

8331-A

SILVER CONDUCTIVE EPOXY ADHESIVE

Safety Data Sheet

Section 1: Identification

Product Identifier and Other Means of Identification

Product Name: 8331-A**Other Means of Identification:** Silver Conductive Epoxy Adhesive**Related Part #** 8331-14G, 8331-50ML, 8331-200ML (withdrawn: 8331-429G, 8331-454G)

Recommended Use and Restriction on Use

Use: Electrically conductive epoxy adhesive resin part for use with hardeners

Uses Advised Against: Not available

Details of Manufacturer or Importer

ManufacturerMG Chemicals
1210 Corporate Drive
Burlington, Ontario L7L 5R6
CANADAMG Chemicals (Head Office)
9347-193 Street
Surrey, British Columbia V4N 4E7
CANADA**☎** +1-800-340-0772**FAX** +1-800-340-0773**E-MAIL** support@mgchemicals.com**WEB** www.mgchemicals.com**☎** +1-905-331-1396**FAX** +1-905-331-2682**E-MAIL** info@mgchemicals.com**E-MAIL** (Competent Person): sds@mgchemicals.com

Emergency Phone Number

For hazardous material incidents ONLY (leaks, spills, fires, exposures or accidents)
USA or CANADA—Call CHEMTREC at **+1-800-424-9300****For emergencies involving the transport of dangerous goods;** 24/7 service
CANADA—Call CANUTEC collect at **+1-613-996-6666** or ***666** on cellular phones

8331-A

SILVER CONDUCTIVE EPOXY ADHESIVE

Section 2: Hazard(s) Identification



Classification of Hazardous Chemical

GHS Categories

Criteria		Category	Signal Word	Pictograms
Sensitization	Skin	1	Warning	Exclamation
Eye Irritation		2	Warning	Exclamation
Skin Irritation		2	Warning	Exclamation
Hazardous to the Aquatic Environment	Chronic	1	Warning	Environment

Note: The degree of severity is ranked within each hazard class from 1 (Highest Severity) to up to 5 (Lowest Severity), which is opposite to HMIS and NFPA conventions. Severity category rankings do not allow comparisons between classes.

Label Elements

Signal Word	WARNING
Pictograms	Hazard Statements
	H317: May cause an allergic skin reaction H319: Causes serious eye irritation H315: Causes skin irritation
	H410: Very toxic to aquatic life with long lasting effects
Prevention	Precautionary Statements
P102	Keep out of reach of children.
P261	Avoid breathing fumes/vapors.
P280	Wear protective gloves/eye protection.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P264	Wash hands thoroughly after handling.

Section continued on the next page

8331-A

SILVER CONDUCTIVE EPOXY ADHESIVE

Continued...

Response	Precautionary Statements
P302 + P352	IF ON SKIN: Wash with plenty of water.
P333 + P313	If skin irritation or rash occurs: Get medical advice/attention.
P362 + P364	Take off contaminated clothing and wash it before reuse.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/attention.
P391	Collect spillage.
Disposal	Precautionary Statements
P501	Dispose of contents/container in accordance to local/regional/international regulations.

Hazards Not Otherwise Classified

Other Criteria	Hazard Statements/Precautionary Statement	Signal Word	Pictograms
Argyria	Long term exposure to silver powder or compounds can lead to an irreversible blue-grey discoloration of the skin.	<i>None</i>	<i>None</i>

Section 3: Composition/Information on Ingredients

CAS #	Chemical Name	%(weight)
7440-22-4	silver	67%
28064-14-4	phenol, polymer with formaldehyde, glycidyl ether	33%

8331-A

SILVER CONDUCTIVE EPOXY ADHESIVE

Section 4: First-Aid Measures

<i>Exposure Condition</i>	<i>GHS Code/Symptoms/Precautionary Statements</i>
IF ON SKIN	P302 + P352, P333 + P313, P362 + P364
Immediate Symptoms	<i>redness, irritation, allergic dermatitis, rash</i>
Response	Wash with plenty of water. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
IF IN EYES	P305 + P351 + P338, P337 + P313
Immediate Symptoms	<i>redness, irritation</i>
Response	Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
IF INHALED	P304 + P340
Immediate Symptoms	<i>cough, irritation of the respiratory track, sore throat, asthma</i>
Response	Remove person to fresh air and keep comfortable for breathing.
IF SWALLOWED	P301 + P330, P331
Immediate Symptoms	<i>abdominal discomfort, nausea, vomiting</i>
Response	Rinse mouth. Do NOT induce vomiting.

Section 5: Fire-Fighting Measures

Extinguishing Media	In case of fire: Use extinguishing media suitable for surrounding materials.
Specific Hazards	Not flammable or combustible, but burns if involved in a fire. Produces irritating smoke of unknown toxicity in fires. Inhalation of silver oxide fumes may cause metal fever and irritate the respiratory tract. The flu-like symptoms of metal fever may be delayed, occurring 4 to 12 hours after exposure. Prevent fire-fighting wash from entering waterway or sewer system.
Combustion Products	Produces carbon oxides (CO,CO ₂), and toxic metal fumes.
Fire-Fighter	Wear self-contained breathing apparatus and full fire-fighting turn-out gear.

8331-A**SILVER CONDUCTIVE EPOXY ADHESIVE****Section 6: Accidental Release Measures**

Personal Protection	See personal protection recommendations in Section 8.
Precautions for Response	Avoid breathing fumes/vapors. Remove or keep away all sources of extreme heat or open flames.
Environmental Precautions	Avoid releasing to the environment. Prevent spill from entering drains and waterways.
Containment Methods	No containment method required—this product is not readily flowable
Cleaning Methods	Collect liquid in a sealable, chemical-resistant container. Sprinkle inert absorbent compound onto spill, then sweep into the container. Use soap and water to remove the last traces of residue.
Disposal Methods	Dispose of spill waste according to Section 13.

Section 7: Handling and Storage

Prevention	Keep out of reach of children. Avoid breathing fumes/vapors or contact with skin or eyes. Avoid release to the environment. Take off contaminated clothing and wash it before reuse. Contaminated work clothing should not be allowed out of the workplace.
Handling	Wear protective gloves/eye protection. Wash hands thoroughly after handling. Collect spillage.
Storage	Not available

8331-A

SILVER CONDUCTIVE EPOXY ADHESIVE

Section 8: Exposure Controls/Personal Protection

Substances with Occupational Exposure Limit Values

Chemical Name	Country	Long Term Exposure Limits (PEL)	Short Term Exposure Limits (STEL)
silver (metal dust, mist) (metal) (Ag and its compounds) (metal, dust, fumes)	ACGIH	0.1 mg/m ³	Not established
	U.S.A. OSHA PEL	0.01 mg/m ³	Not established
	Canada AB	0.1 mg/m ³	Not established
	Canada BC	0.01 mg/m ³	0.03 mg/m ³
	Canada ON	0.1 mg/m ³	Not established
	Canada QC	0.1 mg/m ³	Not established

Note: The ACGIH¹, OSHA (Table Z-1), and Canadian provinces exposure limits were consulted. Limits from the RTECS² database and data from suppliers' SDS were also consulted. Short term exposure limits (STEL) are for 15 min and long term permissible exposure limits (PEL) for 8 h.

Engineering Controls

Ventilation

Keep airborne concentrations below the occupational exposure limits (OEL).

The silver flakes are inextricably bound to the adhesive mixture; therefore they are not available as airborne hazards under normal use. Ensure adequate ventilation if the product is mechanically aerosolized.

Personal Protective Equipment

Eye protection

Wear appropriate protective eyeglasses or chemical safety goggles.

RECOMMENDATION: Ensure that glasses have side shields for lateral protection.

Skin Protection

For likely contacts, use of protective butyl rubber, latex, neoprene, or other chemically resistant gloves.

For incidental contacts, use nitrile or other chemically resistant gloves.

Section continued on the next page

8331-A
SILVER CONDUCTIVE EPOXY ADHESIVE

Respiratory Protection If exposed to fumes or dust above the exposure limit, wear a suitable respirator meeting local/regional/national guidelines.

If the product is heated or the worker has a known allergic reaction, consider using a full mask with organic vapor cartridge or with an independent air supply.

RECOMMENDATION: Consult your local safety supply store to ensure that your respirator has a NIOSH (U.S.) approved filter cartridges appropriate for the ingredients listed in Section 3. The respirator should be 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	Solid, paste	Lower Flammability Limit	Not available
Appearance	Silver grey	Upper Flammability Limit	Not available
Odor	Slight	Vapor Pressure @20 °C	Not available
Odor Threshold	Not available	Vapor Density	Not available
pH	Not available	Specific Gravity @25 °C	2.5
Freezing/Melting Point	Not available	Solubility in Water	Insoluble
Boiling Point	Not available	Partition Coefficient	Not available
Flash Point ^{a)}	>150 °C [>302 °F]	Auto-ignition Temperature	Not available
Evaporation Rate	Not available	Decomposition Temperature	Not available
Flammability (solid, gas)	Not available	Viscosity @40 °C	>20.5 mm ² /s

a) The closed cup flash point values are based on the phenol, polymer with formaldehyde, glycidyl ether resin component.

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

Reactivity	Reacts exothermically with amines.
Chemical Stability	Chemically stable at normal temperatures and pressures
Conditions to Avoid	Avoid ignition sources, open flames, and incompatible substances. Do not use in a way that aerosolizes the product.
Incompatibilities	Avoid strong oxidizing agents, strong acids, strong bases
Polymerization	Will not occur
Decomposition	Will not decompose under normal conditions. For thermal decomposition, see combustion products in Section 5.

Section 11: Toxicological Information**Summary of Effects and Symptoms by Routes of Exposure**

Eyes	May cause redness and mild irritation.
Skin	May cause skin redness, mild irritation, dry skin, or allergic contact dermatitis.
Inhalation	May cause cough, respiratory irritation, sore throat, or asthma.
Ingestion	It may cause abdominal discomfort, nausea, vomiting (see inhalation symptoms).
Chronic	Prolonged and repeated exposure may lead to skin sensitization. Prolonged and repeated ingestion or inhalation of silver may yield to an irreversible blue-grey discoloration of the skin.

Acute Toxicity (Lethal Exposure Concentrations)

Chemical Name	LD50 oral	LD50 dermal	LC50 inhalation
silver	>5 g/kg Guinea Pig	≥2 000 mg/kg Rabbit	5.16 mg/L Rat 4 h (dust)
phenol, polymer with formaldehyde, glycidyl ether	Not available	Not available	Not available

Note: Toxicity data from the RTECS² and ECHA database were consulted. The data from supplier (M)SDS were also consulted.

Section continued on the next page

8331-A**SILVER CONDUCTIVE EPOXY ADHESIVE****Other Toxicological Effects**

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/irritation	Causes severe eye irritation. Contains mechanically abrasive particles.
Sensitization (allergic reactions)	The epoxy resin components (CAS# 28064-14-4) may cause skin sensitization in humans.
Carcinogenicity (risk of cancer)	None of the ingredients are classified or listed as a carcinogen by IARC, ACGIH, CA Prop 65, or NTP.
Mutagenicity (risk of heritable genetic effects)	Based on available data, the classification criteria are not met.
Reproductive Toxicity (risk to sex functions)	Based on available data, the classification criteria are not met.
Teratogenicity (risk of fetus malformation)	Based on available data, the classification criteria are not met.
STOT-single exposure	Based on available data, the classification criteria are not met.
STOT-repeated exposure	Based on available data, the classification criteria are not met.
Aspiration hazard	Based on available data, the classification criteria are not met. The mixture does not contain Class 1 aspiration toxicant and its viscosity is $>20.5 \text{ mm}^2/\text{s}$ at $40 \text{ }^\circ\text{C}$.

8331-A**SILVER CONDUCTIVE EPOXY ADHESIVE****Section 12: Ecological Information**

Ecological classifications are based on the IMDG/GHS criteria in conjunction with ecotoxicological data from our suppliers, the European Chemical Agency database (<http://echa.europa.eu>), and other reliable sources.

Contains silver particles of less than a 1 mm but more than 100 nm (larger than nanoparticles), which release ionic silver levels that is very toxic to the environment. While massive silver is insoluble in water, its powders is considered sufficiently soluble to give rise to an ecological hazard by EU regulators. The classification that follows takes into account to chronic aqueous toxicity of category 1 (M = 10 for silver) of the EU.

In Europe, similar epoxy resin with CAS# 28064-14-4 is generally classified as chronic category 2 marine pollutant due to LC50 96 h of >1 mg/L but ≤10 mg/L.

Acute Ecotoxicity

Category 1

Very toxic to aquatic life

Chronic Ecotoxicity

Category 1

Very toxic to aquatic life with long lasting effects

Avoid release to the environment. Collect spillage.

Biodegradability

Not readily biodegradable

Bioaccumulation

Not available

Other Effects

Not available

Section 13: Disposal Information

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

8331-A

SILVER CONDUCTIVE EPOXY ADHESIVE

Section 14: Transport Information

Ground

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

<p>Sizes under 450 kg <i>8331-14G, 8331-50ML, 8331-200ML</i> NOT REGULATED in TDG per Special Provisions 99</p>	<p><i>FOR REFERENCE ONLY</i> UN number: UN3077 Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (silver flakes <1 mm; phenol, polymer with formaldehyde, glycidyl ether) Class: 9 Packing Group: III Marine Pollutant: Yes</p>
<p>Sizes 5 kg and under NOT REGULATED in 49 CFR per exception 171.4 (c)(2)</p>	

Special Provision 99 (2): These Regulations, except for Part 1 (Coming into Force, Repeal, Interpretation, General Provisions and Special Cases) and Part 2 (Classification), do not apply to the handling, offering for transport or transporting of less than 450 kg of UN3077, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S., or less than 450 L of UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., on a road vehicle or a railway vehicle. The dangerous goods must be contained in one or more small means of containment designed, constructed, filled, closed, secured and maintained so that under normal conditions of transport, including handling, there will be no accidental release of the dangerous goods that could endanger public safety.

Air

Refer to ICAO-IATA regulations.

<p>Sizes 5 kg and under <i>8331-14G, 8331-50ML, 8331-200ML</i> NOT REGULATED Not Restricted, as per Special Provisions A197</p>	
--	--

Special Provision A197: These substances when transported in single or combination packagings containing net quantity per single or inner packaging of less than 5 L or less for liquids or having a net mass of 5 kg or less for solids, are not subject to any other provisions of these Regulations provided the packagings meet the general provisions 5.0.2.4.1, 5.0.2.6.1.1 and 5.0.2.8.

Section continued on the next page

8331-A**SILVER CONDUCTIVE EPOXY ADHESIVE****Sea****Refer to IMDG regulations.**

Sizes 5 kg and under

8331-14G, 8331-50ML, 8331-200ML

NOT REGULATED

per 2.10.2.7

2.10.2.7: Marine pollutants packaged in single or combination packagings containing a net quantity per single or inner packaging of 5 L or less for liquids or having a net mass per single or inner packaging of 5 kg or less for solids are not subject to any other provision of this Code relevant to marine pollutants provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8. In the case of marine pollutants also meeting the criteria for inclusion in another hazard class, all provisions of this Code relevant to any additional hazards continue to apply.

Note: Shipper must be appropriately trained and certified before involvement with the transport of dangerous goods.

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

All hazardous ingredients are listed on the DSL.

Hazardous Products Act (R.S.C., 1985, c. H-3)

The safety data sheet and label comply with the Hazardous Product Act and WHMIS 2015.

Section continued on the next page

8331-A

SILVER CONDUCTIVE EPOXY ADHESIVE

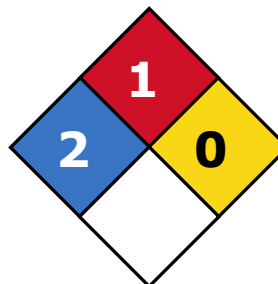
USA

Other Classifications

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)

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; reportable quantity = 1 000 lb), 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, USA).

This product does not contain any listed substances in California.

Europe

RoHS (Restriction of Hazardous Substances Directive)

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

WEEE (Waste Electrical and Electronic Equipment Directive)

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

8331-A**SILVER CONDUCTIVE EPOXY ADHESIVE****Section 16: Other Information****SDS Prepared by** Regulatory Department**Date of Review** 23 May 2018**Supersedes** 14 September 2017**Reason for Changes:** Change to product name**Reference**

1) ACGIH 2017 TLVs and BEIs: Based on the documentation of the threshold limit values for chemical substances and physical agents & biological exposure indices, American Conference of Governmental of Industrial Hygienist Cincinnati, OH (2017).

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

Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists (USA)
ECHA	European Chemicals Agency
EC50	Half maximal effective concentration
EL50	Half maximal effective loading
IARC	International Agency for Research on Cancer
NOELR	No observable effect loading ratio
NTP	National Toxicology Program
GHS	Globally Harmonized System of Classification of Labeling of Chemicals
LC50	Lethal Concentration 50%
LCLo	Lowest published lethal concentration
LD50	Lethal Dose 50%
OEL	Occupational Exposure Limit
PEL	Permissible Exposure Limit
SDS	Safety Data Sheet
STEL	Short-Term Exposure Limit
TCLo	Lowest published toxic concentration
TWA	Time Weighted Average
VOC	Volatile Organic Content

Section continued on the next page

8331-A**SILVER CONDUCTIVE EPOXY ADHESIVE**

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.

Email: support@mgchemicals.com

Mailing Addresses *Manufacturing & Support*
1210 Corporate Drive
Burlington, Ontario, Canada
L7L 5R6

Head Office
9347-193rd Street
Surrey, British Columbia, Canada
V4N 4E7

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.

8331-B

SILVER CONDUCTIVE EPOXY ADHESIVE

Safety Data Sheet

Section 1: Identification

Product Identifier and Other Means of Identification

Product Name: 8331-B**Other Means of Identification:** Silver Conductive Epoxy Adhesive**Related Part #** 8331-14G, 8331-50ML, 8331-200ML (withdrawn: 8331-429G, 8331-454G)

Recommended Use and Restriction on Use

Use: Electrically conductive epoxy adhesive hardener part for use with resins**Uses Advised Against:** Not available

Details of Manufacturer or Importer

ManufacturerMG Chemicals
1210 Corporate Drive
Burlington, Ontario L7L 5R6
CANADAMG Chemicals (Head Office)
9347-193 Street
Surrey, British Columbia V4N 4E7
CANADA**☎** +1-800-340-0772**FAX** +1-800-340-0773**E-MAIL** support@mgchemicals.com**WEB** www.mgchemicals.com**☎** +1-905-331-1396**FAX** +1-905-331-2682**E-MAIL** info@mgchemicals.com**E-MAIL** (Competent Person): sds@mgchemicals.com

Emergency Phone Number

For hazardous material incidents ONLY (leaks, spills, fires, exposures or accidents)
USA or CANADA—Call CHEMTREC at **+1-800-424-9300****For emergencies involving the transport of dangerous goods;** 24/7 service
CANADA—Call CANUTEC collect at **+1-613-996-6666** or ***666** on cellular phones

8331-B

SILVER CONDUCTIVE EPOXY ADHESIVE

Section 2: Hazard(s) Identification




Classification of the Chemical Material

GHS Categories

Criteria		Category	Signal Word	Pictograms
Eye Damage		1	Danger	Corrosion
Skin Corrosion		1B	Danger	Corrosion
Sensitization	Skin	1	Warning	Exclamation
Acute Toxicity	Oral	4	Warning	Exclamation
Reproductive Toxicity		2	Warning	Health
Hazardous to the Aquatic Environment	Chronic	1	Warning	Environment

Note: The degree of severity is ranked within each hazard class from 1 (Highest Severity) to up to 5 (Lowest Severity), which is opposite to HMIS and NFPA conventions. Severity category rankings do not allow comparisons between classes.

Label Elements


Signal Word	DANGER
Pictograms	Hazard Statements
	H314: Causes severe skin burns and eye damage
	H317: May cause an allergic skin reaction H302: Harmful if swallowed
	H361: Suspected of damaging fertility or the unborn child

Section continued on the next page

8331-B

SILVER CONDUCTIVE EPOXY ADHESIVE

Continued...

Pictograms	Hazard Statements
	<p>H410: Very toxic to aquatic life with long lasting effects</p>
Prevention	Precautionary Statements
<p>P102 P201 P202 P260 P280 P264 P270 P272 P273</p>	<p>Keep out of reach of children. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe fumes/vapors. Wear protective gloves/eye protection. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing should not be allowed out of the workplace. Avoid release to the environment.</p>
Response	Precautionary Statements
<p>P308 + P313 P305 + P351 + P338, P310 P301+ P330 + P331, P310 P303 + P361 + P353, P310 P363 P333 + P313 P304 + P340, P310 P391</p>	<p>If exposed or concerned: Get medical advice/attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor. IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER or doctor. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Immediately call a POISON CENTER or doctor. Wash contaminated clothing before reuse. If skin irritation or rash occurs: Get medical advice/attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor. Collect spillage.</p>

Section continued on the next page

8331-B

SILVER CONDUCTIVE EPOXY ADHESIVE

Continued...

Storage	Precautionary Statements
P405	Store locked up.
Disposal	Precautionary Statements
P501	Dispose of contents/container in accordance to local/regional/international regulations.

Hazards Not Otherwise Classified

Other Criteria	Hazard Statements/Precautionary Statement	Signal Word	Pictograms
Argyria	Long term ingestion or inhalation of silver can lead to an irreversible blue-grey discoloration of the skin.	None	None

Section 3: Composition/Information on Ingredients

CAS #	Chemical Name	%(weight)
7440-22-4	silver	67%
84852-15-3	4-nonyl phenol, branched	22%
140-31-8	1-piperazineethanamine	7%
68411-71-2	diethylene triamine, reaction product with diglycidyl ether of bisphenol A	1%
111-40-0	diethylene triamine	1%
80-05-7	4,4'-isopropylidenediphenol	1%

Section 4: First-Aid Measures

<i>Exposure Condition</i>	<i>GHS Code: Precautionary Statement</i>
IF IN EYES	P305 + P351 + P338, P310
Immediate Symptoms	<i>redness, severe irritation, pain, burns</i>
Response	Rinse cautiously with water for at least 20 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.

Section continued on the next page

8331-B**SILVER CONDUCTIVE EPOXY ADHESIVE***Continued...*

IF SWALLOWED	P301 + P330, P331, P310
Immediate Symptoms	<i>severe irritation, burns to mouth, throat, stomach</i>
Response	Rinse mouth. Do not induce vomiting. Immediately call a POISON CENTRE/doctor.
IF ON SKIN	P303 + P361+ P353, P310, P333 + P313, P363
Immediate or Delayed Symptoms	<i>redness, rash (allergic contact dermatitis), severe irritation, pain, burns, blistering</i>
Response	Take off immediately all contaminated clothing. Wash with plenty of water/shower. Immediately call a POISON CENTRE/doctor. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse.
IF INHALED	P304 + P340, P310
Immediate Symptoms	<i>cough, severe irritation or burns of the respiratory track</i>
Response	Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTRE/doctor.

Section 5: Fire-Fighting Measures

Extinguishing Media	In case of fire: Use dry chemical, carbon dioxide, chemical foam, or water spray to extinguish. Use water spray to cool containers.
Specific Hazards	Not flammable or combustible, but will burn if involved in a fire. Produces irritating smoke and toxic smoke in fires. Inhalation of silver oxide fumes may cause metal fever and irritate the respiratory tract. The flu-like symptoms of metal fever may be delayed, occurring 4 to 12 hours after exposure. Prevent fire-fighting wash from entering waterway or sewer system.
Combustion Products	Produces carbon oxides (CO, CO ₂), nitrogen oxides (NO _x), amines, silver oxide fumes and other toxic fumes.
Fire-Fighter	Wear self-contained breathing apparatus and full fire-fighting turn-out gear.

8331-B**SILVER CONDUCTIVE EPOXY ADHESIVE****Section 6: Accidental Release Measures**

Personal Protection	Use personal protection recommended in Section 8.
Precautions for Response	Do not breathe fumes/vapors. Keep away from extreme heat or open flames.
Environmental Precautions	Avoid releasing to the environment. Prevent spill from entering drains and waterways. Do not flush to sewer.
Containment Methods	None required—this product is not readily flowable
Cleaning Methods	Collect liquid in a sealable container. Sprinkle inert absorbent compound onto spill, then sweep into the container. Wipe remaining residue with a paper towel wetted with alcohol (or other suitable organic solvent) 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. Avoid containers with copper, aluminum, zinc, or galvanized surfaces since the waste mater can slowly oxidize them.
Disposal Methods	Dispose spill waste according to Section 13.

Section 7: Handling and Storage

Prevention	Keep out of reach of children. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Contaminated work clothing should not be allowed out of the workplace. Take off contaminated clothing and wash it before reuse. Do not breathe fumes/vapors. Do not eat, drink, or smoke when using this product. Avoid release to the environment.
Handling	Wear protective gloves/eye protection. Wash hands thoroughly after handling. Collect spillage.
Storage	Store locked up.

8331-B

SILVER CONDUCTIVE EPOXY ADHESIVE

Section 8: Exposure Controls/Personal Protection

Substances with Occupational Exposure Limit Values

Chemical Name	Country or Vendor	Long Term Exposure Limits (PEL)	Short Term Exposure Limits (STEL)
silver (metal dust, mist) (metal) (Ag and its compounds) (metal, dust, fumes)	ACGIH	0.1 mg/m ³	Not established
	U.S.A. OSHA PEL	0.01 mg/m ³	Not established
	Canada AB	0.1 mg/m ³	Not established
	Canada BC	0.01 mg/m ³	0.03 mg/m ³
	Canada ON	0.1 mg/m ³	Not established
	Canada QC	3 mg/m ³	Not established
diethylene triamine	ACGIH	1 ppm (Skin)	Not established
	U.S.A. OSHA PEL	Not established	Not established
	Canada AB	1 ppm (Skin)	Not established
	Canada BC	1 ppm (Skin) (S)	Not established
	Canada ON	1 ppm (Skin)	Not established
	Canada QC	1 ppm (Skin)	Not established

Note: Ingredients are listed in descending weight contribution order (from greatest to least). The ACGIH¹, OSHA (Table Z-1), and Canadian provinces exposure limits were consulted. Limits from the RTECS² database and data from suppliers' SDS were also consulted. Short term exposure limits (STEL) are for 15 min and long term permissible exposure limits (PEL) for 8 h.

Skin—can be absorbed through the skin

S—Sensitizer

Engineering Controls

Ventilation

Keep airborne concentrations below the occupational exposure limits (OEL).

Because the silver flakes and diethylene triamine are bound in the adhesive mixture, they do not present an airborne hazard under normal use.

Section continued on the next page

8331-B**SILVER CONDUCTIVE EPOXY ADHESIVE****Personal Protective Equipment****Eye protection**

Wear appropriate protective eyeglasses or chemical safety goggles.

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

Skin Protection

For likely contacts, use of protective butyl rubber, neoprene, or other chemically resistant gloves.

For incidental contacts, use nitrile or other chemically resistant gloves.

Respiratory Protection

For over-exposures up to 10 x OEL of vapors/fumes, wear respirator such as a half-mask respirator with organic vapor cartridges and particulate filter.

Above 10 x OEL or if the worker is allergic, use a full mask, positive-pressure, air-supplied respirator or a self-contained breathing apparatus.

If the product is heated or worker has a known allergic reaction, consider using a full mask with organic vapor cartridge or with an independent air supply.

RECOMMENDATION: Consult your local safety supply store to ensure that your respirator has a NIOSH (U.S.) approved filter cartridges appropriate for the ingredients listed in Section 3. The respirator should be 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.

8331-B

SILVER CONDUCTIVE EPOXY ADHESIVE

Section 9: Physical and Chemical Properties

Physical State	Solid	Lower Flammability Limit	Not available
Appearance	Silver grey, paste	Upper Flammability Limit	Not available
Odor	Amine-like	Vapor Pressure @25 °C	Not available
Odor Threshold	Not available	Vapor Density	Not available
pH	Not available	Specific Gravity @25 °C	2.4
Freezing/Melting Point	Not available	Solubility in Water	Practically insoluble
Boiling Point	Not available	Partition Coefficient	Not available
Flash Point ^{a)}	93.3 °C [200 °F]	Auto-ignition Temperature	Not available
Evaporation Rate	Not available	Decomposition Temperature	Not available
Flammability (solid, gas)	Not available	Viscosity @40 °C	>20.5 mm ² /s

a) Setaflashed closed cup for hardener components

Section 10: Stability and Reactivity

Reactivity	Reacts exothermically with epoxide groups.
Chemical Stability	Chemically stable at normal temperatures and pressures
Conditions to Avoid	Incompatible substances and excessive heat
Incompatibilities	Strong oxidizing agents, strong acids, strong bases, ammonia
Polymerization	Will not occur
Decomposition	For thermal decomposition, see combustion products in Section 5.

8331-B
SILVER CONDUCTIVE EPOXY ADHESIVE
Section 11: Toxicological Information
Summary of Effects and Symptoms by Routes of Exposure

Eyes	May causes redness, severe eye irritation, pain, or corrosive eye damage. Contains mechanically abrasive particles.
Skin	May cause redness, serious skin irritation, allergic contact dermatitis, chemical burns, and blistering.
Inhalation	May cause cough and severe respiratory irritation.
Ingestion	May cause severe irritations or burns to mouth, throat, and stomach (see inhalation symptoms).
Chronic	<p>Prolonged and repeated exposure may lead to skin sensitization and to reproductive toxicity.</p> <p>Long term exposure to silver powder or compounds can lead to an irreversible blue-grey discoloration of the skin.</p>

Lethal Exposure Concentrations

Chemical Name	LD50 oral	LD50 dermal	LC50 inhalation
silver	>5 g/kg Guinea Pig	>2 000 mg/kg Rabbit	5.16 mg/L Rat ≥4 h (dust)
4-nonyl phenol, branched	1 300 mg/kg Rat	>3 160 mg/kg	Not available
1-piperazineethanamine	2 140 µl/kg Rat	866 mg/kg Rabbit	Not available
diethylene triamine, reaction product with diglycidyl ether of Bisphenol A	Not available	Not available	Not available
diethylene triamine	1 080 mg/kg Rat	1 090 mg/kg Rabbit	Not available
4,4'-isopropylidenediphenol	2 400 mg/kg Rat	3 mL/kg Rabbit	>170 mg/m ³ Rat 6 h

Note: Toxicity data from the RTECS² and ECHA were consulted. The data from supplier (M)SDS were also consulted.

Section continued on the next page

8331-B**SILVER CONDUCTIVE EPOXY ADHESIVE****Other Toxicological Effects**

Skin corrosion/irritation	The 4-nonyl phenol, branched; diethylene triamine; and 1-piperazineethanamine cause skin burns.
Serious eye damage/irritation	The 4-nonyl phenol, branched; diethylene triamine; and 1-piperazineethanamine cause eye damage.
Respiratory and skin sensitization (allergic reactions)	The 1-piperazineethanamine and 4,4'-isopropylidenediphenol may cause skin sensitization.
Carcinogenicity (risk of cancer)	None of the ingredients are classified or listed as a carcinogen by IARC, ACGIH, CA Prop 65, or NTP.
Mutagenicity (risk of heritable genetic effects)	Based on available data, the classification criteria are not met.
Reproductive Toxicity (risk to sex functions)	Based on available data, the classification criteria are not met.
Teratogenicity (risk of fetus malformation)	The 4-nonyl-phenol, branched and 4,4'-isopropylidenediphenol are suspected of being reproductive toxicants.
STOT-single exposure	Based on available data, the classification criteria are not met.
STOT-repeated exposure	Based on available data, the classification criteria are not met.
Aspiration hazard	Based on available data, the classification criteria are not met. The mixture does not contain components classified as aspiration hazards and the kinematic viscosity of the mixture is >20.5 mm ² /s at 40 °C.

Section 12: Ecological Information

Ecological classifications are based on the IMDG/GHS criteria in conjunction with ecotoxicological data from our suppliers, the European Chemical Agency database (<http://echa.europa.eu>), and other reliable sources.

Contains silver particles of less than a 1 mm but more than 100 nm (larger than nanoparticles), which release ionic silver levels that is very toxic to the environment. While massive silver is insoluble in water, its powders is considered sufficiently soluble to give rise to an ecological hazard by EU48 regulators. The classification that follows takes into account to chronic aqueous toxicity of category 1 (M = 10 for silver) of the EU.

The 4-nonyl phenol, branched, ingredient has a chronic aqueous toxicity of category 1 according to the minimal LC50 96 h of 0.135 mg/L *Lepomis macrochiru*.

Section continued on the next page

8331-B**SILVER CONDUCTIVE EPOXY ADHESIVE**

The 4,4'-isopropylidenediphenol ingredient is a category 2 aqueous pollutant according to the minimal 96 h LC50 of 4.6 mg/L for Pimephales promelas (fathead minnow); EC50 48 h of 10.2 mg/L Daphnia Magna (water flea); and EC50 96 h of 2.73 for Pseudokirchneriella subcapitata (green algae).

The 1-piperazineethanamine (CAS# 140-31-8) is a category 4 aqueous pollutant according to the minimal 96 h LC50 of 2190 mg/L for Pimephales promelas (fathead minnow); EC50 48 h of 58 mg/L Daphnia Magna (water flea); EC50 72 h of 465 mg/L for Selenastrum capricornutum.

Diethylene triamine (CAS# 90-72-2) is not classified as an aqueous pollutant according to available data.

Acute Ecotoxicity

Category 1

Very toxic to aquatic life

Chronic Ecotoxicity

Category 1

Very toxic to aquatic life with long lasting effect

Avoid release to the environment. Collect spillage.

Persistence and Biodegradability

Not available

Bioaccumulative Potential

Not available

Mobility in Soil

Not available

Other Effects

Not available

Section 13: Disposal Considerations

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

8331-B

SILVER CONDUCTIVE EPOXY ADHESIVE

Section 14: Transport Information

Ground

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

Sizes 1 kg and under

8331-14G, 8331-50ML, 8331-200ML
Limited Quantity



Sizes greater than 1 kg

FOR REFERENCE ONLY

UN number: UN3263

Shipping Name:

CORROSIVE SOLID, BASIC, ORGANIC
N.O.S. (4-nonyl phenol, branched; amino-
ethylpiperazine; silver powder <1 mm)

Class: 8

Packing Group: II

Marine Pollutant: Yes



Air

Refer to ICAO-IATA Dangerous Goods Regulations.

Sizes 30 g and under

8331-14G

Excepted Quantity

Document as class **E2**

Max Net Qty/Outer Pkg =
500 g



Sizes greater than 1 kg up to 15 kg

FOR REFERENCE ONLY

UN number: UN3263

Shipping Name:

CORROSIVE SOLID, BASIC, ORGANIC
N.O.S. (4-nonyl phenol, branched; amino-
ethylpiperazine; silver powder < 1 mm)

Class: 8

Packing Group: II

Marine Pollutant: Yes



Sizes 1 kg and under

8331-50ML, 8331-200ML

Limited Quantity



Section continued on the next page

8331-B

SILVER CONDUCTIVE EPOXY ADHESIVE

Sea

Refer to IMDG regulations.

Sizes 30 g and under

8331-14G

Excepted Quantity

Document as class

E2



Max Net Qty/Outer Pkg

= 500 g

Sizes greater than 1 kg

FOR REFERENCE ONLY

UN number: UN3263

Shipping Name:

CORROSIVE SOLID, BASIC, ORGANIC
N.O.S. (4-nonyl phenol, branched; amino-ethylpiperazine; silver powder < 1 mm)

Class: 8

Packing Group: II

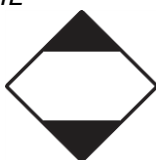
Marine Pollutant: Yes



Sizes 1 kg and under

8331-50ML, 8331-200ML

Limited Quantity



Note: Shipper must be appropriately trained and certified before involvement with the transport of dangerous goods.

Section 15: Regulatory Information

Canada

Domestic Substance List (DSL)/Non-Domestic Substance Lists (NDSL)

All hazardous ingredients are listed on the DSL/NDSL.

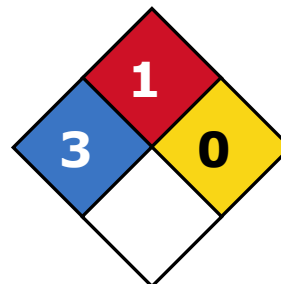
Hazardous Products Act (R.S.C., 1985, c. H-3)

The safety data sheet and label comply with the Hazardous Product Act and WHMIS 2015.

Section continued on the next page

8331-B**SILVER CONDUCTIVE EPOXY ADHESIVE****USA****Other Classifications****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)

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; reportable quantity = 1 000 lb), which is subject to the reporting requirements of section 313 Title III of the SARA of 1986 and 40 CFR part 372.

This product contains 4,4'-isopropylidenediphenol (CAS# 80-05-7), which is subject to the reporting requirements of section 313 of the SARA Title III.

TSCA (Toxic Substances Control Act of 1976, USA)

All substances are TSCA listed.

California Proposition 65 (Chemicals known to cause cancer or reproductive toxicity, USA).

This product contains 4,4'-isopropylidenediphenol (CAS# 80-05-7), which is listed as a reproductive hazard.

Section continued on the next page

8331-B**SILVER CONDUCTIVE EPOXY ADHESIVE****Europe****RoHS** (Restriction of Hazardous Substances Directive)

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

WEEE (Waste Electrical and Electronic Equipment Directive)

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

Section 16: Other Information

SDS Prepared by	Regulatory Department
Date of Revision	23 May 2018
Supersedes	14 September 2017
Reason for Changes:	Change to product name

Reference

- 1) ACGIH 2017 TLVs and BEIs: Based on the documentation of the threshold limit values for chemical substances and physical agents & biological exposure indices, American Conference of Governmental of Industrial Hygienist Cincinnati, OH (2017).
- 2) All toxicological data were checked against the RTECS (Registry of Toxic Effects of Chemical Substances®)

Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists (USA)
EC50	Half maximal effective concentration
GHS	Globally Harmonized System of Classification of Labeling of Chemicals
IARC	International Agency for Research on Cancer
LC50	Lethal Concentration 50%
LD50	Lethal Dose 50%
NTP	National Toxicology Program
OEL	Occupational Exposure Limit
PEL	Permissible Exposure Limit
SDS	Safety Data Sheet
STEL	Short-Term Exposure Limit
TCLo	Lowest published toxic concentration
TWA	Time Weighted Average
VOC	Volatile Organic Content

Section continued on the next page

8331-B**SILVER CONDUCTIVE EPOXY ADHESIVE**

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.

Email: support@mgchemicals.com

Mailing Addresses *Manufacturing & Support*
1210 Corporate Drive
Burlington, Ontario, Canada
L7L 5R6

Head Office
9347-193rd Street
Surrey, British Columbia, Canada
V4N 4E7

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.