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|  | MATERIAL SAFETY DATA SHEET <i>according to EC 1272/2008 [CLP]</i> | VERSION NO: | 1 |
| | FLEXIBLE CONDUCTOR | REVISION: | 2017-11-13 |

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

1.1 Product Identifier

Product name: Flexible Conductor
Synonyms: Flexible Conductive Ink, Flex Ink, Flexible Silver Ink, Flexible Silver Paste

1.2 Relevant identified uses of the substance or mixture and uses advised against

Intended use: Circuit board prototyping

1.3 Supplier's Details

Supplier Name: Voltera Inc.
Supplier Address 1: 100-113 Breithaupt St.
City: Kitchener
Province: Ontario
Postal Code: N2H5G9
Country: Canada
Business Phone: 1-888-381-3332

1.4 Emergency Phone Number

Emergency Phone: CANUTEC 1+ 613-996-6666

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
2.1.1 Classification according to Regulation (EC) No 1272/2008 [CLP]

GHS Class Phrases: Eye Irritation Category 2A
Hazardous to the aquatic environment, short-term, acute Category 1

2.2 Label Elements


Signal Words: Warning.
Hazard Statements: H319: Causes serious eye irritation.
H400: Very toxic to aquatic life.
Precautionary Statements: P260: Do not breathe dust, mist, spray, vapors, gas, fume.
P264: Wash hands thoroughly after handling.
P273: Avoid release to the environment.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P314 - Get medical advice/attention if you feel unwell.
P337+P313: If eye irritation persists: Get medical advice/attention.
P391: Collect spillage.
P501: Dispose of contents/container in accordance with Local, State, Federal and Provincial regulations.

2.3 Other Hazards

Other Potential Health Effects: No additional information available.

**MATERIAL SAFETY DATA SHEET***according to EC 1272/2008 [CLP]***VERSION NO:****1****FLEXIBLE CONDUCTOR****REVISION:****2017-11-13****SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS****3.1 Substance**

Not applicable.

3.2 Mixtures

| Component | CAS | % by Weight | GHS-US Classification |
|-----------------------------------|-----------|-------------|-----------------------|
| Diethylene glycol monobutyl ether | 112-34-5 | 15-35 | Eye Irrit. 2. H319 |
| Silver | 7440-22-4 | 65-90 | Not classified |

SECTION 4: FIRST AID MEASURES**4.1 Description of first aid measures**

- General:** Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible). If exposed or concerned: Get medical advice/attention.
- Eye Contact:** Immediately flush eyes thoroughly 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 and attention.
- Skin Contact:** Remove/take off immediately all contaminated clothing. Rinse and then wash skin thoroughly with water and soap. Wash contaminated clothing before reuse. If skin irritation or rash occurs: Get medical advice/attention.
- Inhalation:** Remove victim to fresh air and keep at rest in a position comfortable for breathing. If exposure symptoms persist: seek medical advice.
- Ingestion:** If swallowed, rinse mouth with water (only if the person is conscious). Do not induce vomiting. Never give anything by mouth to an unconscious person. Seek immediate medical advice.

4.2 Most important symptoms and effects, both acute and delayed

- Eye Contact:** Causes eye irritation.
- Skin Contact:** May cause slight irritation to the skin. Silver may result in darkening of skin and cornea of eye (gray-blue patches or darkening) where the metal has contact; prolonged and heavy exposure may also affect lung function and may be manifested as mild or chronic bronchitis.
- Inhalation:** Inhalation of airborne droplets or aerosols may cause irritation of the respiratory tract.
- Ingestion:** May cause irritation to the digestive tract.
- Chronic symptoms:** May cause damage to organs through prolonged or repeated exposure.

4.3 Indication of immediate medical attention and special treatment needed

- Note to Physicians:** Provide general supportive measures and treat symptomatically.

SECTION 5: FIRE-FIGHTING MEASURES**5.1 Extinguishing media**

- Suitable Extinguishing Media:** Foam, Dry powder, Carbon dioxide, Water spray.
- Unsuitable Extinguishing Media:** Do not use a heavy water stream.

5.2 Special Hazards arising from the substance or mixture

- Fire hazard:** Combustion generates smoke fumes, carbon monoxide and dioxide and various hydrocarbon compounds.
- Explosion Hazard:** Prolonged exposure to fire may cause containers to rupture/explode.
- Reactivity:** This product is non-reactive under normal conditions of use, storage, and transport.

5.3 Advice for firefighters

- Protective Equipment:** Wear Self-Contained Breathing Apparatus (SCBA), chemically protective clothing. Do not attempt to take action without suitable protective equipment.

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Firefighting instructions: In case of fire: Wear self-contained breathing apparatus. Wear proper protective equipment. Evacuate personnel to a safe area. Do not allow run-off from firefighting to enter drains or water courses. Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.

Other information On heating, there is a risk of bursting due to internal pressure build-up. Cool down the containers exposed to heat with a water spray.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

General measures: Stop leak if safe to do so. Ensure adequate air ventilation.

6.1.1 For non-emergency personnel:
Emergency procedures: Ventilate spillage area. Avoid contact with skin and eyes. Avoid breathing mist or vapor.

6.1.2 For emergency responders:
Emergency procedures: Evacuate unnecessary personnel. Ventilate area.
Protective equipment: Do not attempt to take action without suitable protective equipment. Avoid breathing dust, mist, or spray. Wear suitable protective clothing, gloves, and eye/face protection. For further information refer to section 8: Exposure-controls/personal protection.

6.2 Environmental precautions

Environmental precautions: Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. Collect in closed containers for disposal. Avoid release to the environment. Notify authorities if product enters sewers or public waters.

6.3 Methods and materials for containment and cleaning up

Methods for Containment: Stop leak, if possible without risk. Absorb with liquid-binding material (e.g. sand, diatomaceous earth, acid- or universal binding agents). Collect spillage. Put into a labeled container and provide safe disposal.

Methods for Cleanup: Take up liquid spill into absorbent material. Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect all waste in suitable and labeled containers and dispose according to local legislation. Wear suitable protective clothing. Notify authorities if product enters sewers or public waters.

Other information: Dispose of materials or solid residues at an authorized site.

6.4 Reference to other sections

Protective Equipment: For further information refer to section 8: Exposure-controls/personal protection. For disposal of residues refer to section 13: Disposal considerations.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Handling: Obtain special instructions before use. Ensure good ventilation of the work station. Do not handle until all safety precautions have been read and understood. Wear personal protective equipment. Avoid contact with skin and eyes. Avoid breathing mist or vapor.

Special Handling: Do not use in areas without adequate ventilation.

Hygiene Practices: Separate working clothes from town clothes. Launder separately. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reuse. Do not eat, drink, or smoke when using this product. Always wash hands after handling the product.

7.2 Conditions for safe storage, including any incompatibilities

Storage: Store in well-ventilated area. Keep cool. Long-term storage in closed containers.

Incompatible materials: Strong oxidizing agents. Light metals.

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SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Exposure Guidelines – Ingredient Based:

Diethylene glycol monobutyl ether (112-32-5):

ACDIH: ACDIH TWA (ppm): 10 ppm (inhalable fraction and vapour)

Silver (7440-22-4):

ACGIH: ACGIH TWA (mg/m3) : 0.1 mg/m3 (dust and fume)

OSHA: OSHA PEL-TWA (mg/m3) : 0.01 mg/m3

IDLH: US IDLH (mg/m3) : 10 mg/m3 (dust)

NIOSH: NIOSH REL (TWA) (mg/m3) : 0.01 mg/m3 (dust)

8.2 Exposure Controls

| | |
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| Engineering Controls: | Provide local exhaust or general room ventilation. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure good ventilation of the work station. |
| Personal protective equipment: | Avoid all unnecessary exposure. Glove. Protective goggles. Protective clothing. Personal protective equipment should be selected based on the conditions under which this product is handled or used. |
| Eye Protection: | Chemical goggles or safety glasses. |
| Hand Protection: | Wear impermeable protective gloves. It is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves. |
| Skin and body protection: | Wear suitable protective clothing. |
| Respiratory protection: | Wear appropriate mask. Avoid breathing dust/fume/gas/mist/vapors/spray. Wear respiratory protection. |
| Environmental exposure controls: | Avoid release to the environment. |
| Other information: | Do not eat, drink or smoke during use. |

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

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| Color | Grey |
| Physical state: | Viscous liquid |
| Odour: | Alcohol odour |
| Odour threshold: | Not determined |
| pH-value: | Not determined |
| Melting Temperature: | Not determined |
| Freezing Point: | < 0°C |
| Boiling Temperature: | > 100°C |
| Flash point: | Not determined |
| Flammability (solid, gas) | Non-flammable |
| Explosive Limits: | Not determined |
| Oxidizing Properties: | Not determined |
| Auto-Ignition temperature: | Not determined |
| Vapour Pressure: | Not determined |
| Relative Vapour Density @ 20°C: | > 1 |
| Relative Density: | 2.5-3.5 (@25°C) |
| Solubility: | Water. Not dispersible. |
| Log POW: | Not determined. |
| Relative Evaporation rate (butyl acetate = 1): | <= 1 |
| Decomposition temperature: | Not determined. |
| Viscosity: | Not determined. |
| Viscosity, kinematic: | Not determined. |
| Viscosity, dynamic: | Not determined. |

9.2 Other information

Note from Section 9: None.

**MATERIAL SAFETY DATA SHEET***according to EC 1272/2008 [CLP]***VERSION NO:****1****FLEXIBLE CONDUCTOR****REVISION:****2017-11-13****SECTION 10: STABILITY AND REACTIVITY****10.1 Reactivity**

Not applicable.

10.2 Chemical Stability

Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use. Hazardous polymerization does not occur.

10.4 Conditions to avoid

High temperatures. Open flame. Sparks. Incompatible materials.

10.5 Incompatible materials

Strong oxidizing agents. Light metals.

10.6 Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. During a fire, carbon monoxide and various hydrocarbon components may be produced.

SECTION 11: TOXICOLOGICAL INFORMATION**11.1 Information on toxicological effects****Silver (7440-22-4):**

LD50 Oral Rat: >2000 mg/kg.

Diethylene glycol monobutyl ether (112-34-5):

LD50 Oral Rat: 7291 mg/kg

LD50 Dermal Rabbit: 2764 mg/kg

Acute toxicity:Not classified
(Based on available data, the classification criteria are not met)**Route of Exposure:**

Ingestion, Oral; Skin and Eye contact.

Skin corrosion/irritation:Not classified
(Based on available data, the classification criteria are not met)**Serious eye damage/irritation:**

Causes serious eye irritation.

Respiratory or skin sensitization:Not classified
(Based on available data, the classification criteria are not met)**Germ cell mutagenicity:**Not classified
(Based on available data, the classification criteria are not met)**Carcinogenicity:**Not classified
(Based on available data, the classification criteria are not met)**Reproductive toxicity:**Not classified
(Based on available data, the classification criteria are not met)**Specific target organ toxicity (single exposure):**Not classified
(Based on available data, the classification criteria are not met)**Specific organ toxicity (repeated exposure):**Not classified
(Based on available data, the classification criteria are not met)**Aspiration hazard:**Not classified
(Based on available data, the classification criteria are not met)**Symptoms/injuries after inhalation:**

Inhalation of airborne droplets or aerosols may cause irritation to the respiratory tract.

Symptoms/injuries after skin contact:

May cause slight irritation to skin.

Symptoms/injuries after eye contact:

Causes serious eye irritation.

Symptoms/injuries after ingestion:

May cause irritation to the digestive tract.

SECTION 12: ECOLOGICAL INFORMATION**12.1 Toxicity****Ecology - general:** Very toxic to aquatic life.

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Silver (7440-22-4):

LC50 Fish 1: 0.00155 – 0.00293 mg/l (Exposure time: 96 h – Species: Pimephales promelas [static])
 EC50 Daphnia 1: 0.00024 mg/l (Exposure time: 48 h – Species: Daphnia magna [Static])
 LC50 fish 2: 0.0062 mg/l (Exposure time: 96 h – Species: Oncorhynchus mykiss [flow-through])

Diethylene glycol monobutyl ether (112-34-5):

LC50 Fish 1: 1300 mg/l (Exposure time: 96 h – Species: Lepomis macrochirus [static])
 EC50 Daphnia 1: > 100 mg/l (Exposure time: 48 h – Species: Daphnia magna)

12.2 Persistence and degradability

No data available.

12.3 Bioaccumulative potential

Flexible conductor:

No data available.

Diethylene glycol monobutyl ether (112-34-5):

BCF Fish 1: No bioconcentration expected.

12.4 Mobility in soil

No data available.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste treatment methods: Dispose of contents / container in accordance with licensed collector's sorting instructions.
Waste disposal recommendations: Dispose of in a safe manner in accordance with local/national regulations.
Ecology – waste materials: Avoid release to the environment.

SECTION 14: TRANSPORT INFORMATION

DOT: Not regulated for transport.

Transport by sea:

UM-No. (IMDG): 3082
 Proper Shipping Name (IMDG): Environmentally hazardous substance, liquid n.o.s
 Class (IMDG): 9 – Miscellaneous dangerous substances and articles
 Packing Group (IMDG): III – substances presenting low danger
 MFAG-No.: 171

TDG: Not regulated for transport.

Transport by air:

UN-No (IATA): 3082
 Proper Shipping Name (IATA): Environmentally hazardous substance, liquid n.o.s
 Class (IATA): 9 – Miscellaneous Dangerous Goods
 Packing Group (IATA): III – Minor danger

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health, and environmental regulations/legislation specific for the substance or mixture

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory.

Chemical(s) subject to the reporting requirements of Section 313 or Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372:

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| Component | CAS | % by Weight |
|-----------------------------------|-----------|-------------|
| Diethylene glycol monobutyl ether | 112-34-5 | 15-35 |
| Silver | 7440-22-4 | 65-90 |

Regulatory – Ingredient Based:

Silver (7440-22-4):
 RQ (reportable quantity, section 304 of EPA's List of Lists): 1000 lbs
 SARA Section 313 – Emission Reporting 1.0 %
Diethylene glycol monobutyl ether (112-34-5):
 Sara Section 313 – Emission Reporting 1.0 %

15.2 International Regulations

CANADA

Silver (7440-22-4):
 Listed on the Canadian DSL (Domestic Substances List)
 WHMIS Classification: Uncontrolled product according to WHMIS classification criteria.
Diethylene glycol monobutyl ether (112-34-5):
 Listed on the Canadian DSL (Domestic Substances List).
 WHMIS Classification: Class B Division 3 – Combustible liquid : Flash point of 37.8 – 93.3°C
 Class D Division 2 Subdivision B – Toxic material causing other toxic effects.

EU-Regulations

Silver (7440-22-4):
 Listed on the EEC Inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
 Classification according to Regulation (EC) No. 1272/2008 [CLP]: Aquatic Acute 1 H400
Diethylene glycol monobutyl ether (112-34-5):
 Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

National regulations:

Silver (7440-22-4):
 Listed on the AICS (Australian Inventory of Chemical Substances)
 Listed on the IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
 Listed on the Korean ECL (Existing Chemicals List)
 Listed on NZIoC (New Zealand Inventory of Chemicals)
 Listed on PICCS (Phillipines Inventory of Chemicals and Chemical Substances)
 Japanese Pollutant Release and Transfer REgister Law (PRTR Law)
 Listed on the Canadian IDL (Ingredient Disclosure List)
 Listed on INSQ (Mexican National Inventory of Chemical Substances)
 Listed on CICR (Turkish Inventory and Control of Chemicals)
Diethylene glycol monobutyl ether (112-34-5):
 Listed on the AICS (Australian Inventory of Chemical Substances)
 Listed on the IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
 Listed on the Korean ECL (Existing Chemicals List)
 Listed on NZIoC (New Zealand Inventory of Chemicals)
 Listed on PICCS (Phillipines Inventory of Chemicals and Chemical Substances)
 Japanese Pollutant Release and Transfer REgister Law (PRTR Law)
 Listed on the Canadian IDL (Ingredient Disclosure List)
 Listed on INSQ (Mexican National Inventory of Chemical Substances)
 Listed on CICR (Turkish Inventory and Control of Chemicals)

15.3 US State Regulations

California Proposition 65 – This product does not contain any substance(s) known to the state of California to cause cancer, developmental and/or reproductive harm.

SECTION 16: Additional Information

Revision Date: 2017-11-13 22:04:00

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Disclaimer:

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Additionally, Voltera Inc. assumes no responsibility for injury to the end user proximately caused by the material even if reasonable safety procedures are followed. The end user assumes the risk in their use of this material.

Full text of H-statements:

| | |
|--------------|---|
| Eye irrit. 2 | Serious eye damage/eye irritation, Category 2 |
| H319 | Causes serious eye irritation |
| H400 | Very toxic to aquatic life |