liquids. Part B in particular causes skin burns 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.

While the product has low volatility and moderate odor, use in well-ventilated area.

The cured epoxy resin presents no known hazard.

## Application Instructions

Follow the procedure below for best results. If you have little or no experience with the 8321C epoxy, please follow the long instructions instead. The short instructions provided here are not suitable for first time users.

### To prepare 3:1 (A:B) epoxy mixture

1. Carefully scrape any settled material in the **Part A** container; and stir and fold material until homogenous.
2. Carefully scrape any settled material in the **Part B** container; and stir and fold material until homogenous.
3. Measure **three** parts by volume of the pre-stirred **A**, and pour in the mixing container.
4. Measure **one** part by volume of the pre-stirred **B**, and slowly pour in the mixing container while stirring.
5. Put in a vacuum chamber, bring to 25 Hg/in pressure, and wait for 2 minutes to de-air.  
—OR—  
Let sit for 30 minutes to de-air.
6. If bubbles are present at top, use the mixing paddle to gently break them.
7. Pour mixture into the mold or container containing the components to be encapsulated.

### To room temperature cure the 8321C epoxy

Let stand for 4 days.

### To heat cure the 8321C epoxy

Put in oven at 80 °C [176 °F] for 2 hours.

### **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.



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## Packaging and Supporting Products

### Product Availability

<i>Cat. No.</i>	<i>Form</i>	<i>Net Volume</i>	<i>Net Weight</i>	<i>Shipping Weight</i>
<b>8321C-320ML</b>	Liquid	0.325 L 10.8 oz	0.35 kg 0.8 lb	0.9 kg 2 lb
<b>8321C-4L</b>	Liquid	4.02 L 1 gal	4.39 kg 9.67 lb	5.4 kg 12 lb

### Supporting Products

- 8328 Epoxy and Adhesive Cleaner
- 8329 Epoxy Mold Release (for temperature cures  $\leq 85$  °C)

## Technical Support

Contact us regarding any questions, improvement suggestions, or problems with this product. Application notes, instructions, and FAQs are located at [www.mgchemicals.com](http://www.mgchemicals.com).

Email: [support@mgchemicals.com](mailto:support@mgchemicals.com)

Phone: 1-800-201-8822 Ext. 128 (Canada, Mexico & USA)

1-604-888-3084 Ext. 128 (International)

Fax: 1-604-888-7754 or 1-800-708-9888

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.

## Disclaimer

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