



# Silver Conductive Epoxy Adhesive

## 8331 Technical Data Sheet

### Description

The 8331 Silver Conductive Epoxy Adhesive is an electronic grade epoxy with good electrical and thermal conductivities. This adhesive bonds very well to a variety of surfaces. It is easy to use and has a convenient 1 to 1 ratio. It cures in five hours at room temperature, but for faster and better results heat cure at elevated temperatures are suggested.

### Applications & Usages

The 8331 epoxy has many uses. It is primarily used as a solder replacement for bonding heat-sensitive electronic components. It allows for quick cold soldering repairs, and is effective at bonding heat sinks to other components and PCBs. It also provides excellent EMI/RFI shielding, and is very effective at filling in seams between metal plates.

Its primary applications are repair and assembly of electronics in microelectronics and optoelectronics. It is used in the automobile, aerospace, marine communication, instrumentation, and industrial control equipment industries.

### Benefits

- **Excellent electrical and thermal conductivity**
- **Easy 1:1 mix ratio**
- **Strong water and chemical resistance** to brine, acids, bases, and aliphatic hydrocarbons

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

<i>Properties</i>	<i>Value</i>
Working Life	10 min
Shelf Life	≥3 year
Full Cure (at 25 °C [77 °F])	5 hour
Full Cure (at 65 °C [149 °F])	15 min
Full Cure (at 90 °C [194 °F])	12 min
Full Cure (at 125 °C [257 °F])	7 min
Full Cure (at 150 °C [302 °F])	5 min
Storage Temperature of Unmixed Parts	16 to 27 °C [60 to 80 °F]

a) Cure and life values 5 g and room temperature unless stated otherwise.

### Temperature Service Range

<i>Properties</i>	<i>Value</i>
Constant Service Temp.	-55 °C to 150 °C [-67 to 302 °F]



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### Principal Components

Name	CAS Number
Part A: Bis-F Epoxide Resin	28064-14-4
Metallic Silver	7440-22-4
Part B: Aliphatic Amines	140-31-8 + 84852-15-3 + 68411-71-2 + 111-40-0
Metallic Silver	7440-22-4

### Properties of Cured 8331

Physical Properties	Method	Value <sup>a</sup>
Color	Visual	Silver Grey
Density (at 26 °C)		2.44 g/cm <sup>3</sup>
Hardness	(Shore D durometer)	70D to 75D
Tensile Strength	ASTM D 638	6.28 N/mm <sup>2</sup> [911 lb/in <sup>2</sup> ]
Elongation	"	0.30%
Shear Strength	ASTM D 732	1.61 N/mm <sup>2</sup> [234 lb/in <sup>2</sup> ]
Izod Impact <sup>b</sup>	ASTM D 256	1.7 kJ/m <sup>2</sup> [0.80 ft·lb/in]
Compression Strength	ASTM D 695	7.56 N/mm <sup>2</sup> [1,090 lb/in <sup>2</sup> ]
Flexural Strength	ASTM D 790	17.2 N/mm <sup>2</sup> [2,500 lb/in <sup>2</sup> ]
Outgassing (Total Mass Loss) @ 24 h	ASTM E 595	7.16%
@ 48 h	"	6.11%
Solderable		No
Electric Properties	Method	Value
Volume Resistivity <sup>c</sup>	Method 5011.5 in MIL-STD-883H	0.0174 Ω·cm
Dielectric Dissipation & Constant @1 MHz	ASTM D 150-98	dissipation, <i>D</i> constant, <i>k'</i> 0.012                      3.01
Thermal Properties	Method	Value
Thermal Conductivity @25 °C	ASTM E 1461	0.903 W/(m·K)
@50 °C	"	0.893 W/(m·K)
@100 °C	"	0.813 W/(m·K)
Glass Transition Temperature (T <sub>g</sub> )	ASTM D 3418	55.1 °C [131 °F]
CTE <sup>d</sup> prior T <sub>g</sub>	ASTM E 831	38.5 ppm/°C
CTE <sup>d</sup> after T <sub>g</sub>	ASTM E 831	101.8 ppm/°C

Note: Specifications are for epoxy samples that were cured at 65 °C for 1 hour. Additional curing time at room temperature was given to allow for optimum curing. Samples were conditioned at 23 °C and 50% RH prior to most tests.

a) N/mm<sup>2</sup> = mPa; lb/in<sup>2</sup> = psi

b) Cantilever beam impact

c) The uncured epoxy mixture does not conduct electricity well and can have high resistance. To attain stated resistivity, ensure that the mix ratio is followed and that the product is fully cured by heat curing. Room temperature cures may give higher resistivity.

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



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### Properties of Uncured 8331

<i>Physical Property</i>	<i>Mixture (1A:1B)</i>	
Color	Silver Grey	
Density	2.34 g/mL	
Mix Ratio by volume (A:B)	1:0:1.0	
Mix Ratio by weight (A:B)	1.2:1.0	
Solids Content (w/w)	93%	
<i>Physical Property</i>	<i>Part A</i>	<i>Part B</i>
Color	Silver Grey	Silver Grey
Density	2.47 g/mL	2.20 g/mL
Flash Point	N/E	>93 °C [199 °F]
Resistivity of uncured material	Off-scale (no reading)	Off-scale (no reading)

### Compatibility

**Adhesion**—As seen in the substrate adhesion table, the 8331 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  Weaker
Steel	
Fiberglass	
Wood	
Paper, Fiber	
Glass	
Rubber	
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

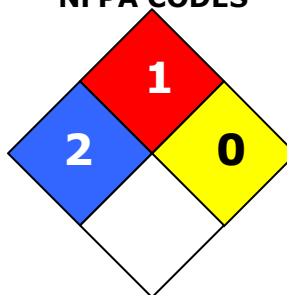
Please see the 8331 **Material Safety Data Sheet** (MSDS) parts A and B for more details on transportation, storage, handling and other security guidelines.

#### 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

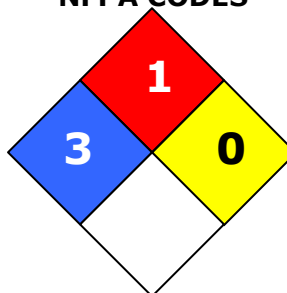


#### Part B

##### 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 8331 parts can ignite if the liquid is both 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 will not wash off once cured: wear protective work clothing. Wash hands thoroughly after use or if skin contact occurs. Do not ingest.

Use in well-ventilated area since vapors may cause irritation of the respiratory tract and cause respiratory sensitization in susceptible individuals.

The cured epoxy resin presents no known hazard.



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## Application Instructions

Follow the procedure below for best results. Heat cure is recommended to get the best possible conductivity.

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

1. Remove cap or cover.
2. Measure **one** parts by volume **A**.
3. Measure **one** part by volume of **B**.
4. Thoroughly mix the parts together with a stir stick until homogeneous.
5. Apply to with an appropriate sized stick for the application area.

**NOTE:** Remember to recap the syringe or container promptly after use.

**TIP:** Due to the high viscosity and abrasiveness of the silver filler, you may preheat parts A and part B to increase the flow and improve air release.

### To heat cure the 8331 epoxy

Put in oven at 65 °C [149 °F] for 15 minute.

**TIP:** Hair dryers are normally rated not to exceed 60 °C, so they can generally be used to accelerate the cure.

You can cure the epoxy faster by using higher temperatures of up to 150 °C [302 °F].

**ATTENTION:** Keep the curing temperature well below temperature limit of heat sensitive components that may be present. As a guideline, remember that commercial grade devices normally can be safely operated up to 70 °C, industrial grade up to 85 °C, and military grade up to 175 °C.

**ATTENTION:** Heat guns can easily exceed the temperature limits for your assembly: they should not be used.

### To room temperature cure the 8331 epoxy

Let stand for 5 to 24 hour.

**TIP:** While the product can be room temperature, the best conductivity is achieved with the application of some heat.

## Application Notes

A slight discoloration of the 8331 epoxy may occur over time. The discoloration does not affect the adhesiveness or conductivity.

This product cannot be soldered through cleanly and safely for the printed circuit assembly components.



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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>8331-14G</b>	Liquid	10 mL 0.35 oz	14 g 0.031 lb	32 g 0.07 lb
<b>8331-454G</b>	Liquid	336 mL 11.4 oz	454 g 1.00 lb	0.65 kg 1.4 lb

## 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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