

## SILVER CONDUCTIVE EPOXY ADHESIVE

## 8331-PART B

# Material Safety Data Sheet

## Section 1: Product and Company Identification

**Product Name:** Silver Conductive Epoxy Adhesive: Moderate Cure / High Conductivity

**MSDS Code:** 8331-Part B

**Related Part #:** 8331-14G, 8331-40G, 8331-429G, 8331-454G

**Use:** Silver filled electrically conductive adhesive for repairing traces on circuit boards, cold soldering, and bonding

**Emergency Contact:** CANUTECH ☎: 1-613-996-6666, Collect 24/7

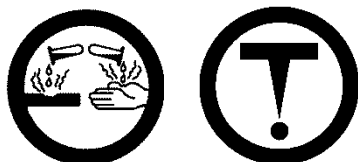
**Manufacturer:** MG Chemicals (Head Office), 9347-193 Street, Surrey, B.C., V4N 4E7

**Technical Contacts:** ☎ 1-800-201-8822 FAX 1-800-708-9888

**E-MAIL:** [support@mgchemicals.com](mailto:support@mgchemicals.com) **WEB** [www.mgchemicals.com](http://www.mgchemicals.com)

## Section 2: Hazards Identification

### WHMIS Classification



E – Corrosive Material; D2A – Very Toxic Material (Reproductive Toxicity, Respiratory Sensitization) D2B – Toxic Material (Skin Sensitization in Humans)

### GHS Pictograms



Signal Word  
DANGER

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**SILVER CONDUCTIVE EPOXY ADHESIVE**

**8331-PART B**

**GHS Categories**

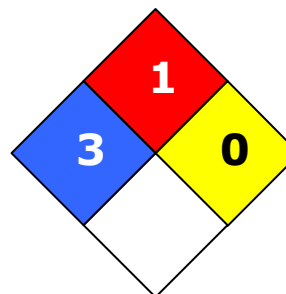
Criteria		Category	Signal Word	Symbol
Eye Damage		1	Danger	Corrosion
Skin Corrosion		1B	Danger	Corrosion
Reproductive Toxicity		2	Warning	Health
Sensitization	Skin sensitizer	1	Warning	Exclamation
Specific Target Organ Toxicity	Single Exposure	3	Warning	Exclamation
Acute Toxicity	Oral <sup>a)</sup>	4	Warning	Exclamation
Acute Toxicity	Dermal <sup>a)</sup>	4	Warning	Exclamation
Acute Toxicity	Inhalation <sup>a)</sup>	4	Warning	Exclamation
Environmental Hazard	Acute Aqua. Tox.	1	Warning	Environmental
Environmental Hazard	Chronic Aqua. Tox.	1	Warning	Environmental

a) Base on mixture acute toxicity estimate (ATE)

**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® 704 CODES**



*Approximate HMIS and NFPA Risk Ratings Legend:*

0 (Low or none); 1 (Slight); 2 (Moderate); 3 (Serious); 4 (Severe)

**Physical Hazards**

*GHS Code: Hazard Statement*  
none

**Health Hazards**

*GHS Code: Hazard Statement*

H314: Causes severe skin burns and eye damage

H317: May cause allergic skin reaction

H335: May cause respiratory irritation

H361: Suspected of damaging fertility or the unborn child

H302 + H312 + H332: Harmful if swallowed, in contact with skin, or if inhaled

*Continued on the next page*

**SILVER CONDUCTIVE EPOXY ADHESIVE**

**8331-PART B**

**Environmental Hazards**

*GHS Code: Hazard Statement*

H400: Very toxic to aquatic life

H410: Very toxic to aquatic life with long lasting effects

**Eyes** Causes eye burns. The adhesive contains mechanically abrasive particles.

**Skin** Harmful if absorbed through skin. Causes skin burns. May cause allergic skin reactions.

**Inhalation** May be harmful if inhaled. Material is destructive to the tissue of the mucous membranes and upper respiratory tract.

**Ingestion** Harmful if swallowed.

**Chronic** Prolonged and repeated exposure to the uncured material used may cause sensitization and chemical burns.

Long term accumulation of silver can lead to Argyria, which is an irreversible blue-grey discoloration of the skin.

**Section 3: Hazardous Ingredients**

CAS #	Chemical Name	Wt%	ACGIH TWA	OSHA PEL	STEL
7440-22-4	silver	60-100%	0.1 mg/m <sup>3</sup>	0.01 mg/m <sup>3</sup>	Not Established
84852-15-3	4-nonylphenol, branched	10-30%	Not Established	Not Established	Not Established
140-31-8	2-piperazin-1-ylethylamine	3-7%	Not Established	Not Established	Not Established
68411-71-2	Diethylene triamine, reaction product with diglycidyl ether of Bisphenol A	0.5-1.5%	Not Established	Not Established	Not Established
111-40-0	Diethylenetriamine	0.5-1.5%	1 ppm	Not Established	Not Established
80-05-7	4,4'-isopropylidene-diphenol	0.5-1.5%	Not Established	Not Established	Not Established

Note: Limits from by RTECS database of the Canadian Centre for Occupational Health and Safety (CCOHS).<sup>1</sup> Data from suppliers' MSDS were also consulted.

**SILVER CONDUCTIVE EPOXY ADHESIVE**

**8331-PART B**

**Section 4: First Aid Measures**

<i>Exposure Condition</i>	<i>GHS Code: Precautionary Statement</i>
<b>IF IN EYES</b>	P305
<b>Symptoms</b>	Immediate: <i>irritation, redness, pain, blurred vision, burns</i> , Delayed: <i>eye damage, necrosis, blindness</i>
<b>Response</b>	P351: Rinse cautiously with water for several minutes. P338: Remove contact lenses, if present and easy to do. P338: Continue rinsing. P313: Get medical attention.
<b>IF ON SKIN</b>	P302
<b>Symptoms</b>	Immediate: <i>chemical burns, irritation, pain, nausea, headache</i> Delayed: <i>necrosis, scarring</i>
<b>Response</b>	P362+ P364 + P272: Take off contaminated clothing and wash it before reuse. Contaminated work clothing should not be allowed out of the workplace. P352: Wash with plenty of water. P313: Get medical attention.
<b>IF INHALED</b>	P304 ( <i>Not a likely route of exposure under normal use</i> )
<b>Symptoms</b>	Immediate: <i>irritation, chemical burns, cough, tightness of chest</i> , Delayed: <i>necrosis, scarring, abnormal fetal development</i>
<b>Response</b>	P340: Remove person to fresh air (out of the contaminated zone) and keep comfortable for breathing.
<b>If feeling unwell</b>	P312: Call a POISON CENTRE/doctor
<b>IF SWALLOWED</b>	P301 ( <i>Not a likely route of exposure under normal use</i> )
<b>Symptoms</b>	Immediate: <i>irritation, burns</i> Delayed: <i>abnormal fetal development</i>
<b>Response</b>	P330: Rinse mouth. P331: Do NOT induce vomiting. P312: Call a POISON CENTRE/doctor

*Note:* GHS codes and corresponding precaution statements are used when available.

**SILVER CONDUCTIVE EPOXY ADHESIVE**

**8331-PART B**

**Section 5: Fire Fighting Measures**

<b>Autoignition Temperature</b>	Not established	<b>Flash Point</b> <sup>a)</sup>	>73 °C [>163 °F]	<b>LFL [LEL]</b> <sup>b)</sup>	Not established
				<b>UFL [UEL]</b>	Not established

**In case of fire** P370

**Response** P378: Use dry chemical, carbon dioxide, or chemical foam to extinguish. Use water spray to cool containers.

**COUNTER INDICATION:** Avoid use of water jet as extinguishing media. Material can form a very toxic aqueous solution with water. Prevent run-off from entering drains and waterways.

**Combustion Products** Produces CO, CO<sub>2</sub>, ammonia, nitric acid, nitrogen oxides and other toxic fumes and smoke.

**Fire-Fighter** Wear self-contained breathing apparatus for fire fighting

**General Information** Toxic metal fumes may be released in fire. In presence of strong oxidizers and air, the silver metal powder may lead to an explosion.

*Note:* The GHS codes and the GHS precaution statements are used. The format is *GHS Codes: Statements.*

- a) Closed cup value for lowest flash point component
- b) LFL = Lower Flammability [or Explosion] Limit (in volume %);  
UFL = Upper Flammability [or Explosion] Limit (in volume %)

**Section 6: Accidental Release Measures**

**Personal Protection:** See Section 8. Wear protective clothing. Avoid breathing the mist/vapors.

**Containment** Remove all sources of ignition.

**Cleaning** Collect spill in a sealable, chemical-resistant container with a spatula. Sprinkle inert absorbent compound onto spill remainder, then sweep into the container. Wipe residues with paper towel imbibed in isopropyl alcohol and place dirty towel in container. Wash spill area with soap and water to remove the last traces of residue.

**RECOMMENDATION:** Use a plastic, stainless steel, or carbon steel container. Avoid containers with copper, aluminum, zinc, or galvanized surfaces since the waste material can slowly oxidize them.

**Disposal** Dispose of spill waste according to Section 13.

**SILVER CONDUCTIVE EPOXY ADHESIVE****8331-PART B****Section 7: Handling and Storage**

**Prevention** P262: Do not get in eye, on skin, or on clothing.

P261 + P271 + P284: Avoid breathing fume/vapors. Use only outdoors or in well-ventilated area. In cases of inadequate ventilation, wear respiratory protection.

P270: Do not eat, drink, or smoke when using this product.

**RECOMMENDATION:** Protect from heat. Do NOT process in a fashion that causes mist or fumes.

**Handling** P280: Wear protective gloves/clothing/eye protection.

**RECOMMENDATION:** Wear neoprene, butyl rubber, nitrile or other impervious gloves with breakthrough time greater than intended use period.

P264: Wash hands thoroughly after handling.

**Storage** P403 + P233+ P235: Keep Container tightly closed. Store in a well-ventilated area. Keep cool.

**RECOMMENDATION:** Keep in a dry and clean area, away from incompatible substances.

*Note:* The GHS codes and the GHS precaution statements are used.

**Section 8: Exposure Controls/Personal Protection****Routes of Entry**

Eyes, ingestion, inhalation, and skin

**Engineering Controls**

**Ventilation** Keep airborne concentrations below exposure limits given in Section 3.

**RECOMMENDATION:** If the product is heated or worker is allergic, consider using a full mask with organic vapor cartridges.

**Personal Protective Equipment**

**Eye protection** Wear appropriate protective eyeglasses or chemical safety goggles.

**RECOMMENDATION:** Use safety glasses with lateral protection (side shields).

**Skin Protection** Wear appropriate protective clothing to prevent skin contact.

**RECOMMENDATION:** Use of protective gloves in butyl rubber, neoprene, or other chemically resistant gloves.

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**SILVER CONDUCTIVE EPOXY ADHESIVE**

**8331-PART B**

**Respiratory Protection** If exposed to mist, wear respirator such as a full-mask respirator.

**RECOMMENDATION:** Consult your local safety supply store to ensure your respirator has filter cartridges appropriate for the ingredients listed in section 3 of this MSDS, and that the respirator is fitted to the employee by a professional. Ensure vapor cartridges are stored in sealed plastic bags when not being used.

**General Hygiene Considerations**

Wash hands thoroughly with water and soap after handling.

**Section 9: Physical and Chemical Properties**

<b>Physical State</b>	Liquid	<b>Odor</b>	Amine like	<b>Odor Threshold</b>	Not established
<b>Appearance</b>	Silver grey	<b>Specific Gravity</b>	2.20	<b>Freezing Point</b>	Not established
<b>Boiling Point</b>	Not established	<b>Vapor Pressure @ 20 °C</b>	Not established	<b>Evaporation Rate</b>	Not established
<b>Autoignition Temperature</b>	Not established	<b>Flash Point <sup>a)</sup></b>	>73 °C [>163 °F]	<b>Vapor Density</b>	Not established
<b>Lower Flammability Limit</b>	Not established	<b>Upper Flammability Limit</b>	Not established	<b>Decomposition Temp.</b>	Not available
<b>Viscosity</b>	Paste like	<b>Partition Coefficient</b>	Not established	<b>Solubility in Water</b>	Insoluble
<b>pH</b>	Not available				

a) The closed cup flash point values is based on the lowest value component.

**SILVER CONDUCTIVE EPOXY ADHESIVE****8331-PART B****Section 10: Stability and Reactivity**

<b>Stabilities</b>	Chemically stable at normal temperatures and pressures
<b>Conditions to Avoid</b>	Ignition sources and incompatible substances
<b>Incompatibilities</b>	Acids, peroxides, acetylene, sodium or calcium hypochlorites, strong oxidizing agents
<b>Polymerization</b>	Will not occur
<b>Decomposition</b>	Will not decompose under normal conditions. For thermal decomposition, see combustion products in Section 5

**Section 11: Toxicological Information**

<b>Skin corrosion/irritation</b>	Skin irritant. Causes skin burns
<b>Serious eye damage/irritation</b>	Causes severe eye damage. Contains mechanically abrasive particles
<b>Sensitization</b> (allergic reactions)	The 2-piperazin-1-ylethylamine (CAS# 140-31-8) and 4,4'-isopropylidene-diphenol (CAS# 80-05-7) may cause skin sensitization in humans
<b>Carcinogenicity</b> (risk of cancer)	Not classified or listed as a carcinogen by IARC, ACGIH, CA Prop 65, or NTP
<b>Mutagenicity</b> (risk of heritable genetic effects)	No data available
<b>Reproductive Toxicity</b> (risk to sex functions)	No data available
<b>Teratogenicity</b> (risk of fetus malformation)	The 4-nonyl-phenol, branched (CAS#84852-15-13) and 4,4'-isopropylidenediphenol (CAS# 80-05-7) are suspected of being a reproductive toxicants.
<b>STOT-single exposure</b>	Diethylenetriamine (CAS# 111-40-0) and 4,4'-isopropylidene-diphenol (CAS# 80-05-7) are respiratory irritants.
<b>STOT-repeated exposure</b>	No data available
<b>Aspiration hazard</b>	Viscosity at 40 °C is >>20.5 mm <sup>2</sup> /s, thus not classifiable as aspiration hazard

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**SILVER CONDUCTIVE EPOXY ADHESIVE****8331-PART B****Acute Toxicity (Lethal Exposure Concentrations)**

Chemical Name	LD50 oral	LD50 dermal	LC50 inhalation	TCLo inhalation
silver	>5 g/kg Guinea Pig	Not established	Not established	Not established
4-nonyl-phenol, branched	1,300 mg/kg Rat	Not established	Not established	Not established
2-piperazin-1-ylethylamine	2,140 µl/kg Rat	800 µl/kg Rabbit	Not established	Not established
Diethylene triamine, reaction product with diglycidyl ether of Bisphenol A	Not established	Not established	Not established	Not established
Diethylenetriamine	1,080 mg/kg Rat	1090 mg/kg Rabbit	Not established	Not established
4,4'-isopropylidene-diphenol	2,400 mg/kg Mouse	Not established	>170 mg/m <sup>3</sup> Rat 6 h	500 mg/m <sup>3</sup> Rat 2 h

Note: Representative toxicity data from by RTECS database of the Canadian Centre for Occupational Health and Safety (CCOHS)<sup>1</sup> data from supplier MSDS were also consulted.

**Section 12: Ecological Information****Acute Ecotoxicity**

The ecotoxicity was estimated according to raw material MSDS data and the supporting data used in the classification of registered substances from the European Chemical Agency database (<http://echa.europa.eu>).

Contains silver particles less than a 1 mm in size and 4-nonylphenol, branched which are both very harmful to the environment. To a lesser extent 2-piperazin-1-ylethylamine is also classified as harmful to the environment.

Category 1

GHS Code: Hazard Statement

H400: Very toxic to aquatic life

P273: Avoid release to the environment.

P391: Collect spillage.

**Chronic Ecotoxicity**

H410: Very toxic to aquatic life with long lasting effects

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**SILVER CONDUCTIVE EPOXY ADHESIVE****8331-PART B****Biodegradability**

The content is not readily biodegradable.

**Other Effects**

VOC (EPA, WHIMS and Europe) = 32% [320 g/L]

\*VOC = *Regulated Volatile Organic Content*

*Note:* Silver should be recovered from the waste to reclaim its value.

**Section 13: Disposal Information**

P501: Dispose of contents in accordance with all local, regional, national, and international regulations.

**Section 14: Transport Information****Ground - all sizes less than 4 liters****Limited Quantity****Ground - sizes greater than 4 liters**

**Refer to TDG regulations** (Canadian Transportation of Dangerous Goods regulations); **USA CFR 49 Regulations** (Parts 100 to 185).

**UN number:** UN2735; **Shipping Name:** AMINE, LIQUID, CORROSIVE, N.O.S. (4-nonylphenol, branched; 2-piperazin-1-ylethylamine; Diethylenetriamine);

**Class:** 8, **Packing Group:** III, Marine Pollutant: Yes

**Air -**

**Refer to IATA Dangerous Goods Regulations.**

**UN number:** UN2735; **Shipping Name:** AMINE, LIQUID, CORROSIVE, N.O.S. (4-nonylphenol, branched; 2-piperazin-1-ylethylamine; Diethylenetriamine);

**Class:** 8, **Packing Group:** III, Marine Pollutant: Yes

**Note:** The 14 g and 40g kits use individual part containers that fall under the E1 30g/30ml inner packaging limit and may be shipped as '**DG in Excepted Quantities**'. Refer to Package Mark 2.6.7.1 in **IATA** for further instruction. Document as Class **E1**.

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**SILVER CONDUCTIVE EPOXY ADHESIVE****8331-PART B****Sea -**

**Refer to IMDG regulations.**

**UN number:** UN2735; **Shipping Name:** AMINE, LIQUID, CORROSIVE, N.O.S.  
(4-nonylphenol, branched; 2-piperazin-1-ylethylamine; Diethylenetriamine);  
**Class:** 8, **Packing Group:** III, Marine Pollutant: Yes

*Note:* Component supplier SDS transportation sections and labeling were consulted. All involved staff of shipper must be appropriately trained before involvement with the transport of this product, or work under direct supervision of a trained person.

**Section 15: Regulatory Information****Canada****Domestic Substance List (DSL) / Non-Domestic Substance Lists (NDSL)**

All hazardous ingredients are listed on the DSL/NDSL.

**Industry and Science Canada**

MG Labels products intended for the workplace to conform to WHMIS labeling regulations. Product identification, net quantity declaration, minimum printing type size heights, and packaging of this product are in compliance.

**Health Canada**

Products produced by MG Chemicals intended for retail display conform to the Canadian Consumer Labeling Regulations.

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

This product does not contain any class 1 ozone depleting substances.

This product does not contain any class 2 ozone depleting substances.

This product does not contain substances that are listed as hazardous air pollutants.

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

This product contains silver (CAS# 7440-22-4) 4,4'-isopropylidene-diphenol (CAS# 80-05-7), which are 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.

**California Proposition 65** (Chemicals known to cause cancer or reproductive toxicity, Sept 2, 2011 revision, USA).

This product does not contain any listed substances.

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**SILVER CONDUCTIVE EPOXY ADHESIVE****8331-PART B****Europe****RoHS**

This product does not contain any lead, cadmium, mercury, hexavalent chromium, PBB's, or PBDE's, and complies with European RoHS regulations.

**WEEE**

This product is not a piece of electrical or electronics equipment, and is therefore not governed by this regulation.

**Section 16: Other Information**

**MSDS Prepared by** Michel Hachey  
**Date of Issue** 31 October 2012  
**Supersedes** Version 1.0, 08 August 2011

**Reason for Changes:** Changed over to GHS format.

**Reference**

1) All toxicological data were checked against the RTECS (Registry of Toxic Effects of Chemical Substances®)

**Abbreviations**

GHS: Globally Harmonized System of Classification of Labeling of Chemicals  
LC50 Lethal Concentration 50%  
LCLo Lowest published lethal concentration  
LD50 Lethal Dose 50%  
N/A Not Applicable  
N/E Not Estimated  
PEL Permissible Exposure Limit  
STEL Short-Term Exposure Limit  
TCLo Lowest published toxic concentration  
TWA Time Weighted Average  
VOC Volatile Organic Content

**Technical Queries** 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)

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Quality System Certified to ISO 9001:2008

SAI Global File #004008  
Burlington, Ontario, Canada

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**SILVER CONDUCTIVE EPOXY ADHESIVE**

**8331-PART B**

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