

SILVER CONDUCTIVE EPOXY ADHESIVE

8331S-PART A

Safety Data Sheet

Section 1: Product and Company Identification**Product Name:** Silver Conductive Epoxy Adhesive: Slow Cure / High Conductivity**MSDS Code:** 8331S-Part A**Related Part #:** 8331S-15G, 8331S-200ML**Use:** Silver filled electrically conductive adhesive for repairing traces on circuit boards, cold soldering, and bonding**Emergency Contact**CHEMTREC ☎: 1-800-424-9300 (**For hazardous material incidents ONLY**—leaks, spills, fires, exposures or accidents)**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:** sds@mgchemicals.com **WEB** www.mgchemicals.com**Section 2: Hazards Identification****WHMIS Classification**

D2B – Toxic Material (Skin/Eye irritation; Skin sensitization in humans)

GHS PictogramsSignal Word
WARNING*Continued on the next page*

SILVER CONDUCTIVE EPOXY ADHESIVE

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GHS Categories

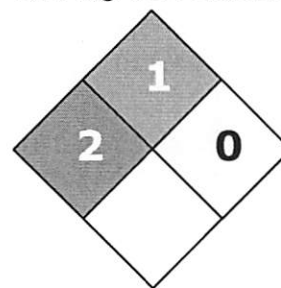
Criteria		Category	Signal Word	Symbol
Skin irritation	Skin	2	Warning	Exclamation
Sensitization		1	Warning	Exclamation
Germ cell mutagenicity		2	Warning	Health
Eye irritation		2B	Warning	
Environmental hazard	Acute aqua. tox.	1	Warning	Environmental
Environmental hazard	Chronic aqua. tox.	1	Warning	Environmental

a) Base on mixture acute toxicity estimate (ATE)

HMIS® RATING

HEALTH:	2
FLAMMABILITY:	1
PHYSICAL HAZARD:	0
PERSONAL PROTECTION:	

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

H315: May cause skin irritation

H317: May cause allergic skin reaction

H320: Causes eye irritation

H341: Suspected of causing genetic defects

Environmental Hazards

GHS Code: Hazard Statement

H410: Very toxic to aquatic life with long lasting effects

Continued on the next page

SILVER CONDUCTIVE EPOXY ADHESIVE**8331S-PART A****Exposure Routes and Symptoms Summary**

Eyes	Chemicals cause mild eye irritation. May also cause eye redness or pain. The adhesive contains mechanically abrasive particles.
Skin	May cause mild to moderate skin irritation and allergic skin reactions.
Inhalation	<i>(Not a likely route of exposure due to low volatility at room temperature)</i> May cause mild irritation of the nose, throat and lungs.
Ingestion	<i>(Not a likely route of exposure)</i> No acute toxicity effect known. May cause irritation. May cause allergic reactions.
Chronic	Prolonged and repeated exposure to the uncured epoxy resins used may cause dermatitis, eczemas, and sensitization. Animal studies suggest possible mutagenicity. 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	40-70%	0.1 mg/m ³	0.01 mg/m ³	Not established
28768-32-3	4,4'-methylenebis [N,N-bis(2-oxiranylmethyl) aniline]	15-40%	Not established	Not established	Not established
17557-23-2	neopentyl glycol diglycidyl ether	1-5%	Not established	Not established	Not established

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

**SILVER CONDUCTIVE EPOXY ADHESIVE****8331S-PART A****Section 4: First Aid Measures**

<i>Exposure Condition</i>	<i>GHS Code: Precautionary Statement</i>
IF IN EYES	P305
Symptoms	Immediate: <i>irritation, redness</i>
Response	P351: Rinse cautiously with water for several minutes. P338: Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists	P313: Get medical attention.
IF ON SKIN	P302
Symptoms	Immediate: <i>irritation, redness</i> Delayed: <i>dry skin, rash, defatting, eczema</i>
Response	P362+ P364 + P272: Take off contaminated clothing and wash it before reuse. Contaminated work clothing should not be allowed out of the workplace.
If skin irritation or rash occurs	P352: Wash with plenty of water. P313: Get medical advice/attention.
IF INHALED	P304 (<i>Not a likely route of exposure under normal use</i>)
Symptoms	Immediate: <i>cough, sore throat, respiratory system irritation</i> Delayed: <i>asthma</i>
Response	P340: Remove person to fresh air (out of the contaminated zone) and keep comfortable for breathing.
If feeling unwell	P312: Call a POISON CENTRE/doctor.
IF SWALLOWED	P301 (<i>Not a likely route of exposure under normal use</i>)
Symptoms	Immediate: <i>irritation</i>
Response	P330: Rinse mouth. P331: Do NOT induce vomiting.
If feeling unwell	P312: Call a POISON CENTRE/doctor.

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

SILVER CONDUCTIVE EPOXY ADHESIVE**8331S-PART A****Section 5: Fire Fighting Measures**

Auto-ignition Temperature	Not Established	Flash Point ^{a)}	>127 °C [>261 °F]	LFL [LEL] ^{b)} UFL [UEL]	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.				
Combustion Products	Produces CO, CO ₂ , 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 the neopentyl glycol diglycidyl ether 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. Avoid breathing the mist/vapors.

Containment Remove all sources of ignition.

Cleaning Collect liquid in a sealable, solvent-resistant container. Sprinkle inert absorbent compound onto spill, then sweep into the container. Wipe up further residue with paper towel wetted with alcohol and place dirty towels 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.

Disposal Dispose of spill waste according to Section 13.

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

- Prevention** P202: Do not handle until all safety precautions have been read and understood.
- 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. Above 88 °C used closed system ventilation.
- Handling** P280: Wear protective gloves/clothing/eye protection.
- P264: Wash hands thoroughly after handling.
- Storage** P403 + P233+ P235 + P405: Keep Container tightly closed. Store in a well-ventilated area. Keep cool. Store locked up.
- 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

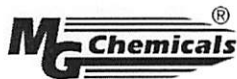
Engineering Controls

- 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, latex, neoprene, or other chemically resistant gloves with breakthrough time greater than intended use period.

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**SILVER CONDUCTIVE EPOXY ADHESIVE****8331S-PART A**

Respiratory Protection If exposed to mist, wear respirator such as a half-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

Physical State	Liquid	Odor	Not available	Odor Threshold	Not established
Appearance	Silver grey	Specific Gravity	2.59	Freezing Point	Not established
Boiling Point	Not established	Vapor Pressure @ 20 °C	Not established	Evaporation Rate	Not established
Autoignition Temperature	Not established	Flash Point^{a)}	>127 °C [>261 °F]	Vapor Density	Not established
Lower Flammability Limit	Not established	Upper Flammability Limit	Not established	Decomposition Temp.	Not available
Viscosity	Paste	Partition Coefficient	Not established	Solubility in Water	Insoluble
pH	Not available				

a) The closed cup flash point values are based on the neopentyl glycol diglycidyl ether component.

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

Stabilities	Chemically stable at normal temperatures and pressures
Conditions to Avoid	Ignition sources and incompatible substances.
Incompatibilities	Strong oxidizing agents, strong acids, strong bases, ammonium nitrate, ammonia, peroxides, perchlorates, phosphorus, selenium, and sulfur. <i>Note:</i> React with amines.
Polymerization	Will not occur
Decomposition	Will not decompose under normal conditions. For thermal decomposition, see combustion products in Section 5

Section 11: Toxicological Information

Skin corrosion/irritation	Skin irritant. Prolonged or repeated skin contact may cause dermatitis and eczemas
Serious eye damage/irritation	Causes moderate eye irritation. Contains mechanically abrasive particles
Sensitization (allergic reactions)	The epoxy resin components (CAS# 28768-32-3-6 and 17556-232) may cause skin sensitization in humans
Carcinogenicity (risk of cancer)	Not classified or listed as a carcinogen by IARC, ACGIH, CA Prop 65, or NTP
Mutagenicity (risk of heritable genetic effects)	In a two year study by Holland in 1981, skin tumors were observed in mice for neopentyl glycol diglicidyl ether component doses of 1.87 mg per week
Reproductive Toxicity (risk to sex functions)	No data available
Teratogenicity (risk of fetus malformation)	No data available
STOT-single exposure	No data available
STOT-repeated exposure	No data available
Aspiration hazard	Viscosity at 40 °C is $>>20.5 \text{ mm}^2/\text{s}$, thus not classified as aspiration hazard.

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SILVER CONDUCTIVE EPOXY ADHESIVE**8331S-PART A****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
4,4'-methylenebis [N,N-bis(2-oxiranylmethyl) aniline]	Not Established	Not Established	Not Established	Not Established
neopentyl glycol diglycidyl ether	2,000 mg/kg Rat ^{a)}	2,150 mg/kg Rabbit ^{a)}	Not established	Not established

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

a) Estimate provided by supplier

Section 12: Ecological Information

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 4,4'-methylenebis [N,N-bis(2-oxiranylmethyl)aniline], which are both very harmful to the environment.

Acute Ecotoxicity

Category 2

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

Biodegradability

The content is not biodegradable.

VOC (EPA, WHIMS, and Europe) = 33% [861 g/L]

*VOC = Regulated Volatile Organic Content

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



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Burlington, Ontario, Canada

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Section 13: Disposal Information

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

Section 14: Transport Information

Ground

Refer to TDG regulations (Canadian Transportation of Dangerous Goods regulations);

USA CFR 49 Regulations (Parts 100 to 185).

All sizes less than 4 liters:

Limited Quantity

Sizes greater than 4 liters:

UN number: UN3077; **Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCE LIQUID, N.O.S. (Silver and 4,4'-methylenebis [N,N-bis(2-oxiranylmethyl) aniline]; **Class:** 9, **Packing Group:** III, Marine Pollutant: Yes

Air

Refer to IATA dangerous goods regulations.

UN number: UN3077; **Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCE LIQUID, N.O.S. (Silver and 4,4'-methylenebis [N,N-bis(2-oxiranylmethyl) aniline]; **Class:** 9, **Packing Group:** III, Marine Pollutant: Yes

Note: The 15 grams product size falls 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**.

Sea

Refer to IMDG regulations.

UN number: UN3077; **Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCE LIQUID, N.O.S. (Silver and 4,4'-methylenebis [N,N-bis(2-oxiranylmethyl) aniline]; **Class:** 9, **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.

SILVER CONDUCTIVE EPOXY ADHESIVE**8331S-PART A****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), which is 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)

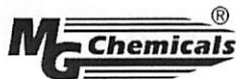
This product does not contain any listed substances.

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.



Quality System Certified to ISO 9001:2008

SAI Global File #004008
Burlington, Ontario, Canada

SILVER CONDUCTIVE EPOXY ADHESIVE

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Section 16: Other Information

MSDS Prepared by Michel Hachey
Date of Issue 16 January 2013
Supersedes Version 1.00, 26 October 2012
Reason for Changes: New related product codes and emergency contact in Section 1.
Reference 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.

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Disclaimer This material safety data sheet is provided as an information resource only. *M.G. Chemicals, Ltd.* believes the information contained herein is accurate and compiled from reliable sources. It is the responsibility of the user to query and verify any information seeming suspect where doubt on the validity may exist. The buyer assumes all responsibility of using and handling the product in accordance with local, regional, national, and international regulations.

SILVER CONDUCTIVE EPOXY ADHESIVE

8331S-PART B

Safety Data Sheet

Section 1: Product and Company Identification**Product Name:** Silver Conductive Epoxy Adhesive: Slow Cure / High Conductivity**MSDS Code:** 8331S-Part B**Related Part #:** 8331S-15G, 8331S-200ML**Use:** Silver filled electrically conductive adhesive for repairing traces on circuit boards, cold soldering, and bonding**Emergency Contact**CHEMTREC ☎: 1-800-424-9300 (**For hazardous material incidents ONLY**—leaks, spills, fires, exposures or accidents)**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:** sds@mgchemicals.com **WEB** www.mgchemicals.com**Section 2: Hazards Identification****WHMIS Classification**

E – Corrosive Material; D2B – Toxic Material (Skin sensitization in humans)

GHS PictogramsSignal Word
DANGER*Continued on the next page*

SILVER CONDUCTIVE EPOXY ADHESIVE

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GHS Categories

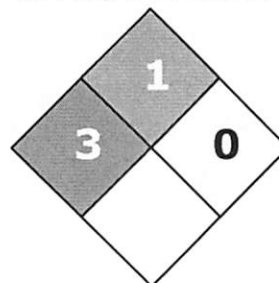
Criteria		Category	Signal Word	Symbol
Eye damage		1	Danger	Corrosion
Sensitization	Skin	1	Warning	Exclamation
Skin irritant		2	Warning	Exclamation
Environmental hazard	Acute aqua. tox.	1	Warning	Environmental
Environmental hazard	Chronic aqua. tox.	1	Warning	Environmental

a) Base on mixture acute toxicity estimate (ATE)

HMIS® RATING

HEALTH:	3
FLAMMABILITY:	1
PHYSICAL HAZARD:	0
PERSONAL PROTECTION:	

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
H318: Causes serious eye damage
H315: Causes skin irritation
H317: May cause allergic skin reaction

Environmental Hazards

GHS Code: Hazard Statement
H410: Very toxic to aquatic life with long lasting effects

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SILVER CONDUCTIVE EPOXY ADHESIVE**8331S-PART B****Exposure Routes and Symptoms Summary**

Eyes	Causes eye damage. The adhesive contains mechanically abrasive particles.
Skin	Causes skin irritation. 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, asthma, and eczemas. 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	40-70%	0.1 mg/m ³	0.01 mg/m ³	Not Established
68541-13-9	9,12-octadecadienoic acid-based polyamidoamine	10-30%	Not Established	Not Established	Not Established
68082-29-1	Fatty acid- polyethylamine polymer	10-30%	Not Established	Not Established	Not Established
4246-51-9	3,3'-(oxybis(2,1- ethane-diyloxy))bis-1- propanamine	1-5%	Not Established	Not Established	Not Established
112-24-3	triethylenetetramine	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). Data from suppliers' MSDS were also consulted.

**SILVER CONDUCTIVE EPOXY ADHESIVE****8331S-PART B****Section 4: First Aid Measures**

<i>Exposure Condition</i>	<i>GHS Code: Precautionary Statement</i>
IF IN EYES	P305
Symptoms	Immediate: <i>irritation, redness, pain, burning sensation</i> Delayed: <i>eye damage, blindness</i>
Response	P351: Rinse cautiously with water for several minutes. P338: Remove contact lenses, if present and easy to do. P338: Continue rinsing. P310: Immediately call a POISON CENTER/doctor
IF ON SKIN	P302
Symptoms	Immediate: <i>irritation, pain, nausea, headache</i>
Response	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.
If skin irritation occurs	P313: Get medical advice/attention
IF INHALED	P304 (<i>Not a likely route of exposure under normal use</i>)
Symptoms	Immediate: <i>irritation, burning sensation, cough, tightness of chest</i>
Response	P340: Remove person to fresh air (out of the contaminated zone) and keep comfortable for breathing.
If feeling unwell	P312: Call a POISON CENTRE/doctor
IF SWALLOWED	P301 (<i>Not a likely route of exposure under normal use</i>)
Symptoms	Immediate: <i>irritation, burns sensation</i>
Response	P330: Rinse mouth. P331: Do NOT induce vomiting.
If feeling unwell	P312: Call a POISON CENTRE/doctor

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

SILVER CONDUCTIVE EPOXY ADHESIVE**8331S-PART B****Section 5: Fire Fighting Measures**

Autoignition Temperature	Not established	Flash Point ^{a)}	>93 °C [>200 °F]	LFL [LEL] ^{b)} UFL [UEL]	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: Material can form a very toxic aqueous solution with water. Prevent run-off from entering drains and waterways.				
Combustion Products	Produces CO, CO ₂ , 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 the 3,3'-(oxybis(2,1-ethane-diyloxy))bis-1-propanamine 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**8331S-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 above 100 °C. Do NOT process in a fashion that causes mist or fumes.

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

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, nitrile, or other chemically resistant gloves with breakthrough time greater than intended use period.

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SILVER CONDUCTIVE EPOXY ADHESIVE
8331S-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.

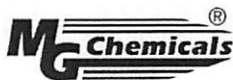
General Hygiene Considerations

Wash hands thoroughly with water and soap after handling.

Section 9: Physical and Chemical Properties

Physical State	Liquid	Odor	Amine like	Odor Threshold	Not established
Appearance	Silver grey	Specific Gravity	2.41	Freezing Point	Not established
Boiling Point ^{a)}	>221 °C [>430 °F]	Vapor Pressure @ 20 °C	Not established	Evaporation Rate	Not established
Autoignition Temperature	Not established	Flash Point ^{a)}	>>93 °C [>>200 °F]	Vapor Density	Not established
Lower Flammability Limit	Not established	Upper Flammability Limit	Not established	Decomposition Temp.	Not available
Viscosity	Paste like	Partition Coefficient	Not established	Solubility in Water	Insoluble
pH	Not available				

a) The boiling point and closed cup flash point values are based on the lowest value component: 3,3'-(Oxybis(2,1-ethane-diyloxy))bis-1-propanamine.



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Section 10: Stability and Reactivity

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

Section 11: Toxicological Information

Skin corrosion/irritation	Skin irritant. Total category 1 components contributions is from 2-3%, giving an overall category 2 rating.
Serious eye damage/irritation	Causes severe eye damage. Contains mechanically abrasive particles
Sensitization (allergic reactions)	Triethylenetetramine (CAS#112-24-3), fatty acid-polyethylamine polymer (CAS# 68082-29-1), and 3,3'-(Oxybis(2,1-ethanedioxy))bis-1-propanamine components (CAS# 4246-51-9) may cause skin sensitization in humans
Carcinogenicity (risk of cancer)	Not classified or listed as a carcinogen by IARC, ACGIH, CA Prop 65, or NTP
Mutagenicity (risk of heritable genetic effects)	No data available
Reproductive toxicity (risk to sex functions)	No data available
Teratogenicity (risk of fetus malformation)	No data available
STOT-single exposure	No data available
STOT-repeated exposure	No data available
Aspiration hazard	Viscosity at 40 °C is >>20.5 mm ² /s, thus not classifiable as aspiration hazard

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SILVER CONDUCTIVE EPOXY ADHESIVE**8331S-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
9,12-octadecadienoic acid-based polyamidoamine	Not established	Not established	Not established	Not established
Fatty acid- polyethylamine polymer	Not established	Not established	Not established	Not established
3,3'-(Oxybis(2,1- ethane-diyloxy))bis-1- propanamine	4,310 mg/kg Rat	2,510 mg/kg Rat	Not established	Not established
triethylenetetramine	2,500 mg/kg Rat 35.5 mg/kg Mouse	805 mg/kg Rabbit	Not established	Not established

Note: Representative toxicity data from by RTECS database of the Canadian Centre for Occupational Health and Safety (CCOHS) 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 fatty acid-polyethylamine polymer, which are both very harmful to the environment. To a lesser extent, triethylenetetramine 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**8331S-PART B****Biodegradability**

The content is not readily biodegradable.

VOC (EPA) = 32% [720 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**

Refer to TDG regulations (Canadian Transportation of Dangerous Goods regulations);

USA CFR 49 Regulations (Parts 100 to 185).

All sizes less than 4 liters:

Limited Quantity

Sizes greater than 4 liters:

UN number: UN2735; **Shipping Name:** AMINE, LIQUID, CORROSIVE, N.O.S.(fatty acid-polyethylamine polymer, fatty acid amides, triethylenetetramine); **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.(fatty acid-polyethylamine polymer, fatty acid amides, triethylenetetramine); **Class:** 8,

Packing Group: III, Marine Pollutant: Yes

Note: The 15 grams product size falls 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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Sea

Refer to IMDG regulations.

UN number: UN2735; **Shipping Name:** AMINE, LIQUID, CORROSIVE, N.O.S.(fatty acid-polyethylamine polymer, fatty acid amides, triethylenetetramine); **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), which is 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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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	17 August 2012
Supersedes	Version 1.00, 26 October 2012
Reason for Changes:	New related product codes and emergency contact in Section 1.
Reference	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.

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