

# Silver Conductive Epoxy



**8331**

## Forms high strength conductive bonds

This two part silver epoxy offers high electrical conductivity and strong conductive bonding. Use in place of traditional soldering on heat sensitive components. Good for repairing defective traces and creating jumpers on boards. Can be used as an effective heat sink adhesive. This Conductive Silver Epoxy comes in two 7g syringes.



## Specifications

Specification	Test Method	Result
Minimum operating temp.		-30°C ( -22 °F )
Maximum operating temp.		90°C ( 194°F )
Cure time @ 24°C (75°F)		5 hours
Cure time @ 65°C (150°F)		15 minutes
Working time @ 22°C		10 minutes
Mixing Ratio		1:1
Volume resistivity @ 25°C	MIL-STD-883E Notice 3, method 5011.4, paragraphs 3.5.8, 3.8.11.1 (Covered Under A2LA Accreditation)	0.38 ohm · cm
Tensile strength	ASTM-D-638-02A	911 psi
Elongation	ASTM-D-638-02A	0.3 %
Compressive Strength	ASTM-D-695-02A	1100 psi
Flexural Strength	ASTM-D-790-03	2,500 psi
Shear Strength	ASTM-D-732-02	234 psi
Cantilever Beam (IZOD) Impact	ASTM-D-256-02 E1	0.39 ft lb ft / in
Thermal Expansion	ASTM-E-831-03	79.3 mm/10 <sup>6</sup> mm
Density	ASTM-D-256-02 E1	2.34 g/cm <sup>3</sup>
Thermal Conductivity	ASTM-C-518	0.578 W/m · °K

## Available Sizes

Catalog Number	Sizes Available	Description
8331-14G	14g (0.35 oz)	Two 7g syringes, 3ml each
8331-454G	454g (1 lb)	1 lb kit

# Material Safety Data Sheet

## Section 1: Product Identification

**MSDS Code: 8331 - Part A Name: Epoxy - Electrically Conductive Adhesive**

**Related Part Numbers: 8331-14G; 8331-454G**

Use: Electrically conductive adhesive.

## Section 2: Hazardous Ingredients

CAS#	Chemical Name	Percentage by weight	ACGIH TWA	Osha Pel	Osha Stel
28064-14-4	Reaction product of epichlorohydrin and bisphenol F	30 - 50	N/e	N/e	N/e
7440-22-4	Silver	50 - 70	0.01mg/m <sup>3</sup>	0.01mg/m <sup>3</sup>	N/e

## Section 3: Hazards Identification

**WHMIS Codes:** B3, D2B

**NFPA Ratings:** Health 2 Flammability 1 Reactivity 0

**HMIS Ratings:** Health 2 Flammability 1 Reactivity 0

**Eyes:** Causes irritation.

**Skin:** Prolonged exposure may cause skin irritation. May cause allergic reaction in some individuals.

**Inhalation:** At room temperature, exposure to vapors is unlikely due to physical property of low volatility. Higher temperatures may generate vapor levels sufficient to cause irritation to the respiratory tract (nose, throat, and lungs).

**Ingestion:** Single dose oral toxicity is low. Amounts ingested incidental to industrial handling are not likely to cause injury; however, ingestion of large amounts may be harmful.

**Chronic:** Chronic inhalation or ingestion of silver salts may cause argyria characterized by a permanent blue-gray discoloration of the eyes, skin, mucous membranes, and internal organs. Inhalation and/or of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count

## Section 4: First Aid Measure

**Eyes:** Remove contact lenses if worn. Flush with water or saline for 20 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Thoroughly wash skin with soap. Remove contaminated clothing and wash before reuse. Solvents should not be used to clean hands or skin because they increase the penetration of the material into the skin. Get medical aid if symptoms persist.

**Inhalation:** Immediately remove from exposure to fresh air. Get medical aid if symptoms persist.

**Ingestion:** Do not induce vomiting. If conscious, give 1-2 glasses of water. Get medical aid.

### Section 5: Fire Fighting Measures

**Autoignition Temperature:** N/e      **Flash Point:** N/e      **LEL / UEL:** N/e  
**Extinguishing Media:** Use water spray, dry chemical, carbon dioxide, or chemical foam.  
**General Information:** N/a

### Section 6: Accidental Release Measures

**Spill Procedure:** Remove all sources of ignition. Provide adequate ventilation. Wear appropriate personal protection. Wipe up with paper towel and place in container. Wash spill area with soap and water.

### Section 7: Handling and Storage

**Handling:** Avoid contact with eyes, skin, and clothing. Wash hands thoroughly after handling. Do not ingest or inhale. Do not expose container to heat or flame.  
**Storage:** Keep away from sources of ignition. Store closed container in a cool, dry, and well-ventilated area away from incompatible substances.

### Section 8: Exposure Controls

**Routes of entry:** Eyes, ingestion, inhalation, and skin.  
**Ventilation:** Use adequate general or local exhaust ventilation to keep airborne concentrations below exposure limits.  
**Personal Protection:** Wear appropriate protective eyeglasses or chemical safety goggles. Wear appropriate protective clothing to prevent skin contact. Use a NIOSH approved respirator when necessary.

### Section 9: Physical and Chemical Properties

<b>Physical State:</b>	Liquid	<b>Odor:</b> Slightly aromatic	<b>Solubility:</b> None	<b>Evaporation Rate:</b> N/e	
<b>Boiling Point:</b>	N/e	<b>Specific Gravity:</b> 2.47	<b>Vapor Pressure:</b> N/e	<b>Vapor Density:</b> >1 (Air=1)	<b>pH:</b> N/a

### Section 10: Stability and Reactivity

**Stability:** Stable at normal temperatures and pressures.  
**Conditions to avoid:** N/a  
**Incompatibilities:** Avoid strong oxidizing agents, mineral acids, ethyleneimine, and strong mineral and organic bases.  
**Polymerization:** Will undergo hazardous polymerization at elevated temperatures.  
**Decomposition:** Carbon dioxide, carbon monoxide, hydrocarbons and silver fumes.

### Section 11: Toxicological Information

**Sensitization:** (effects of repeated exposure) This product is a skin sensitizer.  
**Carcinogenicity:** (risk of cancer) This material does not contain 0.1% or more of any chemical listed by IARC, NTP, or OSHA as a carcinogen.  
**Teratogenicity:** (risk of malformation in an unborn fetus) No  
**Reproductive Toxicity:** (risk of sterility) No



**Mutagenicity:** (risk of heritable genetic effects) No

**Lethal Exposure Concentrations:**                      **Ingestion (LD50):** N/e                      **Inhalation (LC50):** N/e                      **Skin (LD50):** N/e

### Section 12: Ecological Information

**General Information:** Avoid runoff into storms and sewers, which lead into waterways. Water runoff can cause environmental damage.

**Environmental Impact Data:** (percentage by weight)

**CFC:** 0                      **HFC:** 0                      **Cl.Solv:** 0                      **VOC:** 0                      **HCFC:** 0                      **ODP:** 0

### Section 13: Disposal Information

**General Information:** Dispose of in accordance with all local, provincial, state, and federal regulations. Water runoff can cause environmental damage.

### Section 14: Transportation Information

**Ground:**

Non-regulated

**Air:**

Non-regulated

**Sea:**

Non-regulated

### Section 15: Regulatory Information

**This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by the Controlled Products Regulations.**

**SARA** (Superfund Amendments and Reauthorization Act of 1986, USA, 40 CFR 372.4)

Silver CAS# 7440-22-4 50 – 70% is listed under section 313 as a toxic chemical.

**EPCRA** (Emergency Planning and Right to Know Act, USA, 40 CFR 372.45)

This product contains Silver CAS# 7440-22-4 50 – 70% a chemical subject to the reporting requirements of section 313 Title III of the SARA of 1986 and 40 CFR part 372.

**TSCA** (Toxic Substances Control Act of 1976, USA)

All substances are TSCA listed.

### Section 15: Regulatory Information Cont.

**CAA** (Clean Air Act, USA)

This product does not contain any class 1-ozone depletors.

This product does not contain any class 2-ozone depletors.

This product does not contain any chemicals listed as hazardous air pollutants.

**California Proposition 65** (Chemicals known to cause cancer or reproductive toxicity, May 1, 1997 revision, USA)

This product does not contain any chemicals listed.

**Health Canada**

Labeling and containers used in this product are listed in compliance with Consumer Chemicals and Container regulations.

# Cold soldering

## What can I use to solder a heat sensitive component on to my circuit board?

With the shift to lead free soldering, heat sensitive components will become more of an issue. Components will distort or become permanently damaged if the soldering process exceeds its maximum reflow temperature. Plastics, for example, are susceptible to either degrade or melt at high temperatures. Both these can degrade or destroy the function of the component. As lead-free solders require a higher reflow temperature than tin/lead, a wide variety of components may be unsuitable for use unless component manufacturers have modified these parts to increase their maximum reflow temperature.

## There are a few ways to solder components that cannot withstand the higher reflow temperatures:

1. Redesign circuit so that heat sensitive components can be attached using selective soldering or hand soldering after all other components have been attached. These soldering techniques do not heat components to as high a temperatures as SMT but require space around the component.
2. Use Silver Conductive Epoxy as a cold solder method to avoid redesigning circuit.
3. As a last resort, the heat sensitive component will have to be changed to a different type, which often requires significant circuit design changes.

## Lead-free solders are different to tin/lead in several ways, the main differences being:

- ▶ Higher melting point – typically 30 - 40°C higher
- ▶ Inferior wetting properties, mid-chip solder balls
- ▶ Higher surface tension – increased risk of tombstoning and bridging (see page 2 for more on tombstoning and bridging)

All MG products are



For low volume production and maintenance, using Silver Conductive Epoxy makes the most economical sense.



1:1 mixing ratio

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Cat. no.	Size	Format
8331-14G	14 grams (0.5 oz)	Dual syringe
8331-454G	454 grams (1 lb.)	Paste

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



# Cold soldering



## Solder bridge

A solder bridge is a mechanical bridge formed by solder alloy between two component terminals resulting in an electrical short and circuit malfunction. In the reflow soldering process, solder bridges are mostly seen on fine pitch ICs. But in the wave soldering process solder bridges can be seen between terminals on a variety of components with larger pitch or between terminals of two chip components.



## Tombstoning

Tombstoning is a term in the chip soldering industry describing a situation wherein a soldering defect causes a chip component to stand up on end (like a tombstone), leaving one end soldered to the board and the other end free. It is caused during the reflow soldering process where non-uniform melting causes an unbalanced force to be applied to the chip from the solder.

source: en.wikipedia.org/wiki/Tombstoning

### TYPICAL APPLILCATION

Due to its convenience and safety, Conductive Silver Epoxy lends itself well to quick computer modifications. No soldering wire, solder or heat is required, so hobbyists can make quick and easy adjustments to their setup without any additional equipment.



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